A Contingency Plan for Managing Energy Resources for Small Business

by

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Upon recognizing the energy problem, the first reaction is to buffer a firm against energy uncertainties by increasing the supply of the relevant products. Such a strategy assures prolonged operation during the interruption in the energy supply network, whether of motor vehicle fuel, natural gas, electricity, or fuel oil used for operation of plant and equipment. In effect, the higher costs of maintaining such a reserve offset ever increasing prices and circumvent the costs of shut down and restart. This solution to a supply management problem typifies the traditional solution to this type of problem. As long as the supply problem is self-rectifying, such a strategy offers a simple, straightforward solution without disturbing normal operations. Under normal assumptions it would be expected that the market would increase output, consequently bringing supply and demand factors back into equilibrium.

Energy products with universal uses flow unrestricted from user to user. When supplies do not increase with the ready transferability of products, the problem of a shortage rapidly transmits itself throughout all sectors of the economy. Consequently, building petroleum product inventories cannot assure an operation free of external disruption because supplies, transport, and customers (whether industrial or consumer) are not all in a position to maintain inventories to mitigate external disruptions. In effect, dealing with the energy problem is not like dealing with strikes, weather, etc. By the very nature of this new problem a broader more comprehensive analysis is needed and the
resulting strategies focus attention more on planning factors.

Individual and governments also instinctively seek ways to insulate themselves from the problems of energy shortages and rising prices. Accustomed living styles, operating modes, and cost patterns are disrupted, creating uncertainty. These economic units may respond in ways to assure a continuous supply at controlled costs. Advanced purchasing, rationing, or allocation schemes may be considered as interim means of deferring or preventing the shock of energy dislocations due to supply and price considerations. Clearly when all economic units in society endeavor to reduce the shock at the same time, they further compound the problem. Given the complexities discussed here, the small business decision maker is faced with a situation where planning assumptions are difficult to derive with any degree of confidence.

Prior to embarking on an extensive planning effort which may alter existing operating procedures, product lives, etc., the small business manager ascertains both short- and long-term implications. The following questions direct attention to appropriate issues: (1) Will the impact be general or isolated in a geographic area? (2) How long is it expected to last? and (3) Does it involve isolated cost increases, or is it expected to have a general impact on prices?

The purpose of this paper is to establish a format for contingency planning for small businesses concerned about the future impact of energy prices and availability. Although the context is small business, the same procedure is appropriate irrespective of size. Size introduces more complexities, but the problems of energy discontinuities related to increased prices or availability are similar.

Inherently, the uniqueness of each small business means that no
single planning model is applicable to all firms. Some firms operate exclusively at the retail level while others are manufacturers or provide service. Consequently, throughout this paper some differences are addressed, but not to the extent required for planning as contingencies (or risk exposure) may vary among individual businesses.

I. Nature of the Energy Problem

A. Energy Problems Impacting Small Business

A general comprehension of the problem is the first step toward determining its impact on an individual small business. Assessment of the general environment permits a manager to analyze the full impact of the problem and get an idea about the length of time that adverse circumstances will prevail. If a system-wide energy problem exists, numerous effects become identifiable. Under these conditions, cost increases and supply disruptions are expected in the future as changes are felt from raw material supplies all the way through the system to the final consumer. At the consumer end, consumers may change buying habits, thereby changing short-term and, possibly, long-term patterns for the total units demanded or the product characteristics preferred.

When it has been decided that the problem is system wide and expected to last for greater than the current operating period, contingency planning becomes an essential part of the planning process which must take into account energy directly used by a firm as well as energy used in the products and services it purchases.

