Risk Sharing for Energy Emergency Preparedness

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Abstract

This article discusses the need for proper planning and preparedness for local, regional or even national emergencies resulting from energy disruptions. It describes a spectrum of natural and man-made phenomena which can disrupt our energy supply and questions whether we as a nation are properly prepared for such events. It discusses the current fragmented approach to energy emergency risk sharing by industry, state and local governments, and the federal government. It argues that these agents could do a better job, possibly with fewer total resources, if they adopted a risk sharing approach and coordinated their combined activities.

(Editor note: The author is a long-time contingency planner with 15 years in the Department of Energy's (DOE) Office of Emergency Planning and Operations. He can be reached in Washington at DOE headquarters at (202) 586-1311).

Introduction

From the Arab oil embargo in 1973, to the oil price shocks in 1979; from the Iranian revolution, to the unfounded fears of oil market disruptions during the Persian Gulf War, the United States has weathered and learned from emergencies brought about by sudden and unexpected reductions in the supply of energy to the market. Large or extended reductions generally result in higher energy prices and poorer economic performance due to the higher costs of energy as a factor of production.

The extent of economic impact is influenced by the severity and duration of the energy disruption and the particular policies chosen for response. Examples of such emergencies range as widely as the petroleum embargoes of the mid-seventies and the Northeast electricity blackout of 1964.

Steps can be taken before an energy emergency to reduce its likelihood or blunt its impact. Such actions fall under the rubric of energy emergency preparedness.

This article argues that it is possible, even likely, that

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lower overall costs of emergency preparedness can be achieved by those responsible for coordinating and sharing the economic and other risks from being unprepared.

It will be helpful in this discussion, first, to introduce the notion of an emergency s-p-e-c-t-r-u-m. Next, clear distinctions will be made between company emergency risk perspectives, those of states and localities and, finally, those of the federal government. Lastly, a basis for coordinating and sharing responsibility for emergency risks will be proposed.

The Emergency Spectrum

While the emergency preparedness concepts depicted in Figure 1 (**Energy Emergency Spectrum**) and discussed in this article are applicable for all industries, they are especially appropriate for safety net industries (e.g., energy, communications, transportation). On the left of the figure are found those relatively high probability, low consequence emergencies which may occur fairly frequently but which energy companies handle so well that most customers seldom realize they've taken place.

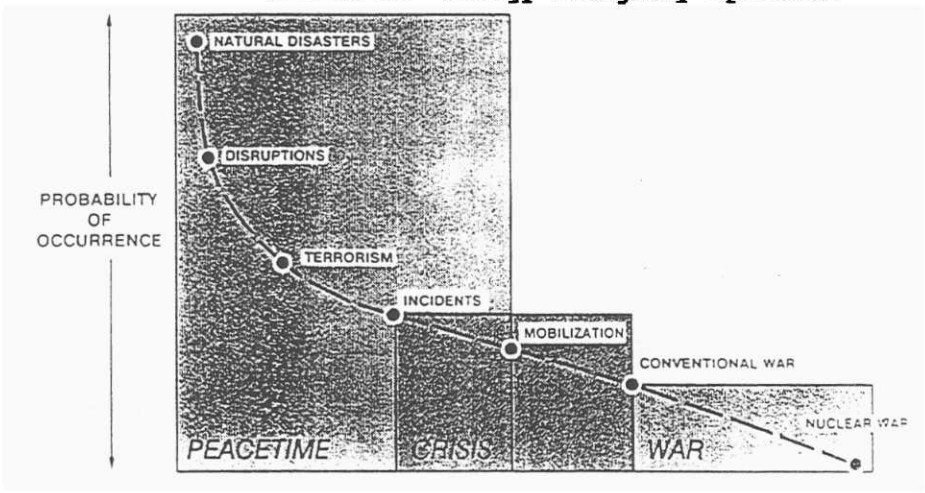
On the right of this curve are those low probability, extremely high consequence emergencies generally considered to be the preparedness domain of the federal government.

Regardless of whether this latter characterization is true, it is safe to assume that industry does not generally concern itself with this region of the emergency spectrum.

In the middle of this curve are other emergencies which, individually, may be beyond the ability of a single company to handle. They may require assistance or intervention by the state, local or possibly the federal government.

Two points should be emphasized: 1) emergencies are not mutually exclusive and can occur simultaneously; and

FIGURE 1: Energy Emergency Spectrum



2) preparedness initiatives may be useful beyond the specific risks they were obtained to reduce.

