

CHEMICALS SECTOR TEAM STUDY

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During the first half of 1995, members of the Chemicals Sector Team conducted a survey of companies in the chemical industry. The general topics discussed were:

1. Industry/Utility Interface
2. ESCOs and Consultants
3. Capital Priorities
4. Government Policies
5. Energy Performance
6. General

Most of the interviews were conducted either in person or by phone. Company and plant representatives were sent a list of questions ahead of time and were encouraged to add other thoughts and observations pertinent to each of the topics during the interview.

This report is not intended to be comprehensive. It does, however, provide a wealth of information about how the chemical industry operates and gives valuable insights into individual company concerns about a variety of energy-related topics. It will help the reader gain a better understanding of the relationships chemical companies have with their utility companies, as well as with state and federal governmental agencies. It will also increase the reader's awareness of the problems, obstacles and frustrations many companies face.

Most of the respondents were from either Texas or Louisiana. This is appropriate because these states have many energy-intensive companies and plants located within their boundaries. The Chemicals Sector Team agreed to keep the names of individual companies confidential, but we wish to publicly thank them for their input.

In the text that follows, questions and discussion topics appear in boxes. Each set of questions is followed by a brief summary of company replies, printed in *italics*. Then come individual company responses, with a blank line separating the responses from different companies. When a new paragraph starts a page, but is part of the same company's response, the word: "(continued)" is inserted at the end of the preceding paragraph.

1. INDUSTRY/UTILITY INTERFACE

What is your relationship with your local power company?

What would you LIKE that relationship to be?

Do you look to the power company for help?

If so: What kind of help?

How have they helped you in the past?

In general, how do you feel about "partnering" with your utility company?

Summary:

In general, most companies have a reasonably good relationship with their local utility company, although it is not one of mutual trust. There appear to be numerous opportunities for utilities to spend more time communicating with and understanding their customers' needs, especially if such dialogue leads to increased profitability for the companies. The main types of help companies look for, however, is either specific to electrical distribution equipment (primarily for reliability), or reductions in rates and tariffs. Some thought the general concept of "partnering" was OK, but no one seemed particularly interested in pursuing a partnering arrangement where the utility got involved in the company's technology. Company interest was more directed at challenging the utility to come up with ways to provide them with lower cost energy. A few utilities were criticized for their slowness to respond to company requests for information or assistance, but this did not seem to be a serious problem.

Individual Responses:

Our relationship with our local power companies is generally positive. We are served by many utilities so it is probably inappropriate to generalize too broadly. Most seem to recognize that the era of the "captive" customer is coming to a close and that they need to earn their customers through improved customer service and through competitively priced service.

I believe that the Power Companies should treat their customers in the same manner that any other commodity provider treats its customers. They should aggressively work to make their customers more successful by offering a quality/reliable product at a cost which gives their customers a competitive advantage in the global marketplace in which they compete.

My sense is that in the past, work with the poorer companies has focused on reliability aspects. Regarding pricing, the utilities have varied in their interest in obtaining input regarding rate design, cost allocation and new supply options.

We have several "partnering" arrangements with utility companies serving us and have no problem with entering into additional partnering relationships. A key is for both parties to be interested in the long term success of both "partners." There obviously needs to be a fit between the "needs" of the participants and the capability of each party to meet those needs.

We'd look for partners which are anxious to work towards beneficial supply relationships and not hide behind the excuse of "regulation prevents me from doing what you want." The regulators will agree to initiatives which are truly beneficial to all parties if the utility is "bold" enough to present such initiatives.

We are a cogenerator and buy a small amount of power from LP&L. I think we have a good relationship, except for price. We have considered phasing out some of our inefficient cogeneration equipment and purchasing power from LP&L. They've made a number of proposals, but we haven't reached agreement yet, especially on price. They are fixed in what they'll do. They aren't very flexible.

LP&L has helped us by allowing us to borrow transformers to cover outages. Other than that type of support I don't know of anything else they could be doing for us.

Our relationship with LP&L is very good. We have good communications. The operators at their control center, for example, have established a good communications link. They contact our plant operators regularly.
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Most of the help we have needed from them concerns improved reliability on their part. We aren't interested in having them get involved in our process.

We have a pretty good relationship, especially when it comes to holding discussions. The problem is that they're too expensive. They're not competitive.

We have a very good relationship with HL&P. We are one of their top ten customers. They are always very receptive to meeting and discussing problems, and meet with us at our convenience. In general, they try to discourage self-generation or cogeneration.

We look to them for help in managing costs, primarily through rate structures. They have been helpful in this regard. They have also been helpful and responsive on special relay and outage problems. We have our own in-house engineering group that provides our technical support needs, so don't need them for that.

Over the last few years, policy relationship between electric and gas utilities have bumped up against one another.

The electric utilities are promoting "good sense homes" which are all-electric. They are not cost-effective.

Using gas for heating homes, for example, is more efficient than electric heat.

Our utility has a litigious approach; they fight everything.

While our relationship has not been "adversarial" over the years, they have been less than cooperative at working with us on situations that should be mutually beneficial. They have not been innovative, preferring instead to present us with a "take-it-or-leave-it" position.

Since they merged into ENTERGY, they have been more receptive to discussing innovative ideas, although nothing has come to fruition yet. The ENTERGY management is not as intractable; they treat us less like they are a monopoly and are trying to develop ideas that would benefit both our companies.

We still feel they could be doing more in developing these ideas and hope they become more flexible.

We haven't called on them for much technical assistance except for a few operations/maintenance problems. We have our own in-house electrical and mechanical expertise that is adequate for our needs.

Partnering is a very good idea and we should grow into a partnering relationship. One of the key aspects of partnering is having the utility company work with us to take advantage of mutually beneficial opportunities. We have no need for them to get into our technology, however. That is not what we think of as "partnering."

Our relationship is generally good, but not as good as it was before they restructured.

We want them to talk to us more and communicate better. They need to understand where we're coming from on topics such as retail wheeling.

"Help" to us primarily means better rates and tariffs.

We are planning some major expansions in the future. A utility company representative sits on our Planning Committee, and that has worked well. I would call that "partnering."

We also have a Reliability Committee that the utility company participates on, trying to resolve supply problems.

We have a good relationship with our local power company. They have a monopoly situation, however, and they can treat us poorly.

We don't especially look to them for help. They have come in from time to time, especially if they're trying to sell us something (e.g. something that uses more electricity — such as electrically driven compressors — or replaces steam use with electrical use).

We have our own electrical engineers. We don't need the power company's.

Not sure what "partnering" means. We have worked with the power company's people.

We like to think of our relationship with our utility company as a partnership, but it is not a true partnership. They are a regulated utility and they can use that position to their advantage.

They charge us a "facilities fee" for equipment they have installed on our property. The problem is that we can never pay them off. We pay what we consider to be an exorbitant fee and the utility company makes a windfall profit. We could buy the equipment ourselves, but the utility company sets the price, and it is not competitive. This is our only major problem with the utility company. (continued)

Occasionally we look to our utility company for help, but we have our own electrical engineers and don't need to do this very often. A few years ago we hired a utility company employee into our marketing and engineering area.

We have good contact with our local power company. We meet on a regular basis. We don't, however, buy a lot of power because we are a cogenerator.

Our problem is with ratchets. We want the power company to eliminate them and have shown them that they are losing money because we won't buy power from them when our turbines trip. We will cut back our operating rates instead.

The utility company is extremely slow to move, and we don't feel they have our best interests in mind on this issue.

Partnering works well between us except when money is involved. The utility company helped do an energy survey. We were pleased with the results.

Our utility company has consolidated, but we still find that it takes a long time to get a decision. There are a lot of administrative details that make it slow to work through their organization.

We had a better relationship before our local power company merged. They are contracted to operate and maintain two coke-fired boiler-based cogeneration units that we jointly own with two other companies. The cogeneration units supply steam and power to all three of our plant sites.

The power company is no longer focused on our company's interests. They are more interested in reducing their own costs. They have down-sized and have allowed their organizational structure to become too lean. They are losing management focus on running the power plant to the point where we are now concerned about availability and reliability. These are extremely important to us; more important than their cost reduction achievements.

In the past they have provided some technical and engineering support, but they have cut folks now; that effort is diluted.

We were on very good terms with our local power company prior to our company's building a cogeneration plant. After that our relationship declined a little, but I think we still have a good relationship.

We are dependent on them for backup and standby power. We also have purchase agreements from other facilities. Our desire is to keep it on a good basis which makes negotiating for different contract requirements a lot easier.

With respect to partnering we discussed partnering with our power company at the time we built our cogeneration unit. However, they were in a poor financial state at that time.

Ours is a customer-supplier relationship. In one location it is a regulated relationship and in another location it is an unregulated relationship. In both cases it is customer supply oriented. The relationship is OK but there is no opportunity to solicit competitive bids. We would like more options than just buying from the local power company but that is now not possible. I'm not unhappy with the relationship that we have. We don't look to them for help.

Our relationship with our electric utility is open. The utility considers us a key account and the management of each company meets at least once per year for discussions. Our company does participate in industrial interventions at the public utility commission and has taken an adversarial position with our utility when we felt the utility should be doing more to control costs.

We have had in the past a "quality partnership" with the utility and will be working to reestablish that partnership. The monthly meetings of the quality partnership were canceled while the utility was going through a reorganization. We would like the utility to provide power at the lowest reasonable cost and with good service so we could feel that we have chosen the best supplier.

Our company has an internal electrical distribution system for the plant site. The utility has loaned us equipment such as overhead transmission line, connectors, and lightning arrestors for our repair needs. They very closely coordinate their maintenance schedule on the nearby transmission lines with our operations in order to minimize our risk of an operations upset when we aren't in a stable operating condition.

We would not be opposed to "partnering" a cogeneration project with our utility if it makes economic sense.

The relationship between us and our local power company is cordial, but one of mutual mistrust. I would like to see us working together to further common objectives.

Yes, we look to our power company for purchase/sales of power to benefit us and the general consumers. They have helped us to find or develop lowest cost tariffs for power purchase. We would welcome the opportunity to partner with our utility.

The relationship we have with our power company is based on a good understanding of each others needs and co-operation to meet them. Yes, we would like for the power company to help us in determining the best type of power contract for our company.

We have mixed feelings about partnering. The concept is interesting but results of our "partnering" relationships with other suppliers have been mixed.

We do business with three investor owned utility companies in Texas. We have had an excellent relationship with one of three for over 30 years. The remaining two have become much more cooperative during the last 10 years as competition in the form of self-owned or third party owned cogeneration became an option.

We are satisfied with the present relationship except for one utility which has reduced its staff in cost reduction moves to the point that its industrial sales representatives are not always timely in their response to requests for information or assistance. This is a minor inconvenience.

Yes, we look to our power company for help with fuel cost projections and optional rate information.

We feel that partnering can be beneficial for both parties. Rates tailored to a group of customer's specific needs can benefit the utility also by retaining some base rate revenue.

Our relationship with our local power company is generally pretty good - we are satisfied.

I wish our local marketing representatives would be a little more visible and provide more information. It is very rare that they come to me and explain new things that they are doing, their strategic plans, new rate schedules that they might have. With regard to the help that they might have given us, they could advise us of studies that they may have going on, or strategic pricing in the future.

In the past they have provided us with utility expertise. For example, they have provided us with utility equipment expertise. We have generators in a cogeneration facility and we had problems with retaining rings on a generator and they put us in contact with an expert within their own company who deals with these problems. I think "partnering" is a good idea directionally.

We have a good relationship and we do look to them for help. They provide free power factor surveys, meter services and rebate programs for equipment (lighting, HVAC, insulation).

Our relationship with our utility is fine but we don't look to TVA to help us out.

Our relationship is usually friendly though not always. Differences of opinion about fair pricing is the largest stumbling block.

The help we get from our utility centers around prices and how much we spend on power. We have taken advantage of their DSM programs and rebates.

Our relationship with utilities vary up and down the board depending on what location you are talking about. Some of them are very good. We do look for technical support but not for consumption reduction.

How important is the quality of electrical service you are receiving? Are you having any problems?

If so: Describe your concerns and problems.

If not: Will this become more of an issue in the future?

Summary:

This question was added to the survey after an initial round of questions, so not everyone responded. Reliability is extremely important to most companies, and in general has been improving. No one mentioned electrical quality problems such as harmonics or surges. Power interruptions were the main concern.

Individual Responses:

Both quality and reliability have been good, but we don't purchase much power. If we ever shut down some of our gas turbines and purchase more power from LP&L, quality and reliability will become more important.

In the past, we had some power interruptions. We asked LP&L to increase their reliability and to keep us informed about how they were making that improvement. They have done that, and reliability has improved.

Quality is a huge issue for one of our off-site plants that supplies us with a major raw material. They have had numerous outages.

Reliability is extremely important to us. Our plants have to run 24 hr/day throughout the year. Many of our customers operate on a small profit margin. We supply them by pipeline, and they can't afford an outage caused by interruption of our product flow. Their needs will not go down in the future; they may even increase.

Generally speaking, we are satisfied with the quality of service we receive from HL&P. We have other facilities around the country, however, where the local utility companies are not as responsive. Sometimes they even try to blame us for their own system problems. We know better.

Quality and reliability are extremely important to us. Reliable electricity is a very important part of our process. We view it as a raw material.

We have no special concerns or problems now. A few isolated instances in the past associated with unreliable electric feeds have been improved. We were pleased with their response to our concerns and don't anticipate that reliability will be a problem in the future.

Quality is absolutely important to us. It has been excellent during the past year. Our power company is much more reliable than it was 5 years ago. Back then, we set up a Reliability Committee that the utility company participates on, trying to resolve supply problems. It has worked well.

We are concerned about the restructuring they are going through. It has taken its toll. Their employees' minds are on other things. Some are afraid of losing their jobs.

Are you currently a cogenerator?

If so: How did you evaluate cogeneration?

Was the local utility involved? In what way? Did they influence your decision?

Are you satisfied with efficiency and cost gains associated with cogenerating?

If not: Have you seriously considered cogeneration?

What most influenced your decision not to cogenerate?