Table 1 contains a summary of selected factors expected to
<table>
<thead>
<tr>
<th>Consumer</th>
<th>Distributor</th>
<th>Manufacturing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation to work</td>
<td>Unstable sales due to demand problem</td>
<td>Unstable sales due to demand problem</td>
</tr>
<tr>
<td>Transportation to shopping</td>
<td>Unstable sales due to supply problem</td>
<td>Unstable sales due to supply problem</td>
</tr>
<tr>
<td>Environmental control costs</td>
<td>Unstable cash flow</td>
<td>Unstable cash flow</td>
</tr>
<tr>
<td>Disruption of work schedule</td>
<td>Greater variability of income</td>
<td>Greater variability of income</td>
</tr>
<tr>
<td>Disruption of income</td>
<td>Lower returns of investment</td>
<td>Lower returns of investment</td>
</tr>
<tr>
<td>Dissaving due to price increase and income increase at lower rate</td>
<td>Alter product mix due to change in demand</td>
<td>Alter product mix due to change in demand</td>
</tr>
<tr>
<td>Funds tied up in fuel reserve</td>
<td>Need for increased liquidity</td>
<td>Alter product due to material availability</td>
</tr>
<tr>
<td></td>
<td>Energy related cost increases employee travel</td>
<td>Product design change due to value engineering</td>
</tr>
<tr>
<td></td>
<td>Transportation cost and reliability</td>
<td>Substitution of materials due to supply and/or cost considerations</td>
</tr>
<tr>
<td></td>
<td>General increase in operating costs</td>
<td>Maintain greater raw material inventory</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Energy related cost increases</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Employee travel</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Transportation cost and reliability</td>
</tr>
</tbody>
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influence demand for goods and services, operational plans, and capital expenditure plans. Some of these factors operate independently while others occur sequentially as energy costs are added at each stage through the production-distribution network. The recent occurrence of gasoline and diesel shortages show how sudden changes in supply markets for these products greatly disrupt normal operations. Gasoline shortages, or the uncertainties associated with them, forced consumers to alter their shopping habits, some acutely impacted shopping centers reported significant sales declines. Manufacturers reported that transportation delays or shortages forced modification of operating schedules.

The implications of these short-term disruptions are clear—greater uncertainty on the revenue side and increased costs on the supply or manufacturing side. In the event these are isolated and short in duration, the financial impact is significant, but the risks to the small business would not be threatening to profitable survival. On the other hand, if these events become more common and are compounded by the occurrence of several adversities simultaneously, the potential for far greater impact exists.

B. Nature of Energy Problems

Given the increase in uncertainties caused by energy supply and price problems, planning must incorporate more factors and alternatives than it has in the past. The nature of contingencies resulting from energy problems is far more complex than those usually encountered. First, problems must be identified at all levels. The distributor, whether retail or wholesale, is forced
to anticipate changes in the demand by end consumers. As the cost of shopping increases, traditional shopping patterns may be altered as well as patterns of products or services desired. Internal operations of the distributor are directly influenced by energy costs and availability. In addition employees' travel may be altered, thus resulting in a need to consider modification of internal operating practices. Buying patterns can be altered due to availability and so forth.

The objective of this section is to identify some of the types of problems and to justify the added effort of contingency planning. Energy induced problems cannot all be predicted with accuracy. Clearly the magnitude of the problems does not allow simple solutions such as obtaining a secondary source of production energy; for example, if natural gas is the primary fuel source, a backup could be obtained by converting equipment to use fuel oil as well.

Any coherent and useful plan, of necessity, includes elements like inflation that encompass all factors related to energy. Such a plan is not limited to short-term supply problems but contains strategies to account for what can be reasonably expected to occur due to supply and price considerations, both direct and indirect, in the short- and long-term. These energy induced changes in supply and price can be gradual or sudden in their impact. Thus the small business may be subject to sudden or gradual changes in inputs to the business, operation of the business, and customer demand for the business products or services. It becomes obvious that contingency planning for energy problems deals with a situation much broader than isolated instances of maldistribution of energy or other supplies.
Imagination is not needed to envision the consequences of the new energy uncertainties upon the small business. Tracing the consequences of each separate problem or combination of problems gives the financial impact on profits, liquidity, and financial structure. Examination of these various factors and the financial consequences permits alleviating strategies to be considered.

II. Contingency Planning

With the heightened uncertainty associated with firm operations, existing systems of planning and control need to be re-examined to ascertain if they adequately take into account the new factors expected to disrupt operations. Common tools of analysis, such as the budget system and the firm planning model are structured to take into account a limited range of variation in operational variables and the associated financial consequence. As a rule, the planning tools assume an orderly or predictable flow of goods or services through a firm. In recent years persistent inflation has caused some difficulty in dealing with the problem of predicting and reporting, but adequate warning allows firms to make some adjustments to minimize adverse reactions.