Contingency planning for some companies extends further to the right than other companies. As a contingency planner for the federal government, I believe that the further industry's planning horizon extends to the right, the better. This will mean that the likelihood of involvement by states, localities or the federal government will decrease because industry is ready to respond to a larger component of the emergency spectrum.

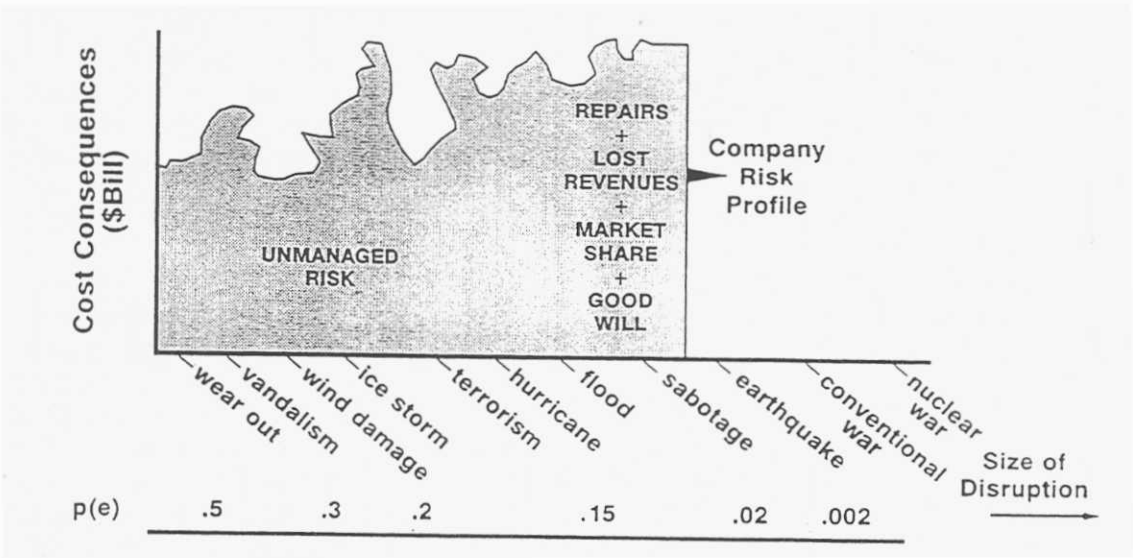
Risk Avoidance-Company View

To put the discussion of emergency preparedness in perspective, it will help to introduce the notion of risk avoidance and to describe its niche in emergency planning.

Most well-run companies, including energy companies, buy insurance against various emergencies. They design their corporate enterprise to balance the certain costs of risk avoidance against the contingent benefits of insurance against such risks (i.e., the emergency consequences they might suffer if they weren't so insured). These latter avoided costs are used as estimates of the benefits from insurance.

For example, in the hypothetical case shown in Figure 2 (**Energy Emergency Risk Avoidance-Unmanaged Risk**), the company estimates its cost consequences from a range of emergencies. It is reasonable to assume that

FIGURE 2: Energy Emergency Risk Avoidance-Unmanaged Risk



the company will include in its estimates of cost consequences the cost of repairs, lost revenues while service is out, any customers lost to other suppliers whose service is not disrupted (i.e., market share), and a judgmental add-on for good will (e.g., future customers initially may seek suppliers with a better record of undisrupted delivery, regulators may decide to step in if service becomes too erratic). While only a single point cost consequence is shown for our purposes, it should be understood to represent the midpoint of an entire distribution of consequences which could result from each emergency event considered.