Summary:

Companies who are currently cogenerating are pleased with their operation and feel it was a good decision. They are well-satisfied with the efficiency and cost benefits they have achieved. Companies who are not cogenerators have often been able to negotiate lower utility costs in return for not installing cogeneration equipment, although they continue to consider it as an option. The current low cost of fuel is a deterrent to investing in more efficient power/steam generating equipment.

Individual Responses:

We are involved in cogeneration at many sites. Originally, cogeneration was installed from a reliability perspective. Projects installed over the last 20 years or so have been based on economic considerations.

We have had discussions with the "host" utility before proceeding with recent projects. In some cases, the utility is the owner/operator of the facility. In other cases, we developed the project independently.

The utility "offering" will influence our decision regarding project structure. In some territories, cogeneration "deferral" rates have been commission approved and in such cases the utility may be successful in presenting an alternative offering which results in postponement of a project (until such time as the utility needs additional capacity).

Cogeneration is not universally attractive but is economic in many instances. Individual cases need to be evaluated. For those sites where we have current cogeneration facilities, we are very pleased with the results.

We have been a cogenerator since the 1960s. I don't know if LP&L was involved at that time or not. The cogeneration facility is shared with two other companies. It has four gas turbines. The steam generated in the gas turbine heat recovery units is sent to extraction/condensing steam turbines. Total power capacity is about 100 MW.

We are not happy with the efficiency of the older turbines and are looking at replacing or upgrading them. Another alternative is to purchase power from LP&L, but the prices they've offered so far are not low enough. That's the main reason we're interested in retail wheeling. It would allow us to buy competitively-priced power.

We are not a cogenerator. We looked at it and decided not to do it. We'll take another look every year or two. LP&L was not involved.

We have been a cogenerator for many years. The utility was not involved. The cost of our power is much cheaper than we could buy from the utility, so we are well-satisfied with being a cogenerator.

We have been a cogenerator since the early eighties. At that time, General Electric approached us and we partnered to build a 300 MW plant. HL&P was not involved.

Our cogeneration plant consists of four 70 MW gas turbines with heat recovery units. We supply our own steam as well as selling to other companies having plants within our integrated industrial complex. All of the power we generate is sold to HL&P through the provisions in PURPA and is priced to include both avoided fuel and avoided capital costs. HL&P in turn sells power to plants in the complex.

Immediately after building the cogeneration unit, we saw rapid growth within our complex. Our steam sales increased, we sold more of our gaseous products, and developed a huge new market for clarified water.

The cogeneration unit has allowed industries at our complex to continue developing and expanding. We have one of the best success stories in the country for a cogeneration installation.

A company in Sweden wanted to build a new facility in our state. Initially the utility company said they supported a joint QF (Qualifying Facility) application to FERC in which our cogeneration plant would supply power to the new plant. When the application was reviewed, however, the utility company changed its position and did not support it. The Swedish company backed out of the deal. Also, they would not give us any concessions on interruptible power. Basically, they killed a deal that would have provided a new plant and 80 permanent jobs.

The market for energy is competitive, but the distribution lines are owned by the utility, which is a monopoly.

We have always been a cogenerator at this site. It is basic to the design of a chlor-alkali plant. It was our decision and we have been well-satisfied with the results. The utility company was not involved in the decision.

We have sufficient cogeneration to satisfy our needs except for times when parts of our cogeneration equipment are down. The utility is essentially back-up for us. Still, we have a sizable power bill.

We do not cogenerate. We considered it 10-12 years ago, but the utility made "curtailable" service rates available (about 1984) and that was a better alternative for us than building a cogeneration plant.

We are not a cogenerator, but we have looked at it from time to time.

Generally, our power company has given us competitive rates that make cogeneration unnecessary.

We are not a cogenerator. We have looked into it a number of times, but have never found it economically feasible. It has helped us a little (not much) in leveraging for better prices when dealing with our utility company.

We are a cogenerator. We have two gas turbines and one steam turbine.

We became cogenerators because the utility company wouldn't negotiate. They wouldn't lower their price for power.

We are very satisfied with our cogeneration installation. It has paid for the capital investment many times over.

We put together a deal with our local power company (before they merged) to purchase one of their smaller sites.

We used two of their gas-fired boilers for a time while we were building our present coke-fired boilers. We are still using the original steam turbines and generators.

We are very happy with our cogeneration unit. We burn internally generated coke which gives us fuel equivalent to natural gas priced at \$0.25 to \$0.50/MMBtu.

We made a decision to become a cogenerator on an economic basis for a 10 year life. The power company did review our evaluation and gave us some advice.

We are fairly satisfied with our cogeneration, but a lot has changed since we originally built it such as the lowering of fuel costs. Also, utility costs of electricity have decreased.

Yes, we are a cogenerator. It was based on an economic evaluation. We have always allowed the utility company to make us a discount offer to keep us from doing more. In some cases they have and some they haven't.

We are satisfied with the efficiency and cost gains; it has been a real benefit to us.

We are not currently a cogenerator. We have been evaluating cogeneration for our site for about 10 years. We have discussed the possibility of a project with several independent power producers/ project developers, and are currently working with one with an interest in developing a project with us.

Yes, we are currently a cogenerator.

Our decision to cogenerate was based primarily on need for thermal energy (steam) in our integrated plant site.

Our local utility is routinely involved to negotiate power purchase and sales contract agreements. They influenced results of these negotiations, but not the decision to build cogen facilities.

Yes, we are satisfied with the efficiency and cost gains we've achieved by cogenerating.

No, we are not a cogenerator.

We chose not to cogenerate because of high capital cost and inability of our electrical system to absorb large amounts of power from the cogeneration unit.

We have four manufacturing plants in Texas and cogenerate at three of the four.

Cogeneration is evaluated strictly on an economic payout basis for steam and electricity. One utility installed and owns the generation on our plant site. The other utilities provided fuel projections and agreed to supply standby power when the cogeneration unit is down for repair.

Yes, we are satisfied with the efficiency and cost gains. We are not cogenerating at the fourth location because the electrical load is too small for self-generation and up until now there has not been a need by the utilities as a whole for power from a third party owned facility.

Yes, we are a cogenerator. This plant was built back in 1902 and we set up our own utility system before there was any utility system in the area. Basically we were an early cogenerator in the definitive, and when PURPA came along, it just made sense for us to apply as a qualified facility. (continued)

We are satisfied with efficiency and cost gains associated with cogeneration.

We are not a cogenerator because our needs don't justify it. We never consulted our utility.

We do a little cogeneration but only do so if the power supply is low in that particular area. We have done it in connection with requests for quotes before.

We don't cogenerate.

We don't cogenerate

We do cogenerate at some of our facilities and have done so since the '40s. The early cogeneration projects were done to meet older plants energy needs. We have continued to put in cogen projects through the '70s with newer, more efficient turbines. The process to justify cogeneration projects is lengthy and involved.

Cogeneration is only worth it if it is done under good free-market conditions and is administered well.

We are cogenerate at a number of our facilities; we try to make use of third party cogeneration when we do. Right now for instance, we are putting in an extra 220 MW in Louisiana and 80 MW in a Texas facility.

Are energy prices in your area affecting your competitiveness?

If so: In what way?

Summary:

Energy costs were very important to most of the companies we interviewed. The comparatively low price of gas is helping some companies to compete better, but others point out that they are in a global market, and must compete with countries who also have low (or lower) prices. Inequities in pricing between states were a concern, as were differences in electricity costs created when utilities charge certain companies lower rates for not becoming cogenerators.

Individual Responses:

All cost elements are important in the global markets into which industry tries to compete. We have facilities across the country and the spread of energy pricing is dramatic. Energy pricing, particularly for the process where energy is a significant cost element, plays a key role in the viability of the operation.

We believe the price we are paying for electricity from LP&L is higher than the price being paid by some other plants. Both GSU and LP&L are giving low rates to a few of our competitors to stop them from becoming cogenerators. The specific prices and rate schedules are not available to the public.

No they are not. However, there is a 4-5¢ cost difference between gas prices in Texas and Louisiana (Texas is lower).

Because we are a cogenerator, we don't buy much power. The price of natural gas has a major effect on our ability to compete. Gas is cheapest in west Texas. As it is transported east, the price goes up, in part because of the cost of compression. There is a 5-10¢ difference per thousand cu.ft. between Texas and Louisiana. Then the state of Louisiana adds sales tax. The net effect is that gas in Louisiana is 10-15¢ more expensive than in Texas. This detracts from our ability to compete with plants in Texas.

There are geographic differences in energy and capacity prices. We are continuously looking for cheap power; it is 60-70 percent of our cost of doing business. (continued)

Currently, we are pushing a number of projects both in the U.S. and overseas. Many include cogeneration, but in some cases cogeneration deferral rates are advantageous.

Cogeneration under PURPA is generally not economical because the avoided cost includes only incremental fuel costs. Environmental advantages and avoided capital investment costs have not been included. Our company, for example, uses waste heat to cogenerate. We receive less than 2¢ per KWH for electricity, but must purchase power at 7¢ per KWH at our other sites. This is seriously affecting our ability to compete on a world wide basis. Ten percent of the world's calcined coke is made in Louisiana. It is vital to the aluminum industry.

Gas is a positive because of our cogeneration units; electricity is not. The cost of power from ENTERGY is near the top of the list when compared nation-wide. This is hurting our competitiveness.

The comparatively low price of natural gas is helping us to compete better.

Most of our costs are for natural gas. Electrical costs are comparatively low.

World markets affect us more than the cost of energy. Right now our product is in short supply and gas is cheap.

In 1982 the reverse was true.

Louisiana's energy prices are some of the highest in the south; in the upper 10 percent. This causes our product cost to be higher, but it is not the only factor.

High energy prices affect decisions about plant expansions in the U.S. and world wide. They are not a major factor, but they are a factor that is considered.

Gas prices are competitive but power is not. Within our company, we lost out on a major expansion because our local power company wouldn't budge to help us. In another state, the power company worked with the plant. They got the expansion because they were more competitive.

Our low energy price because of burning internally generated coke enhances our competitiveness.

Energy costs amount to about 30 percent of the cost of manufacturing and you can become more competitive if you can reduce energy costs.

The prices of electricity are affecting our competitiveness only at sites which are remote from our main plants. These are places where cogeneration is not economical.

Even though the energy prices in our area are relatively low compared to other electric utility prices, they are still rather high compared to what our competitors — who have been cogenerating for some time — have been paying. Also, as a chemical company we are competing in a global market, so competitors located in areas of abundant energy, such as the Middle East and Canada, will also have an advantage over us.

In addition, as retail electric markets are opened throughout the U.S. by state regulatory commissions, we could be at a disadvantage to competitors in those states where they can choose their supplier until our utility commission opens the market in this state.

Energy prices are very important to our competitiveness. We are a major consumer of natural gas for steam and power production.

Yes, energy prices affect our competitiveness because increasing energy costs represent increasing variable costs in a very competitive commodity market.

In some ways yes, energy prices do affect our competitiveness. Some of our manufacturing processes are very energy intensive. Our products have to compete on global basis, sometimes with countries with far cheaper energy prices.

Yes, in general energy prices are cheap and it really helps us competitively, but it is difficult to justify energy efficiency projects and utility projects.

We have good prices.

Our prices are fair though we'd like them to be lower.

Prices are very important to us and, in some markets, are keeping us from being as competitive as we could be.

Price is the most important factor for us when we consider power and it is keeping us from being competitive in places.

Our prices are fairly competitive but, again, it varies up and down the board. It is very location specific. We work with all kinds of utilities and coal supplies the cheapest power by far.

Do you favor retail wheeling?

If so: How do you think it will benefit your company?

Have you discussed retail wheeling with your utility company?

What is their position?

If not: What do you see as the drawbacks or disadvantages?

Summary:

All of the companies we spoke with were in favor of retail wheeling. Many were strong advocates. They feel it will help level power rates across the country as well as lead to generally lower costs. Companies having plants at different locations were especially supportive of wheeling because it would allow them to transfer cogenerated power from their major sites to smaller sites, where local utility power is more expensive. Most indicated that their utility companies were against wheeling. One company pointed out that some utility companies have high power rates because of stranded investments and will need to have some mechanism provided for recovering those investments. This company also felt that FERC needs to take the lead here rather than approaching it state-by-state.

Individual Responses:

We strongly support retail wheeling and believe it will benefit all customers. We have discussed our position with our utility suppliers and experienced a broad range of responses (all the way from "bring the competition on" to "over our dead bodies").

We've talked with our utility but they are against retail wheeling. In fact, some years ago there was an opportunity for us to purchase power from a nearby waste heat boiler cogeneration unit. The utility was adamantly opposed and succeeded in preventing the purchase.

Yes, retail wheeling will provide cheaper energy company wide. We have not discussed this with our supplier. A disadvantage of retail wheeling is that we would need an Operating Company or a Corporate Coordinator to administer it.

We favor retail wheeling; we're 100 percent behind it. In our discussions with GSU, their position has been 100 percent against it. Retail wheeling reduces the revenues of high priced utilities resulting in a higher rate base for their remaining customers. But the basic problem is that their costs are too high.

There has been a lot more openness since ENTERGY has taken over, but the utility company mentality is still there.

We are a strong advocate for self-wheeling (selling power to our own plants at other locations) and believe that retail wheeling will also be advantageous.

My view is that full implementation of retail wheeling will move energy prices up and capacity prices down. It will help level prices around the country. It will not help companies with large steam or electrical loads as much as it helps smaller users. Cogeneration will continue to be a viable option, especially large cogeneration projects.

Some utility companies have high rates because of stranded investments. I am personally sympathetic to their position. They have had so many rules and regulations thrust on them over the past fifteen years that they are going to need some means of recovering their stranded investments within a bulk transmission system. This is appropriate. When such mechanisms are provided, however, the stranded equipment and sites should belong to the transmission system. The utility company should not be allowed to recover the money from its investment and then still retain the physical asset.

Unless FERC puts out some type of opener for retail wheeling, it's going to be long, arduous task when approached state by state. This will be so fragmented that we won't gain the advantages that are possible. There ought to be a federal mandate supporting retail wheeling so that we can get on with it. Even though FERC was specifically excluded from the original legislation, they ought to say: "circumstances have changed; we need to take the first steps."

