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November 1, 2006

Arizona Corporation Commission  
**DOCKETED**

NOV - 1 2006

Docket Control  
Arizona Corporation Commission  
1200 West Washington  
Phoenix, Arizona 85007

DOCKETED BY	
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RE: ARIZONA PUBLIC SERVICE COMPANY  
E-01345A-06-0009  
Emergency Interim Rate Increase

Dear Sir/Madam:

Decision NO. 68685 required APS in conjunction with Staff to hire an outside consultant to conduct a benchmarking study on their fuel costs and hedging practices. Attached please find the Benchmarking study on their fuel costs and hedging practices conducted by R.W. Beck.

If you or your staff have any questions, please feel free to call me.

Sincerely,

Brian Brumfield  
Supervisor  
Regulation

BB/vld

CC: Ernest Johnson  
Brian Bozzo  
Parties of Record

AZ CORP COMMISSION  
DOCUMENT CONTROL

2006 NOV - 1 1 P 4: 41

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**Arizona Public Service Company  
Fuel Hedging Program  
Benchmarking Assessment**

**November 1, 2006**



# Arizona Public Service Company Fuel Hedging Program Benchmarking Assessment

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This report has been prepared for the use of the client for the specific purposes identified in the report. The conclusions, observations and recommendations contained herein attributed to R. W. Beck, Inc. (R. W. Beck) constitute the opinions of R. W. Beck. To the extent that statements, information and opinions provided by the client or others have been used in the preparation of this report, R. W. Beck has relied upon the same to be accurate, and for which no assurances are intended and no representations or warranties are made. R. W. Beck makes no certification and gives no assurances except as explicitly set forth in this report.

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# Section 1

## EXECUTIVE SUMMARY

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This Executive Summary is intended to provide the reader with an overview of the nature of this project and the primary findings. Further detail is provided in the body of the report and the appendices.

### 1.1 Project Overview

Throughout the course of the hearings for the Arizona Public Service ("APS) Emergency Rate Case (ACC Docket E-01345A-0009), the matter of the issue of requiring APS to conduct a benchmarking study on the effectiveness of its natural gas purchasing practices was addressed by the parties. As a result of Decision 68685 from this case, APS was ordered to engage in a benchmarking study of their fuel costs and hedging practices. The ACC directed APS to work with ACC Staff to file within 180 days of the effective date of this decision (May 5, 2006) as a compliance item in this docket.

In keeping with the above, the purpose of this study is to conduct an independent benchmarking assessment of Arizona Public Service Company's fuel hedging program, with specific focus on natural gas. The review covers the overall design and process aspects of the hedging program, an assessment of the quality of the hedging program and associated transactions in light of common industry practices, and an assessment of the resultant net fuel costs. The central element of the project was a benchmarking study of other leading utilities, which is intended to provide a basis for comparing the process aspects and performance of APS' hedging program.

Primary sources of information which form the basis for assessing APS' program include 1) a survey of utilities developed and implemented for this study, 2) R. W. Beck's experience working with a wide range of other clients on energy risk management and hedging issues, and 3) supplemental information made available to R. W. Beck from an ongoing study of energy risk management practices by the Electric Power Research Institute.

### 1.2 Information Supporting Study

As further described in Section 4, a key part of this study was to conduct primary research through the design and implementation of a survey instrument focused on energy risk management and fuel hedging practices. These data points provide current indications of how the survey respondents approach fuel hedging and broader energy risk management issues compared to APS.

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## Section 1

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In addition, R. W. Beck has extensive experience assisting a broad range of utility clients with the development of energy risk management and hedging programs. By conducting interviews and extensive document reviews to develop a clear understanding of the design and implementation of APS' program, R. W. Beck is able to make comparisons of APS' program against those of the other clients with whom R. W. Beck has worked.

During 2006, the Electric Power Research Institute (EPRI) has been conducting a study of practices and techniques in portfolio and risk management. R. W. Beck has had the privilege of working with EPRI for several years, and was involved in the initial design of the EPRI study. R. W. Beck has reviewed EPRI's initial results and is able to rely on (and reference) them as supplemental support for this study.

### 1.3 Hedging Concepts

An important goal of this project is to provide foundational information regarding leading concepts in energy risk management and hedging.

The fundamental purpose of energy risk management and hedging is to reduce the uncertainty of meeting performance goals. The intended benefits of properly-applied hedging are:

- Reducing undesirable fluctuations in net costs and/or revenues so that customer prices and company cash flows become more stable
- Reducing the impact of stress conditions caused by extreme movements in energy market prices
- Creating greater financial performance stability, which is typically supported by customers, regulators, and lenders thereby helping to reduce the cost of capital
- Reducing the amount of cash and short-term credit needed to fund periodic shortfalls in cash flow caused by the impact of market price volatility

It is important to recognize that hedging is not intended to directly reduce costs through the hedging transactions themselves. Hedging can (on average) lead to slightly increased net fuel costs because the hedge transactions may include some level of risk premium. However, overall savings can accrue by creating greater certainty for customers, lenders and investors (thereby leading to lower relative cost of capital) and reducing the amount of cash and short-term credit needed to fund otherwise volatile cash flows that would occur in the absence of hedging.

To achieve the above benefits on a consistent basis, hedging activity must be done in a highly controlled manner through a well-designed and executed risk management program. For a risk management (or hedging) program to be complete and effective, it must be built around a framework that addresses the following elements: Organizational Objectives, Risk Tolerance, Risk Inventory, Portfolio Management, and Risk Control Infrastructure. These elements are described further in Section 3.

## 1.4 Project Tasks

As detailed further in Section 4, R. W. Beck completed a number of primary tasks in conducting this study. These are:

- Task 1: Review Project Plan and Collect Initial Information
- Task 2: Review Hedging Program Processes and Execution
- Task 3: Conduct Benchmarking Study of Comparable Utilities
- Task 4: Assess Hedging Program Design and Effectiveness
- Task 5: Prepare Written Report

## 1.5 Survey Process

A central element of this study was to conduct primary research on current energy risk management and fuel hedging practices. R. W. Beck is experienced in conducting benchmarking studies of electric utility operations and management. The R. W. Beck project team, which included persons with extensive experience in energy risk management and persons involved in prior benchmarking studies, independently developed the survey instrument with APS' input. It is important to note that the survey was intentionally designed to address not just natural gas hedging, but energy risk management practices in general. This was done in order to make the study more attractive for participation.

The project team and APS developed an initial list of approximately thirty-five companies that was provided to ACC Staff for their concurrence. The group of companies reflected a combination of West/Southwest utilities in general, plus utilities from other regions with which R. W. Beck has a relationship. The overall group included companies across the U.S. and Canada, and reflected various types of utilities (e.g. investor-owned, municipal, etc.) This was intentionally done to maximize the likelihood of a sufficient number of responses, and to provide for a more comprehensive study.

In general, the response rate was low in relation to the number of companies which initially either agreed or tentatively agreed to participate. **Energy risk management and hedging information is considered highly proprietary, and it is not surprising that many companies did not return a survey.** A total of twelve surveys were completed and returned. R. W. Beck made attempts to contact the companies who agreed to participate but did not return a survey. In some cases, multiple attempts were made. For the Arizona companies, Salt River Project tentatively agreed to participate, but later indicated that they felt the survey asked for too much proprietary data and that they were unlikely to return a survey. Tucson Electric agreed to complete and return a survey, but never did.

While the number of respondents is low compared to original participation targets, the survey results are very consistent with R. W. Beck's experience working with a wide range of clients on risk management issues. Further, while respondents include

## Section 1

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municipal, district, and consumer-owned (i.e. cooperative) utilities as opposed to only IOU's, R. W. Beck's experience is that the size and type of utility is not a strong indicator of the existence and quality of an energy risk management program. In other words, we have seen excellent programs at small utilities and weak programs at large utilities (and vice versa). **R. W. Beck considers the survey results to be sufficiently representative to draw the conclusions contained in this report.**

### 1.6 Summary of Findings

R. W. Beck's overall conclusion from the survey results is that APS has a high-quality energy risk management and hedging program consistent with or superior to its utility peer group. No significant areas exist where APS would be considered deficient in its hedging program as it relates to standard industry practices, or hedging programs of like utilities. In addition, R. W. Beck's review of the initial results of EPRI's portfolio and risk management practices study also indicates that APS' program is consistent with leading industry practices.

Based on R. W. Beck's experience in energy risk management, the programmatic aspects of APS program are of high quality and consistent with those of other leading programs. All aspects of a high quality risk management framework (please refer to Section 3) are in place and appear to be operating effectively. There are no material areas in which APS' program was found to be substandard. In some areas, APS has arguably a superior program compared to other utilities.

APS has an appropriate mindset regarding hedging which is consistent with best industry practices:

- The purpose of hedging is to reduce volatility in costs by effective forward hedging of commodity prices.
- Seventy eight percent (78%) of the survey respondents forward hedge natural gas more than two years forward, and one third (33%) hedge more than three years forward. APS forward hedges its natural gas and purchased power requirements three years in advance
- The purpose of hedging is not to create financial gains by timing the market. Eighty percent (80%) of utilities surveyed indicated reduced price volatility or protection against unexpected future cost increases as their most important goal in their hedge program.

It is also important to note that APS' hedging activities and energy risk management program elements are consistent with rating agency views which are placing greater importance on energy risk management.

APS' approach to risk analytics and limits is consistent with standard industry practices. APS has implemented hedging parameters and limits based on volumetric parameters, which is consistent with industry standards. The interplay (correlation) between natural gas prices and power prices is considered as part of the volumetric analysis, which is a positive attribute. In R. W. Beck's opinion, APS hedges an

## EXECUTIVE SUMMARY

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appropriate amount of natural gas given the goals of their hedging program, their financial condition, and their level of exposure to natural gas prices.

During recent years of generally rising and historically high natural gas prices, APS' hedging activities appear to have provided significant protection to customers from even higher fuel-related net costs that would have occurred in the absence of hedging. This conclusion is supported by reviews of data and reports provided to R. W. Beck by APS, fuel cost information obtained during the survey process, and analysis of fuel cost data from the Energy Velocity® database. Energy Velocity® is one of the leading industry data services providing comprehensive utility data and information which is collected and validated from numerous publicly-available sources.

## Section 2 INTRODUCTION TO STUDY

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### 2.1 Purpose of Study

The nation's second fastest growing utility, APS is an investor-owned utility serving more than one million customers in Arizona. With a large nuclear generating capacity, APS has traditionally been able to offer their customers low cost power, with rates decreasing several times between the years 1992 and 2004. Rapid growth and a corresponding need for additional resources in recent years have resulted in natural gas power plants comprising a greater percentage of APS' generation mix. This increased reliance on natural gas, coupled with upward price spikes over the past few years, have led to higher generation costs and financial burdens for APS, culminating in a downgrade of the corporate credit rating. In response to these events, APS filed for, and was granted, an emergency rate increase that took effect in May 2006. As part of the rate increase approval process, the ACC's Order required an independent assessment of APS' hedging program.

In keeping with the above, the purpose of this study is to conduct an independent benchmarking assessment of Arizona Public Service Company's fuel hedging program, with specific focus on natural gas. The review covers the overall design and process aspects of the hedging program, its execution in coordination with the energy risk management program and the overarching corporate business strategy, an assessment of the quality of the hedging program and transactions in light of common industry practices, and an assessment of the resultant net fuel costs. The benchmarking aspect of the project consists of comparing qualitative and quantitative aspects of APS' program against programs of other utilities through the results of a customized survey created for this project, subject matter expertise of R. W. Beck gained from a large number of prior risk management and fuel hedging-related consulting assignments, and incremental research. In essence, the questions being investigated are 1) What is the overall quality of the design and execution of APS' energy risk management and fuel hedging program, 2) How does APS' program compare to other utilities, and 3) What has been the impact of hedging on APS' net natural gas costs? These questions have been investigated in the context of assessing the prudence of APS' current hedging strategy, and the robustness of the design, overall philosophy, and execution of the program. The main focus of this assessment is a benchmarking study of comparable utilities, which is intended to provide a basis for comparing the process aspects and performance of APS' hedging program.

## 2.2 Primary Sources of Information

Three primary sources of information were used as the basis for this study. These are described below.

### 2.2.1 Benchmarking Survey Data

As further described in Section 4, a key part of this study was to conduct primary research through the design and implementation of a survey instrument focused on energy risk management and fuel hedging practices. These data points provide current indications of how the survey respondents approach fuel hedging and broader energy risk management issues compared to APS.

### 2.2.2 R. W. Beck Consulting Experience

R. W. Beck has extensive experience assisting a broad range of utility clients with the development of energy risk management and hedging programs. By conducting interviews and extensive document reviews to develop a clear understanding of the design and implementation of APS' program, R. W. Beck is able to make comparisons of APS' program against those of the other clients with whom R. W. Beck has worked.

### 2.2.3 Study by Electric Power Research Institute

During 2006, the Electric Power Research Institute (EPRI) has been conducting a study of practices and techniques in portfolio and risk management. R. W. Beck has had the privilege of working with EPRI for several years, and was involved in the initial design of the EPRI study. Due to the similar nature of the EPRI study and this study performed for APS, R. W. Beck made arrangements with EPRI to gain access to EPRI's study results. In exchange, R. W. Beck will be assisting EPRI with final review and editing of their report prior to publishing in late 2006 or early 2007. EPRI's study addresses many of the key aspects of risk management program design which are relevant and provide supplementation information against with APS' program can be compared. R. W. Beck has reviewed EPRI's initial results<sup>1</sup> and is able to rely on (and reference) this information as part of this study.

The EPRI study addresses both qualitative and quantitative risk management program issues. Rather than a survey approach, EPRI held in-depth discussions with a small number of companies to explore program structure and analytic issues. Similar to the survey instrument used for this project, EPRI's pre-meeting questionnaire covered such topics as type of utility, staffing levels, aggregate years of risk management experience, types and magnitudes of energy risk exposures, risk limits, and a variety of issues connected with analytics and systems.

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<sup>1</sup> Survey of Practices and Techniques in Portfolio and Risk Management, Electric Power Research Institute, presented by Remi Audouin, Knoxville TN, September 2006.

## Section 3

# ENERGY RISK MANAGEMENT & HEDGING CONCEPTS

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### 3.1 Hedging Concepts

An important goal of this project is to provide foundational information regarding leading concepts in energy risk management and hedging. This purpose of this is to provide a common understanding of these principles for those reading this report, and to provide greater context for R. W. Beck's conclusions.

The fundamental purpose of energy risk management and hedging is to reduce the uncertainty of meeting performance goals. An influential study conducted by the Energy Information Administration<sup>2</sup> (and one which provides an excellent introduction to risk management concepts) investigates the benefits of hedging activity through the use of derivatives. These concepts apply to hedging in general, regardless of whether the instruments used are derivatives or conventional physical energy contracting strategies. In essence, these benefits can be summarized as:

- Reducing undesirable fluctuations in net costs and/or revenues so that customer prices and company cash flows become more stable
- Reducing the impact of stress conditions caused by extreme movements in energy market prices
- Creating greater financial performance stability, which is typically supported by customers, regulators, and lenders, thereby helping to reduce the cost of capital
- Reducing the amount of cash and short-term credit needed to fund periodic shortfalls in cash flow caused by market price volatility

It is very important to recognize that hedging is not intended to directly reduce costs through the hedging transactions themselves. In reality, hedging can (on average) create a slight increase in net fuel costs because the hedge transactions may include some level of risk premium. However, as stated above, effective hedging creates greater performance certainty which, in addition to the benefits of greater price stability, can indirectly create lower costs. This occurs by creating greater certainty for customers, lenders and investors (thereby leading to lower relative cost of capital) and reduced cash and short-term credit needed to fund otherwise volatile cash flows that would occur in the absence of hedging.

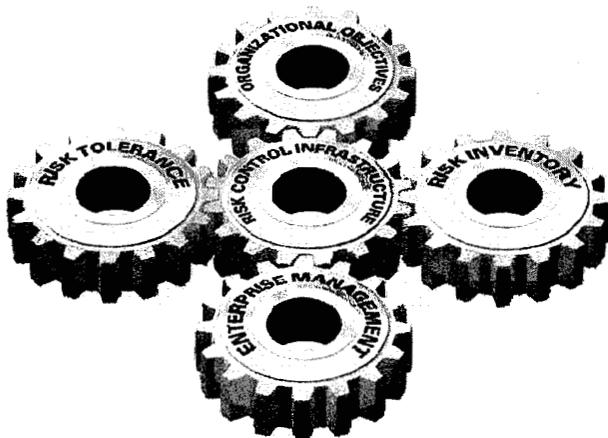
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<sup>2</sup> Derivatives and Risk Management in the Petroleum, Natural Gas, and Electricity Industries, U.S. Energy Information Administration, October 2002

## 3.2 Program Design & Execution

To achieve the above benefits, hedging activity must be done in a highly controlled manner through a well-designed and executed risk management program. Through the experience of its staff, as well as ongoing training and education on both financial standards and best practices among utilities, R. W. Beck has developed a clear view of how the components and execution of “best practices” can be most successfully integrated for risk management in utilities and energy companies.

R. W. Beck’s working definition of risk is “any event or condition that could cause adverse financial performance compared to expectations.” This definition is



intentionally broad so as not to exclude potential risk sources that may be deserving of management attention. The key to successful risk management is to be able to understand and manage the sources of risk that most impact the achievement of core goals. R. W. Beck’s view is that, for a risk management (or hedging) program to be complete, it must be built around a framework that addresses the following five elements:

Organizational Objectives, Risk Tolerance, Risk Inventory, Portfolio Management, and Risk Control Infrastructure. APS has generally incorporated all of these elements into their program in a high-quality fashion.

### 3.2.1 Organizational Objectives

It is critical to articulate goals, strategies, and objectives that provide guideposts that define the appropriate hedging, trading, and portfolio management activities to be undertaken by the organization, as well as those activities that are inappropriate.

### 3.2.2 Risk Tolerance

Through risk tolerance definition, the organization should specify the amount of uncertainty that the organization is willing to accept in its costs and financial performance, with particular emphasis on the organization’s tolerance for falling short of financial expectations.

### 3.2.3 Risk Inventory

Through the risk management program, the organization should characterize the types and magnitudes of risks to which the organization is exposed and which contribute to the potential for adverse financial performance.

### **3.2.4 Portfolio Management**

Management and staff must engage in strategic (longer term) and tactical (shorter term) transaction strategies in order to help maintain risk exposures within the organization's risk tolerance and reduce the probability of falling short of performance expectations. Hedging activities should be driven by a high-quality risk control infrastructure to maximize effectiveness and efficiency, and to minimize the chance of inappropriate transactions.

### **3.2.5 Risk Control Infrastructure**

Best practices dictate that a collection of internal controls, systems, and operating practices are necessary for the organization to maximize risk mitigation effectiveness and achieve the overall objectives of its risk management program. The Risk Control Infrastructure includes:

- Policies and Procedures
- Organization Structure and Responsibilities with clear separation of duties
- Limits for Risk Exposures and Transactions
- Position Tracking
- Risk Measurement
- Performance Measurement
- Management Reporting

By assembling these elements into an integrated system, changes in market environment or other factors can be properly translated into modified corporate policies, transaction strategies, etc. For example, if the risk tolerance of the company (or its customers) changes, this change can be addressed through the processes and controls in the risk control infrastructure, ultimately leading to appropriate adjustments in portfolio management (i.e. hedging) activities.

## **Section 4**

# **STUDY PROCESS**

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This section provides an overview of the primary tasks which comprise the agreed-upon project scope, along with a summary of R. W. Beck's efforts in conducting the survey and the level of survey responses received.

## **4.1 Project Tasks**

### **4.1.1 Task 1: Review Project Plan and Collect Initial Information**

The purpose of this Task was to review the project plan and agree on a common understanding of the project scope, deliverables, schedule, and reporting protocols. This Task also served to facilitate the initial collection of information, through a request of various documents, and through on-site interviews with key personnel associated with various aspects of APS' hedging and risk management program. Specific activities completed under this task are listed below.

- Kick-off call
- Develop revised project schedule
- Submit initial data request
- Schedule and conduct on-site interviews

### **4.1.2 Task 2: Review Hedging Program Processes and Execution**

The purpose of this Task was to understand the current hedging program, in terms of the various processes that comprise the program, how the program aligns with the overarching organizational goals/objectives and risk tolerance, and how the program is being executed. This Task probed more deeply into information obtained from Task 1, with a review of specific documents and follow-up interviews. Activities completed under this task are listed below.

- Conduct follow-up interviews
- Collect and review information
- Review current strategic and business plans
- Clarify business objectives and risk tolerance

## Section 4

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- Review hedging program design and philosophy
- Review specific process aspects of hedging program
- Review hedging program execution, including sample transactions

### **4.1.3 Task 3: Conduct Benchmarking Study of Comparable Utilities**

The purpose of this Task was to design and conduct a benchmarking study of the hedging programs for comparable utilities. This benchmarking study, which is the focal point of the project, consisted of primary research conducted by R. W. Beck, and investigated such measures as net natural gas costs, types of transactions, and process aspects of utility hedging programs. It was anticipated that the study would include up to fifteen peer utilities (twelve surveys were actually completed and returned to R. W. Beck). The intent of this analysis was to compare APS' hedging program against other utilities. Specific activities completed under this task are listed below.

- Develop benchmarking and research objectives
- Define fuel cost and hedging measures and data requirements
- Identify potential participants
- Prepare data collection mechanisms
- Contact and finalize participants
- Participant response time
- Analysis and refinement of results

### **4.1.4 Task 4: Assess Hedging Program Design and Effectiveness**

Utilizing information gleaned from Tasks 1 through 3, the purpose of this Task was to assess the quality of APS' hedging program, both in terms of process aspects and financial performance (fuel costs). R. W. Beck assessed the quality with which APS' program is being executed, identified key differences in program design and execution compared to other utilities' programs, and identified potential improvement opportunities. Specific activities completed under this task are listed below.

- Conduct follow-up interviews
- Collect and review information
- Assess APS hedging program design and process aspects
- Assess APS hedging program execution
- Compare program to benchmarking study findings
- Assess overall program quality and identify key differences

### **4.1.5 Task 5: Prepare Written Report**

The purpose of this Task was to communicate key findings from the assessment of APS' hedging program. These findings, which address both the overall focus and quality of the program, are being communicated in both written and verbal form. R. W. Beck produced a draft written letter report, to be reviewed by APS and the Commission Staff for content and compliance with the Order.

## **4.2 Survey Process**

As stated previously, a central element of this study was to conduct primary research on current energy risk management and fuel hedging practices. Because of the importance of this portion of the project, provided below is additional information regarding the specific activities conducted, and the level of success (in this case, the lack thereof) in receiving survey responses.

### **4.2.1 Survey Design**

R. W. Beck is experienced in conducting benchmarking studies of electric utility operations and management. The R. W. Beck project team, which included persons with extensive experience in energy risk management and persons involved in prior benchmarking studies, worked with APS to design the survey instrument. R. W. Beck developed an initial draft, which APS subsequently reviewed. Some of APS' comments were incorporated. Others were not, reflecting R. W. Beck's position as a fully independent consultant. After several rounds of review and comments, the survey instrument was finalized.

It is important to note that the survey was intentionally designed to address not just natural gas hedging, but energy risk management practices in general. This was done in order to make the study more attractive for participation. For example, some companies do not hedge natural gas (because they do not utilize natural gas), but have broader energy risk management issues connected with other fuels and/or hydroelectric generation. R. W. Beck felt it was important to include such companies to strengthen the number of possible respondents, and to gain greater information on general industry practices in risk management which are relevant regardless of fuel sources. Issues such as governance, segregation of duties, instrument types, etc. are examples of this.

### **4.2.2 Companies Contacted**

The project team and APS developed an initial list of approximately thirty-five companies that was provided to ACC Staff for their concurrence. The group of companies reflected a combination of West/Southwest utilities in general, plus utilities from other regions with which R. W. Beck has a relationship (thereby creating initial optimism that a large number of responses would be achieved). The overall group included companies across the U.S. and in Canada, and also included various types of utilities (e.g. investor-owned, municipal, etc.) This was intentionally done to

## Section 4

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maximize the likelihood of a sufficient number of responses and to provide for a more comprehensive study.

### 4.2.3 Responses and Follow-Up Activities

Appendix B provides a list of the companies contacted, and whether or not a survey was returned. In general, the response rate was low in relation to the number of companies which initially either agreed or tentatively agreed to participate. **Energy risk management and hedging information is considered highly proprietary, and it is not surprising that many companies did not return a survey.** Twelve surveys were completed and returned, one of which only applied to the gas LDC portion of the utility and which was subsequently excluded. All of these were either fully or mostly complete. **Some companies elected to not respond to certain questions which they either thought were particularly sensitive or where they did not have immediate access to the information requested.** R. W. Beck made attempts to contact the companies that had agreed to participate but that did not return a survey. In some cases, multiple attempts were made. For the Arizona companies, Salt River Project tentatively agreed to participate, but later indicated that they felt the survey asked for too much proprietary data and that they were unlikely to return a survey. Tucson Electric agreed to complete and return a survey, but never did.

While the number of respondents is low compared to original participation targets, the survey results are very consistent with R. W. Beck's experience working with a wide range of clients on risk management issues. Further, while respondents include municipal, district, and consumer-owned (i.e. cooperative) utilities as opposed to only IOU's, R. W. Beck's experience is that the size and type of utility is not a strong indicator of the existence and quality of an energy risk management program. In other words, we have seen excellent programs at small utilities and weak programs at large utilities (and vice versa). **R. W. Beck considers the survey results to be sufficiently representative to draw the conclusions contained in this report.**

## Section 5

# FINDINGS & CONCLUSIONS

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### 5.1 Observations from Survey

The observations and findings below are based on comparisons of the survey responses to R. W. Beck's understanding of APS' risk management and hedging program gained through interviews, document reviews, and APS' survey responses.

R. W. Beck's overall conclusion from the survey results is that APS has a high-quality energy risk management and hedging program. No significant areas exist where APS would be considered an "outlier." While a few areas exist where APS could be viewed as unique in their approach (Front Office compensation, for example), R. W. Beck is aware of other companies which handle such areas similarly.

R. W. Beck's review of the initial results of EPRI's portfolio and risk management practices study also indicates that APS' program is consistent with leading industry practices. All aspects of APS' program are within the norms implied by EPRI's results.

Provided below are highlights from the survey data which R. W. Beck considers to be particularly noteworthy.

- Most utilities (eighty five percent (85%) of the survey respondents) either have a formal energy risk management program or most elements thereof. The survey responses did not indicate any clear trend based on region, type of company, or size.
- Nearly three of four utilities surveyed (73%) had S&P credit ratings of AA or A, as opposed to APS which has a credit rating of BBB-. It appears companies with weaker ratings (such as APS) tend to hedge because they have relatively more at stake if unusual fuel cost-related events occur (in other words, they have less financial capacity to absorb cost shocks). Companies with strong ratings tend to hedge to maintain their strong position and because they can afford it.
- A significant portion (forty five percent (45%) of companies surveyed) indicated their ability to hedge is impacted by the credit rating of potential counterparties. APS is consistent with this.
- Diversity of fuel sources does not seem to lead to a difference in whether or not a utility has an energy risk management program, or the amount of fuel that is hedged. Ninety one percent (91%) of respondents have an energy risk management program despite several utilities indicating a vast majority of fuel sourced from either hydro or fixed price coal.

## Section 5

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- There does not seem to be a correlation between a company's preference to hedge fuel costs and their fuel cost recovery mechanism. Companies with limited ability to pass-on fuel costs to customers hedge to protect net income and/or earnings. Companies with the ability to pass-on fuel costs generally hedge to help protect customers from fuel cost volatility. APS falls in the latter category.
- Most utilities hedge their fuel costs by locking in fixed prices for some portion of their needs. **Over one third (33%) of utilities surveyed hedge more than three years forward. APS, which forward hedges up to thirty months forward, was more of the norm.** Some companies hedge less and some companies hedge more.
- **Nearly one-half (45%) of utilities researched hedged over eighty percent (80%) of their expected natural gas usage one year in advance. In addition, two of three (67%) hedged at least sixty one percent (61%) of their forward one year gas requirements. APS is typical amongst its peers as it hedges eighty five percent (85%) of its natural gas needs one year in advance.**
- Only twenty seven percent (27%) of the respondent utilities indicated that their Commission and/or external stakeholders participated in the design of its hedging program. This trend appears to be a standard observation in many jurisdictions.
- Only one utility responding had more experience with energy risk management and fuel hedging functions than APS. APS' program has been in place longer than most.
- APS is the only respondent having Front Office compensation partly tied to transaction-related performance. Depending on the design of the compensation program, this can benefit APS customers by creating incentives for transactions which can lead to net cost savings.
- The risk management committee of a slight majority of the respondents deals with enterprise-wide risk issues in addition to energy commodity risks. APS' committee primarily focuses on energy commodity risks.
- APS' hedging program appears more disciplined than most. Hedging quantity deadlines are enforced and cannot be modified. The Middle Office independently monitors the placement of hedges to ensure that they are in accordance with APS' hedging plan. This is a positive attribute.

### 5.2 Additional Findings

The findings below are based on R. W. Beck's experience in energy risk management, coupled with the information collected during the interviews and document reviews. Please refer to Section 3 for an overview of some of the key principles which R. W. Beck uses as the basis for assessing the quality of energy risk management and hedging programs.

### **5.2.1 Qualitative Program Elements**

Qualitative program elements include the general set of governance, communication, policy, and procedural elements of the program.

- APS has an appropriate mindset regarding hedging which is consistent with best industry practices:
  - The primary purpose of hedging is to reduce volatility in costs.
  - A secondary purpose is to help reduce cost of capital by creating greater customer, regulatory, and investor/lender confidence.
  - The purpose of hedging is not to create financial gains by timing the market.
- The programmatic aspects of APS program are of high quality and consistent with those of other leading programs. All aspects of a high quality risk management framework (please refer to Section 3) are in place and appear to be operating effectively. There are no material areas in which APS' program was found to be substandard. In some areas, APS has arguably a superior program compared to other utilities.
- APS' hedging activities and energy risk management program elements are consistent with rating agency views which are placing greater importance on energy risk management.

### **5.2.2 Quantitative Program Elements**

Quantitative program elements primarily consist of the limits, risk metrics, and the forms of analytics (i.e. models and information systems) employed in the risk management and hedging program.

- APS' approach to risk analytics and risk limits is consistent with standard industry practices.
- APS hedges an appropriate amount of natural gas given the goals of their hedging program, their financial condition, and their level of exposure to natural gas prices.
- APS has implemented hedging parameters and limits based on volumetric parameters, which is consistent with industry standards. The interplay (correlation) between natural gas prices and power prices is considered as part of the volumetric analysis, which is a positive attribute.

### **5.2.3 Impact of Fuel Hedging on Net Fuel Costs**

As discussed in Section 3, fuel hedging activities are intended, first and foremost, to reduce volatility in fuel costs. On average, hedging can tend to create a slight increase in average fuel costs over the long-term. However, most companies generally consider it desirable (and prudent) to incur this cost in order to reduce volatility and the possibility of drastic cost increases which can occur in extreme market conditions. While hedging activity is not, in general, intended to reduce fuel

## Section 5

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costs on average, cost savings can occur during periods of rising prices if the hedging activity occurred prior to or during the beginning of the period of price escalation. Over the last few years the industry has experienced a significant increase in natural gas prices, rising from the \$4-\$6 range per MMBTU to in excess of \$12 for forward gas contracts. While prices have retreated in recent months, the last few years have clearly been characterized by much higher natural gas prices than historical averages.