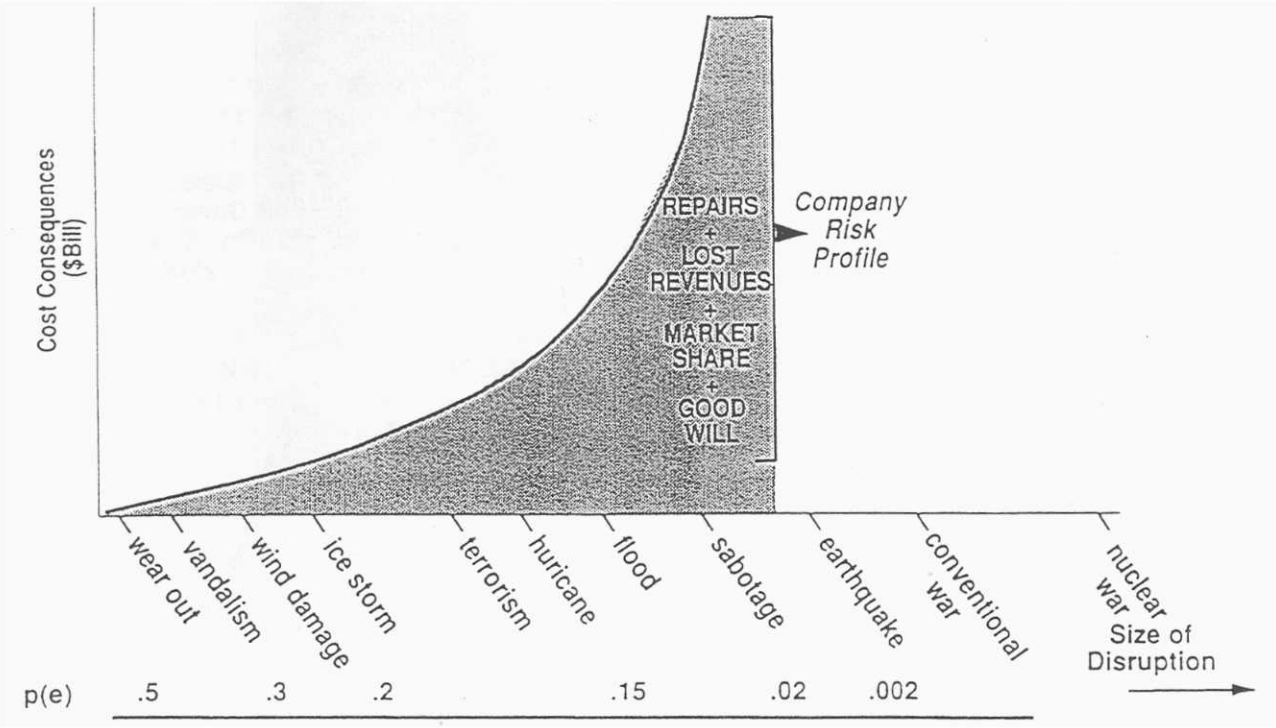
It is important to note that in this context, these cost consequences are unique to this company--in this engineering configuration, in this climate, in this geopolitical setting, using these operating protocols, etc. Once these cost consequences are identified, the company contingency planner introduces the notion of conditionality by estimating the probability of each event and multiplying this probability times the cost consequences. This product, referred to here as the expected cost consequence of each emergency, is the basis for judging how much risk avoidance insurance to buy.

The term insurance is not used here in its normal sense, although it could be. As used here, the term insurance includes any measures which the company might use to reduce the expected cost consequences of various emergencies. For example, a company might choose to carry higher inventories or more spares, to build more redundancy into its system, to harden its facilities or improve its physical security. Each of these measures might be undertaken if the certain costs of the measure itself was less than the expected cost consequences avoided by its purchase. If implemented, each of these insurance measures also would reduce the likelihood or consequences of a supply disruption and upgrade the quality of customer service accordingly. [It is possible for a company to take out insurance--in the traditional sense--against losses. In this case, it would receive a financial settlement from a company which underwrites risks to offset the cost consequences it would otherwise sustain. Such a measure would <u>not</u> reduce the likelihood or consequences of a customer supply disruption but would reduce energy company losses.]

Traditionally, the prudent company invests in such insurance to the point that the marginal cost of the next most efficient emergency measure equals the expected value of the marginal benefits it would buy.

The smooth curve in Figure 3 (**Energy Emergency Risk Avoidance-Managed Risk**) depicts the net of this process and reflects a risk preference profile unique for an individual company. Like any other area of risk accommodation, some companies may be risk takers while others may be risk averse. Using Figure 3 as the model, the difference between

FIGURE 3: Energy Emergency Risk Avoidance-Managed Risk



risk taker and risk averse companies is reflected in curves higher or lower in net cost consequences and which cover more or less of the spectrum of emergencies before rising exponentially. Companies typically review their insurance investments as their systems change, as the conditions under which they operate change, and as the price for their services change (revenues lost!), etc.

The point is that the company invests in emergency insurance to protect its financial interests as it sees them. Left to its own judgement, it would not consider regional or national objectives because it would have no way to capture any economic benefits from such investments.

Risk Avoidance-Regional Level

The curve presented in Figure 4 (Risk Avoidance-Regional Level) shows that potential cost consequences to the energy company do not necessarily reflect the entire cost to the region in which that company operates. Viewed as a commodity, energy is only one input of many needed by other industries to serve their customers. In other words, there is a multiplier effect between the cost consequences which accrue to the energy company and to the entire region served by that company.

Obviously, the multiplier effect of an energy disruption may be very different among regions.

For example, a region which is predominantly agricultural may have a noticeable energy multiplier effect only during certain seasons of the year (e.g., planting, harvesting).