FERC will need to work to eliminate disparities and inefficiencies. The utility companies should be allowed to pass on their real costs. FERC can encourage retail wheeling by supporting recovery of stranded investments. Energy reductions are closely tied to retail wheeling and cogeneration. Retail wheeling will allow us to build a bigger cogeneration units and take advantage of the economies of size. It will give us access to cheaper power, but it will not stop us from making investments in efficient generation facilities.

We have asked our Public Service Commission to order the utility company to unbundle the costs of transmission services versus the costs of generation.

We have plants in two other cities within the state, and plenty of excess capacity in our cogeneration unit. We want to send our cogenerated power to these two plants. The utility company will not volunteer to do it, so the issue is now before the Public Service Commission.

The 1992 Energy Policy Act is silent about FERC's authority over retail wheeling within a state or between states. This has been taken to mean that it is up to each state to adopt its own position, and there are various battles going on within the states. It will take most of 1995 to resolve this issue in Louisiana.

The utility companies say that retail wheeling is threatening their viability, but we need to test that. We're going to be in a transition for the next ten years. Transmission lines will become widely available. Utilities should be able to sell their power anywhere in the U.S. based on competitive prices. Some — primarily the inefficient and/or poorly managed — will go out of business, and they should. The regulators can help or hinder this process.

We support the concept of retail wheeling. We have operational facilities off-site (20-30 miles). If we could wheel some of our cogenerated power to this site we could reduce our costs. We also have a facility in another state and would like to wheel power there.

Another benefit of wheeling is that it would allow us to attract raw material suppliers to build near our plant. Their new facilities would be the customers for our comparatively inexpensive cogenerated power. Even when we are purchasing power from our local power company because of a planned outage (defined in PURPA), the unit cost for that power is still cheaper than the raw material supplier could have arranged for on an ongoing basis.

Our utility's position is that they're not interested. Wheeling is a concept they don't support; in fact, they actively work against it.

We'd like to see electricity be a competitively priced resource, not a monopoly. That should help the U.S. compete on a global basis.

We are in favor of retail wheeling. We have plants in other states. None of them are cogenerators, but we feel we would benefit by being able to bargain for cheaper power with someone other than the local utility company. Discussions with our local utility company about retail wheeling have been mostly off-the-record.

We are not involved in retail wheeling in Louisiana. We do have a location in another state where retail wheeling would be very beneficial. At that location, we cogenerate and SELL PURPA power to the local power company. We BUY power from the same power company for another operation. We would like to send our co-generated power to our other operation via wheeling.

We understand that selling power to other retail customers would make us a public utility.

We are a member of an energy users group. Our utility company talks to us about "embedded costs and stranded capital" in discussions of wheeling. The utilities need to pick a time in the future when they can support retail wheeling and then plan for it.

The concerns about system reliability are valid. The natural gas distribution system, for example, worked well when it was regulated. Now it is more complicated.

A situation in which one industry buys power from another does not need the protection of a Public Service Commission. That is not their purpose. [similarly, a company ought to be free to wheel power to itself]

We are not involved in retail wheeling.

Retail wheeling would be tremendous. We're all in favor of it.

Our local power company says it's going to happen. They don't like it and are merging to be able to compete.

Retail wheeling would be nice, but we are not involved.

Retail wheeling would be an incentive for us to build new plants that would provide additional fuel. This would allow us to expand our cogeneration plant and provide electricity to plants at other company sites.

Yes, we would be in favor of the retail wheeling laws being proposed. I don't know how much advantage that we would be able to take of retail wheeling. We have some huge heat sinks but our power demand is limited plus we do have some excess power from our cogeneration units that could be transferred to one of our other facilities if retail wheeling were in place.

I only see advantages to retail wheeling for us.

Yes very much - I'm in favor of retail wheeling. It would allow us to move cogenerator power from our major sites to our satellite sites. It would reduce electricity prices which would benefit us.

I have discussed it with my utility company and they are strongly opposed to retail wheeling.

I see no drawbacks or disadvantages to retail wheeling. The transition from regulated to free wheeling needs to be managed so that the public is not adversely affected, and the needs of utility share holders are considered.

We favor retail wheeling. The ability to choose our electric supplier would allow us to buy from the supplier who best meets our needs, which may or may not be our local utility. In the long term, we believe competition will lead to innovation and improved energy efficiency.

We have discussed retail wheeling in general conversations with our utility concerning trends and where we see the utility business heading. They did not give us their opinion, but in ads in the local newspaper they have stated their opposition.

Yes, we are in favor of retail wheeling. We are primarily interested in affiliate power sales and retail sales to facilities adjacent to our cogen sites. Affiliate sites would benefit from our lower generation costs. Sales to companies adjacent to our site would be a three-way win for our company, the prospective customer, and the utility company and their customers (More efficient distribution of power generated by a more efficient site).

This has been discussed with the local utility at length. They are strongly opposed.

Yes we favor retail wheeling because we could possibly find a lower cost energy supplier.

We have not discussed retail wheeling with our utility company.

Yes, retail wheeling will benefit our locations which are too small for cogeneration or which do not have a thermal load. (continued)

We have discussed the subject with our utility. They are very much against retail wheeling because it will force them to be competitive.

Yes we do favor retail wheeling. I think it would improve industry competitiveness. One benefit that we have talked about is being able to wheel power from this refinery to our other refineries in our own company. We don't see any drawbacks to retail wheeling from our perspective.

We are strongly support wheeling and are very interested in learning more about the topic and what it means. There is a big interest in industry to find out more about it. From our perspective, there are no drawbacks to wheeling....at least none to industry. We are negotiating a deal where an out of state utility will be supplying several of our sites with power at a discounted price compared to what we have been paying locally. Consequently, our local supplier is willing to renegotiate our price for the first time.

Wheeling is a good thing because it will lower rates; however, some utilities won't survive and there are considerable transition costs to consider.

We are in favor of wheeling because the pros out weigh the cons for us.

Wheeling isn't factoring into our immediate plans; we have no opinion.

Wheeling isn't affecting our future energy initiatives.

We support retail wheeling.

We support wheeling.

2. ESCOs AND CONSULTANTS

Are you currently working with any Energy Service Companies (ESCos) or consultants?

If so: How and for how long?

What are the ESCOs or consultants doing for you?

What kind of services are they providing?

Describe the relationship.

Why did you choose them?

What kind of results have you seen? Are you satisfied?

If not: What kind of assistance would you LIKE to have from outside sources?

Have recent down-sizings created a NEED to seek outside sources for such services?

Summary:

In general, companies are not using ESCOs or consultants except for very specific projects, such as rate studies. Recent down-sizings have not changed that situation. Few companies are seeking outside help.

Individual Responses:

We utilize consultants broadly as part of our "intervention" activities before the various commissions. This is typically through participation as part of "industrial intervention groups."

The consultants typically analyze various filings, recommend appropriate positions and frequently provide expert testimony.

We rarely, if ever, utilize consultants in order to obtain recommendations regarding preferred rate schedule or similar cost analyses. We typically perform these analyses ourselves.

Recent down-sizing has not changed our use of consultants.

We have only used EBASCO (recommended by LP&L). They studied our present cogeneration system and compared various combinations of purchased and cogenerated power. We are satisfied with the results.

Downsizing hasn't created any special new needs.

We are not using any ESCOs or consultants at this time. Maybe at some time in the future.

We are not using ESCOs or consultants. As the reality of wheeling approaches, however, we will need some consultants to help get it done faster.

We work with a number of consultants on rate matters and rate cases; also on proposed retail wheeling issues. We also use consultants for design and for understanding our customers' systems. And, of course, we hire legal counsels.

Right now, there is a need for studies to find out what retail wheeling is going to do to the market. If such studies have already been done, we need to see them.

We are working with an engineering company to study converting an old power plant into a cogeneration facility. As far as I know, we don't use ESCOs at all and don't use consultants on a regular basis because we have adequate in-house resources. We're probably not really up to speed on what they could do for us; we don't know how they could benefit us—what opportunities they would find.

We have not used ESCOs, and in recent years we have not used any consultants. Don't know what we could use them for right now.

We have had some downsizing, but it hasn't created any serious voids.

We use consultants for electrical engineering, but don't see much need for other input from consultants. Don't know what an ESCO is. (continued)

Downsizing is not a problem for us because we were never "upsized."

We have not used ESCOs or consultants directly.

We belong to the Gulf States Energy users group which hired a consultant to oppose rate increases.

We are not working with any ESCOs or consultants.

About a year ago a company came in and evaluated our cogeneration facility.

We do not use ESCOs or consultants for analyzing our plant performance. We occasionally use consultants for special applications.

We don't currently use ESCOs or consultants, but we did use them about 10 years ago when energy prices were high. We have a department set up to watch energy costs very closely and we don't need ESCOs.

I think for a company that does not watch everything very closely that ESCOs could help them.

We haven't used ESCOs or consultants and don't see much to be gained from them as far as we are concerned.

We are not currently working with any ESCOs or consultants. We are considering the use of an outside source to conduct an energy audit of our operating areas to identify and recommend energy savings and/or energy efficiency improvement opportunities. The need for such a service is not due to recent downsizing, but the lack of personnel available in-house to conduct these audits.

We have used a variety of consultants for varying issues, mostly since the advent of PURPA in early 80's. They help with legislative and PUC issues relating to regulatory rules impacting our company. They have served as expert witnesses, advisors, and legal representatives in our behalf.

In general, we have achieved favorable results. We are satisfied.

We are not currently using ESCOs or consultants, but we have used consultants in the past. We had a consulting service review utility contracts and charges for about a year in the mid 80's. The relationship was very distant - all work was done at their office with minimal contact with the plant. The corporate office chose the consulting service. We have seen no results. They were unable to identify any error or opportunity that we had not already identified.

We were not satisfied because they offered no value-added contribution.

No, we do not use ESCOs or consultants. We continue to do it internally unless it is a potential third party owned installation.

We are not working with any energy service companies or consultants at this time.

From outside sources we would like some strategic advice: where should we spend our limited dollars in the utility cogeneration realm, what opportunities exist that we might not be aware of, and also steer us in the right direction in negotiating the best rate schedules from our utility company, and also make us aware of any pending legislation that would affect our business.

Down-sizings will probably create a need to seek outside sources for assistance.

We have talked to some but have not used any. We're unsure what they can do for us because they only seem to be interested in the "low hanging fruit." We need someone who can help us squeeze out the tougher dollars from our energy costs and they don't seem interested.

I am an energy consultant.

We don't use ESCOs or consultants. We have enough other things to worry about as is.

We haven't used in ESCOs.

As a large corporation, we do most of our own energy efficiency work but have occasionally hired consultants to help us out with site-specific issues.

3. CAPITAL PRIORITIES

In what areas are you spending capital and devoting your people's time and efforts?

Summary:

There were a variety of responses to this question. Most companies are spending capital on improving and expanding their processes, on new products, and on environmental compliance. Energy projects have relatively low priority because of the low price of natural gas.

Individual Responses:

We are a manufacturing company in the chemical industry. We WANT to spend our capital in that industry ...not on power and utility and in energy related facilities. We DO spend some time and capital on power and utility facilities in order to get acceptable power reliability and product quality but ONLY AS A NECESSITY. We'd rather NOT worry about energy supply projects.

During the past few years, most of our capital has been spent on new products. We also built a new refrigerant plant at this location.

We are spending capital to improve our process control. We are also investing in a boiler feed water supply system to replace feed water we currently purchase from a neighboring company.

Our time and effort is being spent in expansions and in efforts to increase the reliability of the equipment in the plant. We are also spending our efforts in providing better control of the existing equipment.

The majority of our capital is going into incremental expansions and other improvements that create value for the company.

We are trying to build new air separation plants coupled with cogeneration plants in areas where electricity is costly. Although we are not a utility, by supplying steam and power from the cogeneration units (as well as gases from our air separation plants) we will be "partnering" with industrial customers.

We look at the cost/benefit ratio. Our company is very large and has a low debt. A lot of companies don't have

The top priority for us is to keep up with things mandated by compliance with state and federal regulations. Major plant expansions are number two.

Our plant is in an expansion mode. That is where we are spending capital and time. Energy is not the focus of attention.

A considerable amount of our capital is focused on environmental compliance or staying ahead of anticipated environmental regulations. We have spent over \$50 million during the past 5 years.

Our second capital focus is on modernizing our plant to keep it competitive.

Our third capital focus is on new products. This is where we LIKE to spend our money. It takes 3-8 years to develop a new product and bring it to market and is expensive. Also, there are risks involved. But that is where the long-term future of our company lies.

We are spending a lot on environmental improvements in order to stay in business.

Every year we invest a significant amount of money in environmental projects. For the rest, we do an Economic Value Added (EVA) analysis.

Our capital is focused on optimization and getting more MW out of our cogeneration unit.

At this time our people are devoting their time to production improvements. Natural gas prices are so low that we don't find any justifiable energy projects. The production projects benefits the energy side as well.

We are mostly expanding production capacity. We are appropriating for energy and cogenerating projects and we are looking at big projects that do not require a lot of technical resources per dollar of investment, and which increase capacity and improve efficiency.

We are spending capital in the areas of safety, environmental, cost reductions, quality improvements, and expansions.

This response relates only to our power/steam generation facilities. Capital has recently been used to build a steam/power generation facility justified by a need for efficient thermal and electrical energy at our local site.

We are spending time and money for expanding our manufacturing capacity, automating to reduce manpower and improving product consistency (quality).

Recently, our capital expenditures have been in growth products and environmental controls.

We are spending capital on environmental compliance, high return refining opportunities, and also on areas that would reduce our expenses.

We are focusing in on machinery, especially computer driven machinery, to reduce our energy demands.

No one is going out of their way to undertake energy efficiency projects. Energy efficiency is a consideration in capital investment projects but it is not the primary or driving force behind them.

None of our past 100 capital investment projects were geared toward energy efficiency specifically. It is always a factor but that is all.

We are currently working on using low grade waste as feed stock and coal based generation technology to improve our efficiency. In general we're seeking more efficient ways to produce products.