**During this period, APS' hedging activities appear to have provided significant protection to customers from even higher fuel-related net costs that would have occurred in the absence of hedging.** This conclusion is supported by reviews of data and reports provided to R. W. Beck by APS, fuel cost information obtained during the survey process, and analysis of fuel cost data from the Energy Velocity® database.

## Section 6

# PRINCIPAL CONSIDERATIONS & ASSUMPTIONS

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The performance of this review was based on a variety of considerations and assumptions, which are listed below:

- The review is primarily qualitative in nature and does not include rigorous quantification of risk levels or hedging effectiveness. Any numeric estimates contained in this document not related directly to the study itself are general in nature based on professional judgment and preliminary analysis, and would require further analysis to reach firm conclusions.
- The review included onsite interviews of APS' personnel and document reviews. All meetings at APS' facilities have been for the purpose of meeting with APS' personnel. No direct review of the condition of facilities or systems has been conducted.
- All conclusions and recommendations are based on information provided to R. W. Beck. R. W. Beck has not performed comprehensive "due diligence" confirmation of the quality and accuracy of the information provided.
- The adoption of any conclusions contained in this report, or any actions taken in connection with these conclusions may not, by themselves, fully protect APS against the impact of any or all of the risk sources to which the organization is exposed.
- The outcome of any risk mitigation strategies implemented by APS is highly dependent upon the quality of strategy implementation and the actual business conditions that occur. Extreme conditions are always possible that could result in impacts to APS beyond the potential impacts that may be estimated by APS or other parties, including the assessments of this report.

## Appendix A LIST OF PERSONS INTERVIEWED

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Director of Enterprise Risk  
Associate General Counsel  
Portfolio Manager- Regulated  
Electricity Trader  
Risk Manager  
Vice President/Treasurer  
Vice President, APS Marketing and Trading  
Back Office Manager  
Senior Gas Trader  
Portfolio Manager - Unregulated  
Director of Trading Floor Operations  
Vice President of Planning  
Credit Risk Manager  
Director of Risk Management, APS Marketing and Trading  
Commodity Consultant

**Appendix B**  
**COMPANIES CONTACTED FOR SURVEY**

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Company	State	Contacted?	Agreed?	Sent?	Returned?	Comments
Arizona Public Service	AZ	y	y	y	y	Contacted. Survey completed and returned.
Salt River Project	AZ	y	tent	y	n	Contacted. Tentatively agreed to participate. Survey sent. Survey not returned. Followed-up but no response.
PNM Resources	NM	y	y	y	n	Contacted. Agreed to participate. Survey sent. Survey not returned. Followed-up but no response.
TXU	TX	n		y	n	Unsuccessful contacting.
Southern California Edison	CA	y		y	n	Contacted. Survey sent. Survey not returned. Followed-up but no response.
San Diego Gas & Electric	CA	y		y	n	Contacted. Survey sent. Survey not returned. Followed-up but no response.
Tucson Electric	AZ	y	y	y	n	Contacted. Agreed to participate. Survey sent. Survey not returned. Followed-up but no response.
Lower Colorado River Authority	TX	y	tent	y	n	Contacted. Tentatively agreed to participate. Survey sent. Survey not returned. Followed-up but no response.
Austin Energy	TX	y	y	y	y	Contacted. Survey completed and returned.
City Public Service (San Antonio)	TX	y	y	y	n	Contacted. Agreed to participate. Survey sent. Survey not returned. Followed-up but no response.
Colorado Springs Utilities	CO	y	y	y	y	Contacted. Survey completed and returned.
Tri-State Generation & Transmission	CO	y	y	y	y	Contacted. Survey completed and returned.
Xcel	CO, TX, MN	y	n	n	n	Contacted. Declined to participate.
Los Angeles Dept of Water & Power	CA	y	tent	y	n	Contacted. Tentatively agreed to participate. Survey sent. Survey not returned. Followed-up but no response.
Oklahoma Gas & Electric	OK	y		y	n	Contacted. Survey sent. Survey not returned. Followed-up but no response.
Ameren	MO, IL	y	tent	y	n	Contacted. Tentatively agreed to participate. Survey sent. Survey not returned. Followed-up but no response.
Entergy	TX, AK, LA, MS	y	y	y	y	Contacted. Survey completed and returned.

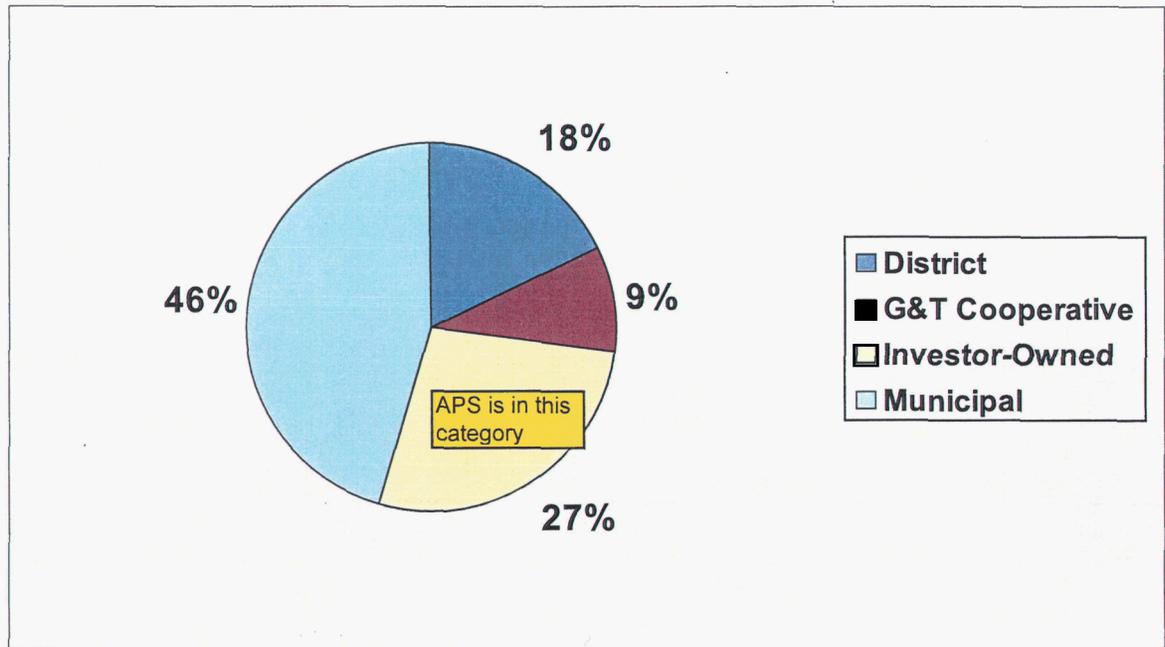
Company	State	Contacted?	Agreed?	Sent?	Returned?	Comments
Kansas City Power & Light	MO, KS	y	y	y	n	Contacted. Agreed to participate. Survey sent. Survey not returned. Followed-up but no response.
First Energy	OH, NJ, PA	y	y	y	n	Contacted. Agreed to participate. Survey sent. Survey not returned. Followed-up but no response.
PSEG	NJ	y		y	n	Contacted. Survey sent. Survey not returned. Followed-up but no response.
Florida Power & Light	FL	y	y	y	n	Contacted. Agreed to participate. Survey sent. Survey not returned. Followed-up but no response.
Progress Energy	NC, FL	n		n	n	Unsuccessful contacting.
SaskPower	Canada	y	y	y	y	Contacted. Survey completed and returned.
Louisville Gas & Electric	KY	y		y	n	Contacted. Survey sent. Survey not returned. Followed-up but no response.
Sacramento Municipal Utility District	CA	y	y	y	y	Contacted. Survey completed and returned.
Enmax	CA	y	y	y	y	Contacted. Survey sent. Survey not returned. Followed-up but no response.
El Paso Electric	TX	y		y	n	Unsuccessful contacting.
Idaho Power	ID	y		n	n	Contacted. Agreed to participate. Survey sent. Survey not returned. Followed-up but no response.
Puget Sound Energy	WA	y	y	y	n	Unsuccessful contacting.
Pacificorp	WA, OR, CA, UT, WY, ID	n		n	n	Unsuccessful contacting.
Portland General Electric	OR	y	tent	y	n	Contacted. Tentatively agreed to participate. Survey sent. Survey not returned. Followed-up but no response.
Seattle City Light	WA	y	n	n	n	Contacted. Declined to participate.
Pacific Gas & Electric	CA	y		y	n	Contacted. Survey sent. Survey not returned. Followed-up but no response.
Nevada Power	NV	y	n	n	n	Contacted. Declined to participate.
Siera Pacific	NV	y	n	n	n	Contacted. Declined to participate.
Manitoba Hydro	Canada	y	y	y	n	Contacted. Survey completed and returned.

Company	State	Contacted?	Agreed?	Sent?	Returned?	Comments
EPCOR	Canada	y	y	y	n	Contacted. Agreed to participate. Survey sent. Survey not returned. Followed-up but no response.
Omaha Public Power District	NE	y	y	y	y	Contacted. Survey completed and returned.
Chelan Public Utility District	WA	y	y	y	y	Contacted. Survey completed and returned.
ATCO Power	Canada	y	y	y	y	Contacted. Survey completed and returned.
City of Pasadena	CA	y	y	y	y	Contacted. Survey completed and returned.
Missouri River Energy Services	SD	y		y	n	Contacted. Survey sent. Survey not returned. Followed-up but no response.

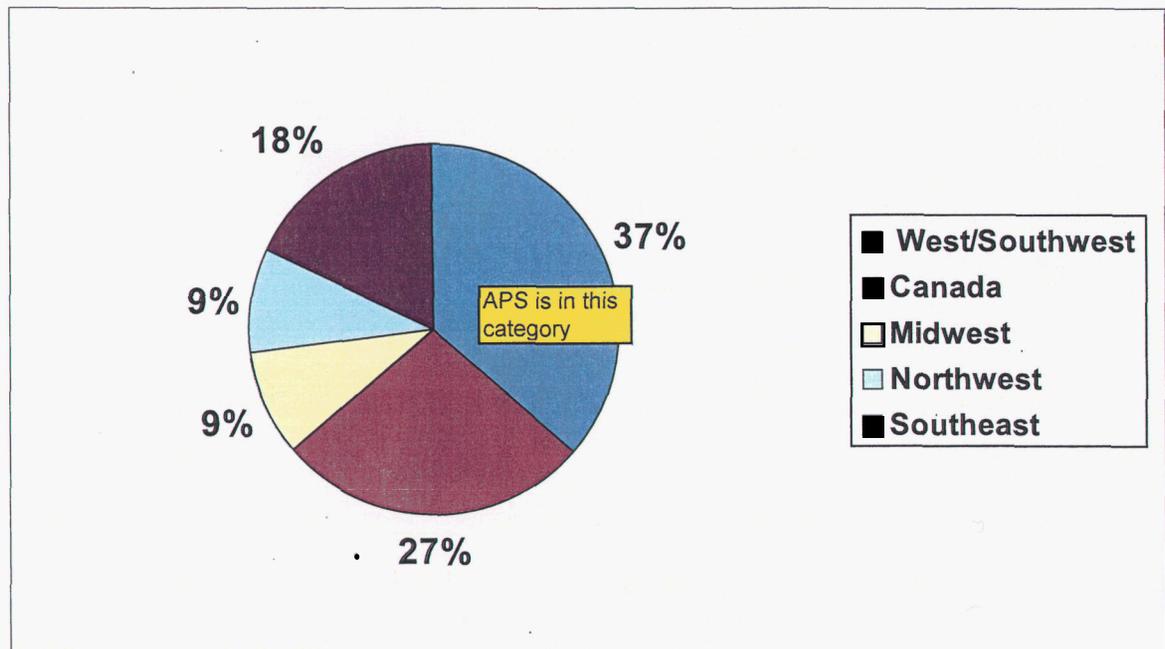
**Appendix C**  
**SURVEY RESULTS**

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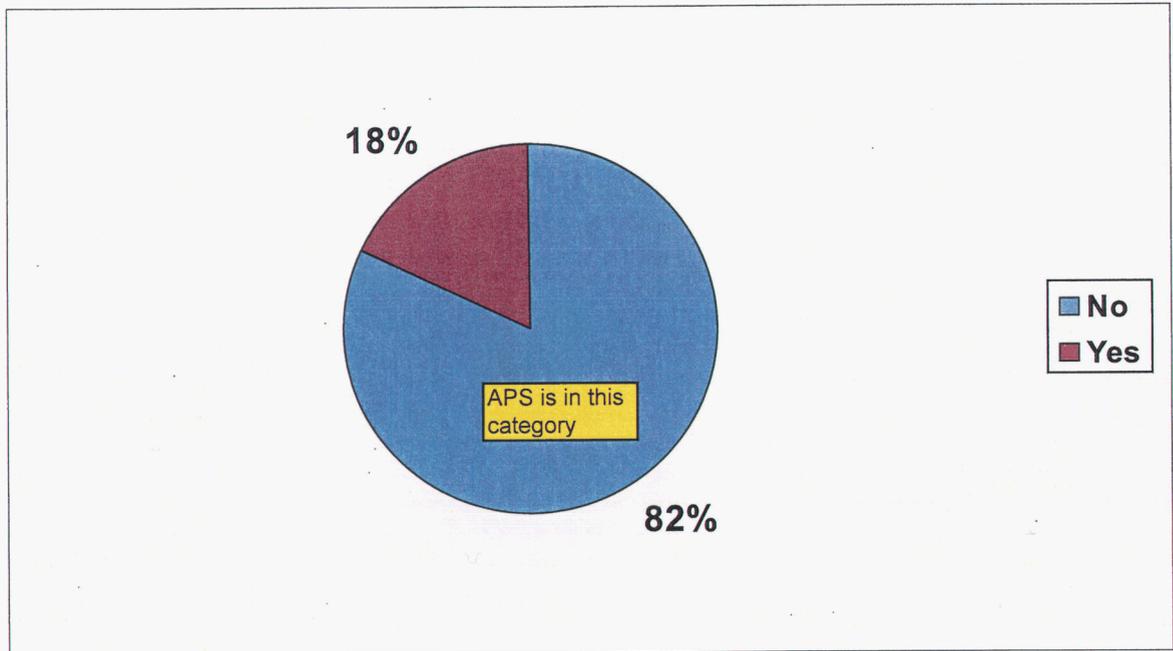
What type of utility is your company?



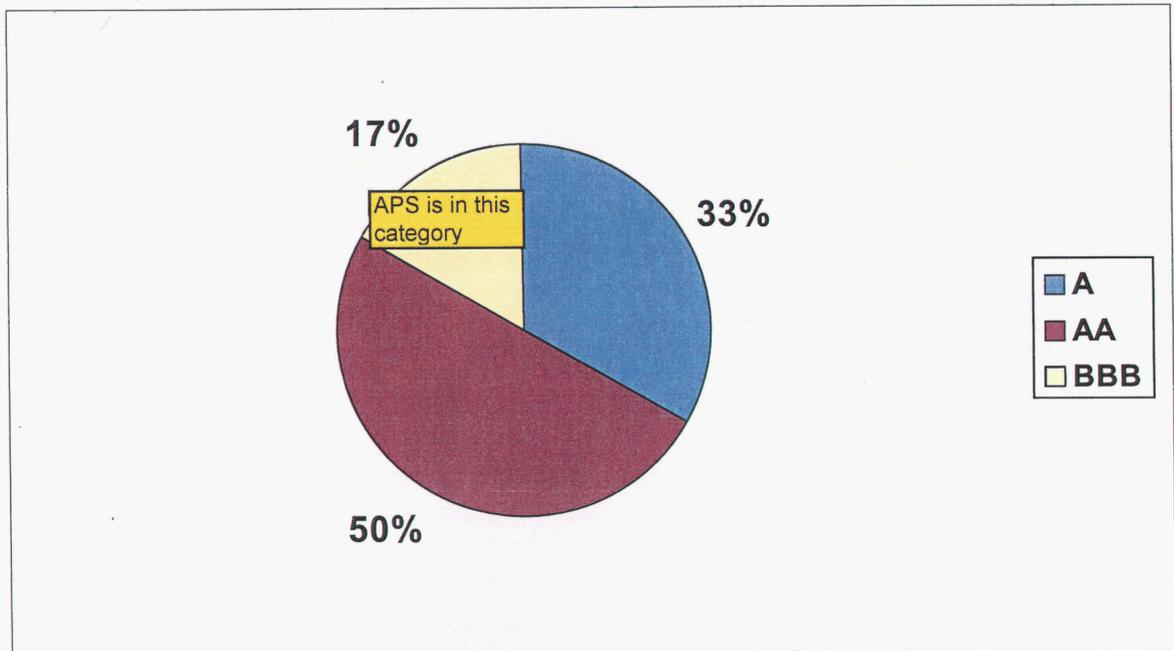
What is the primary geographic region your company operates within?



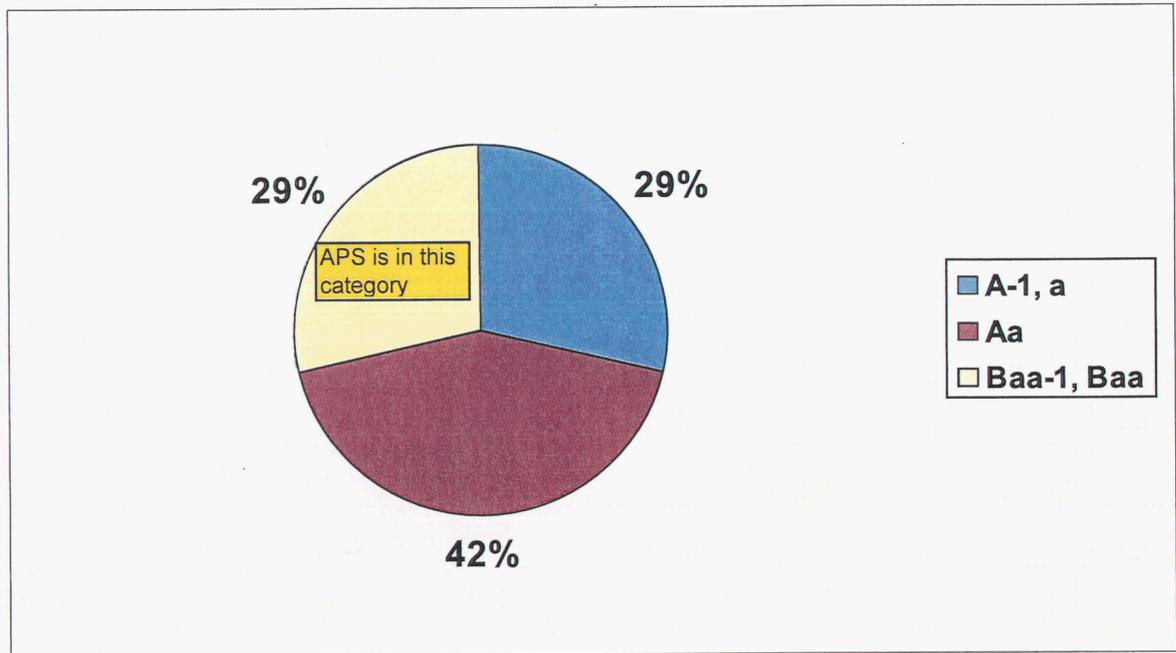
Are you in an Independent System Operator (ISO)?



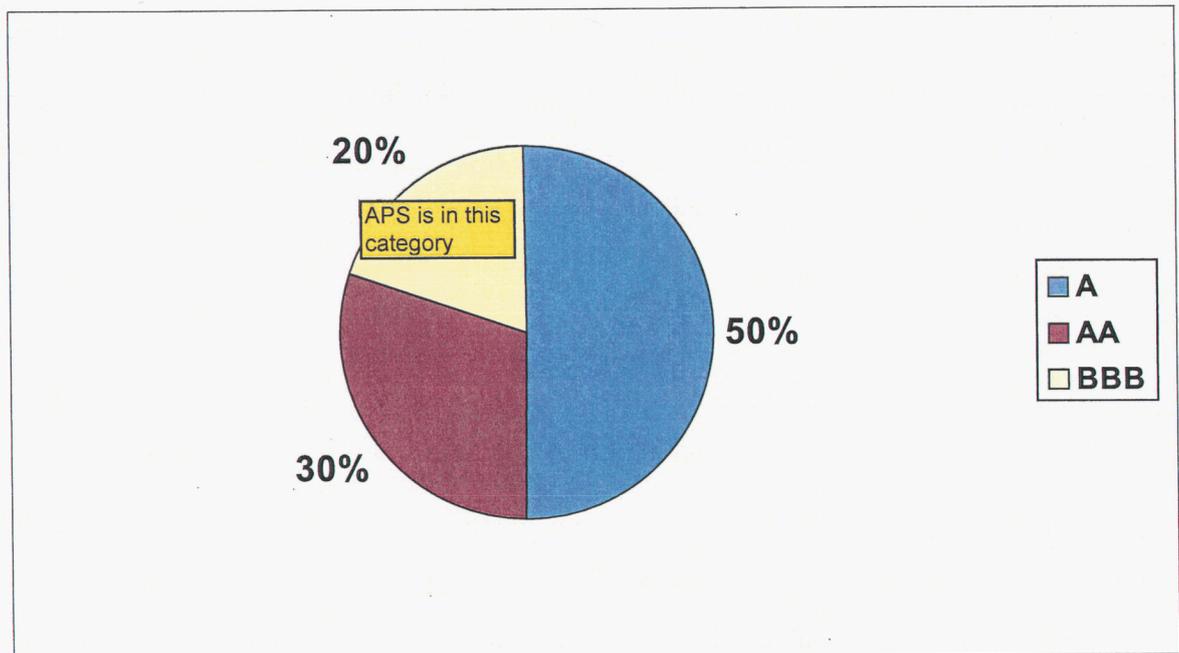
What is your Fitch rating?



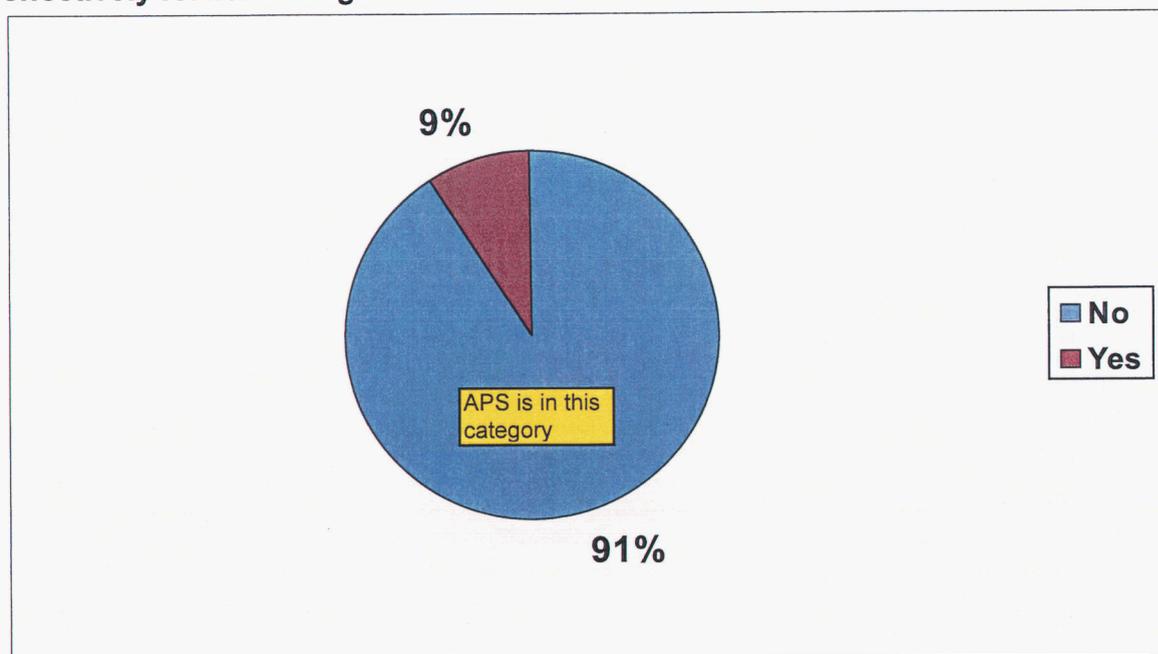
What is your Moody's rating?



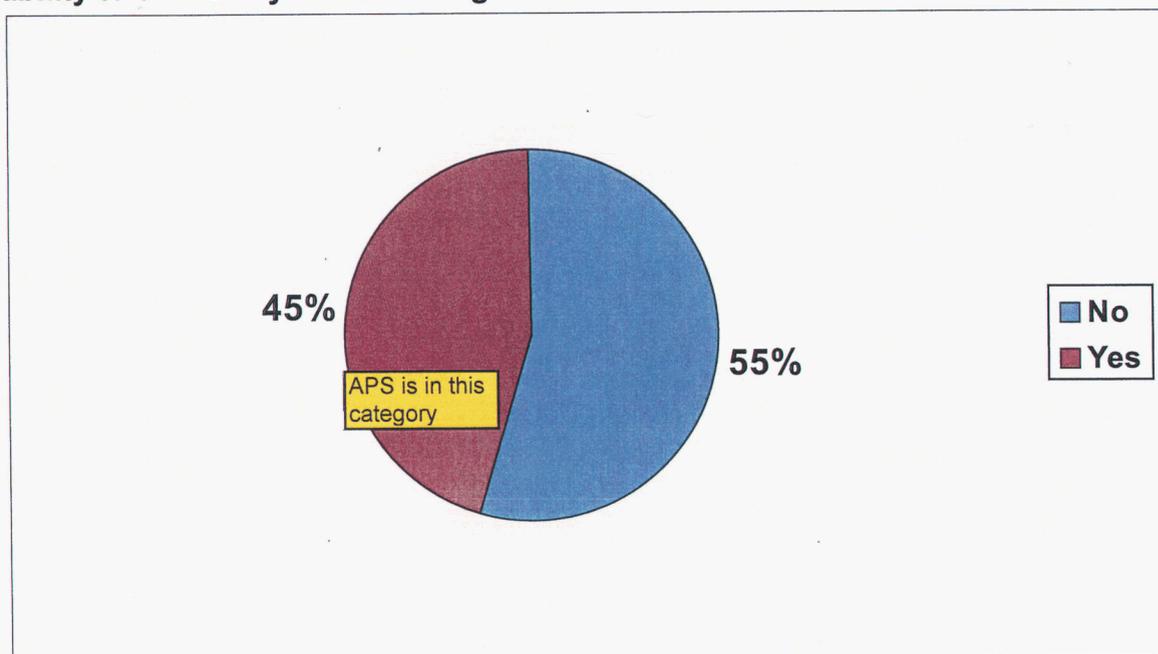
What is your S&P rating?



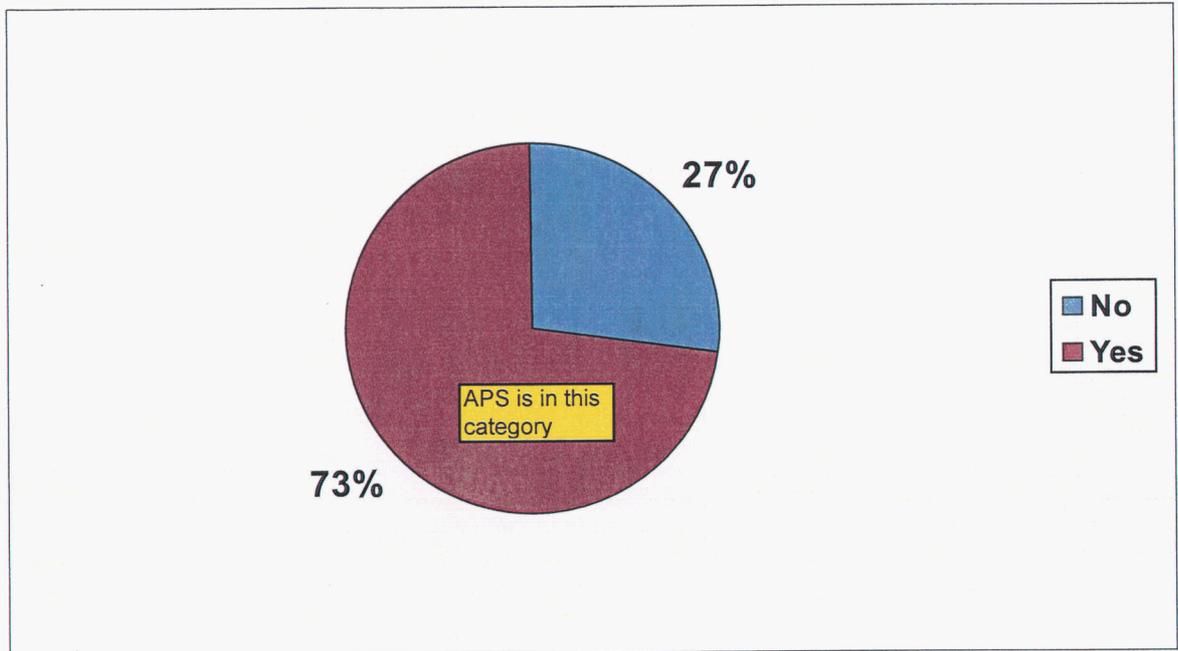
Does your corporate credit rating (or lack thereof) reduce your ability to effectively forward hedge?



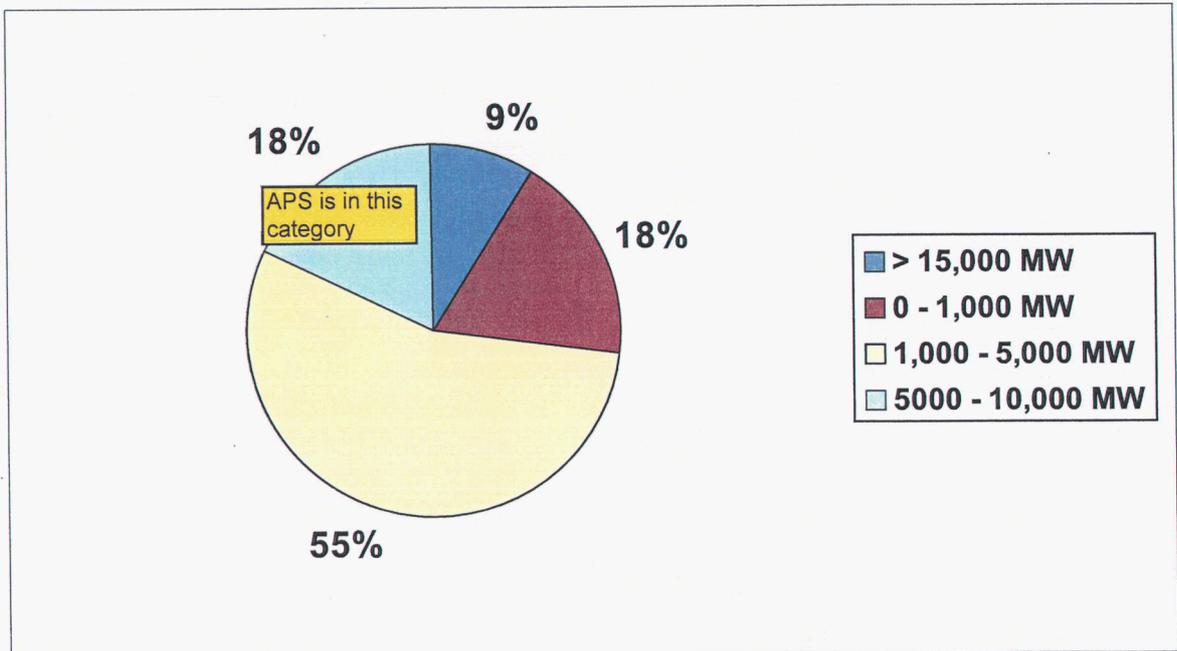
Do counterparty credit ratings of other potential trading partners reduce your ability to effectively forward hedge?