Inflation is almost universally factored into the financial planning process; however, today, the energy problem dictates incorporating additional elements into planning. Both long- and short-term planning are involved. In any given situation, a vast array of assumptions can be incorporated, but confusion will prevail unless an orderly scheme is used.

Many small businesses use a system of budgets which sets out the expectations for operations during the next operating period, frequently
a year. As these tools usually do not take into account all the "contingencies" which might occur with their associated probabilities, supplemental planning becomes essential to reflect realistic problems that may arise due to the energy problem.

Other tools of analysis such as replacement analysis, capital budgeting, and life-cycle cost analysis direct attention to planning horizons. As energy has become more expensive, alternative designs for equipment and plants have become necessary to obtain the most advantageous use of energy to control costs over project lives. Value analysis applications provide the ideal vehicle for optimizing the configuration to account for future energy costs and production facility design.

A. Definition of Contingency Planning

Contingency planning is intended to raise awareness, avoid surprise, and minimize the reaction time before a well-conceived change in operation or capital spending can be accomplished. It permits rapid change in operating plans consistent with goals because alternative courses of action and cost (and other) consequences of each strategy are clearly spelled out. In many respects, the formal use of contingency planning is related to overall use of planning; however, its acceptance is not widespread for a number of reasons.

If, every time a set of plans is made up, a set of contingency plans accompanies them, the whole process becomes much more complicated. For one thing, managers lose confidence in the original plan and may be tempted to deviate and hedge. Such a loss of confidence results in failure to achieve predetermined goals. For this reason,
little attention is given to the problem of what to do if all fails to go according to plan. Contingencies may be considered as unexpected events occur and have significant influence over operations and financial performance, but they are not part of the normal forecasting process.

In most cases, energy-related problems lead directly to measurable consequences or areas of impact. Any form of price increase, delay in production or in the provision of service, or delay in delivery causes a change in cash flow and profits, due to higher costs such as inventory carrying costs. Disruption in price or in materials deliveries usually results in adverse financial performance. If fuel for production, operation, or distribution facilities is unavailable, alternative supplies generally cost more.

Strategic planning examines various contingencies related to the continued profitable operation of small business. Tightening of energy supplies and increases in price are expected to result in numerous social changes. Since these factors tend to be longer term in nature, they give more warning, permitting orderly changes. Without question markets will change, providing opportunities for some and risks for others. As new technologies emerge, competitive positions between industries and companies will be altered. Raw material supplies are especially susceptible to increasing energy costs. These are only a few of the long-term changes the energy situation will bring.

B. Firm Vulnerability

Before investing time and effort in contingency planning for energy
disruptions or price changes, each firm starts by assessing its present vulnerability both to supply shortages and cost increases. Under ideal circumstances, a firm involved in production would have huge reserves of everything needed for the foreseeable future; but from a financial standpoint, this is impractical. The service firm would want to maintain huge reserves of fuel for transportation of employees, etc. In almost all cases the small business cannot obtain vertical integration to provide some form of protection. Nor can it profitably maintain huge reserves which both increase financial risk and investment.

Each firm, depending upon the nature of its operation, can analyze vulnerability or risk exposure to direct (primary) or indirect (secondary) energy disruptions. The direct disruptions come in the form of rapid price increases and supply disruption. Ideally then, operating under conditions of cost plus profit, the increases in price are passed along without adverse results. Although costs may be passed along in the short term, consequences of the prices in the long term may cause customers to change their buying requirements.

Direct energy is the most visible form; it take gas and diesel fuel to operate vehicles, electricity to operate equipment and heating and air conditioning, fuel oil or natural gas to operate production equipment. The planned volume of production or output must be altered if energy sources are restricted.

Indirect energy vulnerability is related to the purchase of goods or services using energy in production or transportation. Energy is a production and transport cost in almost all products,
although the degree varies from product to product. Indirect vulnerability results in higher costs, disrupted receipt schedules, deterioration in product quality, etc. Each of these problems leads to the question of substitutability.