In general, unless there is a 24 month or less payout energy projects aren't being done. The one exception to this is if the business would go under if the project isn't undertaken. Otherwise, they don't happen. There is no shortage of capital. The problem is cost of capital as it is derived from government regulations.

How do you prioritize capital expenditures?

How do you balance the need for growth (major expansions, new facilities, new products, research, etc.) with maintaining and upgrading your current facilities?

Do you have any cut-off (e.g. ROI), above which you would have no problem with funding energy saving or waste reduction projects, as long as the process had long-term viability?

What are the obstacles to obtaining such funding?

Summary:

Everybody seems to prioritize differently. Capacity increases, regulatory compliance, ROI (return on investment), safety and environmental concerns, capital availability, risk, business requirements, long term benefits, ability to manage projects, cost/benefit ratio, and a company's strategic objectives were mentioned as important to investment decisions. Several companies singled out limited capital as the major obstacle to funding otherwise good projects. Some noted that energy efficiency projects often have low priority.

Individual Responses:

New capacity in existing, successful products wins first. Then, new products/new businesses win second.
Power and utility facilities are always last and usually don't get funded.

There are not formal capital "cut-offs" but de facto additional capacity projects for existing, successful products with IRR's (internal rates of return) greater than about 40 percent generally get funded. About the only other projects that are funded are "necessity" projects for infrastructure or regulatory compliance.

In historical terms, energy is very CHEAP. We just don't need to make power and utility commitments of capital in order to be financially successful. Let oil go to \$50/bbl and our behavior will change radically. Today, we worry about employee health care costs rather than energy, not because we're dumb business people, but because we're smart business people.

Our target is to maintain the existing facility and use discretionary funds on cost saving improvements and incremental expansions.

We have rough cut-off of 25-30 percent ROI, but most of our projects are above that level.

All of our projects go into a pool. Our managers get together to evaluate and prioritize them. The major considerations are safety, environmental impact, payout, and high desirability.

We prefer to have at least an 18 percent ROI for payout projects. This would include energy saving and waste reduction projects. The funding for our capital projects is decided on by Divisional management for projects over \$1 million and so far we have had no problems obtaining funding. For projects costing less than \$1 million we are provided with a lump sum amount. It is assigned to capital projects based on local management priorities.

Prioritization decisions are made on a business-by-business basis, not on a site basis. Each business has its own Net Present Value (NPV) and Discounted Cash Flow (DCF) requirements which vary depending on risk.

Businesses decide on the most effective means to ensure their long term profitability, but they are not automatically budgeted capital each year. Within each business, waste reduction and energy conservation projects compete with expansions on the same basis.

We look at the cost/benefit ratio. Our company is very large and has a low debt. We don't have a capital shortage. A lot of companies either don't have funds available or their capital budgets are restricted. Because of our strong cash position, we will even make investments for our customers to help make them more competitive.

We have to recognize that new laws/rules/regulations can make a "profitable" product "unprofitable" very quickly. Therefore, plants tend to put money into projects that offer short-term paybacks. They don't have the luxury of getting their money back over a 10-year period.

For us, a 5-year payback is OK. A 7-year payback may be viable, provided there are certain guarantees.

In the past, we have spent large amounts of capital on projects that improve energy efficiency. Our senior management was very receptive to this. It is less of an expenditure now. Still, in the past 2-3 years, we have spent over \$1 million to install projects that reduce energy use. These projects have cut our energy costs by about 0.5 percent.

All discretionary projects must meet an ROI test. We always have more requests for funds than we can supply. ROI is a key criteria—but not the only criteria—as long as a process has long-term viability.

Currently, we require 18-20 percent for general capital projects. The threshold for energy-related projects, however, is lower. Our management is more receptive to energy projects than in the past and will accept projects with ROIs as low as 12-14 percent. But even with this low cut-off, we haven't been overwhelmed with projects.

Expansions and maintaining the mechanical integrity of our plant (OSHA 1910 requirement) are important to us.

Also, we must comply with environmental regulations. This takes a lot of time and effort.

Nothing is automatically funded just because it has a good ROI.

Question is too broad. We usually worry more about "dollar" conservation.
Right now our priorities are more directed at expanding the supply of our product.
Other factors that enter the picture might be a company's debt/equity ratio, production priorities, owner priorities, or conserving capital for takeover.
We are not a publicly owned company.
An economical supply of energy shift the focus away from energy conservation projects.

We are a foreign-owned company. Our corporate management in Europe wants to maintain a certain level of capital reserves, so only a limited amount of money is made available for improvements and expansions each year. Further, we have to compete for those funds with other locations on a world-wide basis.
I have never seen a project justified solely on ROI. There are usually environmental concerns, the long-term viability of the product and a lot of other factors. A difficult waste stream, for example, may be OK today, but what about 2 years from now?

We do an Economic Value Added (EVA) analysis on projects. Some are major expansions.
There is no automatic cutoff. It's more a function of what projects we can manage with the people we have available. We have a "top-ten" list that is updated regularly.
We have engineering resources and have brought in division (corporate) engineering group at times.
We would consider ROIs as low as 10-12 percent as good providing they are low risk and don't require a lot of capital. The ROI would need to be at least 20-25 percent for higher risk projects, and large capital projects (greater than \$3 million) should have an ROI of more than 20 percent. The ROI of the cogeneration unit, for example, was over 30 percent.
We are competing with other plants for funding.

We do not have a problem getting funding for worthwhile projects.

We normally choose projects on the basis of Return on Investment (ROI). However, we do choose some projects — such as the cogeneration project — because of their long term benefits even though they are not as high as others on ROI.

We are looking for the greatest ROI projects but we factor in risk. If risk is low the ROI can be smaller. If it has a big market risk we require a higher ROI. We try to stay within our capital budget, and thus our cutoffs are influenced by how much capital we have.

We have limited resources. First priority goes to projects that we feel are unreasonable risks to safety or health (our people who are in the plants and most impacted make most of these recommendations). Second are projects clearly required by law. Third are projects that are economic driven (quality, cost reductions, production increases, etc.). On purely financial projects we target for a return somewhat above our cost of capital since not all projects end up meeting their financial objectives due mainly to market conditions or new government regulations.

Only the federal government (irresponsibly) spends more money than it takes in. Business has limited resources so money spent on over-regulation (poor benefit to cost considering these projects rarely create permanent jobs) reduces the resources we have for financial projects. Generally the allocation of these limited resources is done based on the projected financial return but also considering risk and fit with strategic objectives.

Each project is assessed based on economics, risk, and impact on the environment — and then compared to other projects. While there is no specific cut-off for ROI, all high ROI projects are seriously considered; generally there is no problem finding projects with 100 percent or greater ROI. However because of risk or environmental impact considerations, some projects with zero ROI are funded.

Regulatory-driven projects are the biggest obstacles. Most of these projects have negative ROI, and drain resources from more cost effective projects.

At today's energy prices, about 2 to 3 percent per year improvement in Btu/lb would be an appropriate goal.

We have opportunities in both the cogeneration facility and in the plant. The cogeneration unit offers the largest area for improvement. Within the plant, we will continue to spend money on energy conservation projects if they are profitable (i.e. have a reasonable ROI).

We don't have any percent improvement goals.

I don't know of any areas where we should be spending less time and money.

Profitability and low risk are the only things that would motivate us to spend capital on activities and projects that will reduce energy consumption.

It is possible that there are opportunities within the plant to reduce energy consumption, however they have not been identified. At this time we do not have any activities in progress to locate and implement capital energy reduction projects.

Many opportunities for improvement remain. At our site, we are currently funding \$30-40 million worth of energy projects that have good NPVs and DCFs.

We have set a 5 percent per year energy reduction goal (Btu/lb) for our hydrocarbon business for the next several years and are pretty much on target for the past few years. This has been accomplished by 1) changing the process and 2) increasing production.

Funding energy projects is tied to profitability. We try to ensure the efficiency and longevity of our own company as well as the companies we serve.

Energy at this location is so extremely important to us (it's the major raw material) that we have to do everything we can reasonably do to ensure our energy consumption is low. We need to do this to keep ourselves globally competitive.

There are different technologies for making chlorine. Some are more efficient than others. Involvement with chlorine cell technology has been a major focus of our involvement.

A goal of 1 percent per year improvement in energy consumption over the next five years is reasonable. Most of that will be achieved by incremental improvements in existing facilities plus some major design changes.

I can't think of any areas where we should be spending less time now.

I believe there are substantial opportunities for improvement at our plant, but other priorities have taken the attention away from energy. We used to measure and report our energy efficiency, but we don't do that any more.

I think an improvement of 2 percent per year during the next ten years would be a reasonable goal for us.

We spend too much time on environmental reporting — keeping track of trivialities. The DEQ (Department of Environmental Quality - State of Louisiana) and EPA are asking for too many details. Some they never use. It's gone too far. They have no idea how much effort is needed to supply them with numbers and information.

We also spend too much time interpreting regulations.

Every time we think we've found everything, our people come up with new ideas. They keep finding things to improve our performance. We have a good track record.

We have two programs in place. One is for small projects; the other is for cost improvement projects of \$25,000 or greater. Each year we implement \$5-6 million of costs savings ideas.

We have no specific GOALS as such. What we do set are cost book STANDARDS. During the year we try to do better than our standards. The next year we try to lower those standards.

We are spending too much time and money on environmental equipment and paperwork. Some is unnecessary.

We have a number of projects aimed at steam reduction. We recognize that a 1 percent reduction in energy use would be worth a lot of money to us, but we haven't set a specific reduction goal.

Environmental and safety type projects are always high on the priority list. Also money is spent on projects associated with Responsible Care, a CMA project. These are projects that involve improvements that affect the public.

We are profitability oriented. If the projects are about equal in profitability and one has more social benefits than the other one, we'll pick the one with the social benefits.

We are resource limited and we are not spending any money on anything that is not important.

There are always energy savings and other opportunities. Resource availability is an issue. The biggest capital expenditure currently being actively considered is cogeneration.

Consideration of environmental impact and the expendable nature of our energy resources are motivators for us to spend capital on activities and projects that reduce energy consumption. There will continue to be opportunities as technology improves. We have an ongoing program which considers using new technology to improve competitive advantage as well as continue to be environmentally responsible.

Our company's commitment to Responsible Care drives us to spend capital on reducing energy use.

Yes, we have opportunities for energy usage reduction. We are implementing these opportunities by the development of a condensate recovery system for process units.

We have not defined an appropriate goal for annual improvement.

We are motivated by the conviction that energy reduction makes good sense both from a cost and an environmental standpoint.

We have just put in place a goal of reducing our energy consumption by two percent per year. With this we have instituted an energy tracking system across our corporation based on pounds of product sold. Regression rate charting will be used to monitor progress. An awards program will be used to recognize and reward significant energy efficient projects or activities. This has been encouraged and endorsed by our highest levels of management.

There are no areas where we feel less time or money should be spent.

Yes, there are substantial opportunities for significant energy reductions. Opportunities exist in the control realm, for example, particularly in our utilities and in enhancing optimization.

We use a Solomon Index as our goal for measuring performance and improvement.

As for areas where we should spend LESS time and money, we seem to have to spend a lot of money for environmental compliance. A lot of times this is inconsistent and varies from year to year.

Our motivation is a quick payback! We've done all the easy stuff.

We have made considerable gains but there are still gains to be made.

Survival of the business.

What are your biggest impediments to reducing energy consumption?

Summary:

Most companies are finding it harder to identify profitable energy projects. Further, they are resource limited. The low cost of fuel gas means that energy conservation just isn't viewed as having a sufficiently fast payback to warrant much attention. This situation makes it difficult for companies to make energy a priority, even if they want to. Major projects and expansions tend to override energy upgrades.

Individual Responses:

The biggest impediment to reducing energy consumption is low energy prices. It's just not a very competitive financial issue.

I don't know of any big impediments. We've done the "fat" projects, so it's harder to find profitable places to invest in energy conservation. But energy competes for funding with everything else — essentially on an ROI basis.

Our biggest impediment to reducing energy consumption is having the manpower and resources available to do energy usage studies. They have a low impact on profitability versus other projects.

The biggest impediment to reducing energy is the low cost of fuel gas. Incremental gas is currently available at about \$1.30 per thousand standard cu.ft. This is very low, especially for the month of February.

For most industrial companies, the biggest impediment to reducing energy use is that it isn't viewed as having a fast enough payback for them to focus on it. The big dollar gains from efficiency improvements have run out. We are now into "middle-range" savings. The best way to approach funding these types of projects is to group them together.

I can't think of anything here. If it's a good project, we'll probably do it.

Other priorities. Our plant was designed for cheap natural gas (25-30¢ per MMBtu), so our utility system is not efficient. Still, it is difficult to make energy a priority. Major projects override upgrades to our utility system.

No answer. Reducing energy consumption is part of the way we have to operate our plant.

Major reductions in energy consumption in our business (chlor-alkali) would require a large capital investment in new technology. Right now we are not prepared to do that.

Government doesn't understand that the companies do not have an unlimited amount of money regardless of how good the energy project. We have to watch our debt to investment ratio.

We are resource limited.

Business, like the country, has limited resources. We put those resources where they give the largest benefits for the cost. Technology breakthroughs can help improve the returns on energy projects. Eliminating low benefit regulations can also free up more capital for energy and other improvements. Removal of disincentives to modernization, such as applying BACT and MACT environmental controls to plant upgrade projects, can also improve energy efficiency since upgrades and new plants are generally more energy efficient. The U.S. government's antinuclear policy is also contrary to more efficient electricity generation. Policies in other countries have proven this point.

We must constantly be aware of cost vs. the need to remain competitive.

Our biggest impediments to energy reduction are other priorities - implementation of DSM and expansion of manufacturing capacity.

Having a full plate and capital allocation limitations may prevent us from spending more on reducing energy consumption.

There is a lack of cultural buy-in. This culture has developed over the years. Because of cheap fuel for so many years we don't think about energy efficiency as much as we do about safety and environmental compliance but we need to also think about energy conservation.

Time! We are running at full capacity and don't have time to implement anything. Also, low amounts of staff - we don't have enough people to do all the things we want to do.