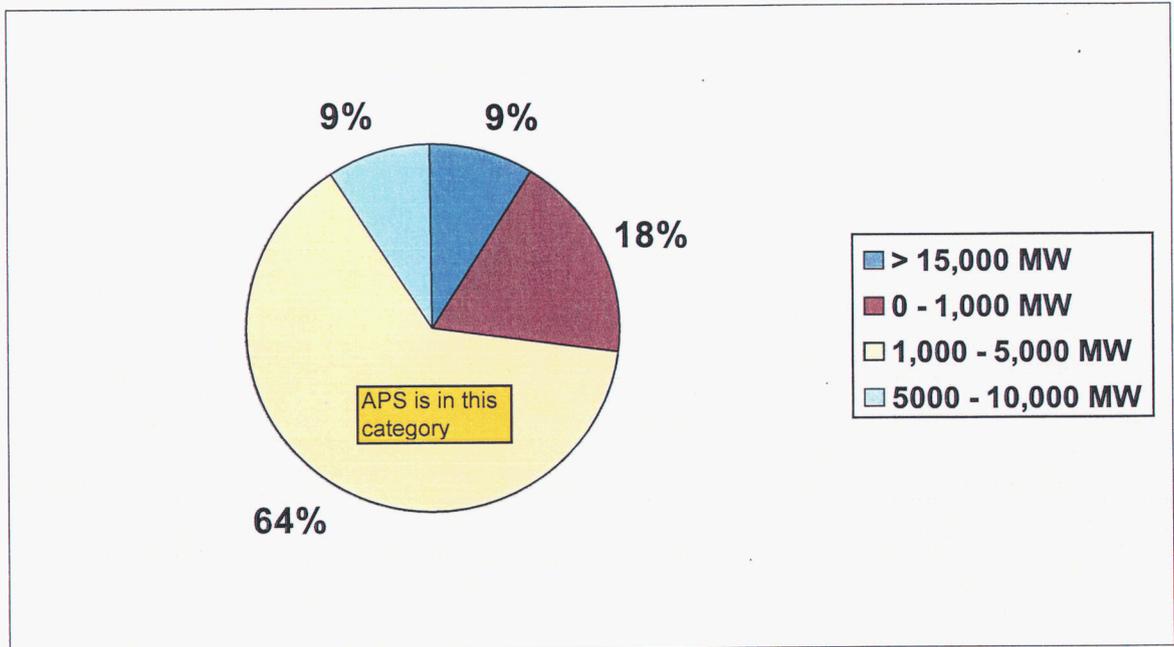
Do you have nearby access to an actively-traded natural gas hub?



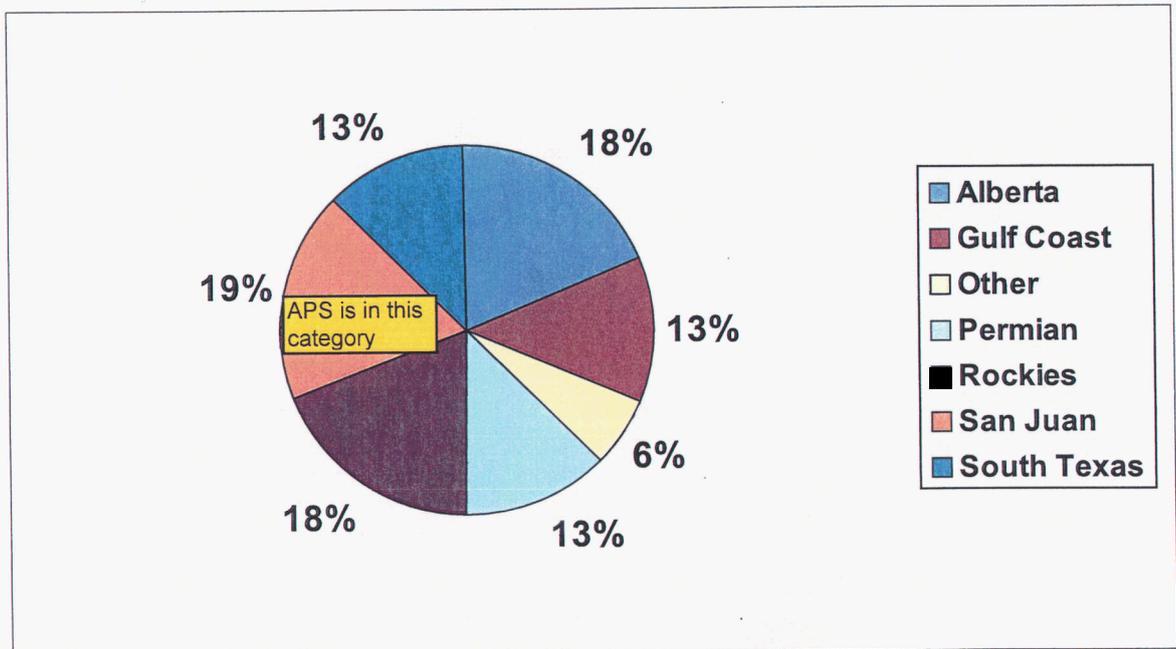
What is your summer peak load (MW) ?



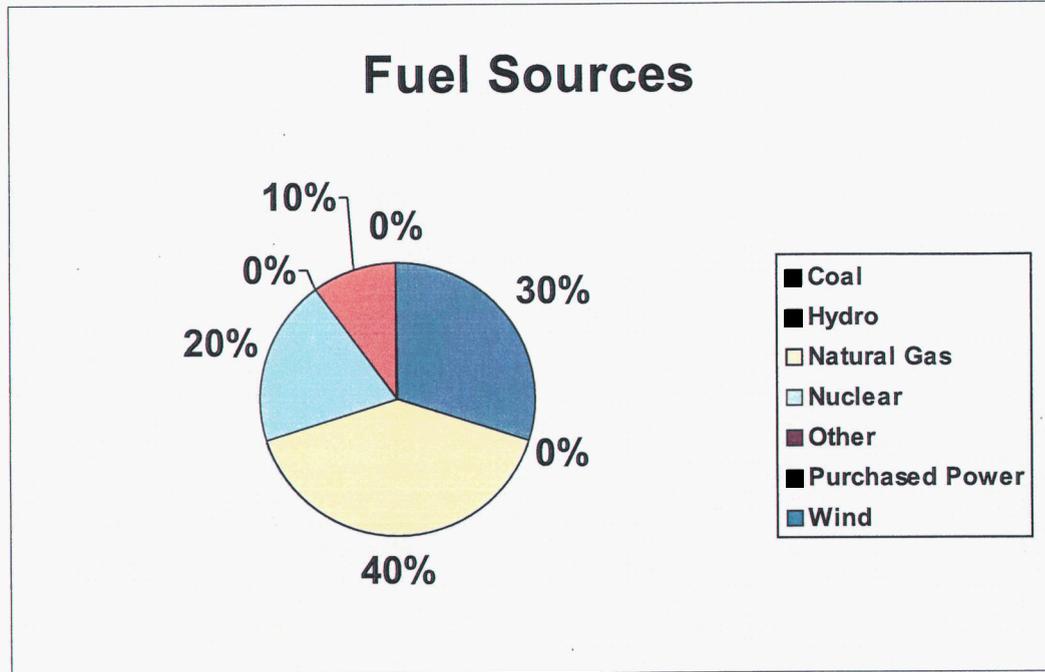
What is your winter peak load (MW) ?



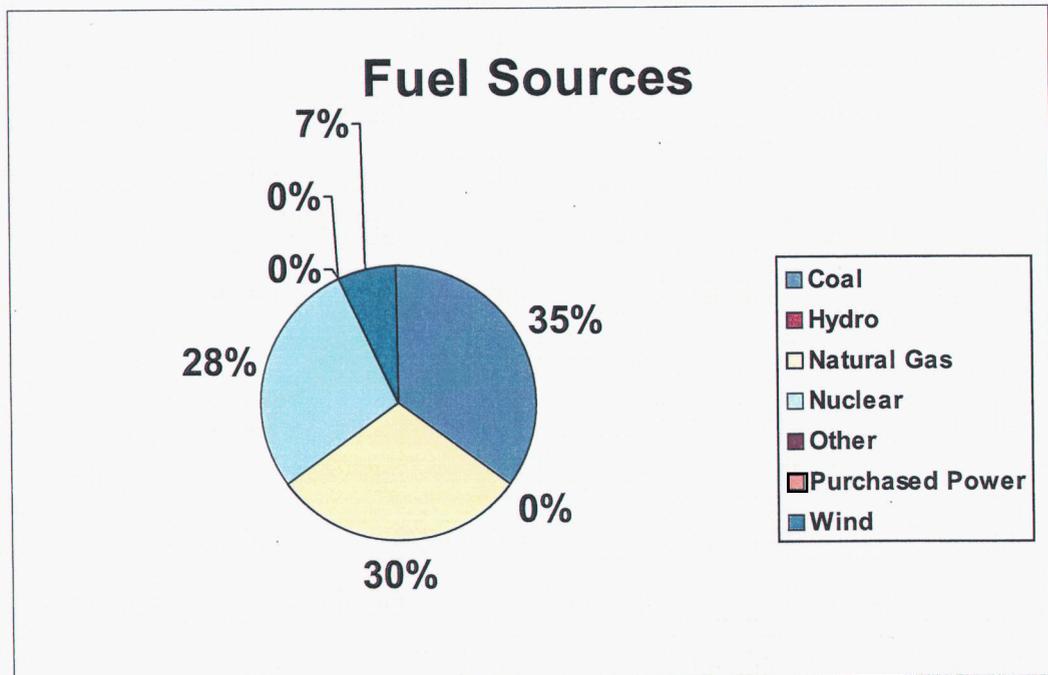
What regional basins is your natural gas delivered from?