The first appropriate step is identification of direct and indirect energy vulnerabilities. A list of each gives an indication of the magnitude of the problem. Each separate disruption has different levels of significance to the firm doing the contingency planning because of the substitutability of other materials or supplies. In some cases critical supplies may cause bottleneck situations and completely obstruct operations. List these vulnerabilities and ascertain whether time delays, cost, or other considerations are most important. This beginning step provides an understanding of the breadth and depth of potential problems.

C. Time For Response

Each of the elements found to create a vulnerability can be classified according to the time of impact. Appropriate strategies to offset these risk exposures can then be structured and analyzed for consequences.

The immediate response to energy problems is "Conservation." Conservation implies that the level of production or output remains constant while the energy required is reduced. Many general energy conservation schemes have been introduced in the past few years. In addition, specialized programs are available for many industries. These programs are of great value to small business since the cost
is minimal while a wide array of possible savings are introduced. As a rule these conservation plans are intended to provide a permanent improvement in energy use.

Under constraint, additional conservation plans can overcome a short-term problem, but they may alter customer or employee comfort, product or service quality, or cost.

Longer-term strategies involve purchase of more efficient equipment or changes in processes. Such alternatives as on-site energy conservation from waste may be a partial solution to some small businesses, but the investment cost may be high.

D. Types of Responses

After enumerating and assessing the vulnerability of energy-related disruptions, various forms of short- and long-term responses require attention. Traditionally, cyclically induced shortages have evoked a range of responses. If capital shortages existed, short-term liabilities were allowed to build up by increased use, along with a slowing of payment. In addition, on the asset side, manipulation was used to economize, where the adverse effects could be minimized. If prices of certain purchases were anticipated to increase, advanced buying or speculation provided a partial hedge, thus controlling costs, at least to a limited extent. Unusual build up of inventory usually resulted from cyclical extremes, strikes, or other types of disrupting activities.

With the energy problem, both short- and long-term solutions provide a way to control risk and assure continued profitable operation. Substitution is the key to many problems, although it may
not be practical or economical in some cases, except as a short-term expediency. Over the long term, new technologies will undoubtedly emerge to replace existing ones.

Future vulnerabilities can be divided into the way they are expected to affect a firm. In essence, increasing energy costs may cause modification of products, processes, or mode of distribution. The inflow of supplies or services is categorized according to how much it will be affected by change, how much response time can be expected from existing operations, and what changes or substitutions can be arranged to assure continuity. For the manufacturing or processing firm, substitutions usually consist of raw materials, parts, components and direct energy used to operate the production and manufacturing facilities. For firms engaged in distribution, change involves the receipt of finished goods to be inventoried then distributed to other firms or end consumers.

In most cases an array of potential responses exists for each problem or set of problems, although many will not pass the test of economic feasibility. Selecting the optimum response depends upon the implication to the firm and expected magnitude of the market responses. Triggering events need to be identified so that staged responses can be implemented in order of desirability. Some types of responses have a permanent effect on one or more stages of the operation or investment, whereas others have a temporary effect which is altered as market conditions change.

A system to alert management to impending changes of necessity identifies specific triggering mechanisms and a set of events which will call for a previously planned change in operating policy. Steps examined in previous sections focus the attention of the
decision maker on the vulnerable areas, limiting the effort required to respond to problems related to energy shortages or materials shortages arising from the energy problems of other firms. The key events which bring about the changes, usually short term, vary from firm to firm, depending upon the nature of business (i.e., manufacturing, distribution, or service). Both quantitative and qualitative factors are appropriate, although quantification reduces the judgment element. Any or all of the following are appropriate factors to be identified as the triggering or action event: price change, stock levels, order time, delivery time, and delay times over accustomed periods.

Changes require a well structured management information system. As shifts to alternate plans take place, priorities to use limited energy resources change with the level of operation; then implementation of a stringent energy status reporting system may be brought into use. Rearrangement of production schedules, dropping of selected products, and use of standby sources may buy time while supply conditions improve and allow a small business to resume normal operation. In some remote situations, major alterations in the line of business may be required to assure continued profitable operation.