Our biggest impediment is the amount of justification it takes to get a project approved and underway. An incredible amount of data has to be collected and then processed before the accountants and managers will approve a project; lots of numbers are needed.

Uncertainty from all the changes in the power market (deregulation) are an impediment. The Clean Air Act is the biggest driver, and that is a good thing, but there are a lot of changes coming.

Some projects are too trivial when compared to other projects as mentioned above (a \$100 million production project versus a couple million for an energy project). It is hard to the attention of the decisions makers when this happens. Also, the unknown in the utilities industry (i.e. wheeling) makes it difficult to ascertain what is a prudent project and what is not.

4. GOVERNMENT POLICIES

What are your major concerns about current and future government policies?

What policies hurt or threaten your business most?

What policies help or potentially will help your business most?

How do you feel about your input into new governmental policies?

Summary:

This subject received a large and varied response. Highlights of the concerns expressed are summarized in the following paragraphs.

There are too many regulations and too many policies; we are overwhelmed. The EPA and other governmental agencies have been inflexible and often unreasonable. The people making regulations don't understand our process or product. They specify "when" and "how" something must be done rather than requiring a certain level of performance. They act as if we have unlimited resources and force us to use them ineffectively. Further, their decisions are not stable; they change their position on policy issues. That costs us a lot of money. Regulations should be based on good science and good cost/benefit ratio. Instead, we are forced to tighten emissions beyond levels that make good sense. The Clean Air Act is particularly onerous, and Superfund is much too costly for the meager results it achieves. Too many regulations are major overkills.

Government policies are not focusing on the most important issues. Newspapers are setting government priorities. Radical environmental groups spread false information and we end up spending millions of dollars defending their untrue statements. The environmental movement has swung too far. Taxes on energy, taxes on CO₂ emissions, and oil import fees all hurt our business and make us less competitive. The issues concerning CO₂ emissions pose a major threat to our future.

We want government policies to encourage a free market. There are now differences in state laws that can make a company uncompetitive; there are inequities created because regulations are applied differently to industry than to utilities; and we are concerned about our government subsidizing competition in foreign countries. Government control of fuels, such as prorating natural gas by states or enacting policies that favor one fuel over another (e.g. promoting propane as an alternate motor fuel) are threats and are contrary to a free market.

Retail wheeling would be a major benefit to the chemical industry. Electricity is the only major purchase that cannot be competitively sourced. Allowing environmentally responsible production of oil and gas in certain areas offshore and in particular regions of Alaska would also be beneficial.

The Chemical Manufacturers' Association (CMA) has helped communicate our interests and concerns about government policies, but we don't take advantage of all opportunities for input. We are generally satisfied with our lobbying efforts, but they cost us a lot of time and money. We now we have an entire staff devoted to government relations.

Individual Responses:

We have a major concern that in our zeal to discard the crazy quilt system we have, we will discard standards, and lose momentum towards achieving environmental excellence and perhaps ultimately environmental quality.

The Clean Air Act with its enhanced monitoring and technology based standards is particularly onerous. Also RCRA with its "mixing" and "derived from" rules are particularly complex. Superfund is also an extremely costly regulation whose benefits are in no way related to the extreme costs. Overall, the media based system creates a polarized view of issues.

Two steps are suggested, go to multimedia permitting with clear-cut concentration limits...this means one permit per site with well defined limits which are achieved using whatever methods are devised.

Second step is the current move to risk based limit setting. This will work only when the methodology for setting risk is codified. (continued)

We seem to have fairly good input at the Federal level through either direct contacts with regulators or through trade groups. I do not feel so confident at the state level.

Being overtaken by regulations is one of the things that tends to hurt us the most. We are overwhelmed with more and more regulations. They have become more restrictive. Every time we turn around, there's more.

Effective legislation that promotes retail wheeling would help us the most.

As a company, we don't input directly into governmental policies. We rely on trade organizations such as the Chemical Manufacturers' Association (CMA). They have done fairly well in communicating our position but I'm not sure it has always done much good.

Our major concerns are environmental policies that are given to us on a "command and control" basis. The governmental agency specifies "how" something must be done and "when" it must be completed. There's no partnering.

We need to get to know each other better so that we have the opportunity to search for better solutions before they issue a mandate.

We do not spend as much time providing our input as we need to. We should probably devote more time to explaining our position, but we have other priorities—and manpower limitations.

The policies that concern me the most are those centered on capping or reducing CO₂ emissions. It can't be achieved economically and seriously affects world-wide competitiveness.

Any regulations that don't give an even playing field can potentially hurt us. An example would be enacting regulations that apply to industry but not to utilities.

Retail Wheeling is about the only policy I'm aware of that would benefit us. Another might involve some sort of tariffs or import limits when a company elsewhere in the world is receiving subsidies from its government.

Our input on governmental policies is getting better. For many years we weren't proactive enough.

We all need clean air and clean water. I personally feel that we should reinstate tax-exempt financing for improving the quality of air and water. Nobody "wants" to spend money on this, but we have to. BUT—everybody should be in the same boat. The problem is that there are differences between states that give a competitive edge to states that have less stringent regulations. There are too many disparities. This situation should be equalized at a federal level. We should have a national base. The basic regulations should be uniform.

Our company doesn't do much lobbying in Washington; we're just getting into it. We support the CMA (Chemical Manufacturers' Association) on many of their issues.

In most states, policy making for utility companies is in the legislatures' hands. They can create a Public Service Commission and staff it the way they want to. Louisiana is different. According to the Louisiana constitution, the Public Service Commission makes all rules and policies, independent of the legislature. Even if the legislature passed a law on wheeling, for example, the Public Service Commission could overrule them. The Public Service Commission, then, is vital to industries in our state. Industry needs to communicate its ideas and concerns to the Commission.

We are concerned about the constant tightening of regulations on air and water emissions. We are in compliance now, but further restrictions on NO_x emissions, for example, will require added capital to maintain compliance. The ability to wheel power would help us stay in compliance at less cost.

As far as input into new governmental policies is concerned, I feel we could be doing better. But overall, we're doing a fairly good job of making our positions known and having a voice. We have an organizational structure set up to do this, both here in Louisiana and at the corporate level.

The environmental movement has swung too far. Less government intervention would help us.

We have opportunities for input but we don't always take advantage of them. For example, we aren't sending anybody to an upcoming ELCON meeting. These kinds of activities require a lot of time.

We have a concern about government subsidized competition in foreign countries. (continued)

Government policies are not focusing on the most important issues. Newspapers set the priorities. Priorities should be risk based. Government shouldn't spend a lot of time on things which are relatively unimportant.

Environmental policies have been the biggest problem. Some of the regulations are asinine. The people making them don't understand our process or product.

Radical environmental groups are spreading false information. It gets the attention of political folks. The current law, for example, says that we can have x ppm in our ground water. Environmental groups say it's too high, but they have no data to substantiate their claim. We DO have the data to substantiate its harmlessness. We end up spending millions of dollars defending our product.

Ten years ago there were virtually no lobbyists or government relations staffs working for our company. We have had to add these, and are pleased with the results. We've been well heard. BUT it's costing us a lot of money.

We have been doing surveys in our community as well as state-wide. The results have been very positive.

There are a lot of tax issues at the state level. Federal regulations cover the whole U.S. Everybody has to comply. State and local taxes are different. They can make you uncompetitive with other parts of the country.

We don't currently have any environmental issues we haven't met.

In the past few years, our company has been a lot more proactive, putting more pressure on our representatives to support "our" interests. We've gotten them into our plants and tried to educate them about the chemical industry; we've tried to show them that they shouldn't be afraid of a chemical plant. We've done this at both the federal and state levels. We even gave Greenpeace a tour!

Policies don't have much of an effect on our plant, which is a cogeneration unit. The proposed Btu tax was a major issue.

We don't have any problem getting our voice heard.

The Federal Energy Commission is good for everyone because it regulates the relationship between cogenerators and the utilities. This commission operates under a law, and one of the regulations is that utilities are required to supply back up power. I would hate to see this law repealed in its entirety because the loss of backup power would have such a large effect on industry. Another problem that threatens our industry is the Global Climate Change which would reduce CO₂ emissions to the 1990 level by the year 2000.

We want to make sure that government policies encourage a free market. We would like to see an open access area with respect to electricity. We don't like government policies which promote one fuel over another. We like a level playing field among various fuel types. I think we are fairly effective with input into government policies through trade associations such as CMA.

Regulations based on good science and good benefits-to-cost ratios are needed. There are many regulations that are major overkills and have little positive direct impact while having large negative indirect (jobs and less poverty) impacts. All regulations on health, safety, and the environment need to pass a sound independent (not politically controlled) review to assure they have a good benefit-to-cost ratio and have a proper priority versus other needs of the nation.

Government rather than marketplace control of fuels is a threat to our business.

Washington is just now beginning to listen. It is yet to be seen if reason and good sense will prevail. EPA and other government agencies for the most part have been inflexible and often unreasonable. They act like the nation has unlimited resources and that impact on job protection and creation is not a factor.

We have several serious concerns:

Government-Mandated Promotion of Propane as an Alternative Motor Fuel

Government mandates related to specific alternative motor fuels for the future are a major concern. Specifically mandated promotion of propane as an alternative motor fuel for use in the U.S. could drive up demand and prices for a fuel/feedstock that is already being imported into the U.S. The results would be higher imports and major price increases that would decrease or eliminate propane's viability as a petrochemical feedstock. Some of our olefin plants do not have the flexibility to use other feedstocks. (continued)

Government Mandates Related to CO₂ Reductions

Clinton Administration spokesmen including Vice President Gore have said global climate change is the gravest environmental threat our planet faces. Because of its very large energy consumption, the chemical industry is a major emitter of CO₂. In October, 1993 the Administration released its "Climate Change Action Plan" to reduce U.S. greenhouse gas emissions to 1990 levels by the year 2000. In March, 1994 the "U.N. Framework Convention on Climate Change" entered into force. This treaty's initial aim is the same as the U.S. goal just mentioned.

Over the long run, the treaty commits our country to an international process whose "objective" is "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." There is not scientific certainty that there is a problem of global warming and about 96 percent of the CO₂ emitted comes from nature. The Administration's targets and the United Nations' "aim" would be extremely expensive to accomplish and have a major adverse effect on the U.S. chemical industry's global competitiveness. U.S. jobs will be lost if these type targets are mandated.

Government - Imposed Energy Taxes, Oil Import Fees, Etc.

Chemical industry processes require large amounts of energy for fuels and feedstocks. Governmental actions that would impose specific energy taxes, import fees, floor prices on crude oil, etc. would cause our energy and feedstock costs to be significantly higher than our global competitors and place the U.S. chemical industry at a competitive disadvantage. U.S. jobs will be lost if such actions are taken.

Natural Gas Prorationing by States

"Prorationing" efforts that restrict the supply/production of natural gas beyond restriction required to protect "correlative rights" will result in significant price increases in natural gas and damage our global competitiveness.

Government policies should be adjusted to allow for environmentally responsible production of oil and gas from areas where drilling is currently prohibited such as certain regions of Alaska and certain offshore areas. Such actions could increase the supply of energy from domestic sources.

Provisions should be made to allow for customer choice/competitive sourcing of electricity by industry in the future. Electricity is about the only major purchased item that cannot be effectively competitively sourced by our industry now. Transmission access is needed.

Input is provided. However, policies seem to get set in some areas, such as the above-referenced global warming issue and propane as a alternative motor fuel issue, without a good basis for the policy by the government. It seems like the input is ignored in some cases.

Overly prescriptive rules (laws and regulations) that result in ineffective use of resources are a major concern. A better policy would provide for the development of reasonable and appropriate performance-based standards, and allow the regulated community the flexibility to meet the standards in the most cost-effective way.

Our major concerns are the increasing volume of policies we are required to implement.

Those that are bureaucratic in nature or those that require implementation in a specific manner, such as requiring a specific technology for an application rather than letting us select the most cost effective one.

Process Safety Management

We have too little input in the development of new policies and regulations.

Taxes on greenhouse gases—including CO₂ emission taxes—would hurt our business.

Similarly, imposing energy taxes, (oil, import taxes, quotes or fees) would also be detrimental to our business.

Opening the outer continental shelf, and Arctic National Wildlife Refuge to exploration and production would be helpful to our business.

Our input to governmental policies is good.

The policies that hurt us most are the lack of good stable decisions by the EPA on the type of requirements they are going to have down the line. By changing their positions on these policy issues, they cost us a lot of money unnecessarily.

Policies that hurt us are those that favor foreign refined products that were not produced under the same laws and regulations that we have.

No concerns - we are all for wheeling. We haven't had any experience with permitting.

The U.S. government has not been a strong participant in energy efficiency (e.g. no carbon taxes) and I am unsure how effective government can be. There is potential to help and to hurt, especially through regulations, but the risks of poor regulations is worse than doing nothing at all.

Government policies are not a major factor for us.

We have no concerns about government policies.

We are concerned about the loosening of the Clean Air Act and the potential harm to the environment.

What has been your experience with the permitting process?

Has turnover in state or U.S. personnel, changing requirements or delays caused problems? In what way?
Have you ever decided to build or expand at a foreign location because of the cost, problems or delays associated with permitting in the U.S.? (note: this does not imply that environmental requirements are less strict in foreign countries)

Summary:

There was a strong consensus in the responses: permitting involves a lot of work; it is a burdensome process; it is costly; and it generally takes too long. Part of the slowness may involve new and inexperienced personnel, but even normal permitting procedures are viewed as a hassle. They can require 1-2 years or more. Companies have adapted by getting an early start, by including permitting time in their schedules, and by planning for delays, but that doesn't mean they support the lengthy and cumbersome permitting process. Some companies complimented their state agencies for expediting the activity when necessary.

It was pointed out that there is considerable variation state-to-state, and that changing or conflicting requirements together with changing interpretations are on-going problems. It was recommended that "reasonable" and "proven" technology be specified, rather than "state-of-the-art" or "best-available" technology because these latter technologies are often speculative.

In general, permitting hasn't prevented most companies from doing a project or caused them to build in another country, although there were a few notable exceptions where companies needed to move quickly to respond to a market. One multinational company said that European regulations are equally demanding, but they are more stable (i.e. they don't keep changing permit requirements). Another cited permitting times of roughly one-half those experienced in the U.S. One company recommended international environmental standards.