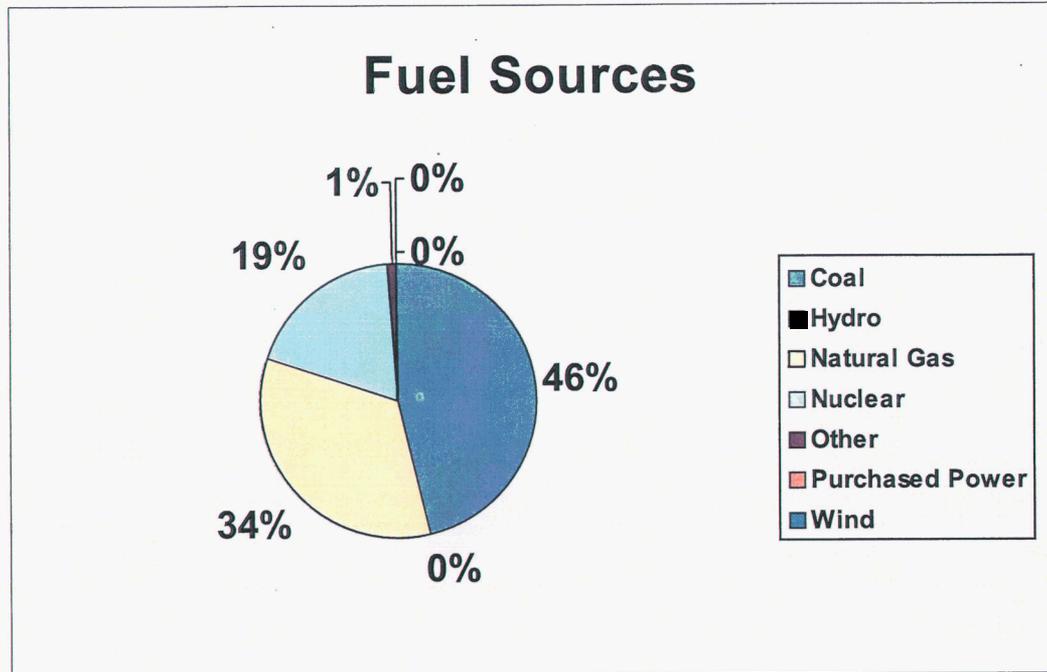
Company A



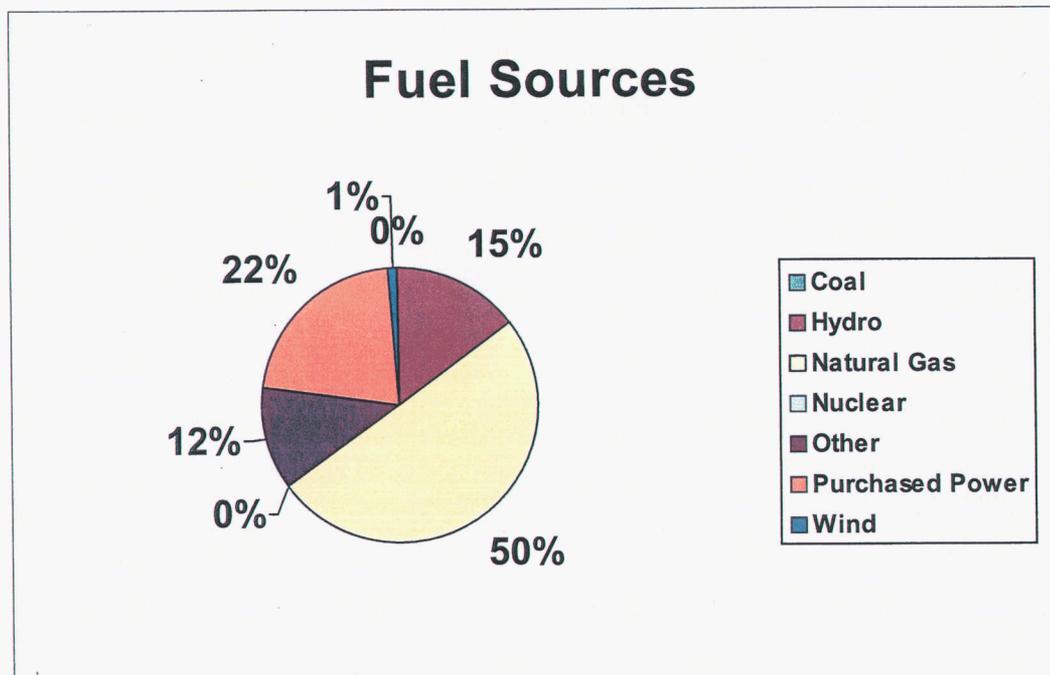
Company B



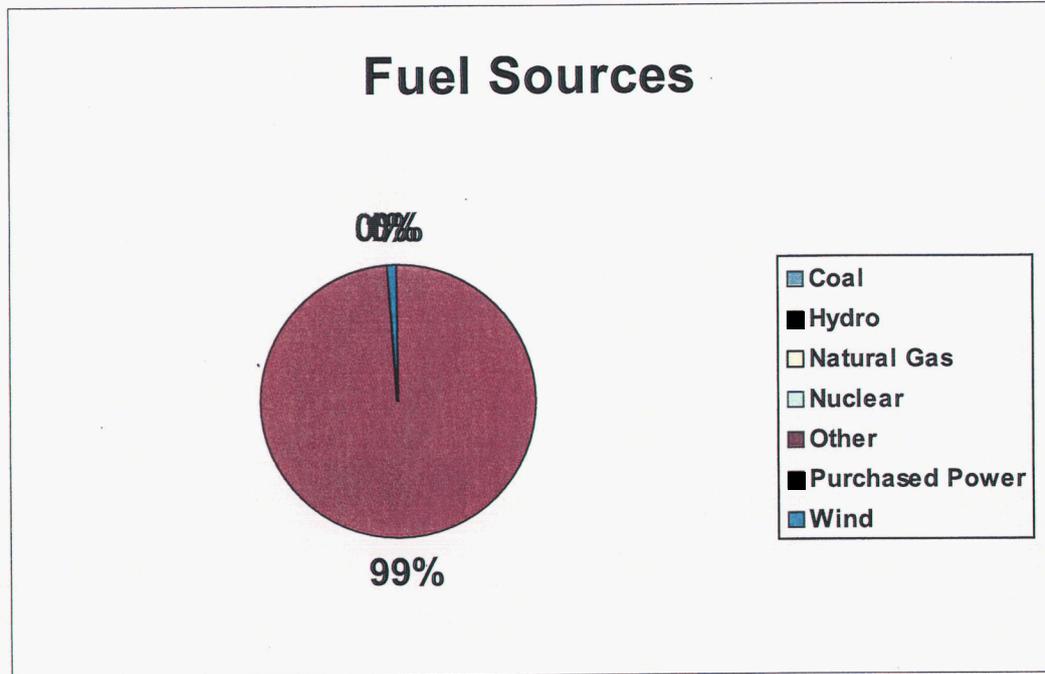
Company C



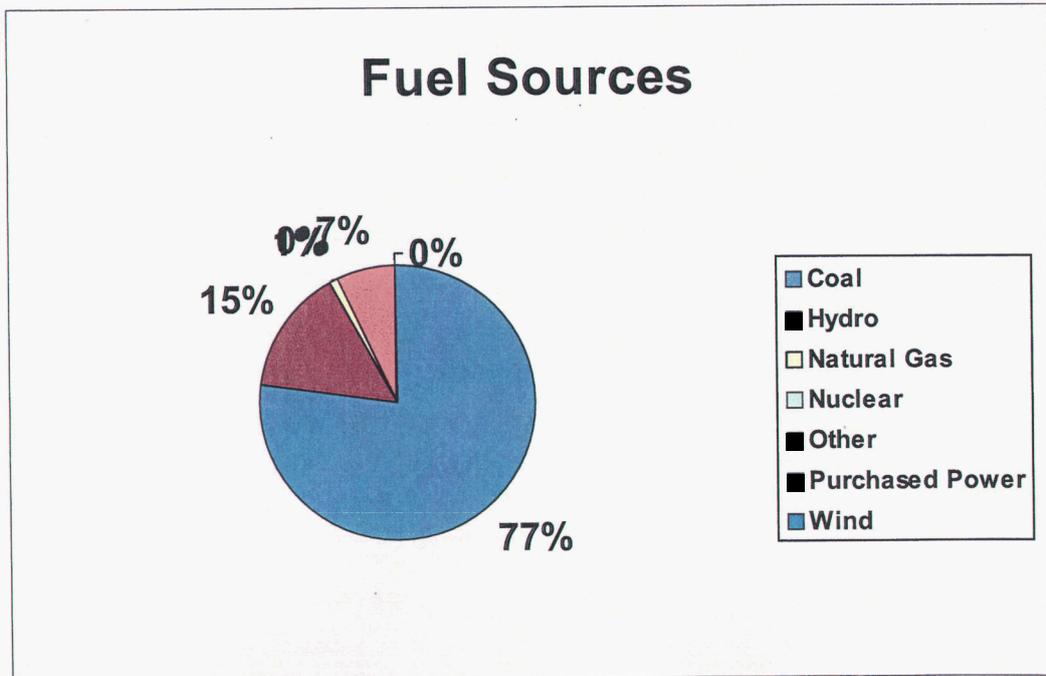
Company D



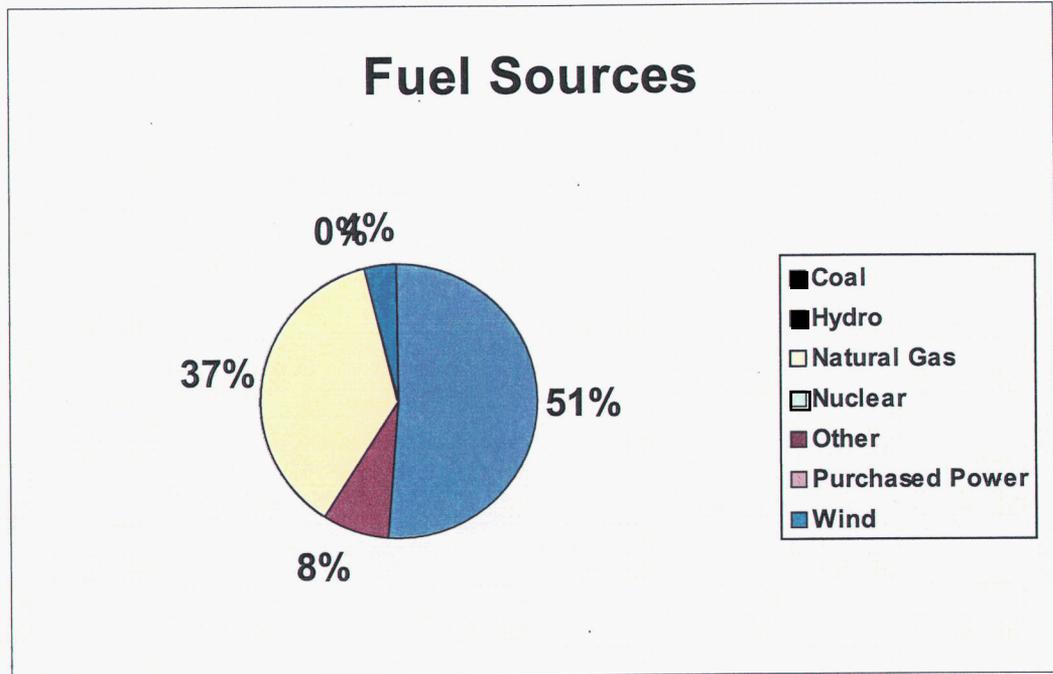
Company E



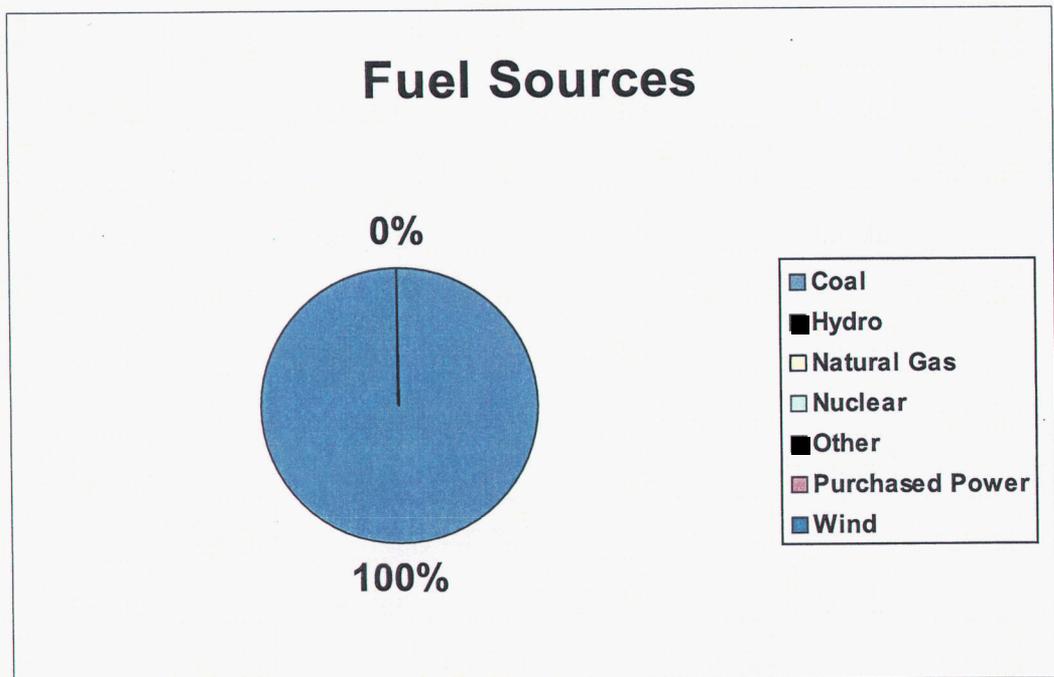
Company F



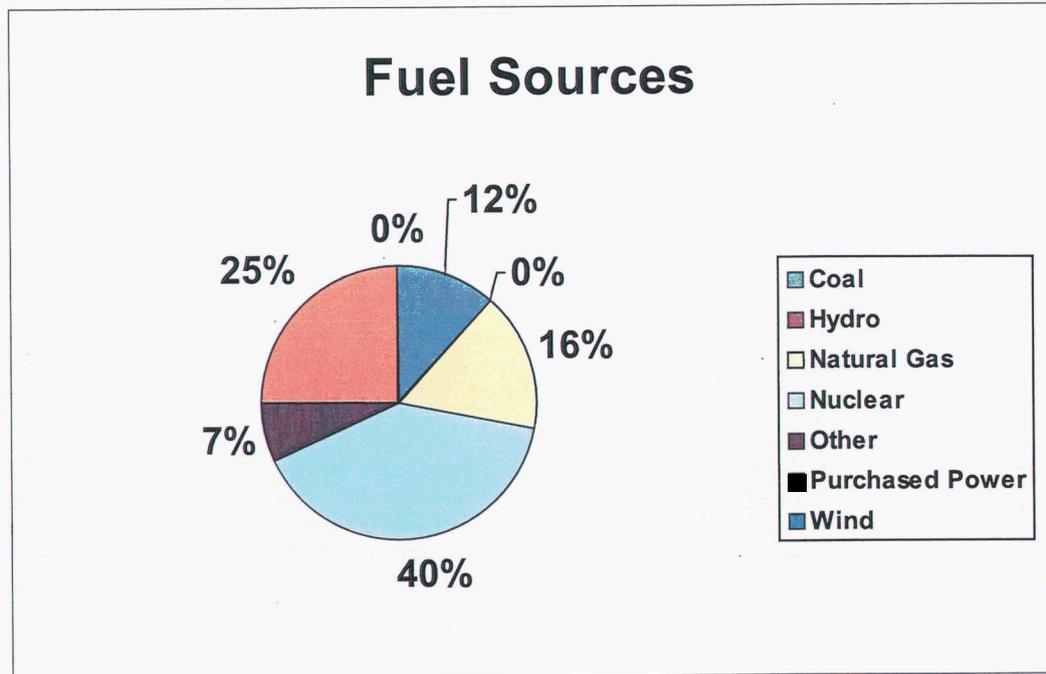
Company G



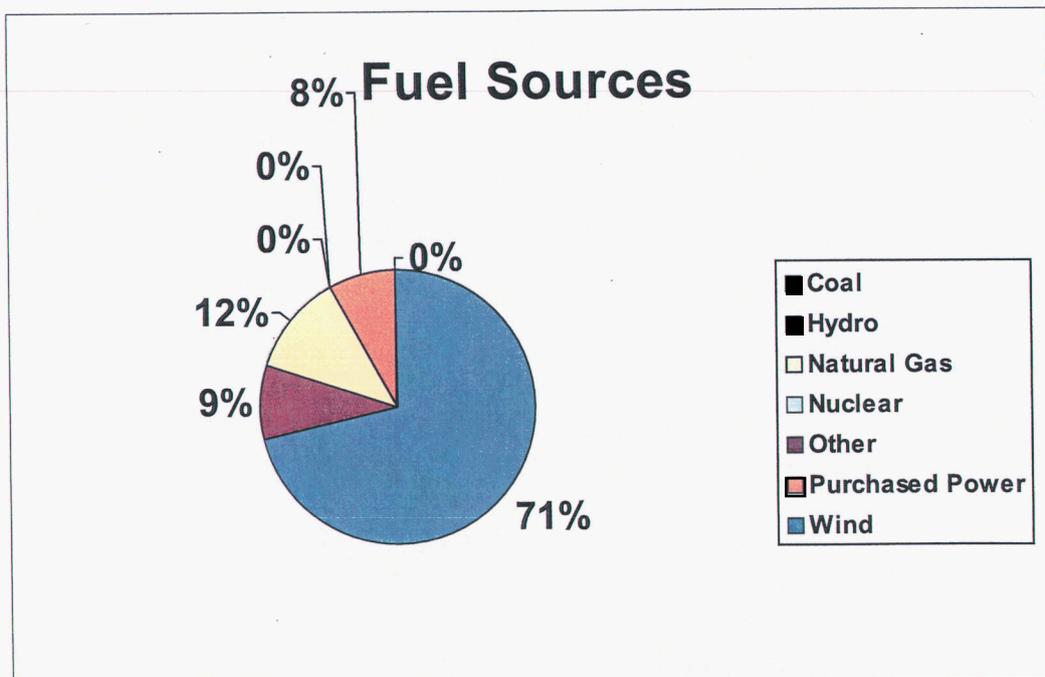
Company H



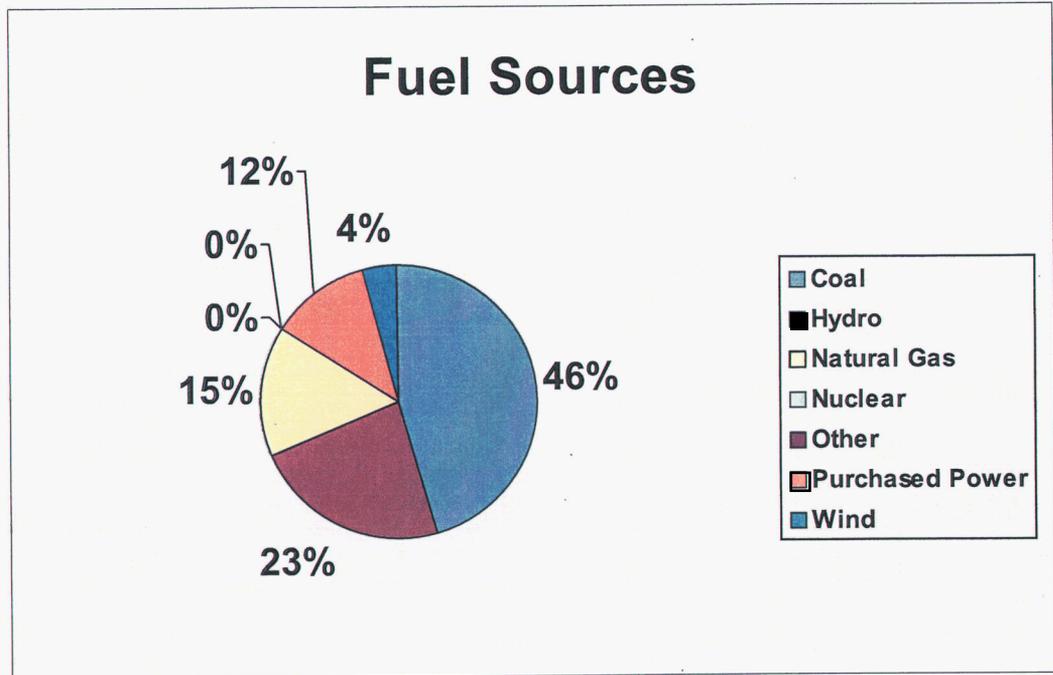
Company I



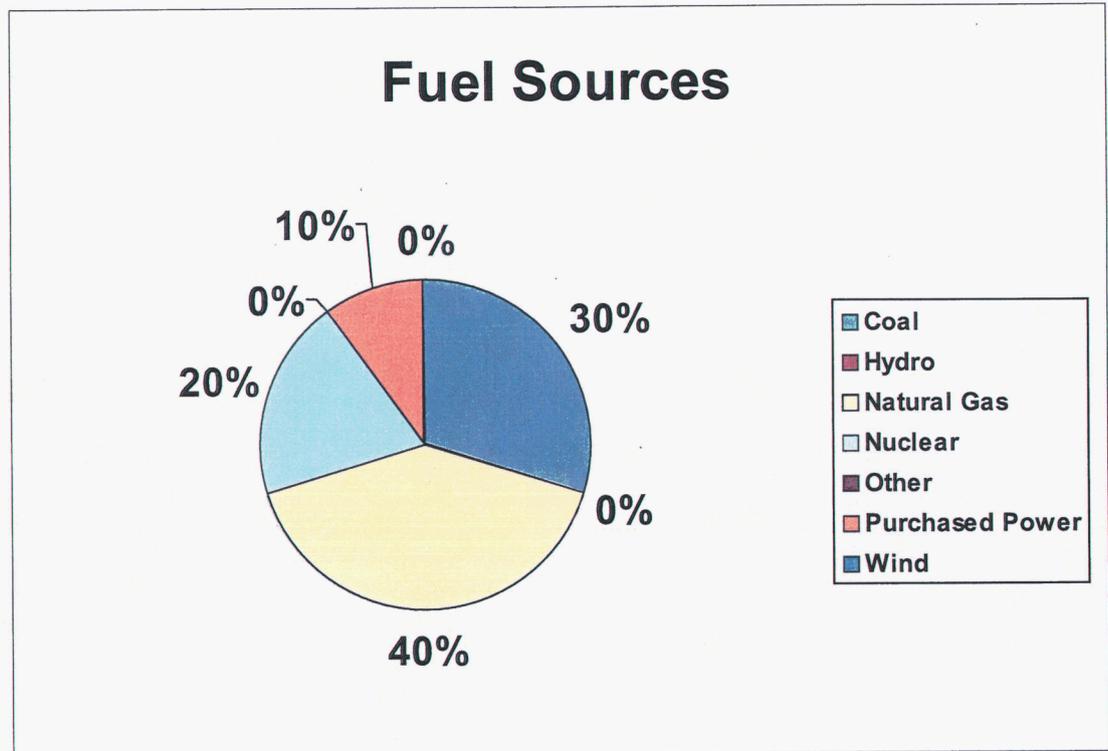
Company J



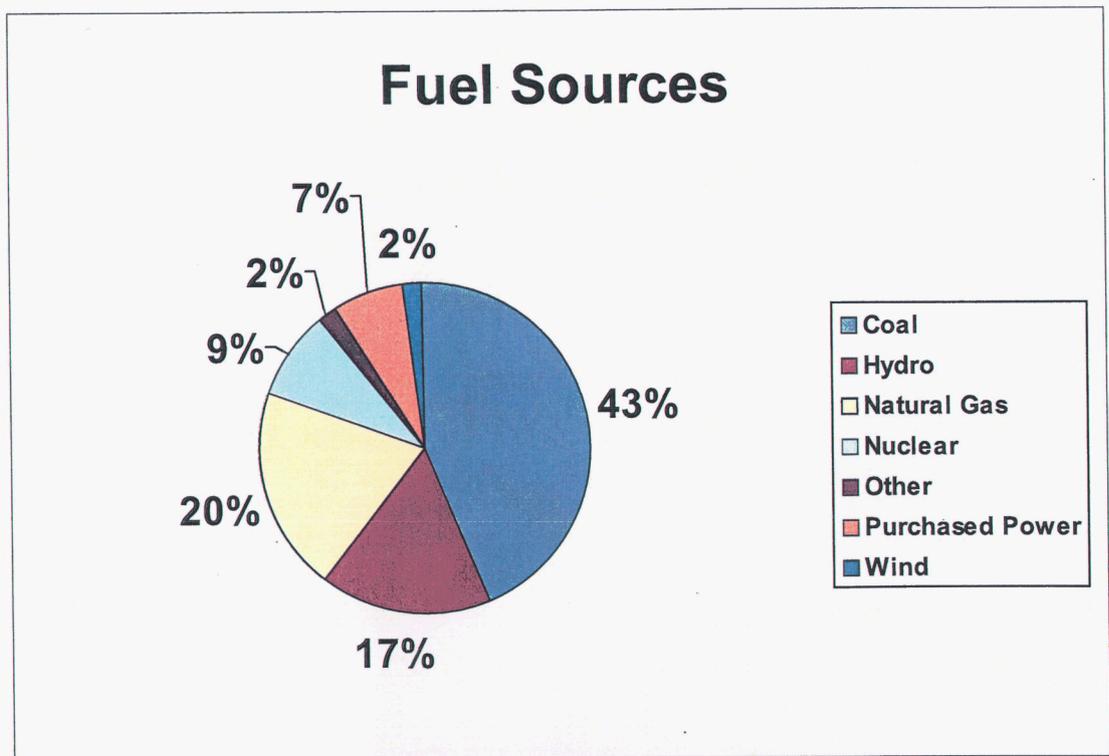
Company K



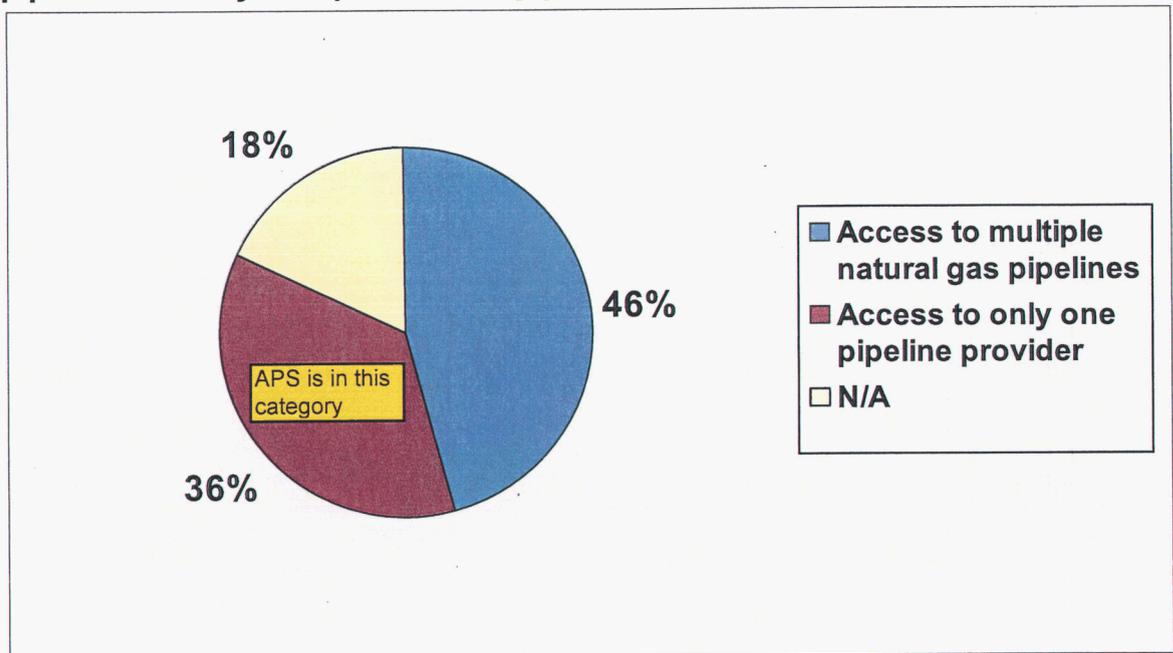
Company A



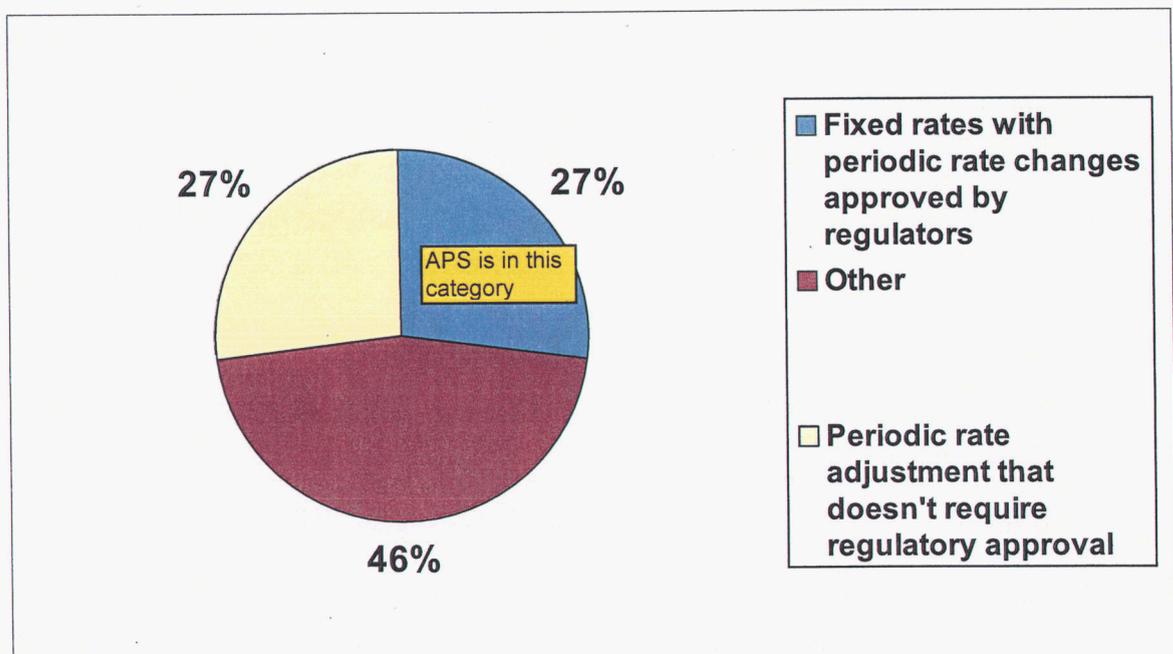
Others



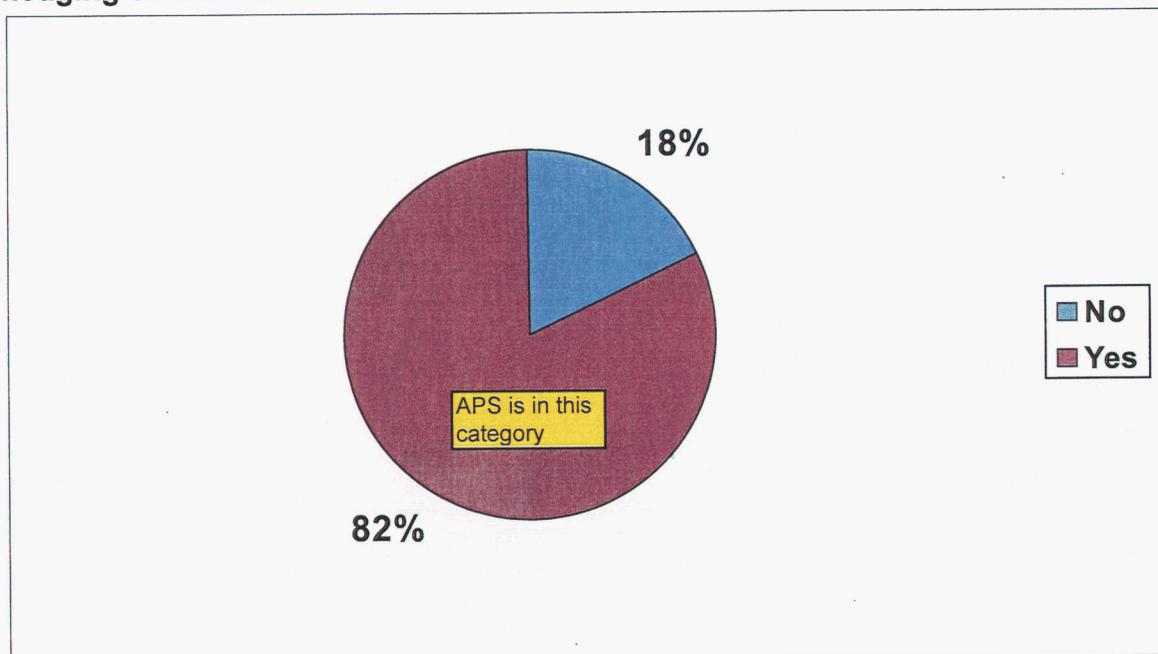
If you use natural gas to serve load, do you have access to multiple natural gas pipelines or are you captive to one pipeline provider?



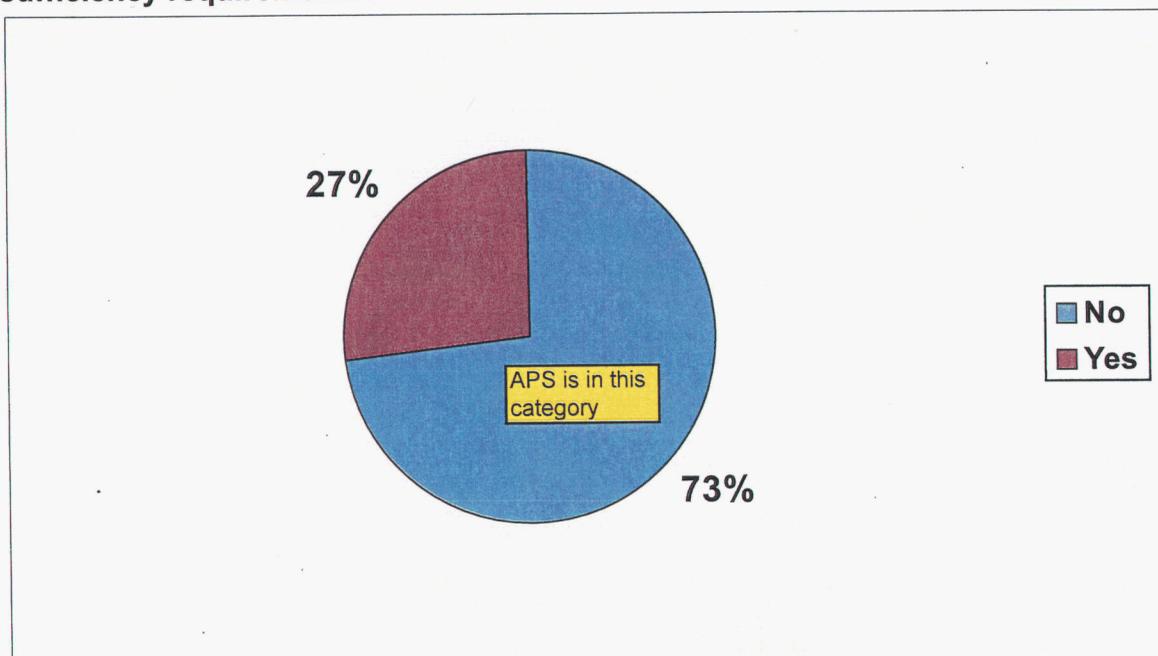
How do you recover fuel costs?



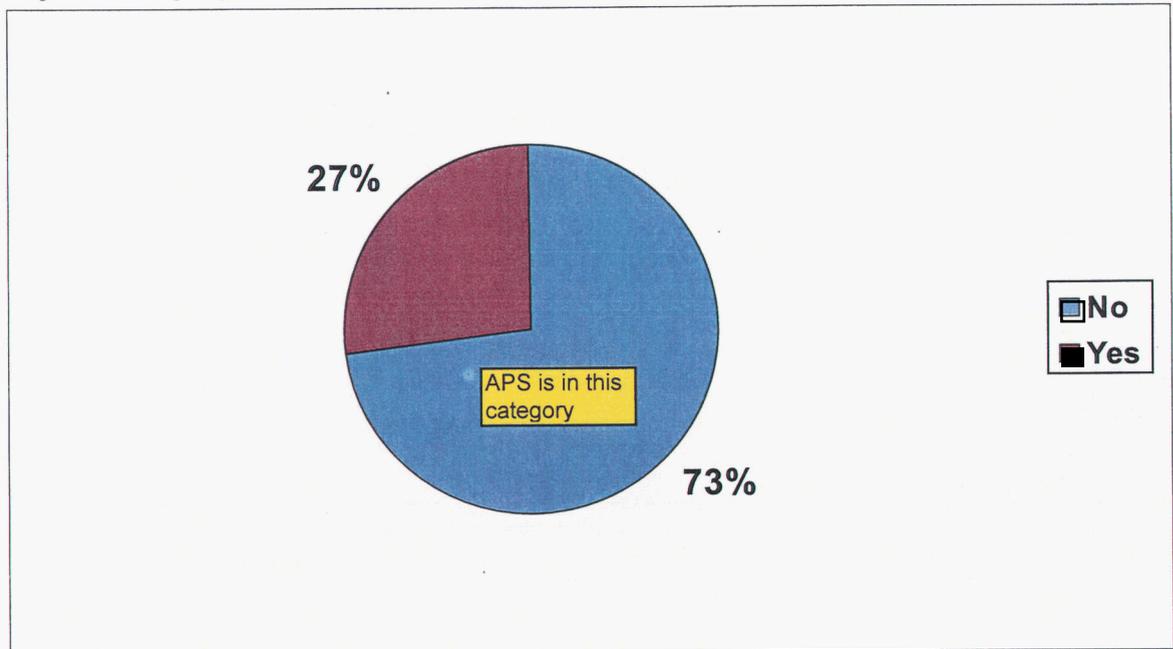
Does your Commission (or other body that regulates your company) allow hedging of fuel costs?



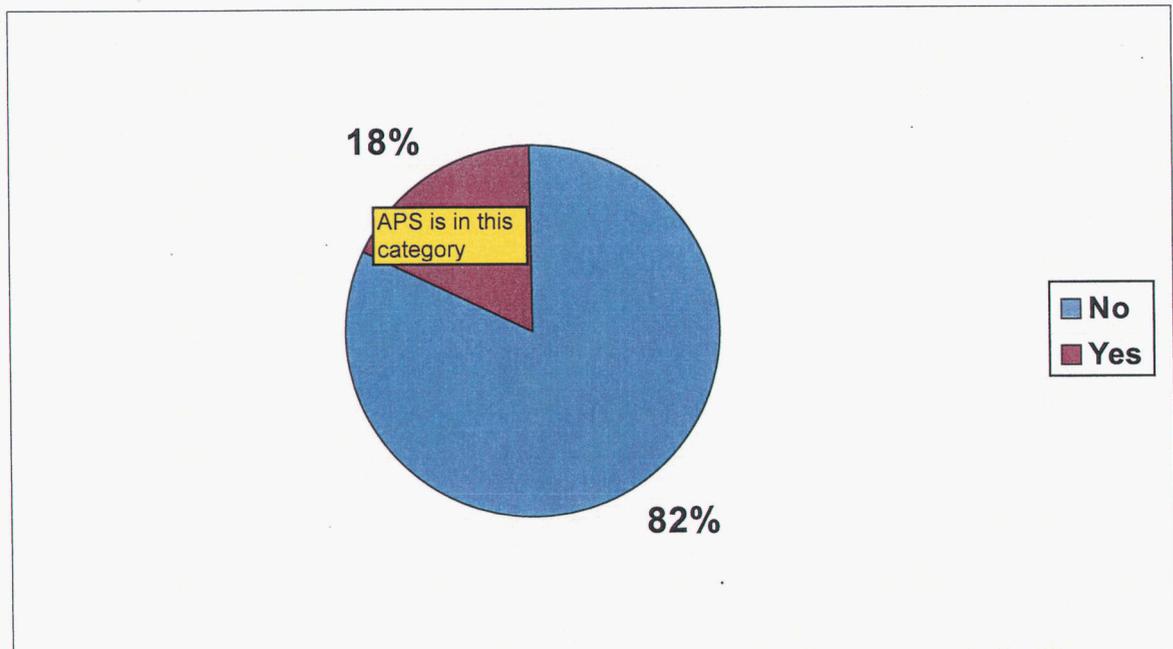
Do you face Commission or other mandated energy or fuel procurement sufficiency requirements?



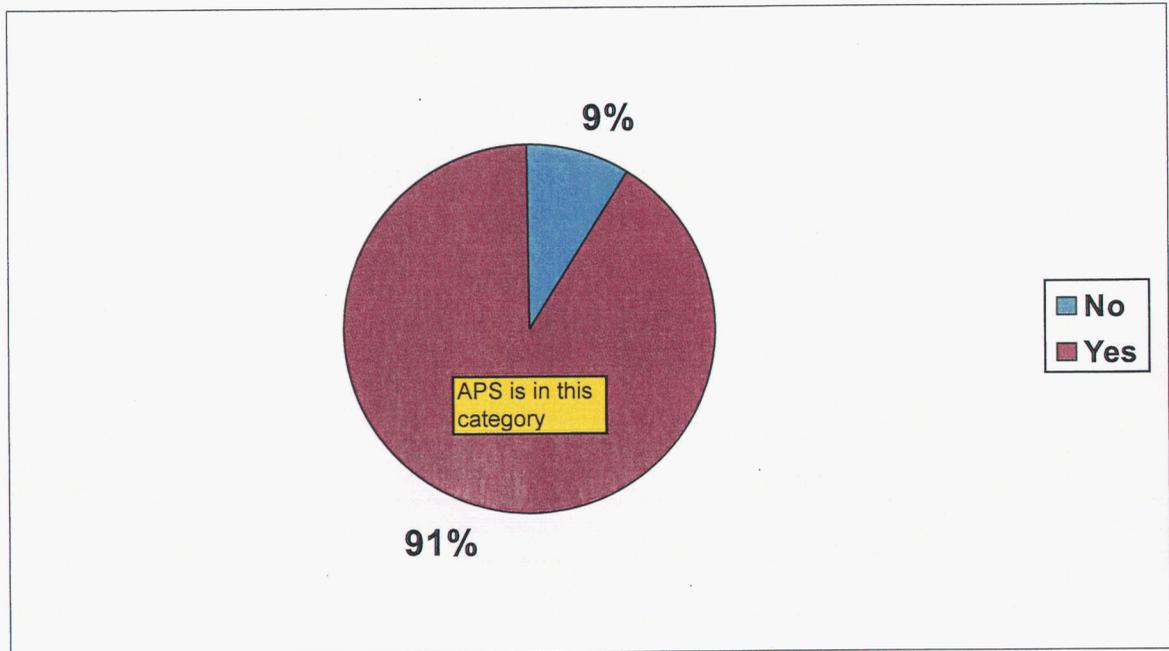
Has your Commission or other external stakeholders participated in the design of your hedging or risk management program?



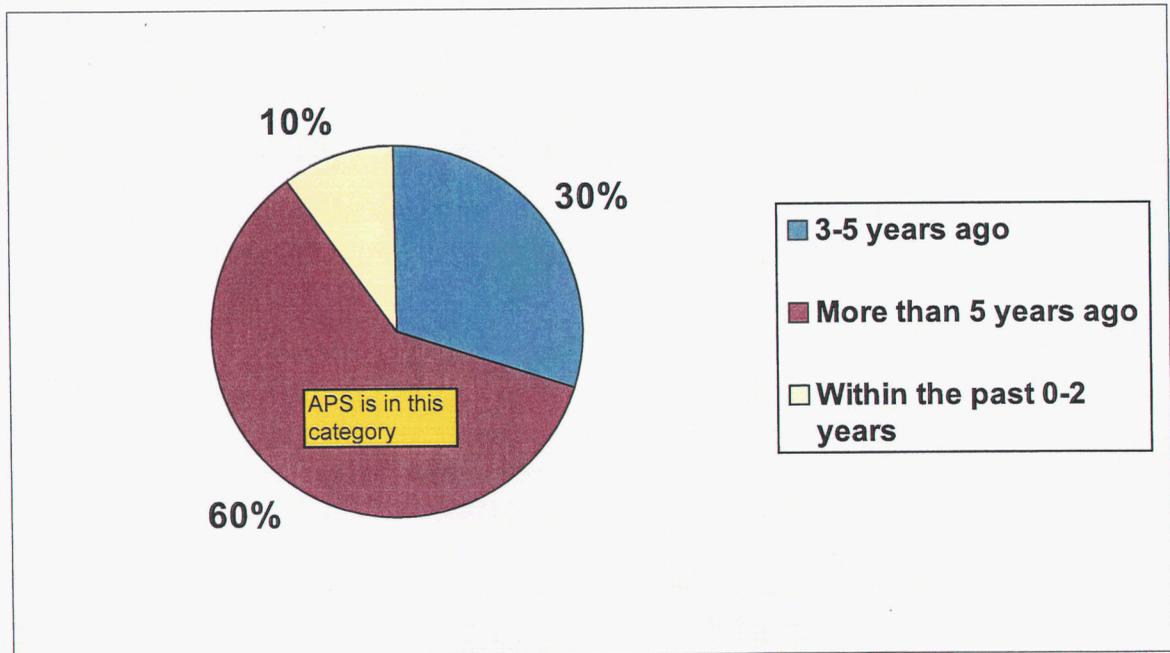
Is Front Office personnel compensation tied to trading related performance?



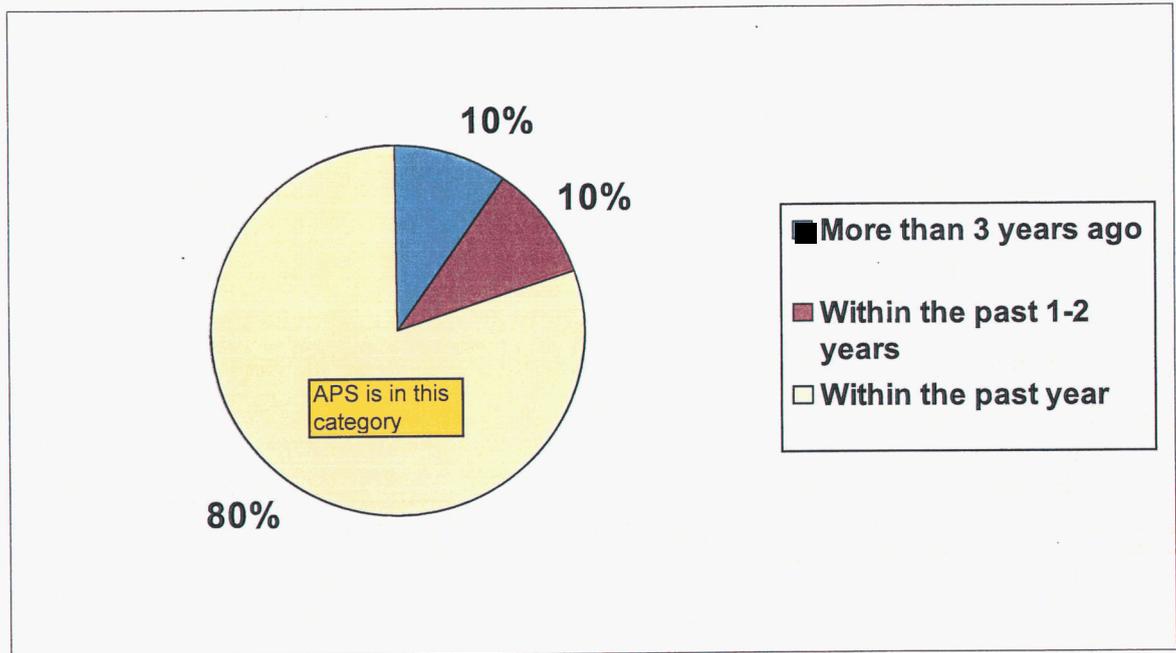
**Do you have a formal energy risk management policy?**



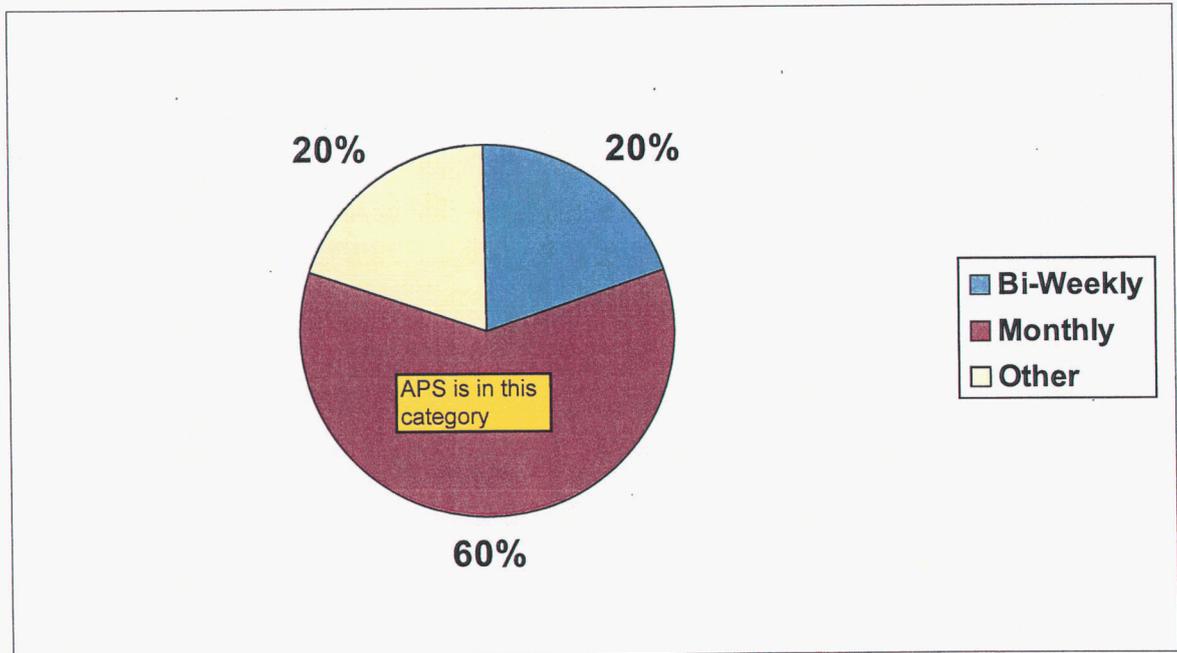
**When was your risk policy first developed?**



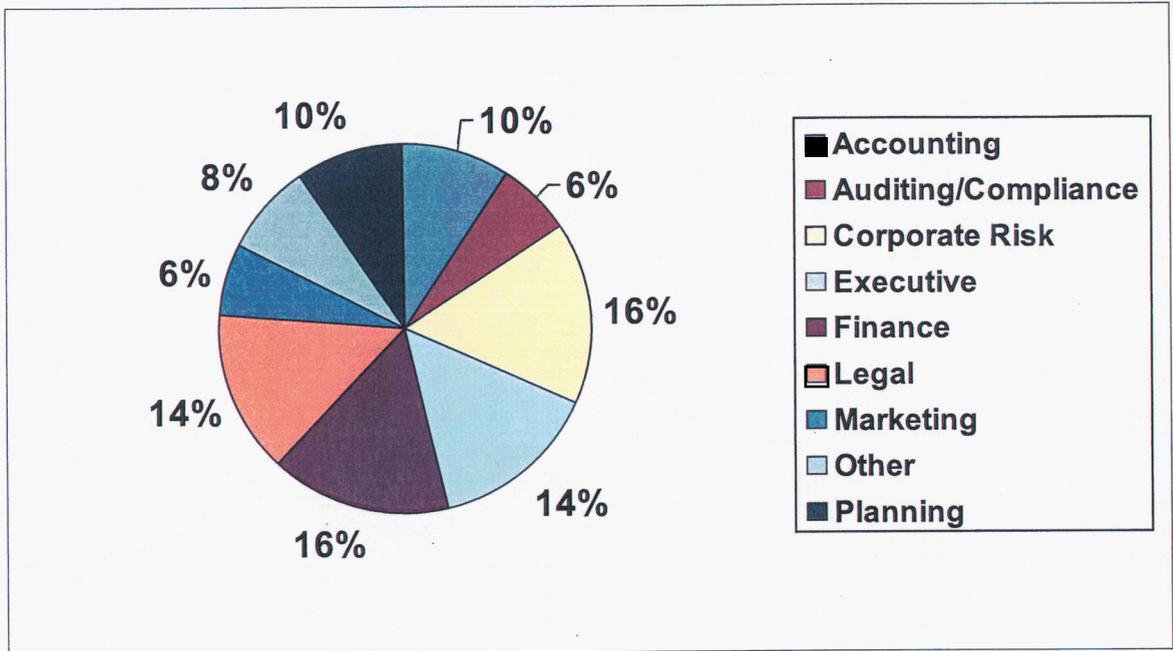
**When was your risk management program last independently reviewed?**