III. Energy Monitoring System

Once the areas of vulnerability are identified and triggering events have been detailed, a monitoring system needs to be developed in order to reduce the surprise element and give the maximum time for response. If the early warning gives the appropriate signal and the prearranged events are set in train, then predictable outcomes can be anticipated.
A. Developing a Monitoring System

Clearly, the costs of developing, implementing and operating a comprehensive management information system must be justified by the value of information provided. Small or moderate size business firms need to define carefully their information requirements to hold down the costs of such a system. For example, a comprehensive external information system is not usually a prerequisite for successful operation. Since most small businesses are limited in scope of operation, the external and internal areas to be included are limited. Thus, by careful definition of information needs with special attention to energy, system costs are restrained.

To plan for the availability of energy and control its cost as one of the operational costs requires careful planning of internal information to monitor direct energy use. Indirect energy appears as part of the cost of materials and services received. Various schemes have been developed to ascertain whether energy is being used in a cost effective way. Our analysis starts with an audit of production facilities, transportation utilization and other facility use. There is no universally accepted audit procedure because of the differing characteristics of each industry and firm. Many satisfactory audit procedures have been developed to provide a baseline for energy use. Once initial audits have been used to identify high-potential energy savings opportunities, the continuing monitoring system provides information to assure efficient use of this resource.
B. Factors to Monitor

The amount of detail internal information and analysis provide depends upon external circumstances; one level of detail is used under normal conditions, while another level of detail is obtained when the external environment becomes unstable. After itemizing the relevant information, each firm will have the type of information best suited to its purposes. Examples of the types of measures include such parameters as: miles per gallon, average fuel use per trip, fuel per ton delivered, energy per unit of output (BYU, KWH, CMF, etc.) energy cost per sale, units of energy used per sale, energy per ton of output, and so forth. Much greater detail can be developed in some situations, depending upon the nature of existing internal information systems and the amount of time and effort the small business is willing to spend to develop a system focusing attention on energy use. One important thing to remember is that energy is only one resource among several that require planning and control in order to achieve profit goals. Although this paper focuses on the energy element, other elements cannot be ignored if profit, risk, and liquidity goals are to be achieved. The internal information to spot savings opportunities through physical and cost control is universally applicable and required for efficient operation, while the external information system focuses more on risk of sales declines and factors which cause operating discontinuities.

A firm serving several geographic markets or product markets requires comprehensive market information about customer's present and future spending patterns. Two questions arise about the way energy problems influence customer's demand for products and services.
First, how does direct energy shortage influence the customer and the demand for your product or service? By segmenting markets, analysis can anticipate all contingencies. Such external information and its continual monitoring provide considerable insight into the vulnerability of sales or output caused by the energy problems of customers.

C. Monitoring the External Environment

External scanning or monitoring of supply conditions appears to have become more important since the Spring of 1979. The variability in receipt of incoming materials or supplies causes production scheduling problems which interfere with budgeted activities. Supply conditions are influenced by both direct and indirect energy problems. Continued monitoring of variables influencing supplies provides additional lead time to seek other suppliers or substitutes. The seasonal, cyclical and growth factors combine with the energy factors in making forecasting complex. In the case of monitoring supplies, identification of supplies likely to be impacted by short-term energy dislocation provides an opportunity to adjust sales, control internal operations, and inventory levels adequately in advance to allow orderly change.

D. Internal Information Requirements

Perhaps the most important requirement for using internal information effectively is the development of a simple system of tabular and graphic presentation. This system should be understandable to
all. Monthly (more frequently if the data are available) plotting of energy use data allows decision makers and employees to see the results of their efforts and contributions. When possible, relevant data are broken down to the level of detail where it becomes relevant to particular employees. Aggregate data have little meaning because personal responsibilities are limited to narrow fields such as transportation, production, or some limited areas within production. Breaking down the energy use rates and costs, and graphically presenting them, shows employees their role in the overall effort. For example, employees engaged in transportation activities are shown energy data such as cost per delivery, fleet miles per gallon, energy use per delivery, etc. Changes in the calculated values are the result of direct action of specific employees. If each major energy using area is informed and the monitoring system gives frequent feedback, new ideas for saving can be tested easily with rapid feedback. Productive ideas can be accepted while unproductive ones can be reexamined, modified or rejected.

To assume timeliness, accuracy and relevancy, specific responsibilities for collecting internal energy information are assigned to a specific person or persons. It is possible to limit data collection responsibilities to internal information, or the same person may be given responsibilities for collecting the external information required for contingency planning.