Individual Responses:

The permitting process is generally time consuming and detail oriented.

Yes, turnover in personal has caused problems.

I do not believe permitting has been a singular issue in siting decisions, although environmental costs are certainly a significant part of overall costs, which are a factor in our siting decisions.

I can only speak about our permitting experiences with the Department of Environmental Quality (DEQ) here in the state of Louisiana. And I would have to say that we have had very good success. They have worked with us very well, especially when we needed to get permitting done quickly. They helped us move through the system rapidly.

I am not aware of any decision to build elsewhere because of permitting.

Permitting has not caused problems for us. We plan for delays. We've gotten used to delays.

As far as I know, we have never built or expanded at a foreign location because of permitting.

Permitting involves a lot of work. We've experienced some minor delays, but it hasn't prevented us from doing anything. Nevertheless, it's a very burdensome process.

I am not aware of our building in foreign countries because of permitting. Mostly, we build in foreign countries to be closer to the market. Sometimes a company has to locate a plant in a country in order to be a participant in industrial activities and sell its products within the country.

I have built plants all over the country. I just don't understand why the time required for permitting varies so much from state to state. Even the time required for permitting something as seemingly consistent as FAA clearance (to avoid building near airports) is different in different states. It ought to be standard. We need a more level playing field. Depending on the state, it may take 6, 12 or 18 months to obtain the same permit. There ought to be a federal law that requires states to give a ruling within a specific time frame, and it should be consistent across the U.S.

The long permitting time caused the complete collapse of one project. We are not asking anyone to waive standards, but recognize that once the decision is made to build a plant, it may be two years before construction is completed and the product enters the market. The timing is critical. Companies need to respond quickly to market demands. If permitting adds another year or two to this timetable, the delay can be very costly and even cause a market opportunity to be seized by a competitor in another country where permits are granted more expediently.

One of our industrial customers decided to build a \$700 million plant in Europe because the permitting time was 12-16 months (Texas) vs. 6-8 months in the Netherlands. We had better capital costs and lower energy costs, but they had to move quickly to seize a market opportunity. Europe won out.

We should not push "state-of-the-art" or "best-available" technology. Often, these technologies are speculative. Instead, we should put in "reasonable" and "proven" technology. We also need to consider the environmental requirements of foreign countries and push for international standards.

I am not directly involved in permitting, but we have a number of people that are. It seems to take forever to get a permit and get something done. The time and effort required are a significant deterrent to operational improvements.

I am not aware of permitting ever being a significant or deciding factor in location decisions.

We have experienced a lot of delays because there are so many details involved in permitting, but in general, the permitting process has not delayed the actual startup of equipment.

An exception was permitting our new steam generator, which saves energy. It's startup WAS delayed.

I am not aware of any decisions to expand at a foreign location because of costs or permitting.

We have no big problem with permitting. We have managed it O.K., although it did take 2 years for us to get a simple renewal of a water permit.

We have never been delayed because of permitting.

We have never built outside the U.S. due to permitting costs or problems.

Permitting is slow and costly. It takes lots of paperwork and people. It is time-consuming. It also needs a lot of planning and requires risk-taking.

Turnover of governmental people has not been a problem for us, and we have not been delayed because of permitting, but it took a lot of planning on our part.

The permitting process is terrible. It is extremely slow.

We have a good relationship with local agencies and can get fairly good cooperation if a quick turnaround is needed. We have learned to get them involved early.

We have not made any decisions to build elsewhere because of permitting.

Permitting has been a big hassle. There was a change of administration at the state level. Things progressed very slowly. The outgoing administration didn't do anything while in a "lame duck" status. Then it took the new administration a while to get up to speed. Since then, our relationship has much improved.

I don't know of any decisions to build at a different location because of permitting problems.

Slow, slow, slow. Most of our permitting with EPA and the state regulatory agencies require from 1 to 2 years and if the project is complex, still more time is required.

Permitting is generally the critical path for any major project. We need to find ways of expediting the permitting process. One thing government needs to do is to find ways of expediting the permitting process for projects with environmental benefits.

We haven't ever made a decision to build at a foreign location because of permitting to the best of my knowledge.

Our company is building foreign plants to be closer to those faster growing markets. We now supply these countries from the U.S. This will present more company sites for the U.S. sites to compete with for our limited dollars. Regulatory problems with permits, unreasonable regulations, or changing regulations will favor foreign sites. Managers of multinational companies who operate in Europe and the U.S. have stated that while European regulations are equally demanding, they don't keep changing permit requirements like the U.S. does (i.e., they can count on more stability).

The process for obtaining environmental permits (state and federal) is extremely burdensome, costly, and time consuming. Construction cannot begin until permits are approved, which typically takes anywhere from six months to two years.

Turnover in agency personnel causes delays due to inexperienced personnel trying to understand complicated agency regulations and procedures.

Changing requirements also cause delays due to inexperienced permit agency personnel not being trained in the latest requirements.

Turnover is definitely an issue. It causes "re-starts" and requires more education/training to bring new personnel up to speed. Changing requirements, conflicting requirements, changing interpretations, or setting policy at low levels in the agencies are also significant issues.

Permitting problems (and/or delays) are often a consideration when deciding whether to build in the U.S. or abroad, but rarely (if ever) does it tip the balance.

Yes, personnel turnover has been a problem because of poor technical competence on part of some permit engineers. Rigidness in permit provisions have limited the operating flexibility of the plant.

No, we have never chosen to build in a foreign country because of permitting.

Permitting is a lengthy and time consuming process.

Turnover and changing requirements cause us to have to re-educate the replacements which results in delays.

I am not aware of any situations where permitting problems in the U.S. resulted in our building in another country.

Permitting requires a lot of effort up front and it drags out the project. However it does appear to be changing some for the better. When the permitting agencies have a lot of turnover, they lose efficiency.

If you had the opportunity to meet with key policy makers in the DOE, EPA, OSHA and other regulatory agencies on a one-to-one basis, what would be the main message you would try to get across?

What concepts, thoughts or ideas do you feel are not well-understood by the folks in Washington?

Summary:

The message here was reasonably consistent. Companies want regulators to be fair, equitable and timely. They want fewer and more simple regulations that allow flexibility in choosing the way in which standards are met. They want regulators need to be more practical and not make unreasonable extrapolations in setting emission levels. In addition to environmental and safety questions, regulatory agencies should ask themselves: "How can we help industry expand and grow and remain competitive in a world market?"

Right now there is too much duplication of effort, and agencies typically ask for a lot of irrelevant information. They accumulate data for its own sake. It takes time and costs money to gather all that data; some companies hire people just to fill out forms. Regulatory agencies should not assume that companies have unlimited financial resources. Every request and regulation should be evaluated on a cost/benefit basis.

In a sympathetic tone, two companies felt that the people in the DOE, EPA, OSHA and other regulatory agencies understood their problems, but had to deal with the politics of the situation. The success of voluntary programs was also mentioned.

Individual Responses:

I want to make two points: 1) That regulatory driven work costs 3 to 5 times more than voluntary work for the same benefit, and 2) That a holistic look versus media based views are needed.

Folks in Washington don't understand global economics and the pressures American Industry faces. They do not understand that we do not have unlimited resources. Finally, they should visit places like Singapore (Benchmark) to learn how progressive countries manage both environmental quality and economic growth.

The main message is that they need to do something about the number of regulations. There are just too many. And they all have mandatory paperwork requirements that consume administrative people and time. There is a lot of duplication of effort. For example, we are required to prepare one type of report at the federal level and a similar, but different report at the state level. The information is essentially the same, but it's organized differently.

I think that a lot of times the regulators begin by trying to accomplish one thing, and then expand their request for information to include a lot of irrelevant items that have no impact on the original thrust of their regulation. They accumulate data for data's sake. And we end up spending copious amounts of time supplying that data.

The costs associated with regulation and compliance are tremendous and are ultimately passed on to the public. We need to focus on how to reduce those costs. This includes manpower- and paperwork-intensive activities such as permitting and studies, as well as costs for equipment and control. We support the current efforts to perform a scientifically based cost/benefit analysis on all regulations.

Reduce all the paperwork that doesn't do anything to help the environment. Most people in industry don't mind putting in projects to reduce emissions, but hiring three people just to fill out forms isn't seen as having much value.

Make record keeping and permitting easier to do. The problem starts with the multiple volumes of regulations.

I think the people in the DOE, EPA, OSHA and other regulatory agencies understand our problems, but they are faced with the politics of the situation. Everybody wants a sound economy. Everybody wants to deal with environmental issues in an effective manner. Everybody wants a government that reacts quickly. Industry is the key. Regulatory agencies need to ask themselves: "How can we help industry expand and grow and remain competitive in a world market?"

We need consistency in environmental rules and regulations.

Let's get on with growth in the industrial sector.

It has become extremely costly in terms of manpower and capital, and increasingly burdensome to keep with and comply with the myriad of government regulations that are constantly being promulgated.

Our environmental compliance group has grown more than any other part of our local organization.

Everything should be analyzed on a risk-benefit basis. I know that these are the "in" words right now, but in many cases we have reached a point of diminishing returns.

They are not in the real world. They don't understand or appreciate the problems they're creating. They need to be more realistic.

Nobody's telling them they need to be more practical - more reasonable. (continued)

It's tough to work on something for a long time and then lose to the bureaucracy.

The American people don't understand what they (the bureaucrats) really do. A lot of government agencies need to be down-sized or eliminated. Just go to a meeting and look at all the government people there. Industry can't afford to have such a large staff. Funding should be taken away.

In the early 70's, the EPA should have started by obtaining DATA on water discharges. Instead, they started by REGULATING them. Publishing data on water discharges would have been a big motivator to reducing emissions. Regulations automatically make industry look like the bad guys. The company's job is to comply. Big companies are the ones who hire people to ensure that they comply.

Handle us in a fair and equitable manner, and do it on a timely basis. One company may get a fast response and another, with a similar request, may get a very slow response.

The people at the EPA handle a lot of plants, but for the most part they have virtually no experience that would enable them to understand what is involved. They need to use sound scientific principles and consider the risk/benefit analysis in their decisions.

In one case, for example, our waste water had to EXCEED drinking water standards.

One of our products is ash. We can take ash out of our silos, dump it on the ground, mix it with water and sell it anywhere in the world. It is recognized as a totally benign material. BUT, if we move it across a line into a permitted area, we have to have a beneficial use to remove it from that area. It can't be sold without a special permit.

The regulations should deal with the product itself, not with some invisible line.

Most of the problems revolve around industry's limited investment ability. Policies developed by regulatory agencies often assume that everyone can afford it and that they have no financial limits.

Free up the electricity market, level the playing field for various fuels, and speed up the permitting processes for those projects that have environmental benefits.

In general, I think the people in Washington understand the situation; it's not a matter of understanding, its politics and philosophy.

Make decisions based on good science rather than unreasonable extrapolations (high dose impact testing extrapolated to low dose impacts). Do cost/benefit analyses that consider both the cost and the number of jobs lost because of using limited resources for nonproductive regulations. Poverty also affects health. Use these analyses to set priorities for out limited resources. Also give regulations a reasonableness check. What health data is available from the people who make and use the chemicals? Many chemical companies have epidemiological data. For air quality like ozone limits, what does the data from cities (Los Angeles) with the highest readings say? (For example, if one hour at 0.13 ppm is really harmful, how can folks live in Los Angeles with three times that much for many hours per year?) Do urban "clean" sites already exceed or approach the limit?

Cost/benefit analysis: Resources must be directed where the greatest benefits will be derived.

We must work on the real problems, not the perceived ones.

Performance-Based Standards: Agencies should set the standards, but allow industry flexibility in choosing methods to achieve them. Methods for meeting the standards should not be prescribed.

The rulemaking process should include all stakeholders, incorporating concepts of total quality management.

We are in this together, lets make it a win, win situation.

No new laws/regulations are necessary. Enforce what you already have on the books.

(1) BTU taxes and emission fees; (2) environmental restrictions; (3) energy competitiveness (availability and cost); and (4) regulatory cost impacts. (continued)

On the surface, Washington supports global competitiveness for U.S. industry; however, we are concerned it might fall victim to increased energy taxes in efforts to balance the budget, or some other political or environmental agenda.

The most important point that I would like to get across is that legislators should measure very carefully the cost/benefits for legislation or regulations.

Keep regulations out of it and let industry reach its own equilibrium.

That regulations on renewable energy are harmful no matter how well meaning (cogeneration). More time should be spent educating plant and production managers about how they can make their operations more efficient.

Environmental regulations are too complicated and are making otherwise easy reductions of emissions too costly.
We could all do better without EPA regulations.

5. ENERGY PERFORMANCE

Are you currently measuring your energy performance?

If so: How are you doing it?

How and to whom is the information being circulated within your company?

What kind of formal (e.g. job performance ratings) and informal pressures exist to improve performance?

How important is energy in relationship to other priorities?

Summary:

Although energy is rarely a top priority, it does receive attention. Most companies are following energy consumption as part of their normal performance tracking. Measurements are typically in Btu/lb of product or \$/lb of product. Routine accounting reports may also give lb steam/lb of product and KWH/lb of product. Some companies also track the energy used by individual pieces of equipment, and even compare actual performance with theoretical or design criteria. One company uses extensive computer monitoring systems.

Several companies have set formal improvement goals and use special reporting formats. Most of the others rely primarily on standard reporting methods and periodic communications to inform employees and management about energy performance. Typically, cogeneration plants and big energy users receive the most attention. Their energy performance is reported more often and in expanded detail.

Except for energy-intensive businesses, most companies have not tied energy consumption to job performance.

Individual Responses:

Yes, we are measuring our energy performance. We have a corporate energy team which measures energy use at each site and rolls it up for the corporation in Btus per pound of production.

During the year, the energy team reports energy performance to the business leaders and energy decision makers. The team also makes energy presentations to senior corporate leadership groups and policy makers. Externally, our energy use is reported as a part of annual corporate environmental report.

A portion of each business leader's compensation is dependent upon his or her safety and environmental performance, of which energy is a factor.