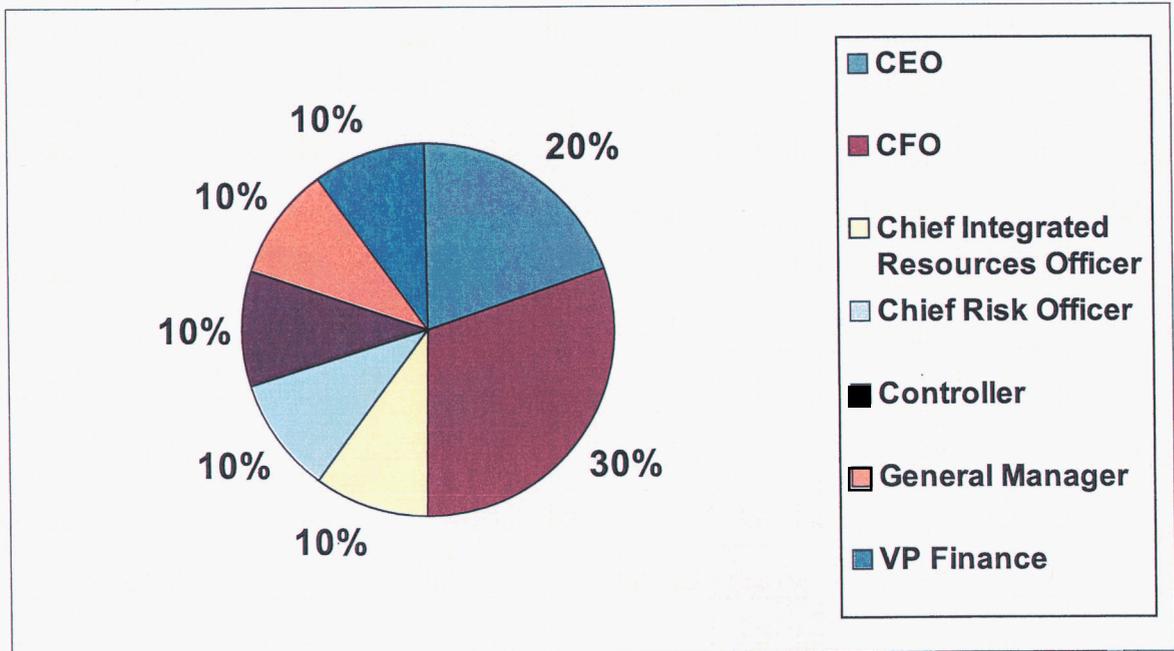
**How often does your energy risk committee meet?**



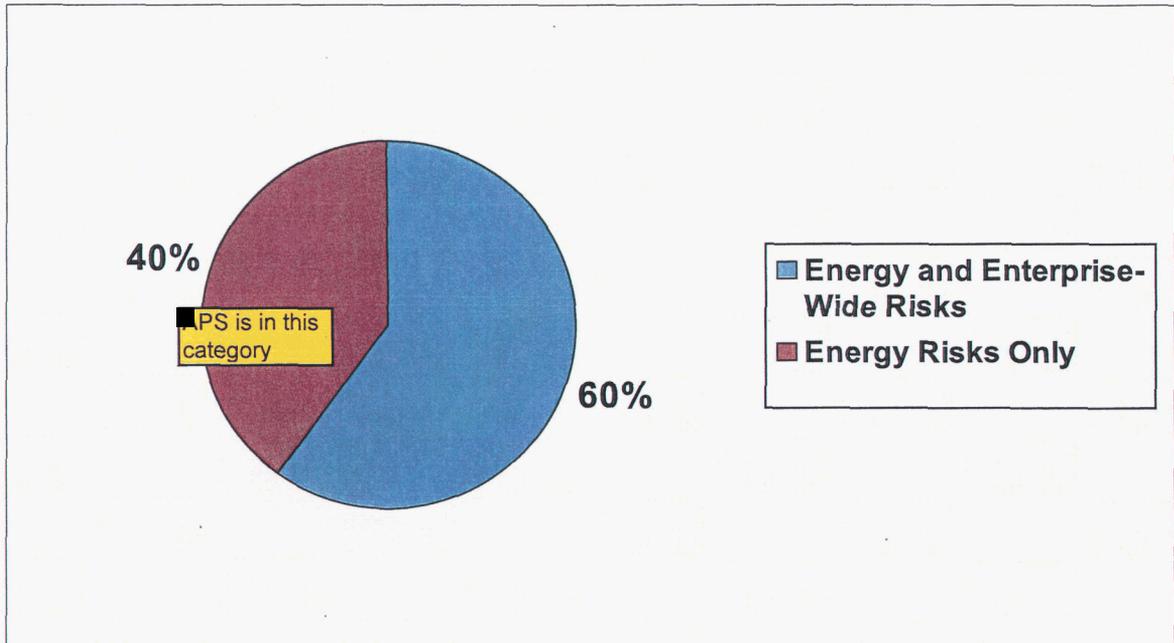
What departments are represented on your energy risk management committee?



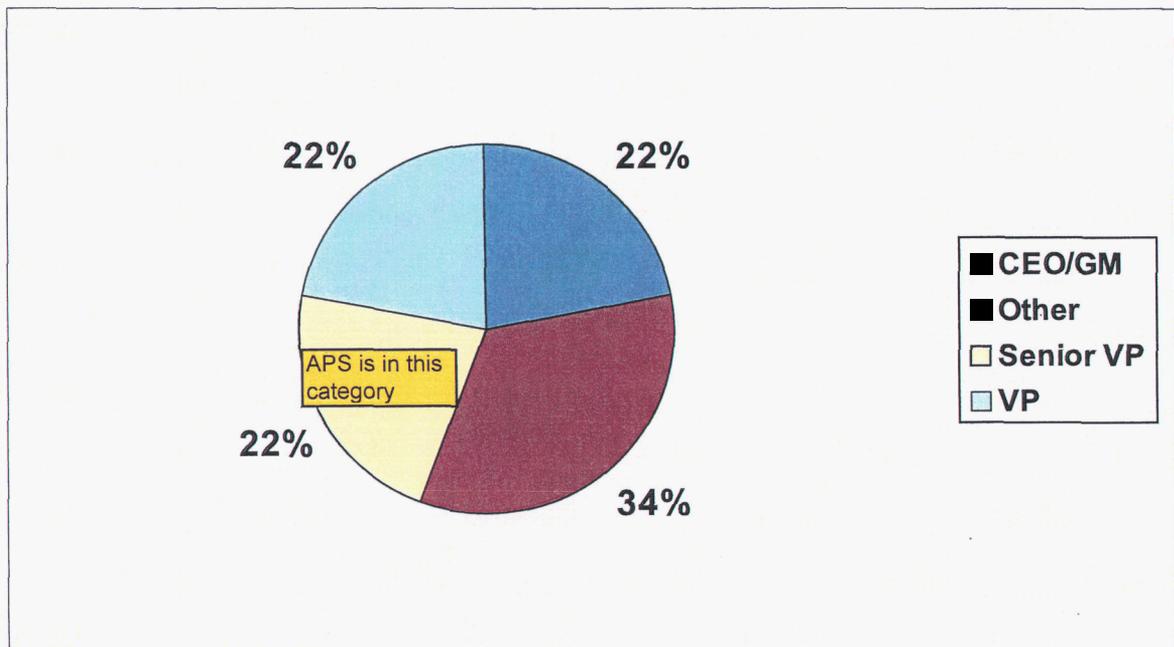
Who serves as Chairperson of your risk management committee?



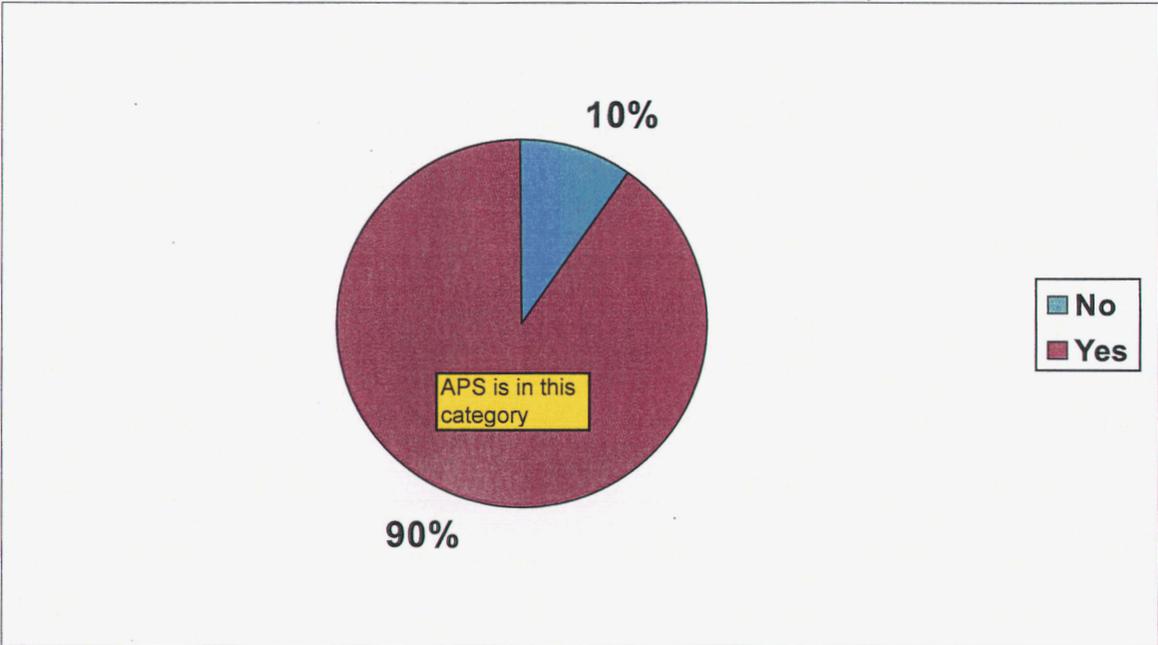
Does the committee deal with energy risks only, or also enterprise-wide risk issues?



What is the highest level person on your risk management committee?



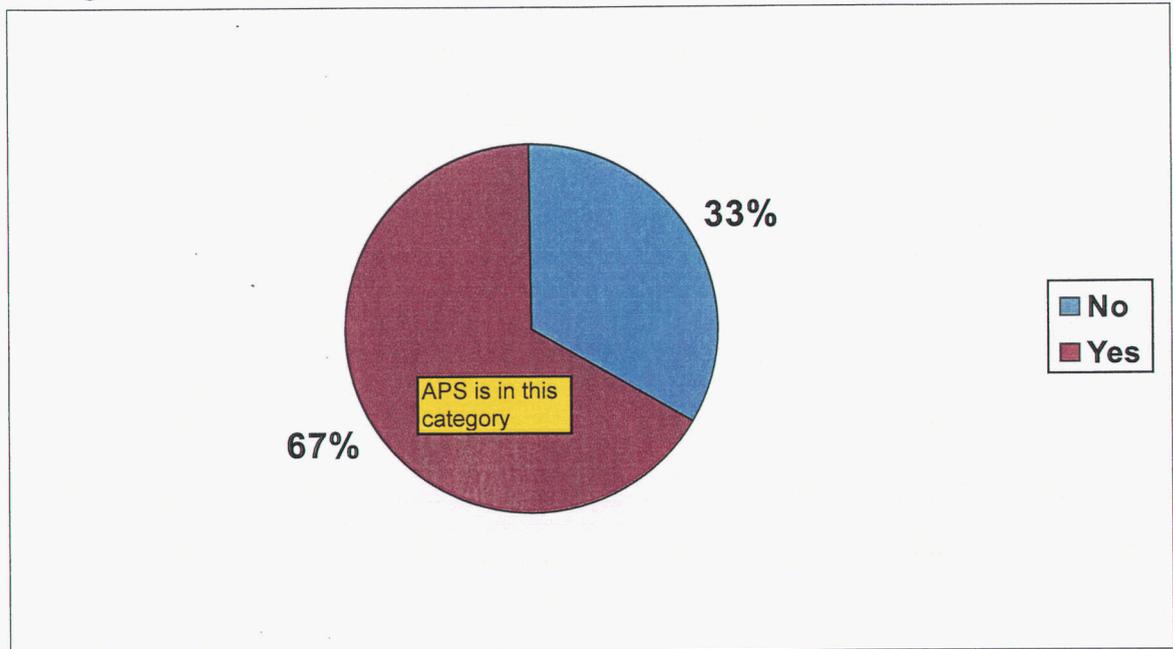
Do you have a formalized Middle Office function which provides for independent oversight?



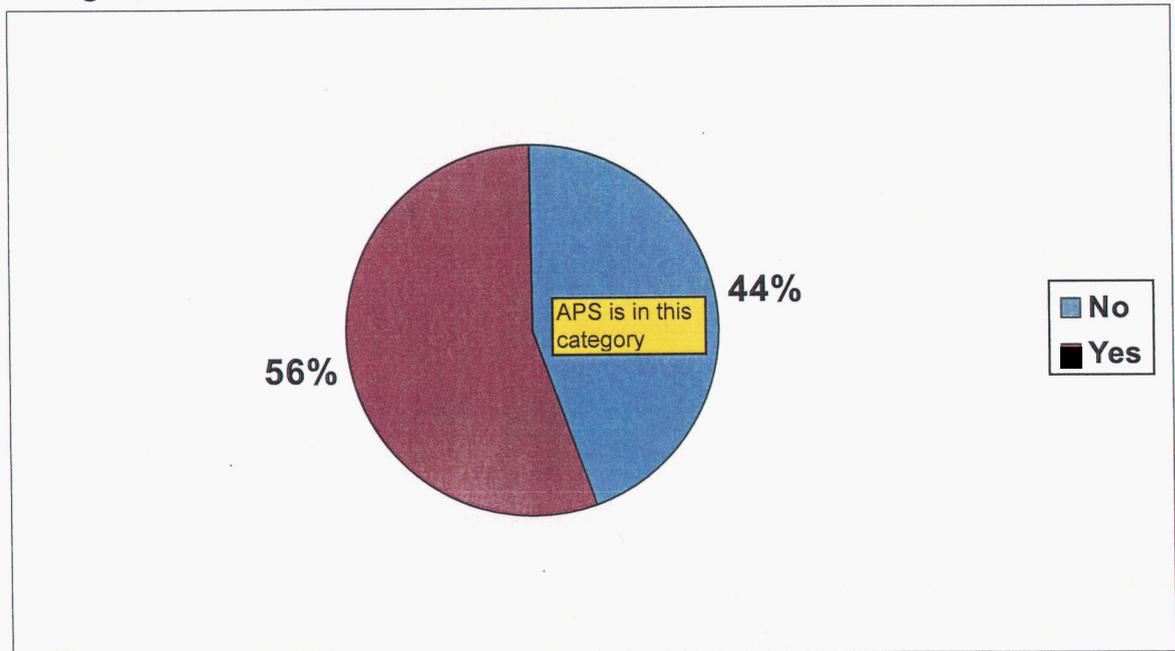
**What is the title of the person who heads the Middle Office?**

Company A	Director of Risk Management
Company B	Manager, Risk Control
Company C	Manager - Treasury & Risk Management
Company D	CFO
Company E	Controller
Company G	Mid-Office Risk Manager
Company I	Chief Risk Officer
Company J	Enterprise Risk Manager
Company K	Director, Energy & Risk Management

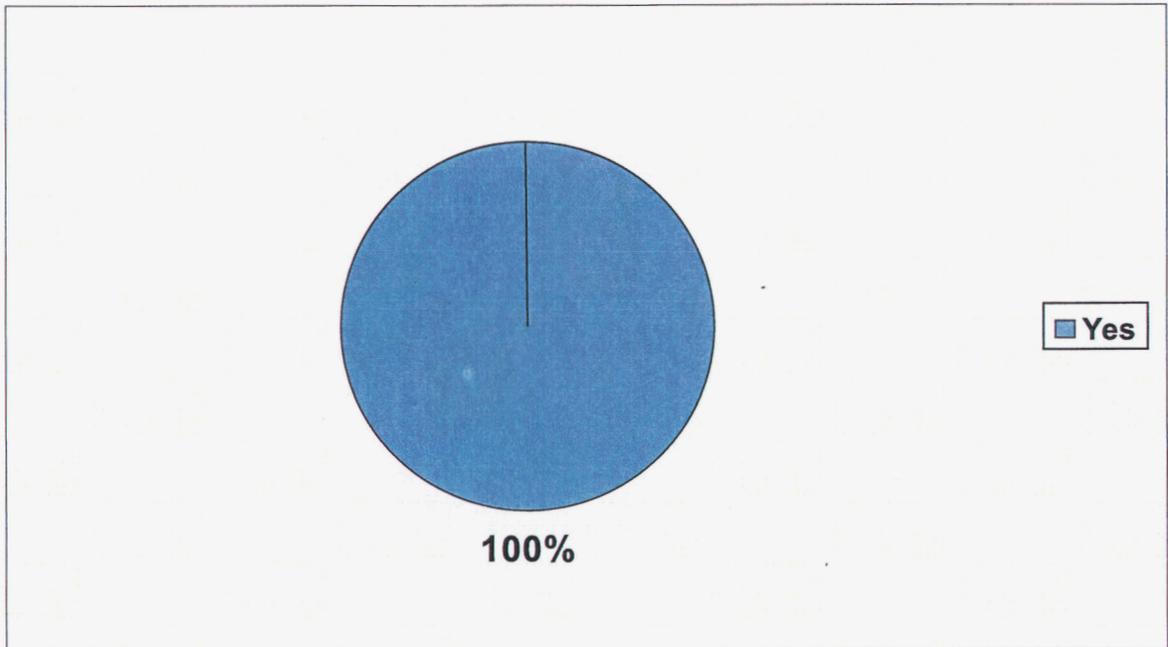
Is the person who heads the Middle Office an official member of the risk management committee?



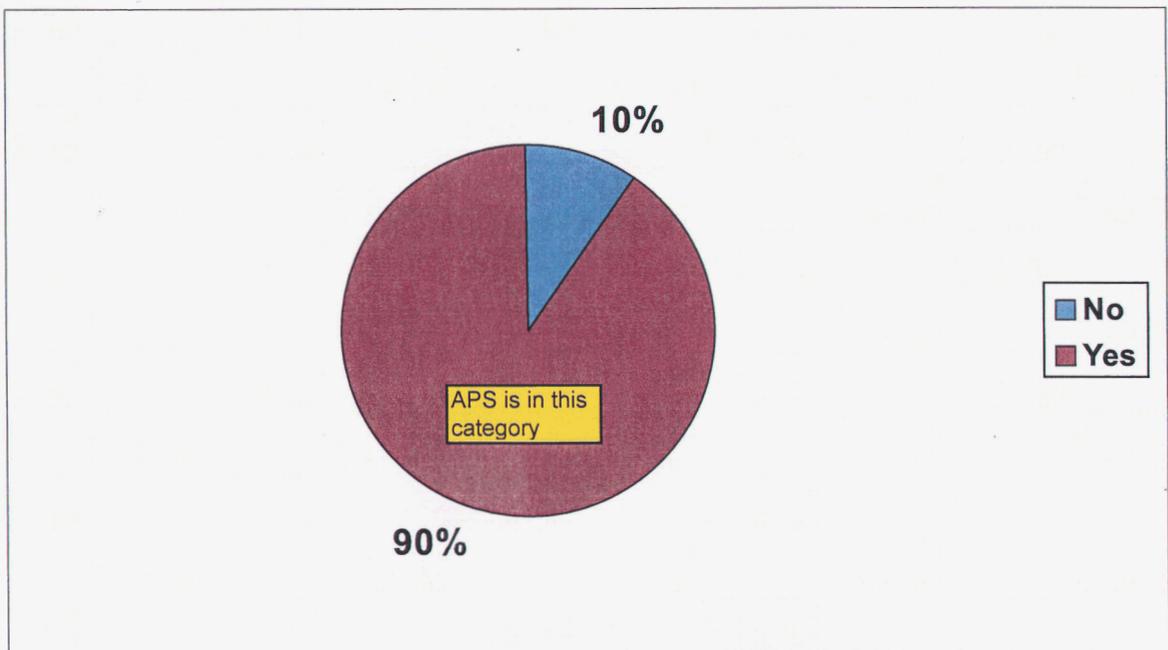
Is the head of power supply and/or trading an official member of the risk management committee?



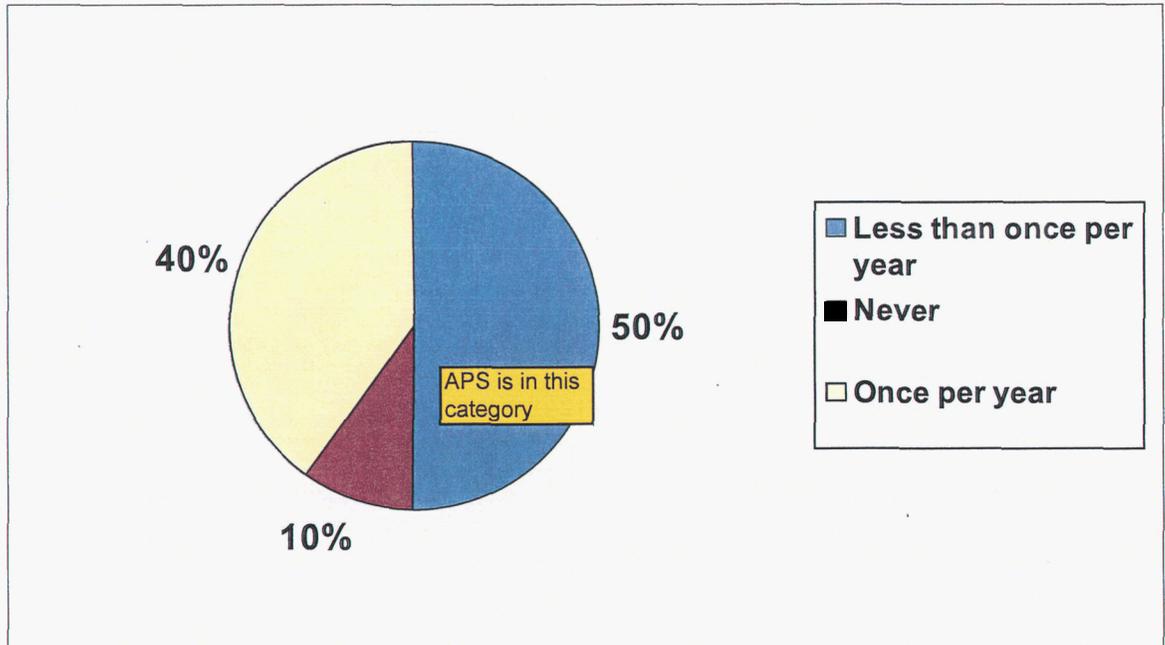
Is your Middle Office fully independent and separate of Front Office transactional activities?



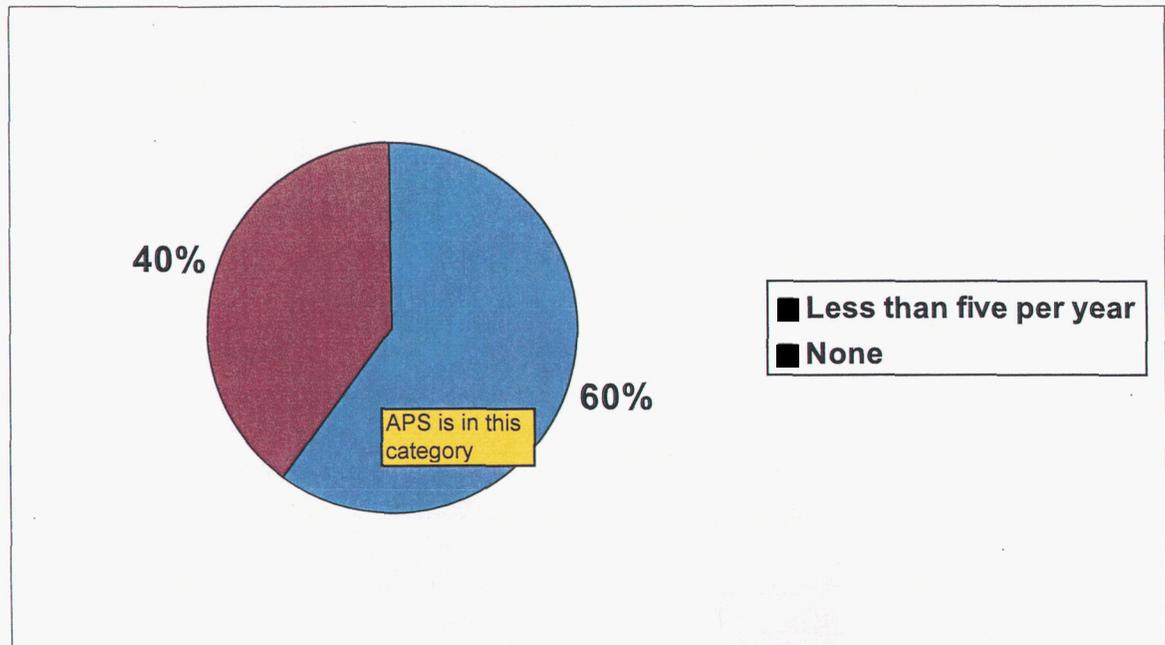
Is your Back Office fully independent and separate of Front Office transactional activities?



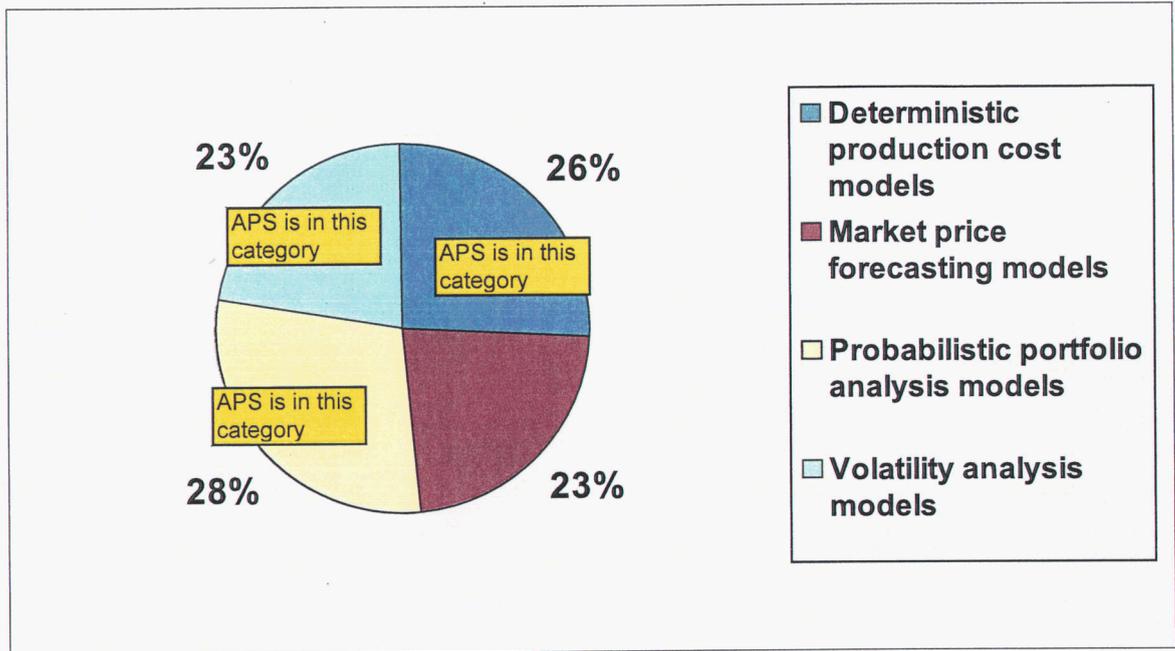
How frequently does your organization have independent audits performed of your energy risk control functions?



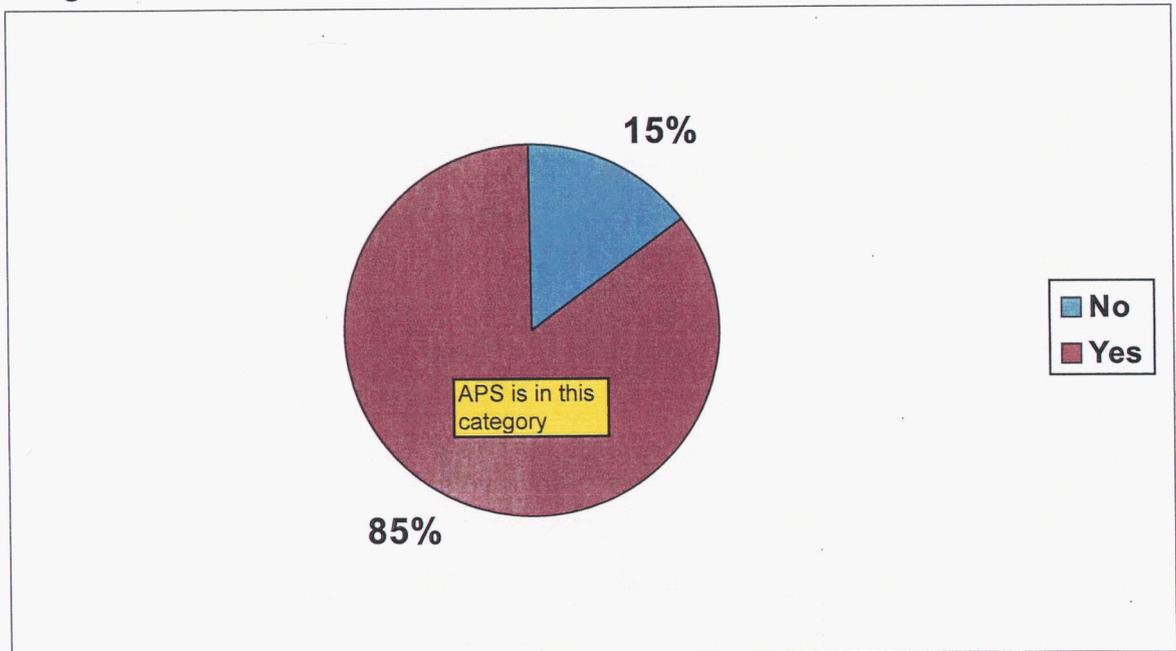
Approximately how many risk limit violations have occurred, on average, in your company in the past 5 years?