A number of books and pamphlets have been written to outline energy data gathering forms which are both general and specific. Forms of this kind are a valuable starting point for the basic or raw data, but for contingency planning, internal and external
events are tied to operations. To handle appropriately the information focused on contingency planning, existing inventories and planned acquisition need to be tied with events and responses. Design, the collection forms, and means of presenting them depend exclusively on the nature of the business operations; consequently no specific form is presented here.

Continuity of effort is obtained by assignment of energy information requirements to one or several individuals. Collection, auditing, monitoring, reporting, and employee education are also closely related areas. Where complex problems of an engineering or marketing nature exist, a team may be required to discharge these responsibilities or act as advisors to the person charged with the responsibility.

IV. Tools for Analysis

A. Inherent Characteristics

The techniques of analysis to be used for planning rely on internal and external information which continuously yields timely information to be used by decision makers to assure that changes in energy supply and cost do not seriously interfere with operations. Perhaps the first step is to examine short- and long-term factors and their implications. Then, ascertain whether these energy problems can be expected to unfold gradually or suddenly, whether they will be isolated or universal, or whether your firm has substitutes available. If direct and indirect energy problems are examined simultaneously, the single most important factor is to ascertain how much lead time is needed to correct or mitigate the
problem of the shortage.

The ultimate success of contingency planning depends upon the ability to implement successfully changes that still strive to achieve the basic firm goals. The degree of formal and informal, short- and long-term planning varies widely; thus all firms do not obtain the same level of sophistication either in routine planning or contingency planning.

In general, a firm's financial vulnerability to energy problems directly relates to its ability to respond positively. Financial resources are implicated in any response or strategy to withstand adverse operating conditions. Technical resources may be the key to successful identification of alternative strategies and the measurement of their financial consequences. Modification of existing production processes or adoption of new technologies depends upon the technical resources available within the firm or the information generally available to small businesses. Technical resources including an engineering staff to accomplish value analysis studies are essential in considering alternative product designs that may lead to energy savings. Where designs and equipment are not available in the market, many industry specific energy saving suggestions are available today from various sources frequently under sponsorship of The Department of Energy.

B. Existing Tools--Operational and Capital Budgeting

Experience with formal planning provides familiarity with concepts which can be modified to include contingency planning. Although an existing budgetary system may be designed to allow a variety of
assumptions to be tested for financial consequences, generally the array and magnitude of assumptions is limited. Because of this limitation, contingency planning requirements for individual firms need to be designed—based upon the level of vulnerability to direct and indirect energy factors.

Most traditional operational budgetary systems (operating budget, cash budget, etc.) permit alternative assumptions such as lead time for purchasing depending on output or sales levels. The financial consequences of short-term moves show up as changes in costs, inventory levels, and possibly the borrowing requirement. Substitution of materials that are less energy dependent can be incorporated into the analysis showing financial consequences, but product modification may influence future sales. Therefore, understanding customer needs and preferences becomes essential for contingency planning.

When strategic decisions are involved, the capital budgeting process is used. As capital projects are analyzed, energy sensitive considerations are tested to appraise cash flow and profit implications. Here the energy cost level and capital investment trade-off emerge for consideration. Building plant and equipment of a general nature gives some operational flexibility, thus reducing risk, but optimum cost performance may be foregone.

C. Scenarios

In order to ascertain the impact of single or multiple energy related problems on the physical flow of goods, flow of funds, profits and financial condition, scenarios can be employed for
both the short and the long term. Brief written scenarios, for the first stage of contingency planning, give a range of operational assumptions to be used—as inputs to conventional financial planning tools to ascertain the impact on key financial variables. To be a useful tool of analysis, the scenarios should incorporate threats and opportunities, alternative strategies, policies and outcomes for all levels. By their nature, scenarios range from a general to a limited scope. For the typical small business with a limited scope of activities, the scenario should be kept simple and realistic to provide for clarity.