Informally, our energy presentations, newsletters, and other internal forms of awareness building and energy advocacy help provide a competitive and moral pressure to improve.

On a total cost basis, energy is in the same order of magnitude as our total cost of maintenance, our R&D (research and development) expenditures, and our after tax earnings. In terms of priority, energy is in a second tier behind first tier items such as business growth, projects with higher returns, maintenance effectiveness, and other environmental priorities.

We look at total energy consumption and how it gets allocated to different products. We constantly monitor trends. The data goes to people who can have an impact on improving performance. Ultimately, we measure process efficiency in terms of Btu/lb and look for areas where we need to improve. We also analyze the performance of individual pieces of equipment such as compressors and other major energy consumers.

For each major product, both Btu/lb and \$/lb data are sent to our corporate headquarters.

Energy performance is not presently tied to job performance.

The priority of energy depends on the plant. In the case of energy-intensive products such as chlorine and caustic, and at our cogeneration plant, energy is a high-priority item—equal to other major issues such as environmental and safety. When the energy usage is small, the priority is lower. The attention energy receives is based on the impact improvements can have.

We use metrics on key process variables such as consumption of fuel gas and chemicals. They are expressed in terms of usage per pound of product. We set targets. If we are worse than the target we try to correct the problem. If we are better, we find out why and try to replicate it elsewhere. (continued)

Performance information is circulated within our local plant. It is posted in the administration building and in the central control room. We focus our reporting on variables that we have control over.

Energy performance is not specifically tied to job ratings.

People come first. Their safety is our number one priority. This is followed by environmental performance and then production. A major component of our production priorities is reducing operating costs, and energy — purchased fuel gas — is directly related to those costs.

We measure energy performance in both Btu/lb and \$/lb. The results are reported to our site management as well as to corporate business teams.

In several businesses, energy performance is directly tied to performance ratings. It's a function of the particular business. If energy is not a large contributor to the total cost of making a product, then energy performance would probably not be part of job performance ratings.

There is a lot of peer pressure to reduce costs and improve the performance of our plants. That helps maintain the emphasis on energy reduction.

We have energy efficiency targets for all major pieces of equipment and regularly compare actual with theoretical performance (i.e. as designed). If the values differ by more than 1 percent, our engineering department investigates the reason for the disparity.

Our company has 25 plants around the country. Each month, the plants send a 1-page report to our CEO that summarizes their energy performance.

Energy is 60-70 percent of our costs, so energy performance is an important part of our managers' performance ratings.

We measure and report energy performance annually on a macro-scale. We look at the ratio of total Btu input to total production. This information is reported once a year to the corporate level.

Within each site, we track energy consumption in terms of lb steam per lb product and KWH per lb product. This performance data is circulated daily to our area supervisors. We have, for example, active on-line monitoring, control and tweaking on our steam/power generating system to ensure that equipment is operating at optimum. Maintaining high energy efficiency is very important to us because it is such a major cost.

We do not have any specific energy goals. Energy performance is not a formal part of our job performance ratings.

We aren't measuring energy performance the way we used to. It is much less formal now. Primarily it's done through the accounting system. Our cost books report Btu/lb for each product. This information is seen by our site manager and by the plant superintendents, but only dollar information is reported to higher levels in our company.

Energy performance is not a specific part of our job performance ratings.

We measure million Btu/unit of product. It is listed on a daily report. It is also part of monthly reports (both production and financial), which are reviewed by management.

Energy performance is a part of established management goals and expectations.

Yes, we measure Btu/lb. We have installed extensive computer monitoring systems and constantly know the energy use of almost every piece of equipment.

The data is used internally in our production unit. Corporate headquarters sees dollars, not Btus.

Job performance ratings involve performance compared to standards. Energy performance is a significant part of those standards.

In our plant, we measure Btu/lb against our previous performance. We have no absolute basis to compare these numbers to.

We measure MM Btu/MWH (millions of Btu per megawatt hour) at our cogeneration unit.

We also track total energy cost (gas plus electricity) per pound of product. (continued)

All of these numbers are reported at the plant level on a monthly basis. Twice a year, performance is formally reviewed with division management.

Energy performance is part of our job ratings. We set goals, such as electricity per ton of chlorine.

Because we are an energy-intensive plant, energy use has a high priority. It is second only to on-stream time.

All key energy performance parameters are measured. This includes tons of coke, MW and heat rates. The results are reported internally.

We have improvement goals, but they are not directly tied to job appraisals.

Because our fuel is so cheap (\$0.25 to \$0.50 per MMBtu) efficiency is not as important to us as it might be to other cogenerators.

We are measuring energy performance in most of our units. We track it on a Btu/lb basis. The information is circulated to management and the unit supervisors to make sure that we stay within our targeted areas.

Energy reduction falls below production, safety and environment type projects. It's about 4th.

We are not following energy performance as closely as we used to because of the lack of people. Once a year, we do participate in the CMA energy survey.

There is an Annual Energy Awards program by CMA which we plan to participate in. There are really no priorities for energy relative to anything else.

We annually update a graph which shows that since 1980 we have improved our energy productivity by nearly 45 percent. This measure is based on the ratio of the energy used from all sources (including the energy required to produce the purchased electricity) to the pounds of product shipped from this plant site.

Energy data is graphed and circulated to top management and to the Energy Management Committee, whose members are managers from various areas including purchasing, engineering, maintenance, and steam production. The committee meets as needed to review energy policies, strategies, and performance.

There are no formal pressures on managers to improve energy performance related to job performance ratings. Informal pressures exist to improve energy efficiency.

Cost control and reduction is a focus for all managers. Improved energy efficiency is one of many factors they look at to reduce costs. We do not favor regulating energy conservation; however, we feel energy management should be driven by economics and market factors.

Yes, we measure energy performance as it impacts cost of producing product.

The information is shared with all employees via standard cost reporting methods and periodic communications.

There are specific energy reduction goals (improvement of 2 percent/year yield), corporate driven.

Energy performance is of equal importance to other corporate driven initiatives.

Yes, we systematically measure the amount of energy consumed per pound of product produced. This information is routinely available to our employees.

We have a long term company goal of being a low cost producer.

Energy is a relatively low priority.

Yes, we track energy at all locations within the corporation on a BTU/lb of product sold.

The information is circulated ass high up in the corporation as the Manufacturing Council and Operating Committee.

We have set two percent per year improvement as a performance goal for all location managers.

With our new energy policy and new performance goals, priority on energy efficiency improvement is increasing.

We are measuring our energy performance using both internal and external counting meters. We compile the data and compute the Solomon energy intensity index.

We have only been measuring efficiency a couple of years. We base it on dollars spent for consumption.

Our barometer is amount of energy in BTUs divided by pound of product. We also use benchmarks and techniques that Ken Nelson has advocated.

We chart our performance weekly though some sites do it daily. Power used divided by production is what we keep track of. The information is charted at the plant itself and stays there - it is circulated among the plant engineers and, every now and then, makes it to the corporate level but that is rare.

We maintain a performance indicator for each facility. All the plant management personnel are aware of the figures and the information is also passed on to corporate as well. The energy performance indicators help us determine where to allocate money within the company. Being a large energy consumer, we think energy is very important and consider as vital to our success as any of the natural resources we use.

Do you have an active energy conservation or energy conservation/waste reduction program?

If so: What kinds of participation and results is it getting?

Have you established specific energy reduction targets or goals?

How closely are you meeting them?

Summary:

About half the companies interviewed have programs in place. Some are directed only at waste reduction. Few companies have specific numerical goals but a number consider "continuous improvement" an acceptable target as recommended by the Chemical Manufacturers' Association (CMA).

Individual Responses:

Yes, we do have an active energy conservation/waste reduction program. It is getting excellent participation and results. We have established specific energy reduction goals, and we are on track for their attainment.

We have a waste reduction program that covers everything from energy to waste. It has been very successful. Participation is high, and we have instituted all types of capital and operating improvements.

There are no specific targets or goals associated with our program. It consists more of asking for improvement suggestions and brainstorming ideas.

We are in the process of kicking off an energy coordination effort. A formal program will be forthcoming.

We have not yet established any specific goals.

We have been tracking waste reduction for several years.

We have had a very active program for many years in the form of an annual contest. Its name has changed several times. Right now, it's called the "Value Creation Contest" and participation is very high.

We have no formal energy or waste reduction program.

Our corporation has an Energy Council that promotes energy conservation. Each location has an energy coordinator. I would describe it as a formal program.

Participation varies at different sites and within different plants at the sites. It is more of a "continuous improvement" program and does not have specific targets or goals.

We don't have any energy or waste programs now. We used to have an energy program, but it was ended several years ago.

We have an continuous energy reduction program that focuses on updating the equipment and processing facilities to save energy. We have seen big reductions in the past, especially from the equipment updates.

How have you achieved major energy reductions in the past ten or fifteen years (i.e. what kinds of process or equipment changes)?

Summary:

Large reductions in total energy consumption have been achieved in a variety of ways. First, companies have made major operational changes such as converting to higher-yield catalysts and improved control schemes. Their processes are now more reliable and run smoother. They have also upgraded plant equipment and put in new processing steps. Examples are: adding heat recovery exchangers, replacing distillation column internals, and converting to more efficient motors and pumps. Better monitoring of energy use (via computers) has helped, and the cumulative effect of many small projects has been sizable. Companies noted that significant improvements occur during major revamps and expansions, and several pointed to cogeneration (especially using gas turbines) as THE major factor in reducing their energy use.

Individual Responses:

During the past ten or fifteen years, a host of items ranging from cogeneration projects to improved process technology have accomplished major energy reductions. However, the bulk of the improvement has come from paying close attention to the use of energy within existing facilities. Things like shutting down unneeded or spare equipment, keeping insulation in good condition, steam traps repaired, etc.

Large energy reductions have occurred because of major process and equipment changes. There have also been many smaller projects which cumulatively are significant.

Major improvements have come from process changes and equipment additions. In 1985, one unit was totally revamped to stay competitive. In 1991, we added a new facility and focused the design on improving efficiency. We added heat recovery exchangers, for example, to generate steam rather than using cooling water to remove the heat.

We converted to gas turbine-based cogeneration about 13-17 years ago. That made a substantial improvement in our site energy performance. Since then, most major reductions in energy consumption have come about because of process changes and improved control.

By changing the way a product is made we have been able to make major improvements in yields and percent prime (i.e. high quality product vs. lower quality product that is sold at a lesser price). Improving yields improves the Btu/lb. Increases in on-line time and reliability have also been big contributors to reducing energy use.

Cogeneration has made the biggest improvement in our energy performance. We have also had gradual gains in pump, motor and compressor efficiencies. In addition, we have developed technology internally — primarily through improved catalysts and processing techniques — that have increased our productivity and energy efficiency.

Our major energy reductions have come from the construction of cogeneration facilities. By-and-large, that has been the largest single area of improvement.

Modernization of our chlorine circuits to reduce electrical consumption has also had a major impact. We are now using more energy-efficient technology.

Information about energy has improved. Our people are more aware of how much energy they use now. Computers have been a big help here, and we are measuring more streams. (continued)

Where do you think the big gains in efficiency will be made during the next ten or fifteen years?

What percent of energy costs could be reduced?

How do you feel about government-sponsored types of programs (e.g. Green Lights) that focus on specific equipment, such as light bulbs, motors, computers, etc.?

Summary:

Companies will continue to replace obsolete, inefficient plants. Further gains will be realized by upgrading equipment and converting to newer, more efficient technology. Large energy users such as turbines and compressors are likely targets for improvement. Some companies felt that process automation and optimization via on-line computer control will give the biggest efficiency gains. One company felt that deregulating the electricity marketplace will increase efficiency by allowing excess cogeneration capacity to be used. New cogeneration units were also expected to be major contributors to reduced energy use in the future. Annual reductions of 1-2 percent (per pound of production) look reasonable for companies having active energy improvement programs.

Green Lights received a lukewarm reception, although the concept of voluntary (rather than mandatory) programs was supported. It was pointed out that companies can (and do) achieve acceptable results by developing their own internal standards for equipment such as lights and energy-efficient motors. These standards are driven by economics, not by government programs. Typically, however, the savings from lights and energy-efficient motors are small when compared to other types of process improvements.

Individual Responses:

During the next ten or fifteen years, the deregulation of the electricity marketplace will allow huge improvements in the effectiveness of energy use by allowing excess cogeneration capacities to be utilized at other companies and locations. Cost reductions will be in the range of 15-20 percent.

Government-sponsored programs need to be more flexible and less paperwork-intensive. On the positive side, voluntary programs are much more cost effective than mandatory ones.

We will continue to realize savings through major process and equipment changes. Over the next ten years, the reduction we can economically achieve is probably in the 15-25 percent range.

We are not involved with Green Lights, but we routinely upgrade to more energy-efficient equipment (lights, motors, etc.) whenever replacements are needed.

Programs like Green Lights are OK, but I don't think they motivate us to improve. We do something because it's the right thing to do—the economic thing.

The big gains will come by taking advantage of process improvements and equipment changes.

I have never heard of the Green Lights program. We are not involved with it. We do use sodium vapor lights in our new process, and we have replaced existing bulbs with sodium vapor lights.

We will continue to look for major process improvements. Most of our businesses are looking for a 50 percent reduction in energy use (Btu/lb) over the next 10 years.

I don't see programs like Green Lights as having high value added. If the economics are there, we'll do them.

Most of the improvements in the next 10 or 15 years will probably come from updating or replacing inefficient plants or equipment. We also expect to see continuous progress in our best-performing plants.

Over the next 10 or 15 years, we'll make additional gains in our cell technology, and we still have opportunities to convert to cogeneration.

I don't think we can extrapolate the 1 percent per year improvement out to 15 years, but a 10 percent improvement of the next 15 years would be very significant.

We have procedures in place to ensure that when lighting fixtures are replaced, energy efficient lights and energy efficient ballasts are installed. Similarly, the electric motors we install are energy-efficient motors. But these changes are mostly for replacements or new installations. We have not retrofitted existing facilities. The eco-

nomics aren't there. Further, procedures were not instituted because of, or driven by government policies. They were instituted by our own internal engineering and purchasing departments in the form of standards and policies, and are driven by our need for energy efficiency.