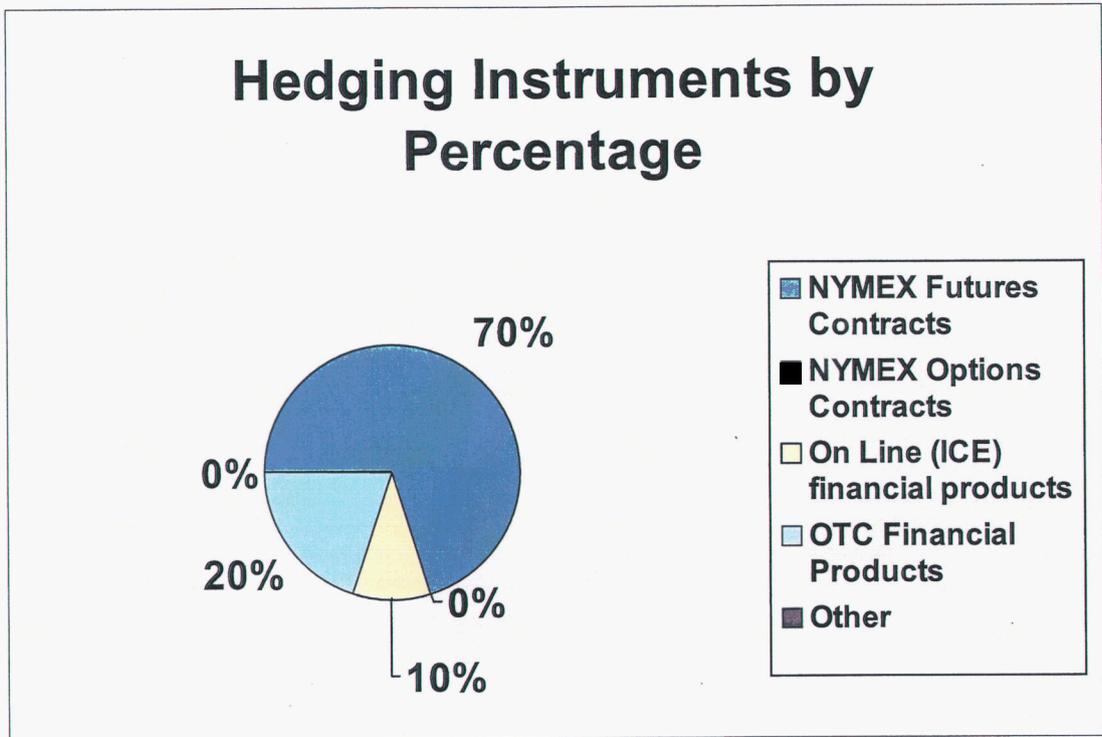
What types of models do you apply in your hedging program?



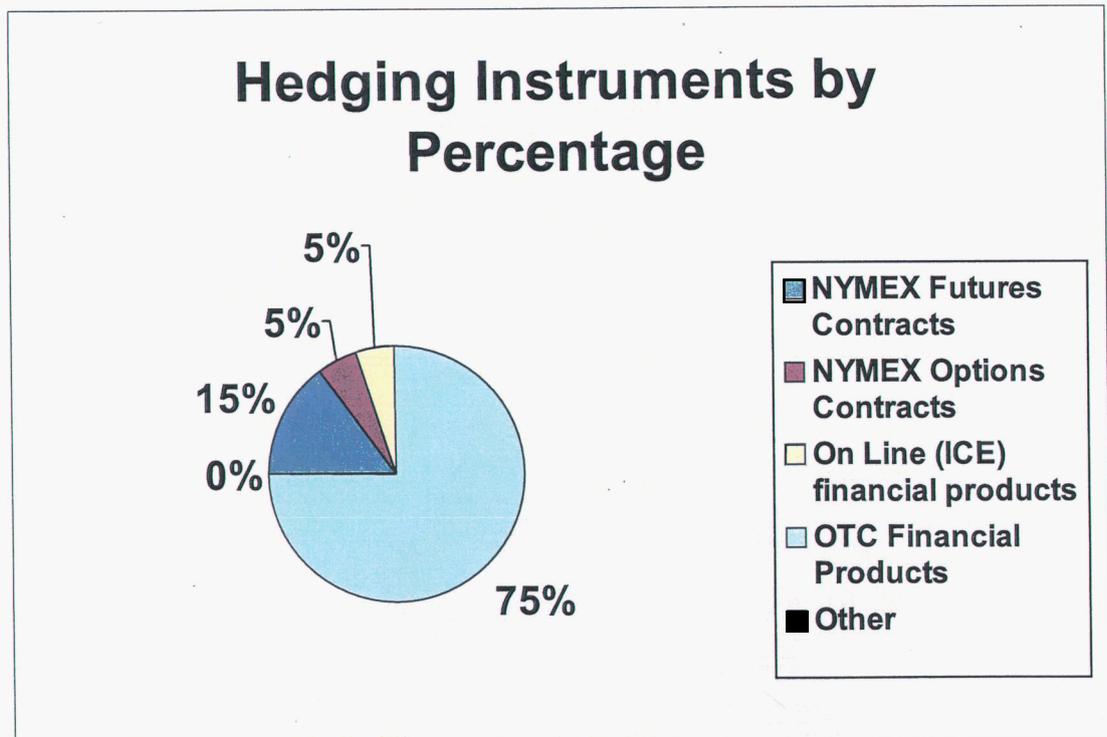
Does your company hedge or "lock-in" a portion of its natural gas requirements using either fixed price physical contracts or financial instruments?



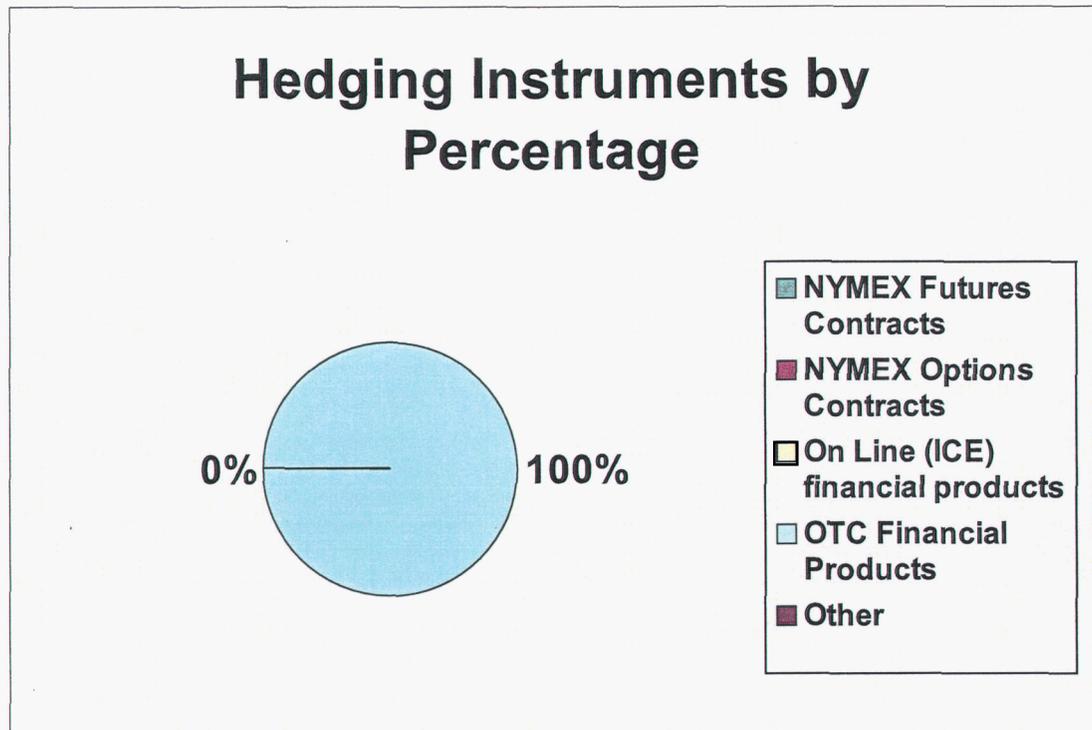
Company A



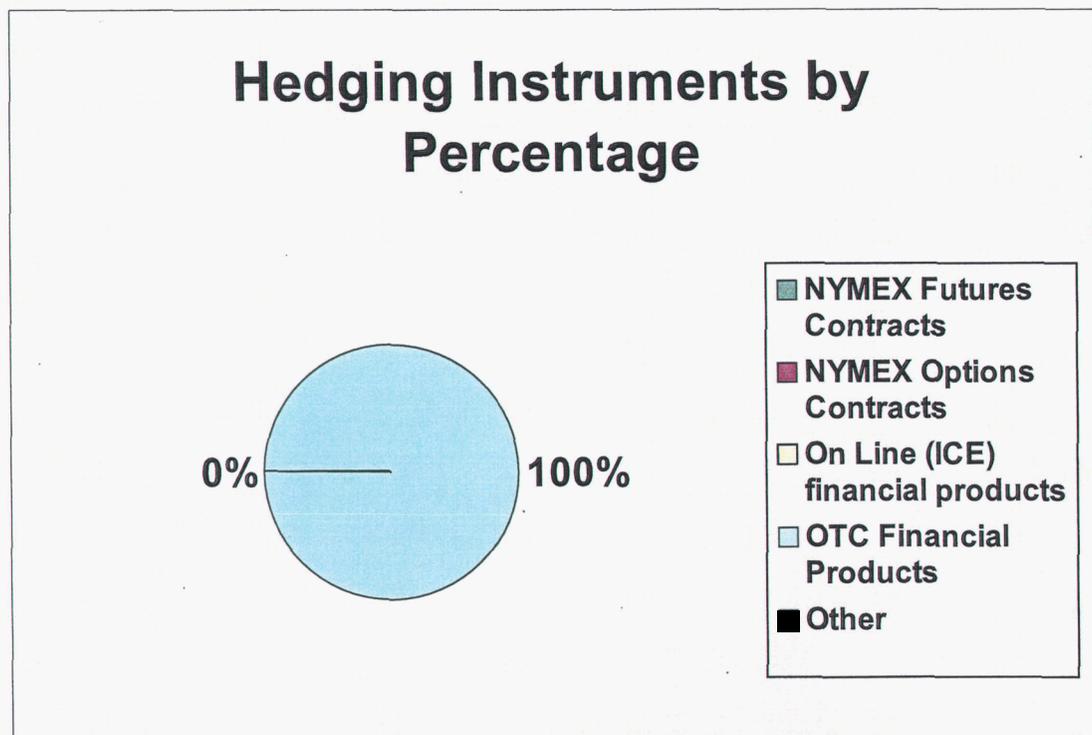
Company B



Company D

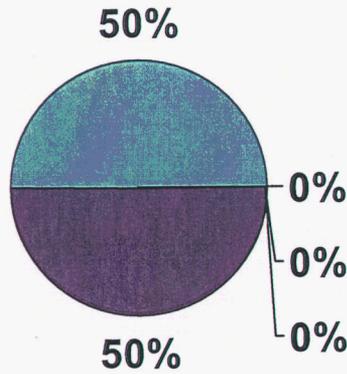


Company G



Company H

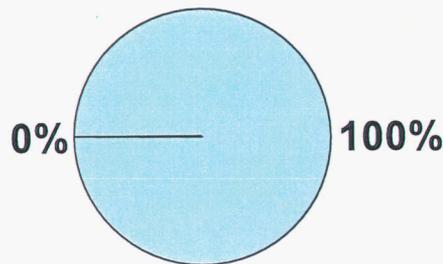
### Hedging Instruments by Percentage



- NYMEX Futures Contracts
- NYMEX Options Contracts
- On Line (ICE) financial products
- OTC Financial Products
- Other

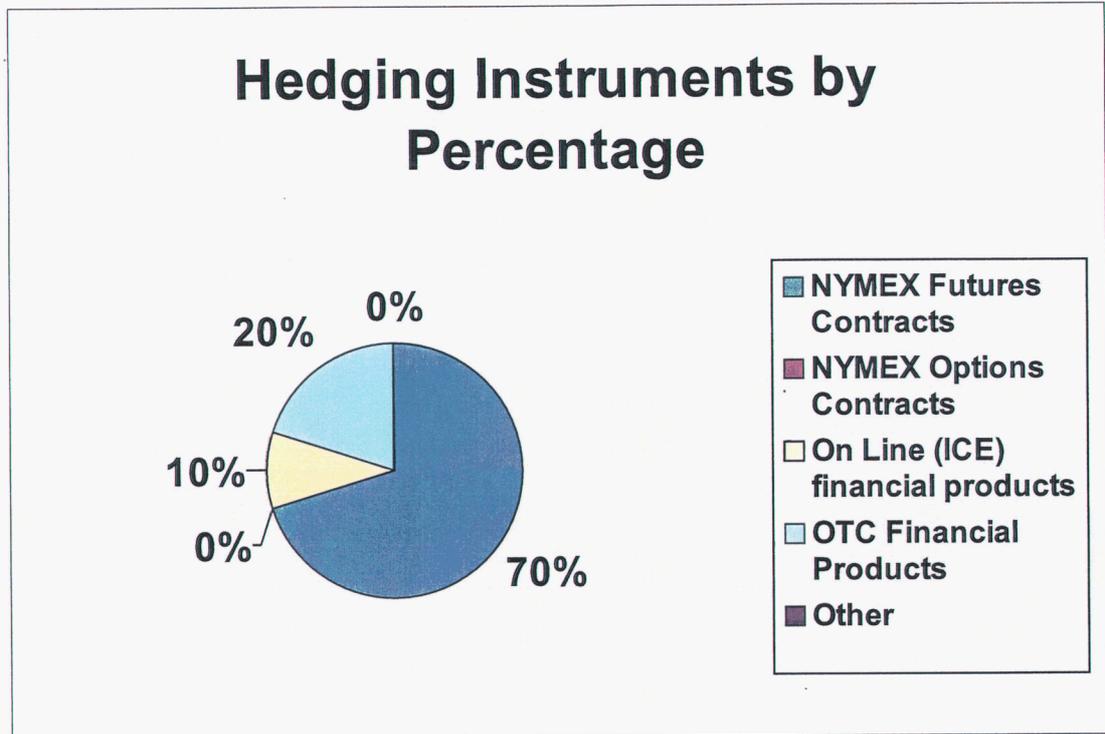
Company I

### Hedging Instruments by Percentage

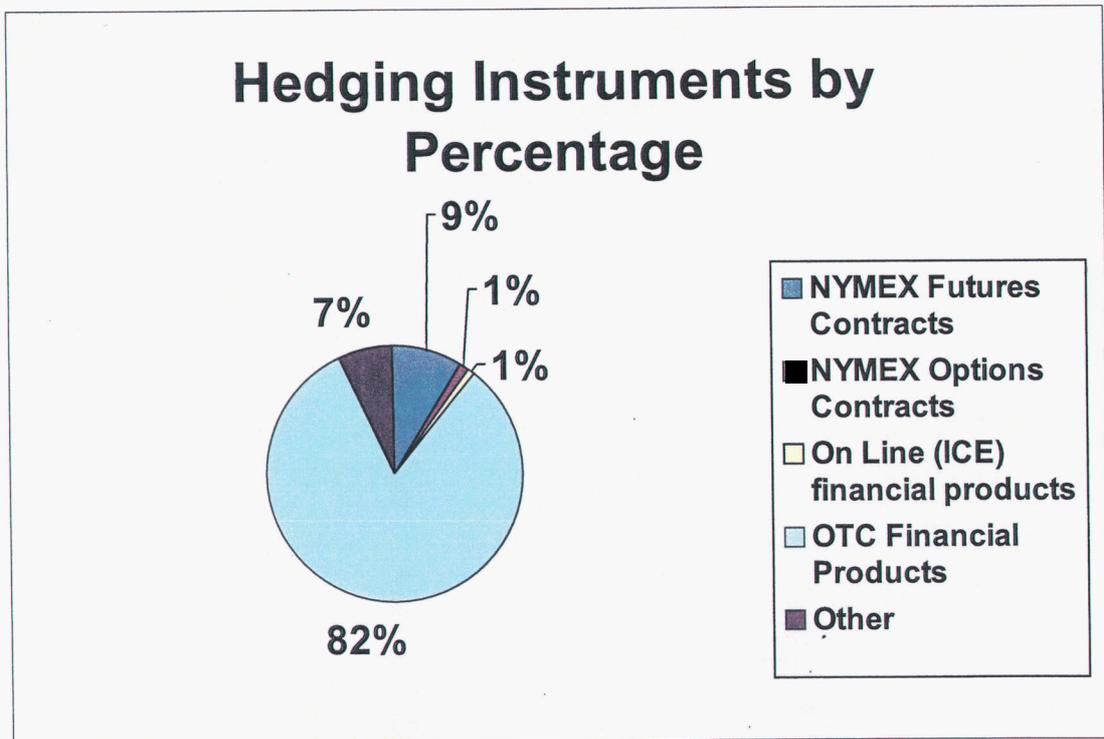


- NYMEX Futures Contracts
- NYMEX Options Contracts
- On Line (ICE) financial products
- OTC Financial Products
- Other

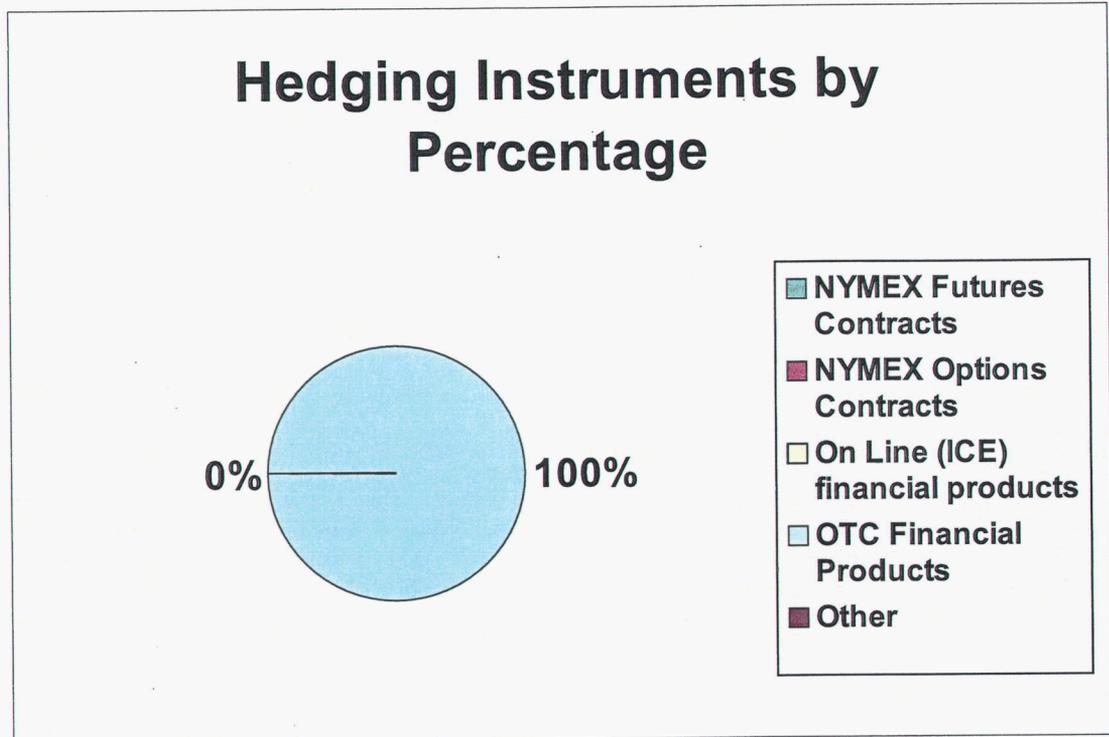
Company A



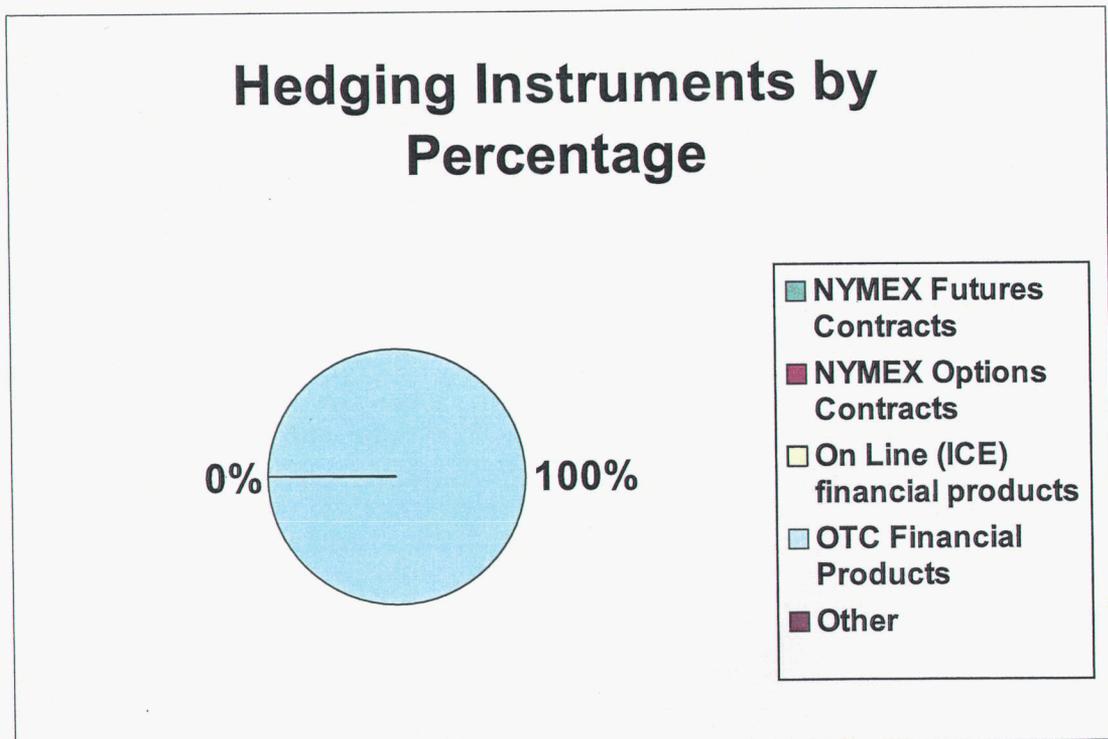
Others



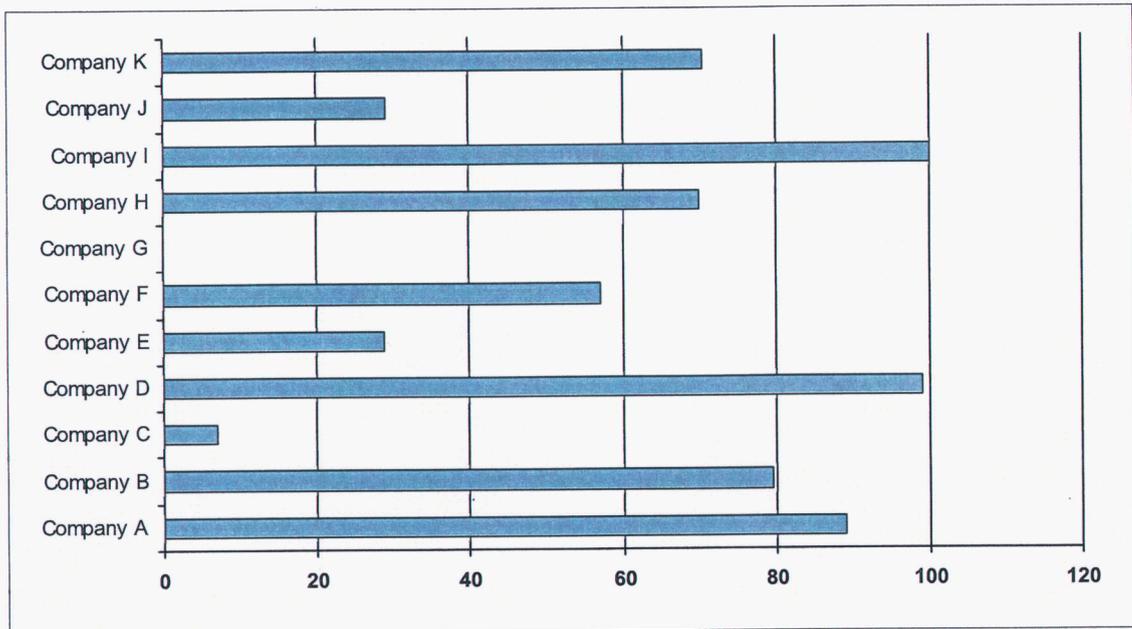
Company J



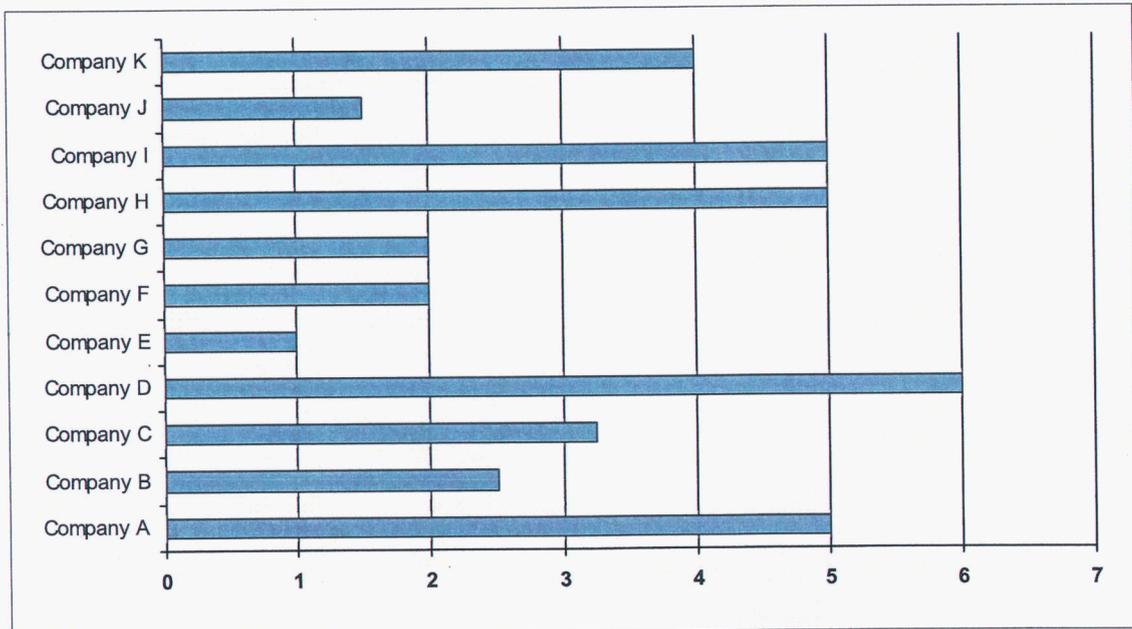
Company K



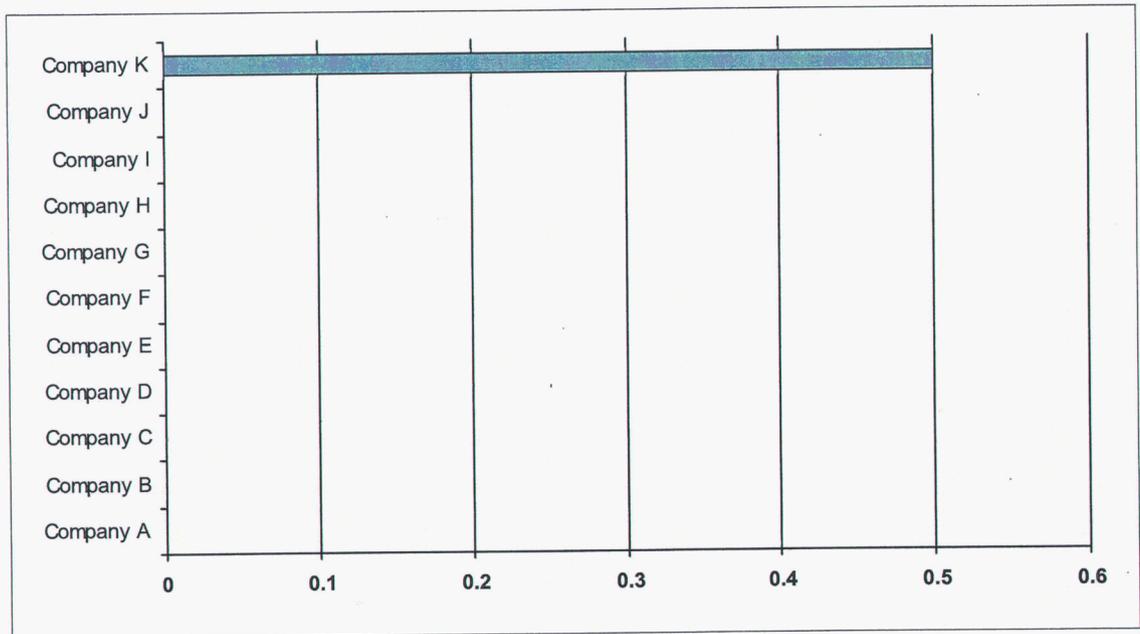
**What is your average delivered energy price (\$/MWh) to your customers?**



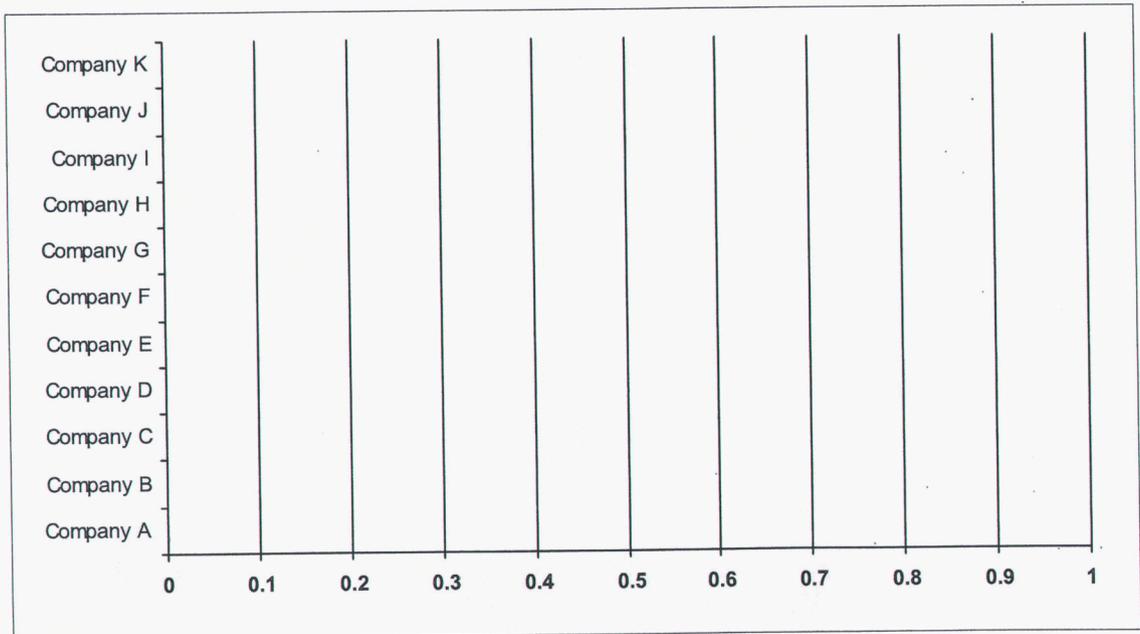
**Number of Full-time-equivalent employees in your energy risk management function**