To develop a scenario, the small business describes its operation within its operating environment. As a scenario or scenarios are developed, additional energy problems can be incorporated to reflect the full impact of both the direct and indirect energy problems. Even in a fairly simple situation, complexities and interrelationships can stretch the scenario to a thesis length document. In deciding upon the nature of the scenario, attention may be given only to the short-term or alternatively to the long-term planning period, or combinations of both can be developed. The decision about the length of time to be studied, or the planning horizon, determines the length and complexity of the overall exercise.

Basic operational characteristics of a small business establish the overall scope of the scenario and the relevant factors to include.

Scenarios about regional operations consider factors different from those pertinent to local operations. Manufacturing firms consider factors different from those of distribution firms. Wholesale and retail firms experience problems unlike those of service businesses.
Some differences include the nature of the inventory, the inventory holding period, the availability of items, acceptable substitutes, sensitivity to transport difficulties, etc. For example, certain retailers have selected product lines whose availability may be immediately affected when petroleum products are scarce, while others may have considerable lag before impact.

After listing the direct and indirect energy uses which influence the business for whom the scenario is to be written, the level of vulnerability can be ascertained. The level of dependence is a function of substitute sources immediately available. Time delays add additional complexity. Furthermore, the expected cost both of direct energy and of price increases from other supplies which contain energy as part of their cost will need to be examined for the expected price increase of each item. The task is simplified by elimination of items that do not significantly impact the operation.

The next step to constructing the energy impact scenarios is to look forward in the production-distribution system. Of course the business's placement in the network determines whether the customer is a manufacturer, a distributor, or an end consumer.

A massive list could be constructed showing all potential sources of present and future problems. Such an exercise is a very individualized process because of the uniqueness of each small business. As each possible energy induced adversity is listed and examined for magnitude of effect, selected items will emerge as being more significant than others. As each set of circumstances is identified along with the likelihood of occurrence, a calculated response can be tailored to the situation. Examples of responses
### TABLE 2

Selected Examples of Direct and Indirect Elements To Include in Energy Contingency Planning Scenarios

<table>
<thead>
<tr>
<th>Customer</th>
<th>Firm Building Scenario</th>
<th>Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport</td>
<td>Fuel for own operation</td>
<td>Suppliers cost</td>
</tr>
<tr>
<td>Cost of shopping</td>
<td>Fuel for transport</td>
<td>Availability of primary and standby energy sources</td>
</tr>
<tr>
<td>Ability to pay (credit rating)</td>
<td>Employee dependability</td>
<td>Raw material cost and availability</td>
</tr>
<tr>
<td>Decline in income</td>
<td>Scheduling of operations</td>
<td>Satisfactory substitutes</td>
</tr>
<tr>
<td>Expectations</td>
<td>Timing of receipts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Timing of deliveries</td>
<td></td>
</tr>
</tbody>
</table>
include: increased inventories, altered production schedules, altered production processes, substitution of raw materials, delay in deliveries, and obtaining of adequate financing to provide for both short- and long-term changes.

After establishing which items are important, the next step is linking these events to measurable financial variables. If the primary focus is long term in nature, much of the attention will be on capital budgeting problems and related capital needs. Various elements relating to future energy costs, production processes, etc. introduce the asset impact over the long term. Timing of the introduction of expected energy savings etc. are taken into account. At this point the examination goes beyond the analysis of a single project; it reaches a firm level where other aspects of the firm's operation are taken into account. For short-term financial impact, both liquidity and profitability are examined by traditional financial ratios, and by energy production efficiency ratios. Where computerized simulation models are available, time can be saved by changing parameters to incorporate the energy induced changes; otherwise pro forma statements are calculated by traditional methods.

The short-term energy impact is found in various forms such as changing inventory policy, substituting material, altering schedules, seeking new suppliers, modifying product lines, etc. For the long term, consideration includes products and services, net technologies, new products, new transport variables, new distribution systems, etc.

Constructing simple scenarios permits examination of the area of impact, the magnitude of the impact and the financial consequence.
The financial consequence is measured by using the traditional operating budget systems and by pro\textsuperscript{form}a analysis of longer term events.

V. Strategies and Impact on Financial Status

No universal set of actions or strategies apply to all small businesses, due to the diversity of their operations and character. However, all face the same problem of dealing with both short- and long-term problems of energy availability and cost. The short-term policies are directed to minimizing adverse changes to operations, while in the long-term, attention is centered on processes or techniques intended to reduce the energy required for continued profitability.