My reaction to programs such as the Green Lights program is that they're unnecessary. If people were minding to their business as they should be, those things that should be done will be done.

I don't know where we'll make big gains in efficiency. We'll continue working at measuring and improving performance. We'll be replacing inefficient motors, turbines and compressors.

We opted not to get involved in the Green Lights program. Quite frankly, I think programs like this suck!

Our company has signed onto the Green Lights program, BUT the cost of incremental power does not make it economical for us to change out fluorescent lights at the plant.

The improvement curve is leveling off. Limited by basic chemistry.

I have no idea how we will achieve improvements during the next 10-15 years, but past performance tells us that the opportunities are there.

I don't know anything about the Green Lights program. They sound good and probably get some results.

With improvements in the design of chlorine cells combined with other process improvements, we should expect reductions of at least 1 percent per year.

We have no experience with Green Lights. We have converted to high pressure sodium lighting for our plants.

10 years from now, I expect we'll be running at about the same efficiencies.

Computer control of processes allows for optimization which we will be doing more. This is the area that will give us the biggest gains. Our experience shows that the improvement in energy efficiency depends on each location.

I think it will come from new plants, new processes, new technologies, and the modernization of existing manufacturing facilities.

We are positive about such things as light bulb improvement, motors, computers, etc.

Cogeneration might provide one of the biggest gains in energy efficiency for our plant site. Gains in efficiency could also be expected from the replacement of older equipment with more energy efficient equipment, such as variable speed motors, and the replacement of older processes as we continue to expand our product capacity. Other developments which could have a major impact on our energy usage would be more efficient separation technologies to reduce the energy used in distillation columns and improved boiler controls which would allow boilers to be started more quickly so that we don't have to keep so much boiler capacity in "hot standby" in case of boiler trip-outs.

We have not directly participated in the government-sponsored programs mentioned here but we do participate through our membership in organizations such as CMA. We are opposed to mandated government programs and appreciate that these government-sponsored programs have remained voluntary so we can participate where it would be of benefit to us.

During the next ten or fifteen years, big gains in efficiency will come from utilization of new technologies. A two percent per year target is reasonable.

Improved equipment manufacturing expertise will drive down the cost of energy efficient equipment and systems. This will allow more of these kinds of equipment to be used. They provide a means of support for these programs that would probably not survive otherwise.

Gains in efficiency will come from production rate improvements using the same or slightly modified equipment, but with little or no increase in energy usage. Cogeneration will also be responsible for major gains in energy efficiency.

I think we could reduce energy costs by ten percent during the period 1995 through 2000.

Government-sponsored programs are good to emphasize the potential for energy conservation, but they result in small gains.

Over the next 5 or 10 years, I think we will see big efficiency gains resulting from control technology, on line automation, and optimization. Energy cost could be reduced 3 to 5 percent.

To be effective, government-sponsored type programs need to get down to the manufacturing level. We have not been contacted about what the programs could do for us. They are probably good ideas, but we don't know anything about them.

Our energy reductions have been good so far but we are just getting rolling.

There is virtually no waste in our operations. Energy is the only measure of our efficiency and we have seen a lot of progress over the past 15 years. The biggest change has come from updating and upgrading our equipment which we have pretty much tapped out now. In the future we are looking for improvements from our utilities and from refining the processes we use.

We have seen large drops in energy consumption. Energy costs will be the big driver in the future. I don't see many energy-technology improvements in equipment coming down the pipe (like the gas turbine) and there is only so much you can squeeze out of your process. Government programs will have minimal impact on major industries; however, they are good for the smaller industries. The buy-back programs are a perfect example of what I'm saying. Government mandated equipment has pushed efficiency down, there is no doubt about it.

Have required environmental equipment installations affected energy consumption?

If so: Has mandated environmental equipment significantly increased your total energy consumption?

Can specific numbers be quoted?

How have the capital demands for environmental equipment affected your energy reduction program?

Summary:

For most companies, the energy used by environmental equipment is not major, although some said it was "significant." At times, decreasing emissions can reduce energy efficiency, as in the case of low-NO_x burners. One company spent \$50 million on environmental equipment and said their energy consumption was now significantly higher because of the added pumps and motors. No one, however, was able to supply actual data on the percent of energy used for operating environmental equipment.

A number of companies said that the capital they invested in environmental equipment has limited their spending on energy projects as well as preventing them from taking advantage of potentially profitable business opportunities. Others did not feel it has been a serious constraint. The difference probably depends to a great extent on what percent of the capital budget was devoted to environmental-related changes. Most of the large-capital mandated changes have now been accomplished and priorities appear to be shifting to other areas, including energy conservation.

Individual Responses:

Yes, "End of Pipe" treatment facilities tend to increase energy consumption and the bulk of the mandated installations fall into this category. Not until you achieve source reduction of waste can you begin to realize energy benefits.

Specific numbers could certainly be obtained for specific installations. We normally track total energy use by location and do not have these specific numbers at hand.

The capital demands for environmental equipment place a very heavy burden on our overall capital budget.

This reduces the availability for business improvements and further reduces what is available for energy, making it extremely difficult to obtain funding for energy conservation efforts.

Although we've spent a great deal of money on environmental installations, the type of equipment we've put in doesn't use much energy, so it hasn't added significantly to our energy consumption. (continued)

The total money available is limited. A significant part of the capital intended for improvements is spent on environmental equipment, and at times, there's no money left for process improvements.

Yes, environmental equipment has increased our energy use. The low-NO_x burners we installed, for example, are less efficient. They burn more fuel for every Btu of heat we gain in the process.

Capital demands for environment equipment haven't cut into our energy expenditures. Not yet—but it's coming.

Energy consumption for environmental equipment is significant, but I don't know how large—no more than 5 percent of our total energy use.

In the past, the capital needed to comply with environmental regulations reduced the amount of capital available for other projects, but this is not currently the case. Environmental needs no longer affect our expenditures for energy reduction projects.

Our processes don't require much in the way of environmental equipment.

I can't say that the increase in energy use has been "major" because chlorine and caustic are such large energy users. But they are "significant." If you remove the chlorine and caustic energy component from our total energy usage, the energy consumed by environmental equipment would certainly be "major," but I can't quantify it.

Capital requirements for environmental projects have not detrimentally affected our efforts to become more energy efficient.

We aren't using much additional energy because of environmental equipment, but we're spending too much capital and time on environment-related activities. That capital and time could be better spent elsewhere.

Not much energy is used for environmental equipment.

We spent \$50 million on environmental equipment. Those additional pumps, motors, etc. have had a major impact on our energy use. It is very significant.

A lot of our capital and energy use is tied to environmental equipment.

The environmental equipment we've installed has included a lot of mechanical equipment. This equipment uses electricity and steam.

Environmental projects have consumed 50-70 percent of our engineering efforts. We have had to pass up a lot of business opportunities because we no one was available to work on them.

We've added baghouses, but they are a relatively small energy consumer.

Our energy requirements haven't changed very much because most of our equipment uses natural gas instead of heavy oils. We have had to add analyzers because of environmental regulations and this has reduced our ability to spend money on other energy reduction projects.

Some of the required environmental equipment installations have increased our energy consumption. However, when compared to our total energy consumption this increase would not be considered large.

The capital we have invested in environmental projects has limited our investment opportunities for energy-related projects. On a wastewater treatment facility alone we spent more than \$40 million that could otherwise have been available for an energy efficiency improvement project such as cogeneration.

Yes, environmental equipment installations have generally increased our energy consumption. Specific numbers could be quoted. Environmental equipment capital requirements generally add constraints to scope of spending for energy improvements.

Environmental equipment, of course, is a net consumer of energy, and regulatory-driven environmental projects divert resources from projects that reduce energy consumption.

No, required environmental equipment installations have not significantly increased our energy consumption.

Our incinerators (required installations) consume additional fuel. Similarly, enclosed process cooling towers require more pumping costs.

For the past five years the priority for manpower and capital has been on waste reduction, but it is now shifting to energy conservation.

No, additional environmental equipment hasn't really affected our total energy consumption much, especially when you consider the amount of energy it uses relative to the total amount of energy that we consume.

We have had to spend a lot of money on environmental compliance projects and I'm sure they have wiped out any energy efficiency opportunities that we may have had.

Within your company, can studies geared towards hazard reduction, energy conservation and waste reduction be combined into a joint effort?

If so: Are any programs actively underway to accomplish this?

If not: What are the impediments to doing this?

Summary:

A few companies include waste reduction and/or energy conservation to some extent in their HAZOPs, but the majority do not. The problem is primarily the extra time and cost involved. HAZOPs are already viewed as time consuming and expensive.

Individual Responses:

We have already made this connection. A single team leads the hazard reduction, energy conservation and waste reduction activities in our company. Linking energy to the environment has been very helpful in improving support for the energy improvement effort. We are expanding the energy effort into a "natural resource conservation" effort, the first step of which has been the initiation of a water conservation program.

We have not looked at energy conservation or waste reduction as part of our HAZOPs. They're directed strictly at hazards.

Our HAZOPs are limited to hazards.

HAZOPs are typically done by themselves. We look at energy and waste in our Technology Center reviews.

HAZOPs are not a major priority in our company.

We do not include energy or waste studies in our HAZOP studies. because of the additional time and manpower that would be required.

Our HAZOPs are only directed at safety. Time is the problem.

It would be a good idea to combine HAZOPs with energy conservation and waste reduction evaluations for new construction.

We have an ongoing HAZOP program and it has been expanded into waste reduction, energy conservation and operating conditions.

We update our reviews every few years with a new team of people. Major new projects also get reviewed.

We blend waste reduction into our HAZOP studies, but not energy conservation. It goes back to the resources available. HAZOPs take a tremendous amount of time.

The chlor-alkali area is an exception. In the chlorine area, we do focus HAZOP effort on electricity; in the caustic area, we focus on steam.

Our HAZOPs are limited to hazards. Energy and environmental improvements are not included.

We do combine hazard reduction, energy conservation and waste reduction to some extent. HAZOPs are really expensive to do. While we are doing the HAZOP safety study, we also find potential operation and energy reduction ideas. We circulate these to our management so they can decide whether or not they want to do them. These are benefits from the safety studies which helps compensate some for their cost.

We don't have a program that ties together waste reduction and energy conservation, but it happens naturally.

We have not necessarily combined studies geared toward hazard reduction, energy conservation, and waste reduction into a joint effort. New process technology often achieves all three. Waste reduction and energy conservation efforts are typically interrelated - waste treatment projects have tended to increase our energy usage while source reduction projects have decreased our energy requirements. We do look for opportunities to reduce hazards in all our studies/programs, but frequently energy conservation and waste reduction projects do not involve elements that affect hazard potential.

Yes, we combine safety analyses, energy conservation and waste reduction where it makes sense. Programs are underway.

The waste management hierarchy — which drives toward source reduction — also leads to reduced risk. Energy reduction generally is on a separate track.

No, we don't include energy and waste reduction with HAZOPs because of our organizational structure and the low level of staffing we presently have.

Yes. We just recently completed a project to remove a small amount of hydrocarbons from a large nitrogen steam by passing the entire stream over a catalyst which causes the hydrocarbon to decompose. During decomposition, the stream's temperature is increased. This thermal energy is recovered and used to generate approximately two MW of electricity.

Also we are close to completing an agreement with a third party to use molten metal technology to incinerate solid waste. The gases off this process are rich in hydrogen and carbon dioxide and will be used as a raw material for our chemical manufacturing processes.

I like that idea of including energy conservation and waste reduction with HAZOPs, but we are not doing that.

We do a thorough job on hazard analysis of all our facilities, and it would be good if they included energy conservation

We do have some programs that combine waste reduction, energy conservation and hazards but there is an immense amount of untapped potential there. Capital demands are impeding the progress of energy programs.

6. GENERAL

What other information or insights would you like to include in this survey?

Summary:

The individual responses that follow are extremely varied. A summary is not appropriate.

Individual Responses:

I want to reemphasize that flexible, voluntary approaches which apply the 80/20 rule when seeking improvements offer the best progress and the most effective use of limited resources.

Just a comment: Energy plays a big roll in our performance and our profits. We continuously look at ways to reduce costs. Energy is one of the areas we focus on.

If you're not competitive world-wide, you're not competitive!

Right now, natural gas prices are low. If they don't increase, people will lose interest in energy conservation. The U.S. does not have a coherent energy policy. It is unlikely we will make any major changes until something happens to the world market.

The people in eastern Europe and South America are going under democratic rule. There will be tremendous pressures to manufacture products that consume energy. Currently, there are not enough wells being drilled to satisfy those needs, so prices will increase.

Recognize the power of the utility monopolies. Without a competitive market, they can lower the price to a few key customers and prevent them from cogenerating. This gives a competitive advantage to those customers. But if the utility — as a monopoly — has the freedom to do that, they must also be prepared to have their distribution facilities open to the rest of the country so that they don't hinder "at risk" customers.

There are different ways to price power; consumption is affected by price. Hi-tech metering (e.g. time of day) pricing may be necessary. Residential customers don't understand the importance of peaks and base loads in determining the cost of electricity. Perhaps a sticker on an oven that tells times to avoid using power could improve the load factor for the residential class of power customers through education. Power companies say education doesn't work, but aluminum recycling received the same negative reaction when it was first introduced. Now it has gained residential understanding and support.

Can't think of anything not already covered.

Go back to risk analysis. Decisions are being made based on very little knowledge. Federal and state agencies responsible for these decisions need to become better educated about the businesses they affect. What risk is involved? What will their decision cost? A whim can cost industry billions of dollars. Will it be worth it, or can that money (or less) be spent more effectively to accomplish changes of even greater benefit?

Every five or ten years, we are threatened with a tax on energy. This is something that has a huge impact on the chemical industry. We are also dependent upon energy-type feedstocks as well as using energy as a utility to produce our products.

We have just gone through a reengineering program and we have dissolved our energy group. We are going to spread these energy responsibilities throughout the organization. It appears that we are going to have to look to third parties to handle more of our non-core business such as utilities and energy projects.