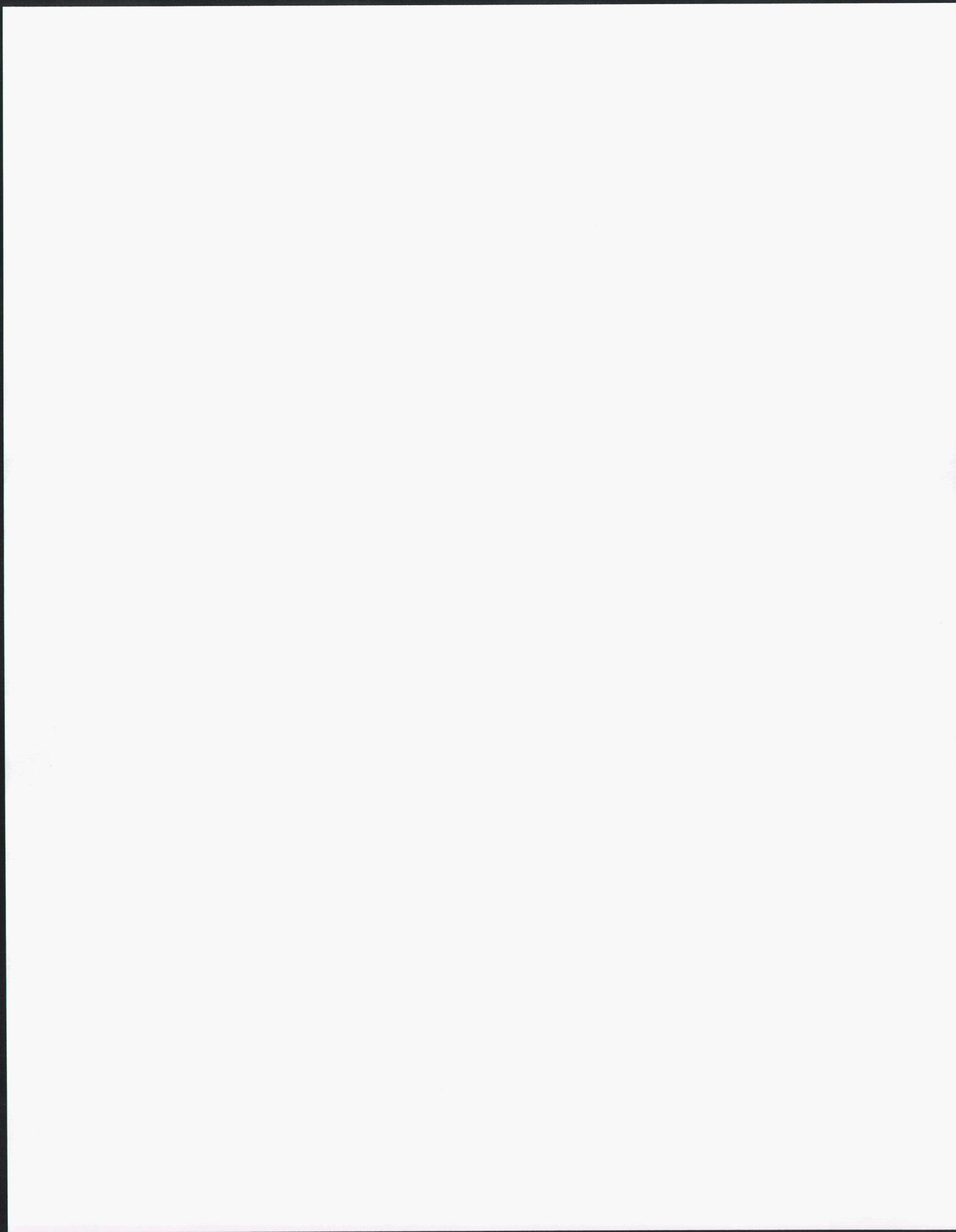


**Number of Part-time employees in your energy risk management function, expressed in terms of Full-time-equivalent employees**

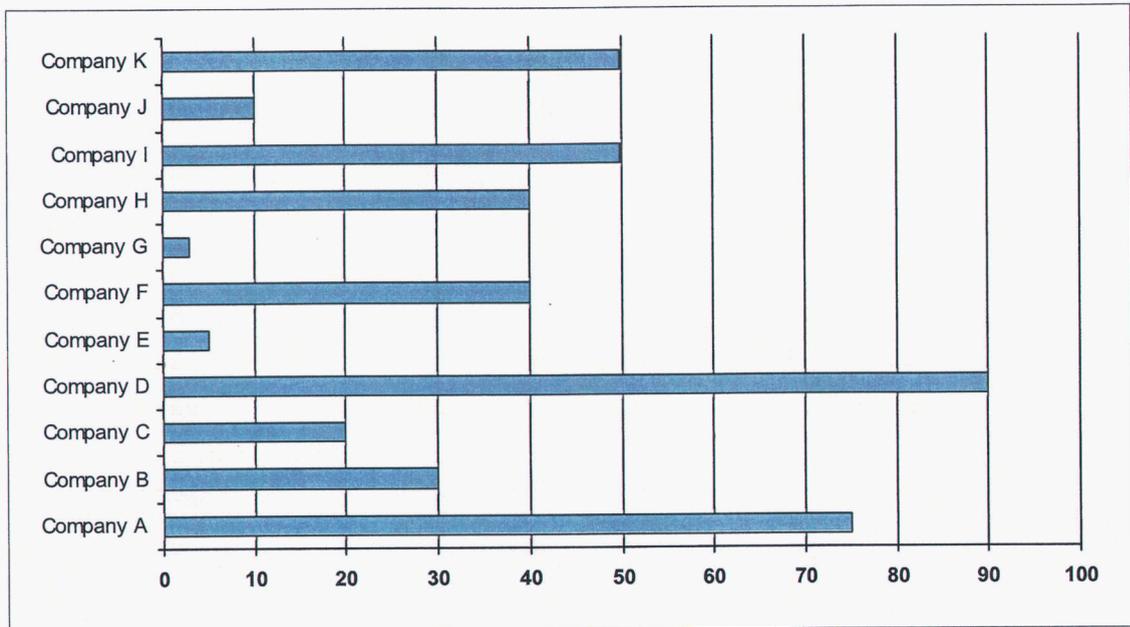


**Number of Outsourced employees in your energy risk management function, expressed in terms of Full-time-equivalent employees**

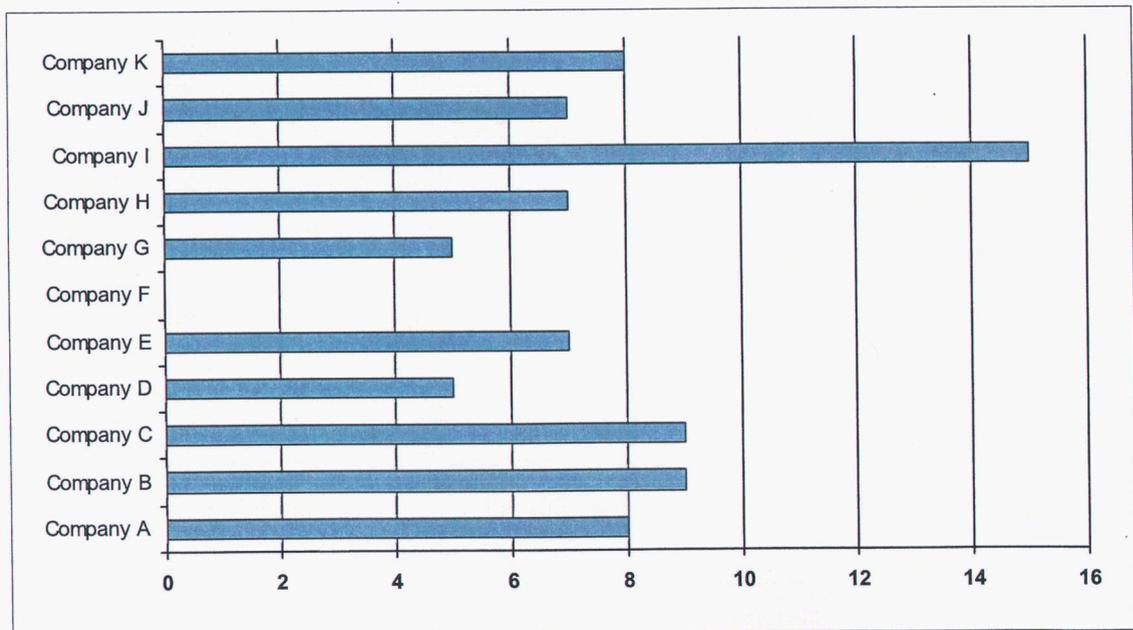




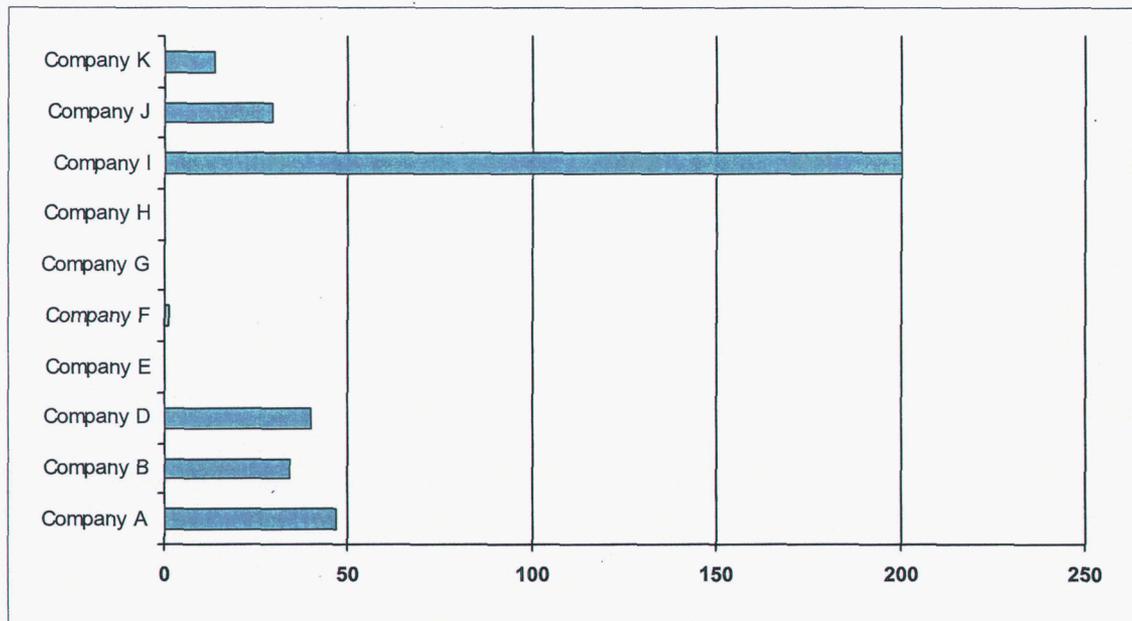
**Number of approximate years of cumulative experience for all employees in energy risk management function**



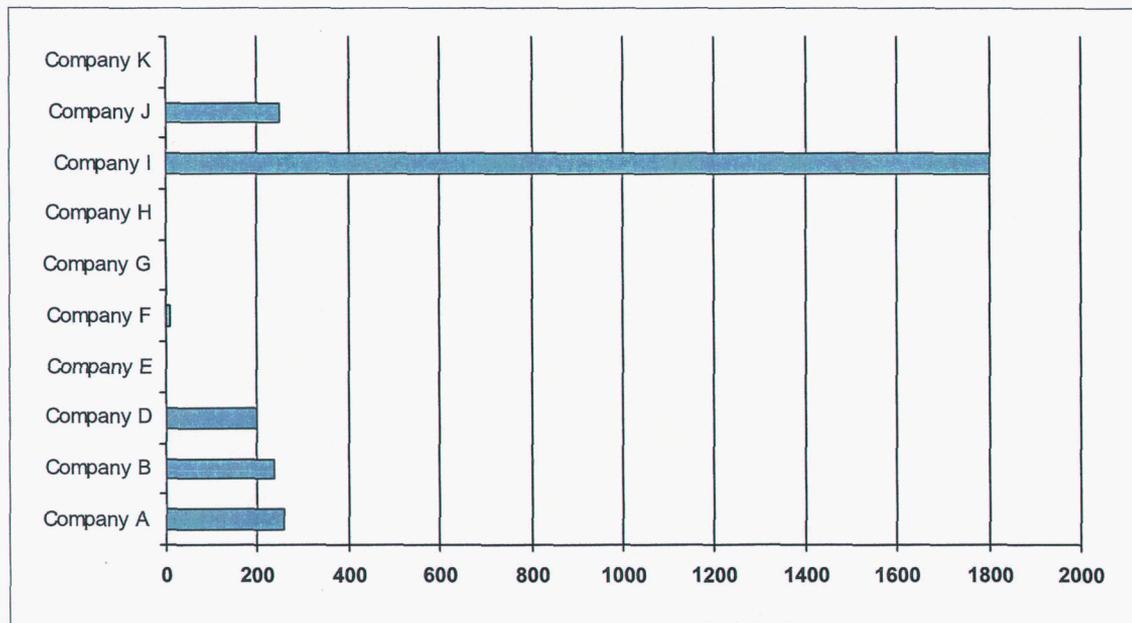
**How many persons are official members of your risk management committee?**



How much natural gas did you buy last year (in millions of MMBTU) ?



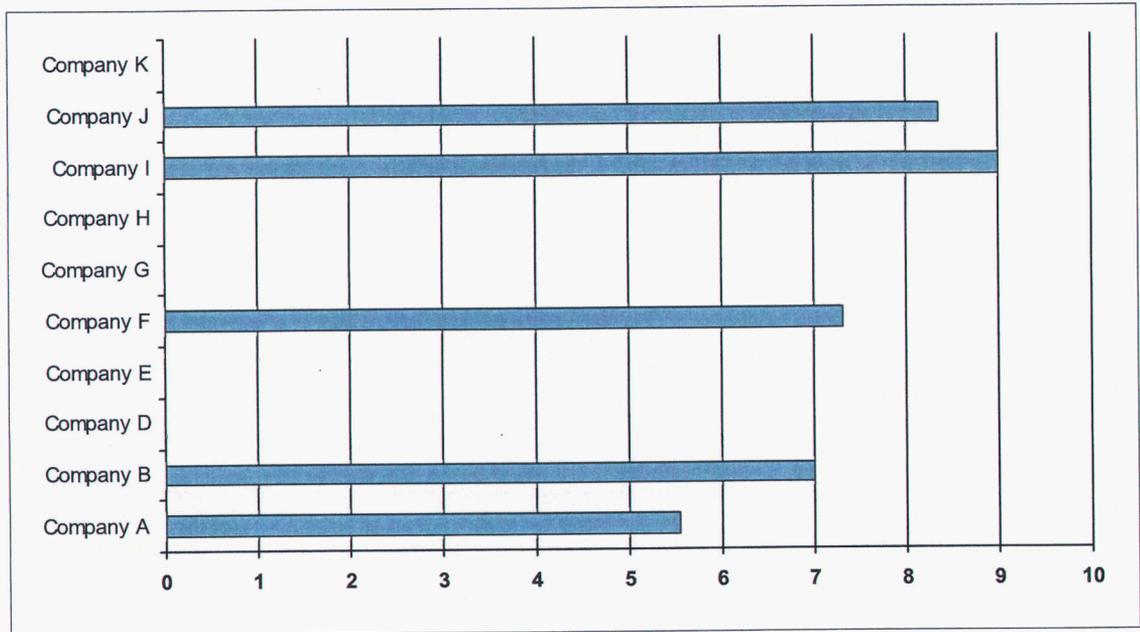
What was your total expenditure on natural gas last fiscal year (in millions of dollars) ?



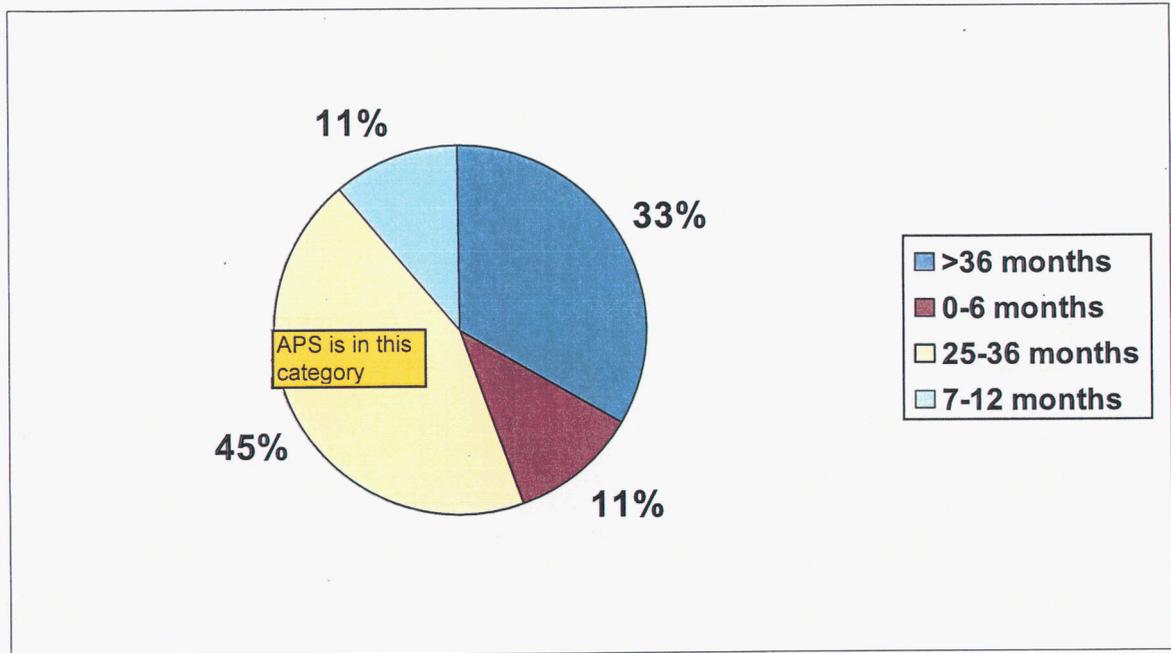
**What circumstances led to development and implementation of the hedge plan?**

Company A	Price volatility in late 1990's
Company B	1) Desire to have written guidelines approved by ROC to guide transactions, provide auditability to strategies
Company C	Volatility in natural gas prices
Company D	California Energy Crisis
Company G	Asset Optimization
Company H	Acquisition of additional supply led to development of hedging plan.
Company I	Desire to stabilize end user costs.
Company K	Increased volatility in natural gas prices.

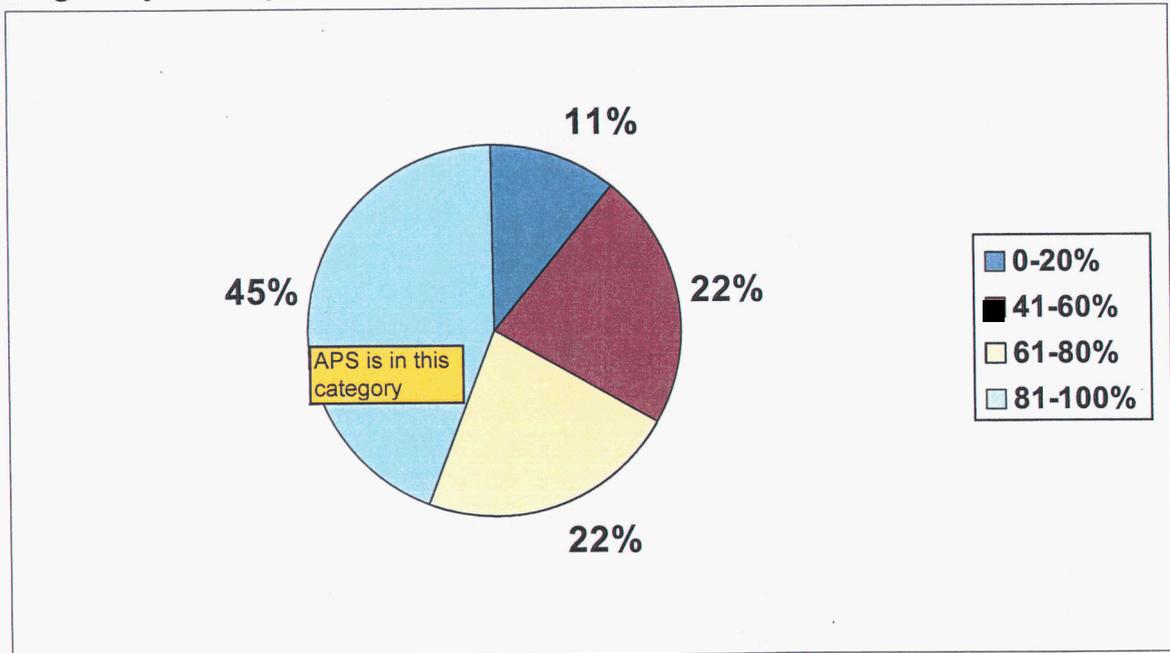
What was the average delivered commodity cost (\$/MMBTU) of that gas?



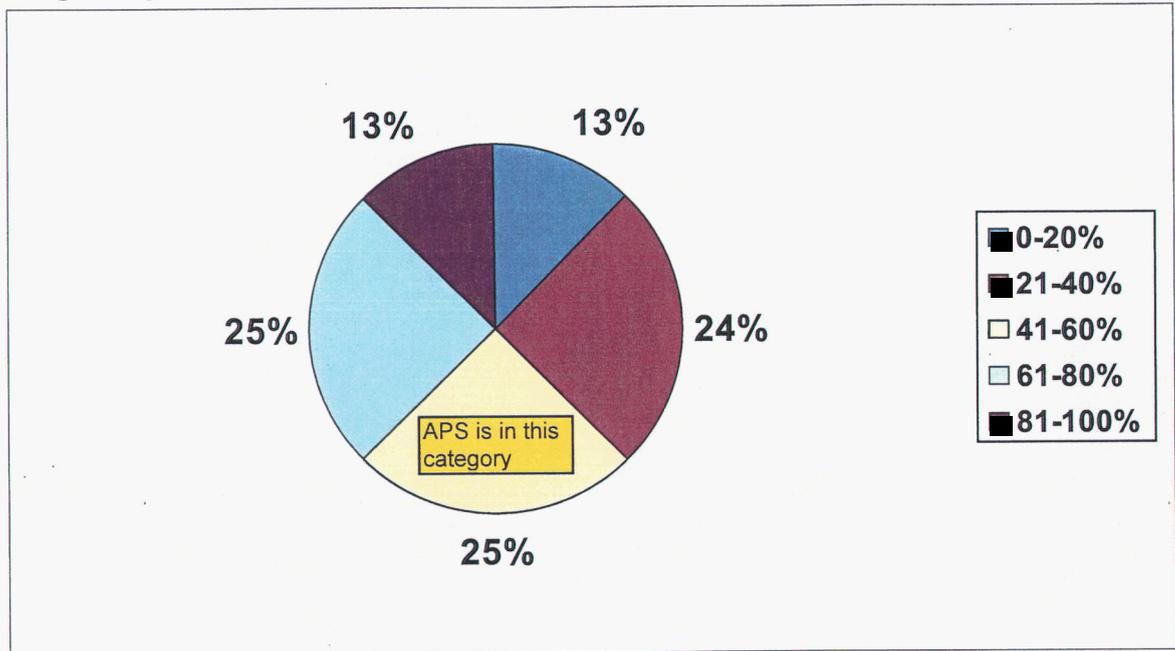
How far out do you typically hedge your natural gas requirements?



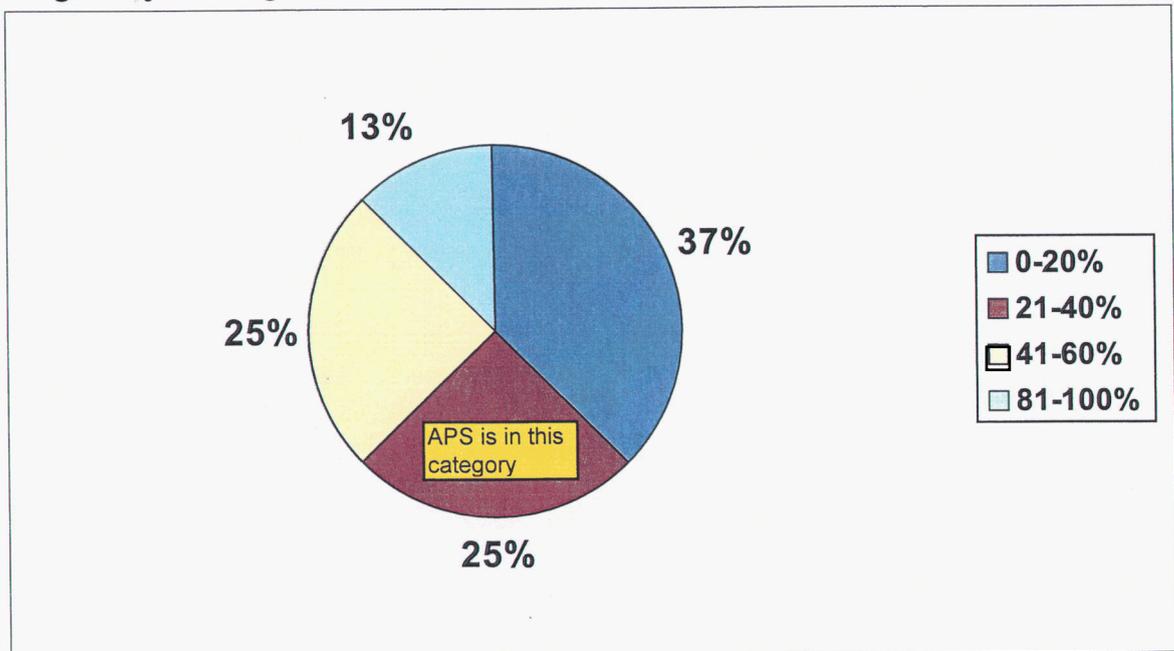
For the period of 0-12 months, what percentage of your expected natural gas usage do you hedge?



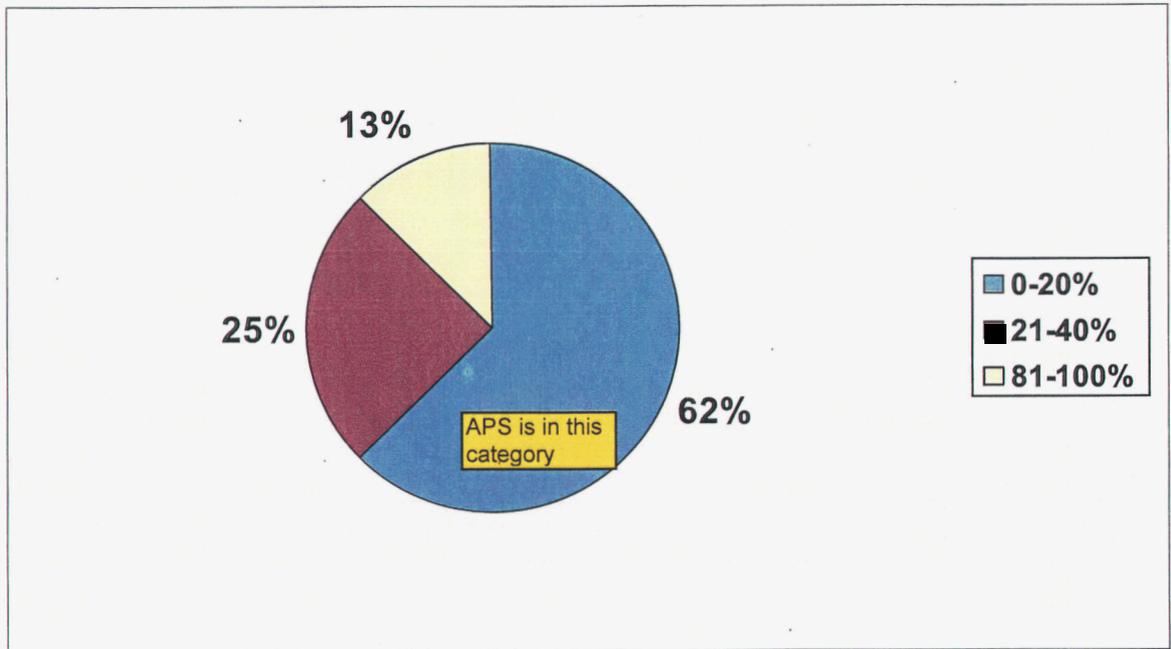
For the period of 12-24 months, what percentage of your expected natural gas usage do you hedge?



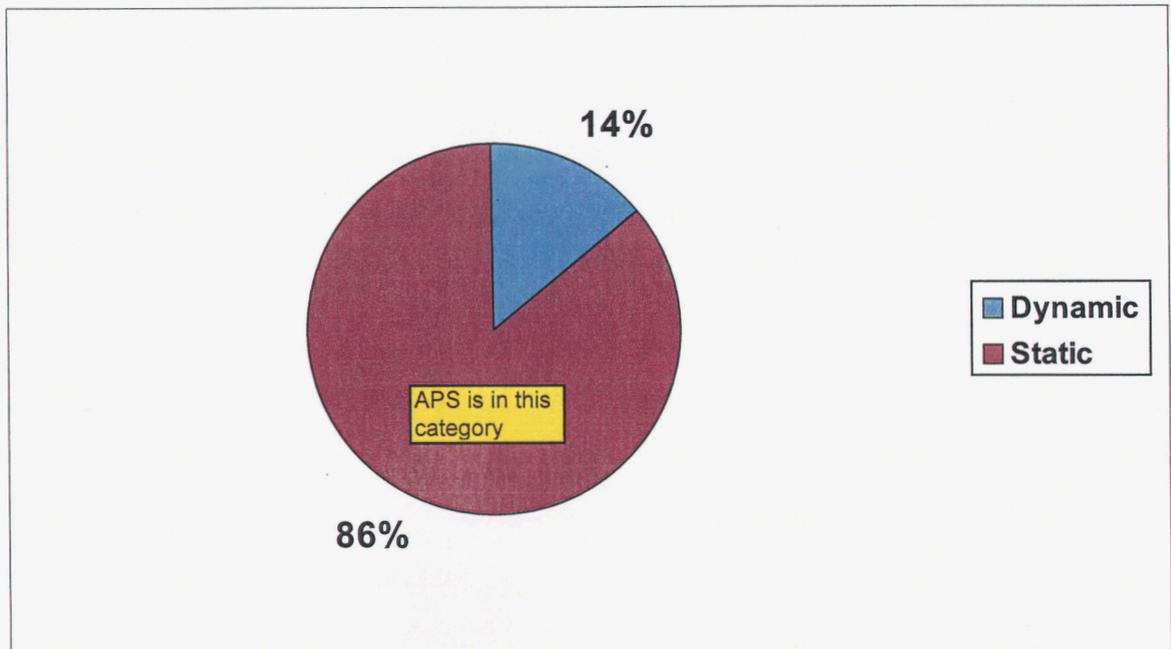
For the period of 24-36 months, what percentage of your expected natural gas usage do you hedge?