Short-term energy related disruptions tend to reduce the efficiency of plant and equipment, reduce utilization of plant and increase inventory investment. This decline in efficiency of operations and facility utilization creates a more uncertain environment in which costs tend to increase. More resources are required per dollar of sales, thereby resulting in decreased profits and return on investment. Selected operational energy conservation measures are appropriate to minimize this adverse trend; however, these measures usually provide only a temporary solution. Measures expected to continue having an impact require greater time to plan and implement. The list of possible temporary changes may be very limited before major capital requirements become evident.

Long-term strategies involve use of capital for energy conservation through product or process changes. New product design may provide savings by using less energy directly and/or by using materials which
cost less. Long-term changes cause greater uncertainties and challenges
to the survival of existing products or services which decrease with the
introduction of new technology.

Alternatively, the impact of problem areas is tied to functional
areas of marketing, production, and finance in order to ascertain
overall effects. Where the functional areas are considered, the time
horizon of the problems can be included. In the area of finance,
adversities impact one or more of the following variables: profit,
breakeven level, capital requirement, liquidity, financial structure,
and borrowing capacity. For marketing the following considerations pre-
vail: product mix, product quality, channel of distribution, facility
location, inventory sales requirements and general market demand. Pro-
duction changes include: process, timing of purchases, level of goods
in process, required finished inventories, equipment requirements
and standby energy sources.

Various short- or long-term goals are possible, depending upon
the immediacy of the problem and whether more than one goal is
formulated. Included among goals related to energy: minimize dis-
ruptions of operation, reduce risk of supply shortage, reduce costs,
improve products, conserve existing supplies.

VI. Summary

In conclusion, energy is only one cost of profitable operation,
but it is of great concern throughout the production-distribution
system. The basic problem is to reduce energy cost by conservation
measures or development of new technologies which minimize the use of
energy. Uncertain supplies are subject to sudden disruption and price
TABLE 3


<table>
<thead>
<tr>
<th>Action</th>
<th>Feasibility of Use</th>
<th>Time to Financial Impact (By Month)</th>
<th>Rank in Order of Desirability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase inventory reserve stock</td>
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<tr>
<td>Alter operating schedule</td>
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<tr>
<td>Modify timing of purchases</td>
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<tr>
<td>Find Substitute:</td>
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<td></td>
<td></td>
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<tr>
<td>Energy suppliers</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Energy supplies</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Other raw materials</td>
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<td></td>
<td></td>
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<tr>
<td>Increase use of supply contracts</td>
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<td></td>
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<tr>
<td>Alter production process</td>
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<td></td>
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<tr>
<td>Alter product line or service</td>
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<td></td>
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<tr>
<td>Alter product quality</td>
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<td></td>
<td></td>
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<tr>
<td>Invest in more efficient equipment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>And other relevant actions</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
increases. Since new techniques take time to develop, the most likely strategy for small business is to minimize risk by obtaining flexibility throughout operations; businesses must prepare for rapid change. Information system development provides early warning of impending change so that alternative policies can be implemented to reduce or minimize both short- and long-term problems.

Substituting, modifying operations, increasing inventories, seeking new supplies and increasing purchasing activities all provide partial answers. Some may find that materials management models provide the formal structures for integrating materials management, purchasing and inventory management.

Since each small business is unique, an individual effort is required to develop a list of vulnerabilities related to energy directly used and to products purchased for resale or further manufacture. As specific adverse exposures are identified, prearranged responses can be designed for one or several problems. Mobility of internal operations can be designed so that different sets of policies are used to achieve the firm's profit, liquidity and risk goals under different energy assumptions.

A well-developed operational planning system minimizes the time needed to implement contingency plans. After the potential energy problems are identified and planned responses have been formulated, the next step is to determine the financial impact of each strategy or set of strategies. The regular budgeting system may allow some modification of assumptions, but the contingency planning process may sometimes be separated and handled independently. Any given event related to disruption of energy supply or price has a signal which triggers pre-
determined policies to minimize adversities.

The internal system to provide flexibility minimizes long-term risk and potential financial problems. Reaction time is greater with contingency planning.
REFERENCES

Selected Books & Articles