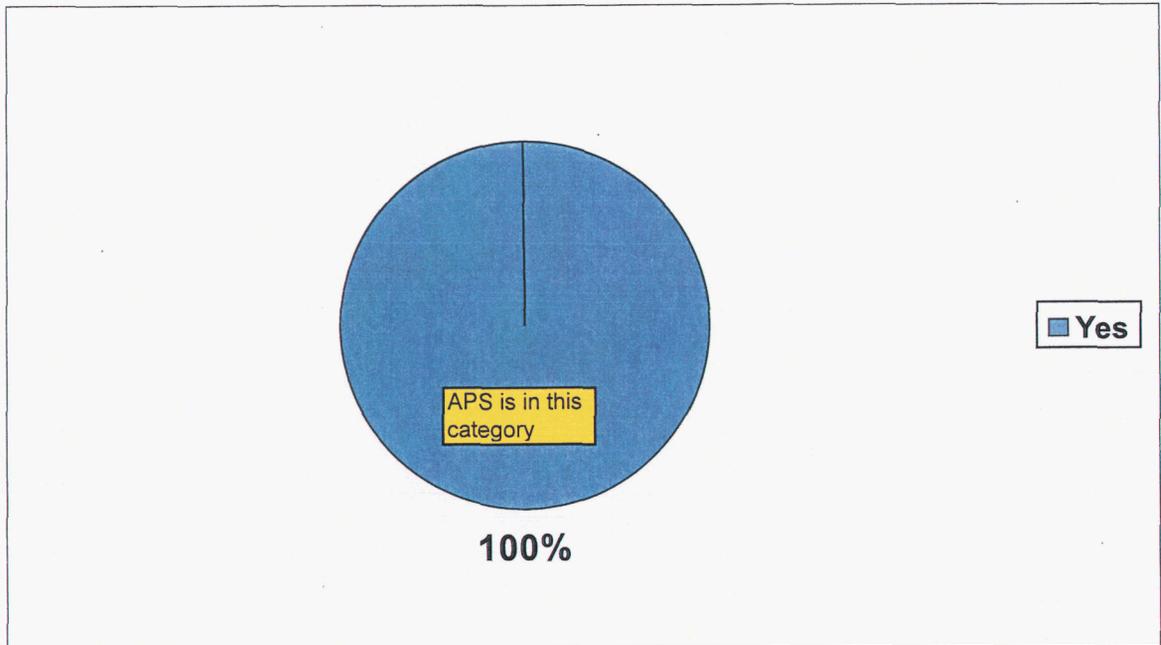
For the period beyond 36 months, what percentage of your expected natural gas usage do you hedge?



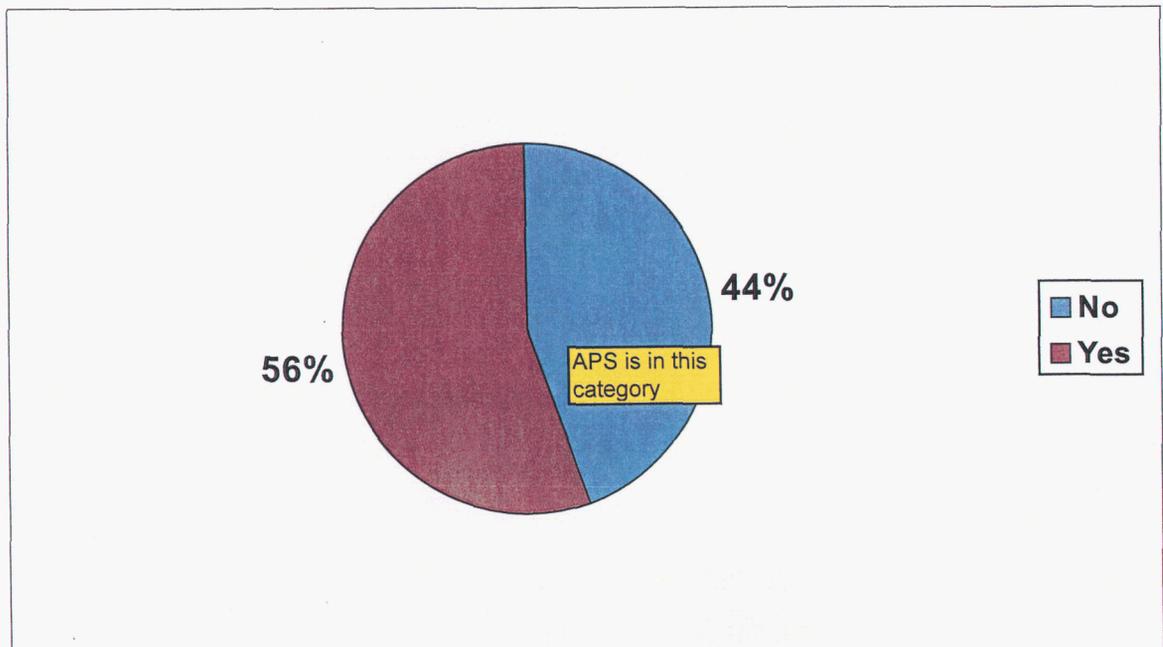
If you hedge fuel, are the hedges primarily static or are they dynamic?



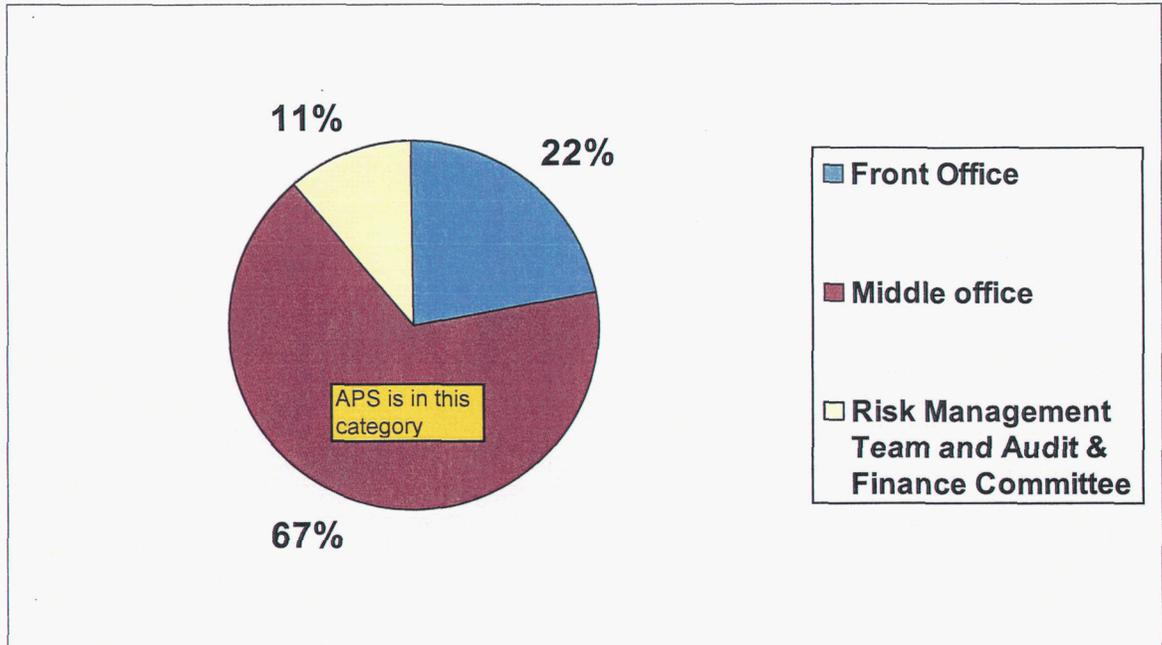
Does your hedge program include target deadlines to reach planned hedge percentage?



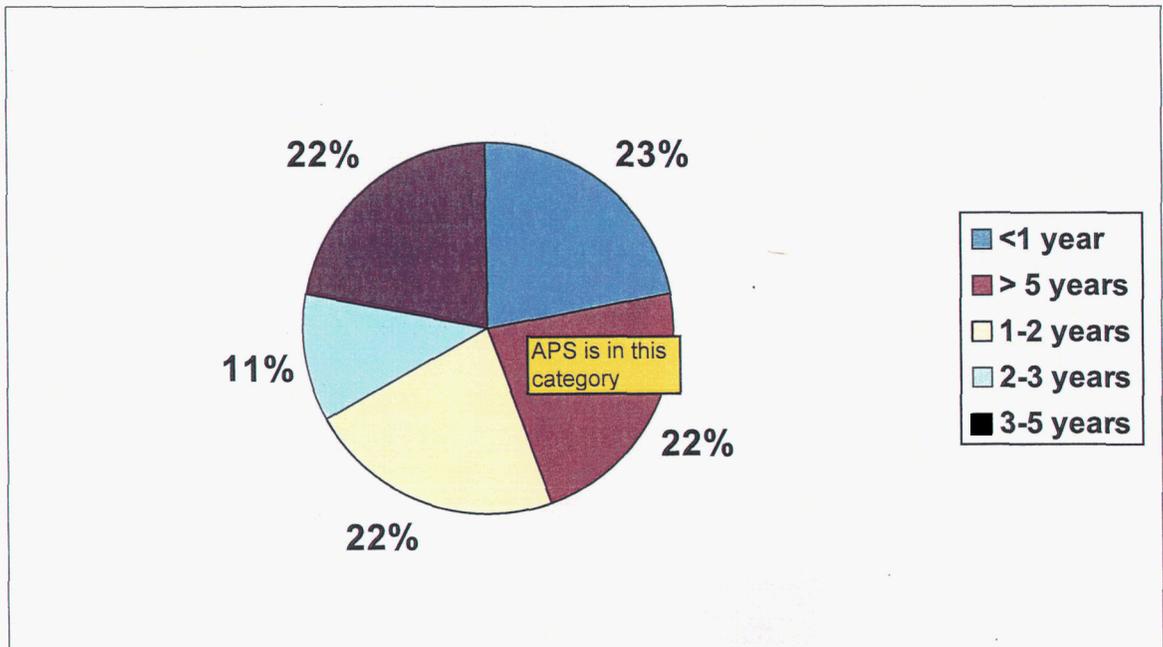
Can the target deadlines be adjusted?



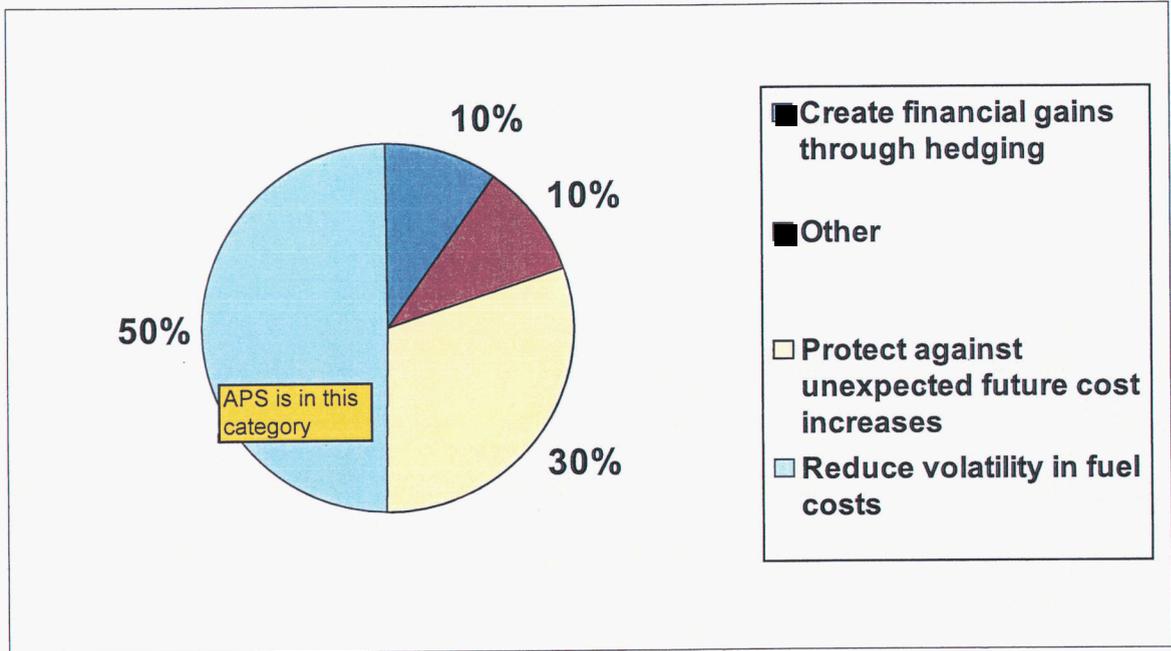
If your hedge program has target deadlines, what individuals/departments ensure they are complied with?



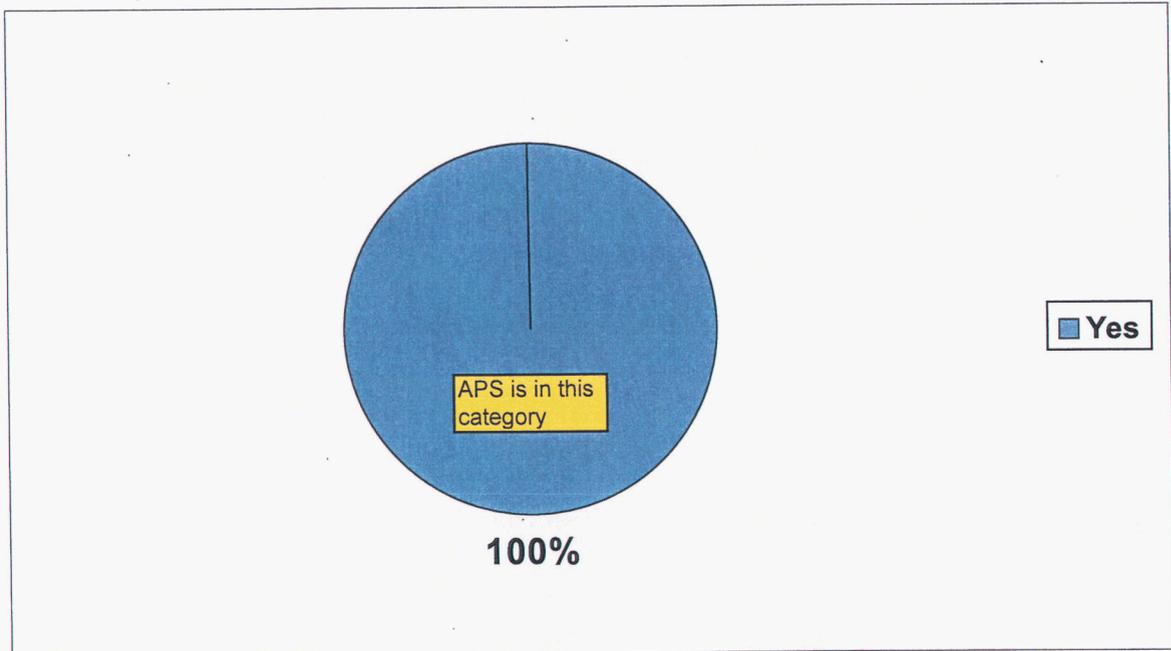
How long has the hedge plan been in place?



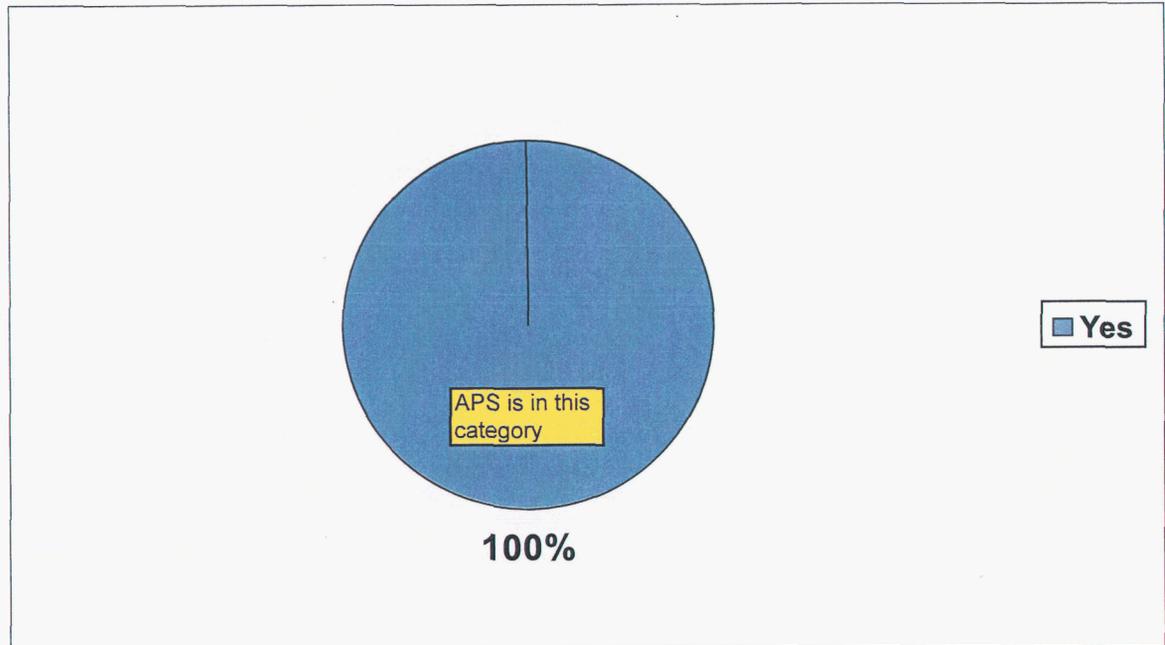
What is the most important goal of your energy hedging program?



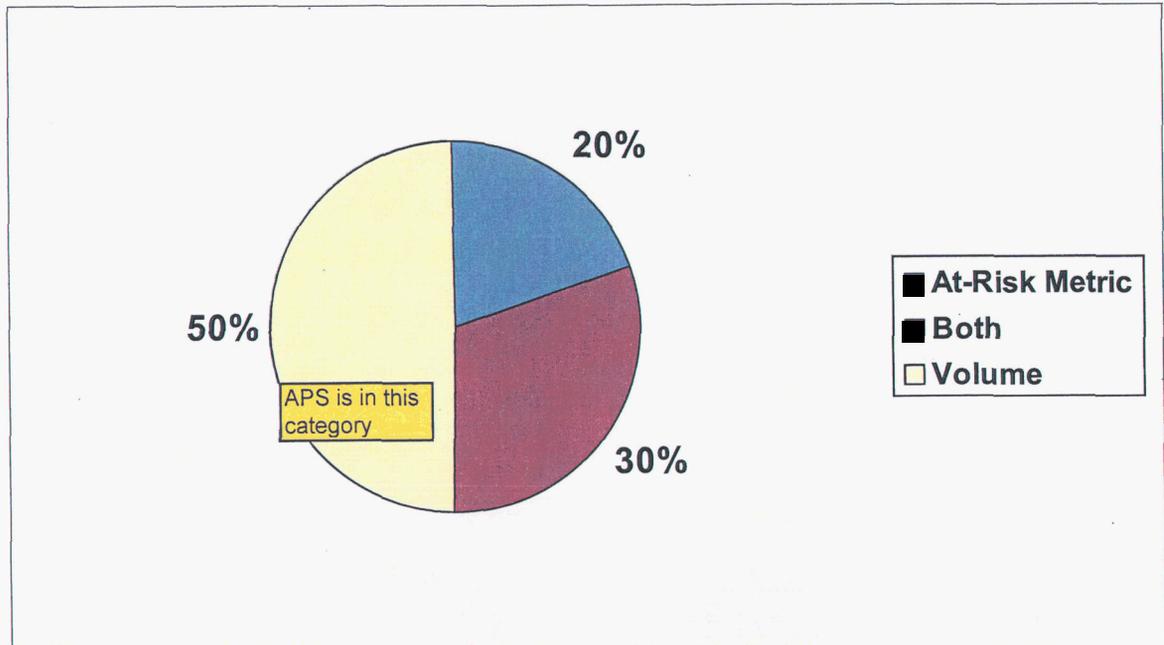
Have your hedges been effective in achieving this goal?

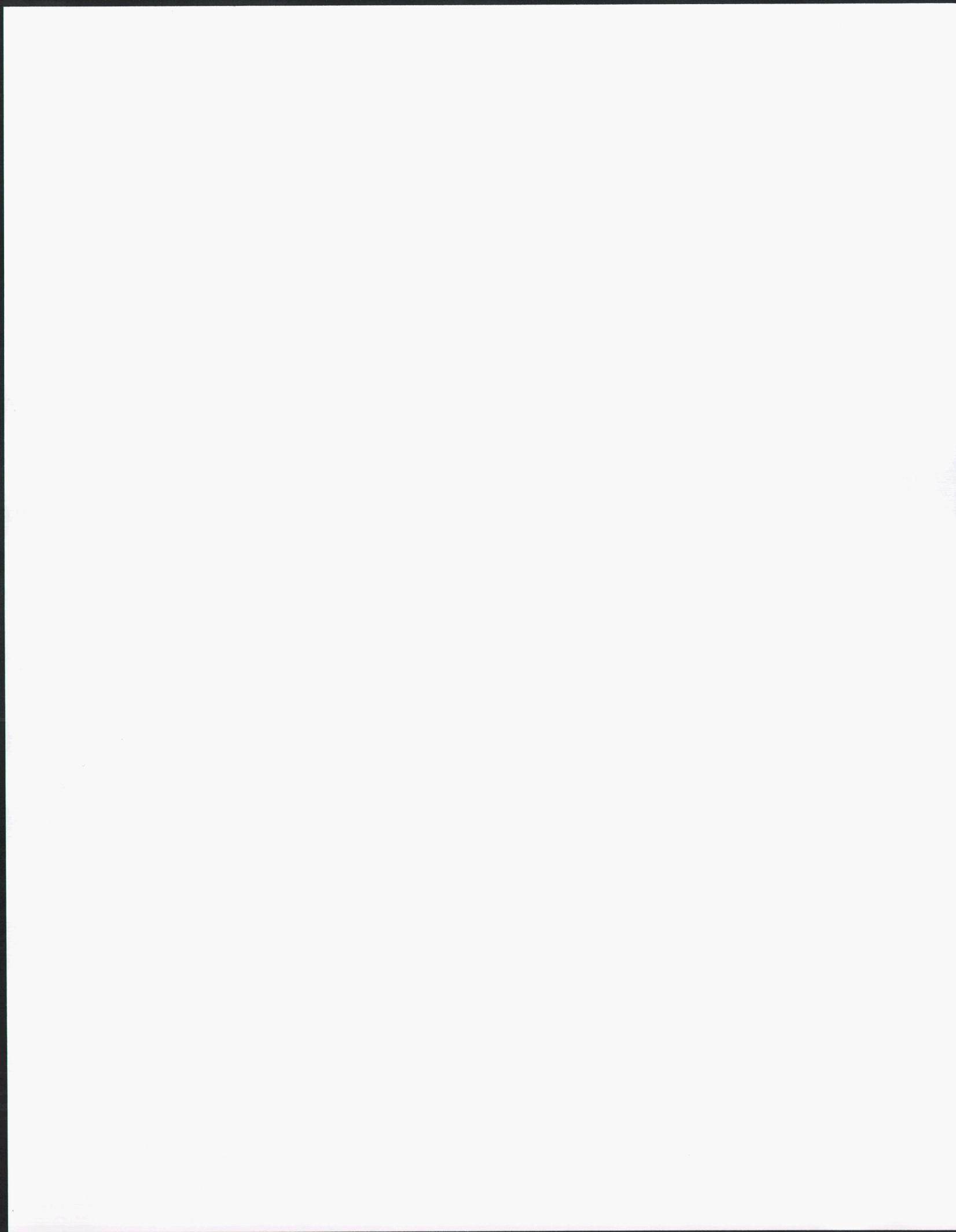


Do you regularly calculate and update the mark-to-market value of your hedges?



Is your hedging program primarily tied to an at-risk metric (e.g. VaR, CFaR, etc.) or to volume?

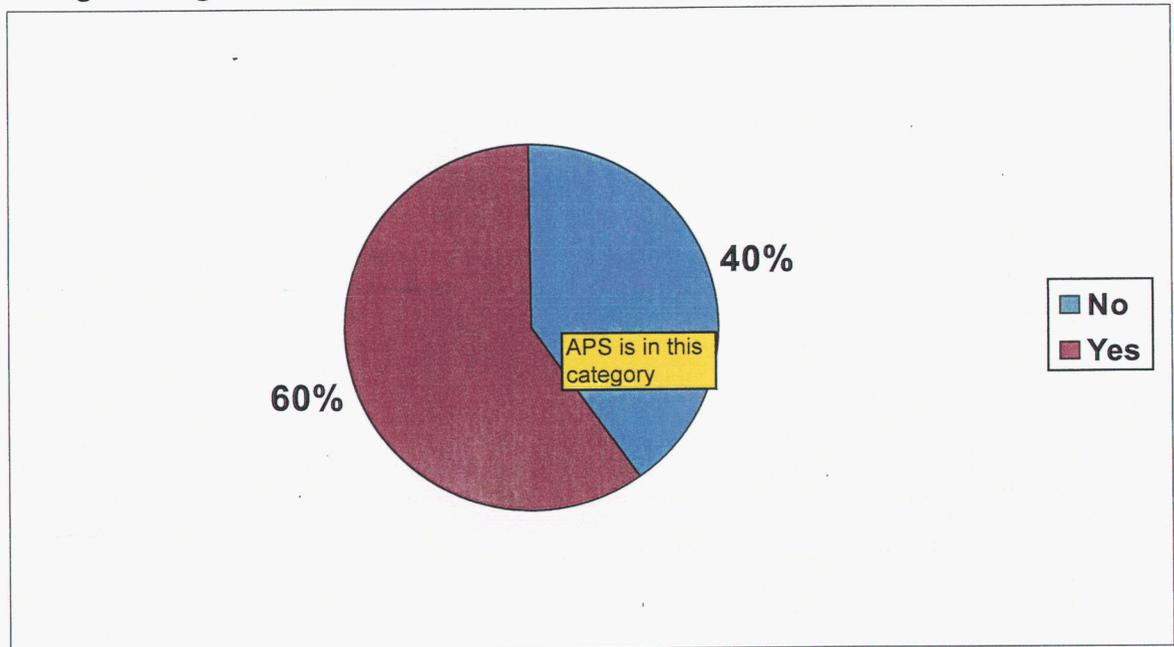




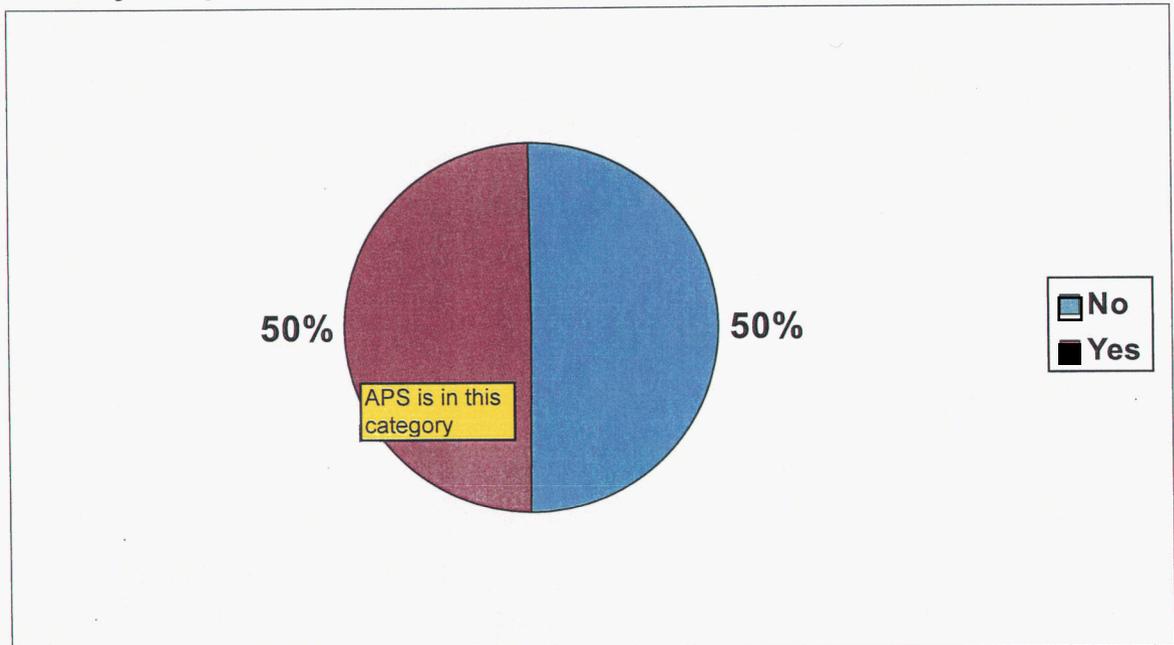
**How do you analyze and document hedge effectiveness? Please describe.**

Company A	We primarily look at changes in stress test levels, and MTM value of hedge.
Company B	Ongoing analysis of overall P&L, and instrument P&L, forecast hedge levels vs. actual (forecast error), annual external review to include strategy elements
Company C	Results are reviewed. Hedging is for price certainty, not speculation.
Company E	Don't currently
Company G	Mark to market
Company H	performance within limits, expected versus actuals
Company J	We do not have an established method for analyzing and documenting hedge effectiveness. We do not use "hedge accounting" under FAS 133
Company K	Prepare an annual report on strategy compliance and effectiveness.

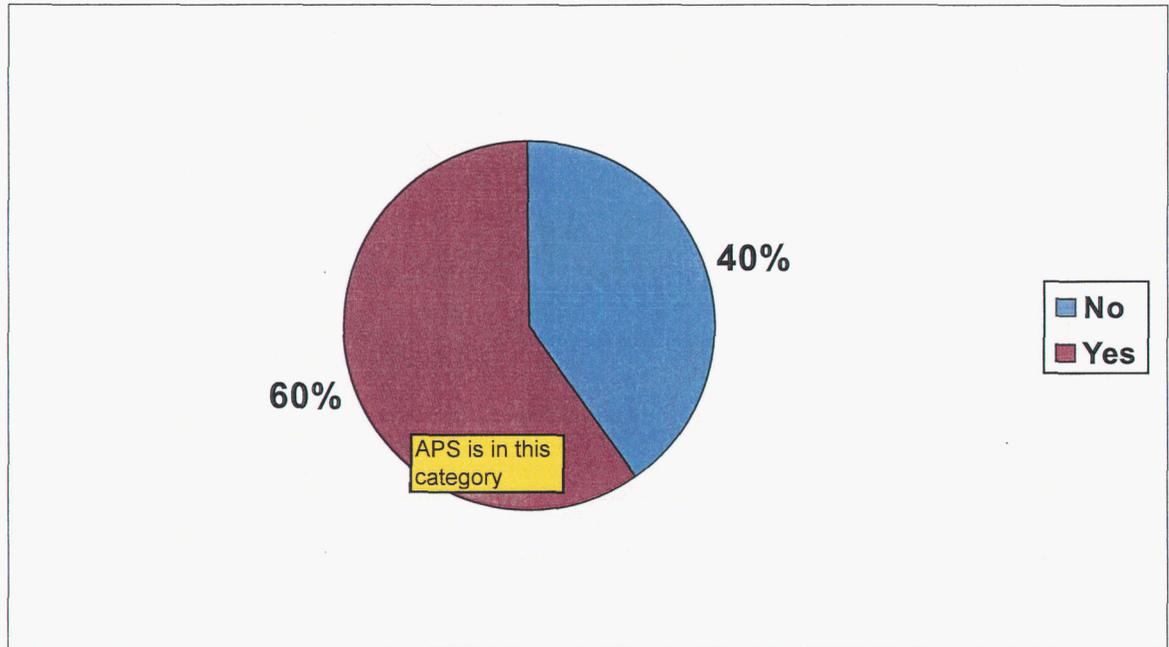
Is your Front Office allowed to execute discretion regarding the quantity and timing of hedge transactions?



After a hedging transaction has been placed, does the Front Office have the authority to liquidate the position?



Does your hedge program allow you to optimize your fuel mix in order to reduce costs?



What level of trader discretion is allowed when optimizing fuel mix to reduce fuel costs?

