The Next 25 Years In Transportation — It Is Our Choice

By JOHN F. SPENCER

What I want to point out to you is that the future in transportation can be good or bad, favorable or unfavorable, what we want or do not want, according to the directions in which we choose to go. Better is not inevitable, and neither is worse.

The choices will be crucial. Make no mistake about it. Civilization can exist only if there is adequate transportation -- in fact, all civilizations have grown up only when there was transportation, first by water, then by land, and in our time by air. That is because civilization can be defined as the way people organize their resources and their actions to satisfy their needs and desires. You cannot organize resources unless you can transport them. Crucial choices must be made when there is a radical change in the resources, or the needs, or the desires. We are now confronted with such choices, mainly because we are reaching a turning point in essential resources, and that turning point is one in which we must cope with new constraints.

This is a new experience in our era. If we go back only 200 years, just before the beginning of the 19th century, we find another such turning point, one that removed constraints. Until that time all the work that was accomplished in the world used only three forms of energy -- muscle power of men and beasts, windpower for mills and ships, and waterpower for mills. An overwhelming proportion of that energy was then muscle power, and I daresay that man contributed more than animals. Then we learned how to convert fuels into useful work, and this made energy cheaper and cheaper, and other resources cheaper, as we advanced from reliance on wood as fuel to the fossil fuels, first coal, then petroleum and natural gas.

It was the progressive cost reduction of these fuels and consequently of energy that made possible our modern form of civilization -- and its absolutely essential transportation --cheap energy. Cheap transportation gave us the power to produce metals and foods, the sinews of both peace and war, in unprecedented abundance.

We are now already well into a new era, one in which important resources, instead of being more abundant and cheaper, are becoming scarcer and more costly. I hope you all agree with me that our fuel situation is not contrived -- I would even argue that it is not being much exploited, either by the fuel producers, or by the OPEC nations, but that is another matter. Concede at least that the declining availability of energy is the condition of one of our resources.

We pay too little attention to other constrictions which confront us. Consider metals. The richest, most cheaply mined lodes of ore have been used; we must pay to tap less accessible sources, and often to apply expensive extraction processes and beneficiation.

Another resource which is dwindling is cheap fresh water. If we expect to maintain the standard of living to which we have accustomed ourselves we must face this problem because it puts limits on our industry and on our ability to produce food.

Yet another factor is land. The best measure of the scarcity of land is price, and in constant dollars the average price of American farm land has risen more than 50 percent in the last 70 years. That may seem moderate to you, but it gains meaning when you learn that many other tangible assets and goods, including many foods, have dropped in real dollar price in the same period. Land is becoming a scarcer and more expensive resource.

A fifth dwindling resource is people who work. For two decades the proportion of workers has risen as a fraction of the whole population. This trend has almost come to an end, and it is predictable -- it is certain -- that the labor force will drop as a proportion of the whole population in North America. This is a firm prediction because about 20 years ago the birthrate began to drop -- there is no way to change the decisions which were made then and since.

So we now enter an era of diminished resources of energy, metals, water, land, and labor. This is where our choices come in. How do we deal with a dwindling of resources? Must we tighten our belts, be thinner, and have a poorer life? Let me cite two historical examples of reaction to resource exhaustion, which have to do with transportation.

One is in the civilization of the classic Greeks, more than 2,000 years ago. Greece had a maritime civilization, made possible because Greece was forested with trees which could be made into sturdy ships. For hundreds of years the Greeks built ships, traded all over the Mediterranean, and established colonies. Ultimatley they exhausted their supply of timber. They found no substitute, and this contributed heavily to the decline of their power and civilization, which were eclipsed by Rome.

The British went through a very similar cycle of shipbuilding, trading, and colonization from the 16th century to the beginning of the 19th century. They too exhausted their supply of

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suitable timber. But the disappearance of this resource was not permitted to cripple their economy. They found two remedies. The first was to import the timber they needed from other countries. Even better, they developed first iron and then steel ships -- assuring themselves a preeminence in the world economy which lasted until after World War I.

That is to say, waning resources call for resourcefulness. Today there are many who are willing to tell us that we must be in a static or declining economy. I would like to make one more general observation before addressing the future of transportation specifically. Throughout the thousands of years when muscle power was the main source of energy, the general economic trend of civilized nations -- the trend of the standard of living -- was upward. This is true because in the main each generation of workers produces a little more than its generation uses up. Each generation leaves a legacy, of buildings, roads, bridges, dams, cathedrals, tools, and also a legacy of additional knowledge and technology, that makes life better and easier for the succeeding generations. That is, capital accumulates. Energy from fuels greatly accelerated this accretion, but even without energy from fuels we do not have to settle for decline. We may settle for less, for decline, but to do so is not foreordained or inevitable.

Suppose, however, we do settle for less, in transportation. We hoard energy, and metals, and all our resources. We give up our individual automobiles; we reduce our street and road network, maintaining only the most necessary arteries for commerce and common carriage. We abandon much of our rail network. We concentrate our industry and commerce in a few cities -- to minimize transportation -- and let our smaller cities atrophy to market towns. We end the long distance transport of food, forcing each region and area to subsist on what it can grow and what it can store in local granaries and root cellars. We close most of the ports of the world, and live behind our coastal defenses. Fantastic? Hardly -- this was the pattern of life in China and Japan less than 200 years ago. It was the condition of the Western world after the fall of Rome. We are all in the stream of time, and if we do not make an effort to move forward into the future, the current will carry us backward into the past. That is what can happen in a static or declining economy, in a world where we no longer have faith in our own resourcefulness or inventiveness, in our ability to venture and gain from the venture.

Suppose, however, we strike out boldly to solve our problems. We accept the costs, in money and sometimes in safety and health -- as we have done in the past. We encourage the inventive, and the entrepreneurs, and allow them generous rewards when they succeed. Put another way, we create new capital. If so, can we continue to progress in our standard of living?

Obviously the costs are going to be greater, and if we are going to meet those costs we must be more efficient. Energy is one central cost. We must find ways to get more benefit from energy, per capita, with less expenditure of energy per capita. That goes right to the heart of transportation. Since more than half the fuel we use for transportation goes to the privately owned passenger car, we need to rearrange ourselves so we use that car less, and use it more effectively. It means we must live closer to the places where we work, and the places where we shop, and closer to public transportation. It may mean that light industries, warehouses, and terminals as well as people will return in great numbers to city centers. It may mean that suburban living will tend to concentrate more along arteries served by public transportation.

Intercity passenger service by surface common carrier will experience a renaissance. Within cities usage of transit systems will grow, more routes will be added, and frequency of service will improve. We can expect a return of the electric trolley and the electric bus; the latter is likely to be a hybrid, capable of either rail or highway movement -- and capable of accepting power from an overhead catenary or running on its own batteries. Private passenger vehicles used in urban areas may be battery operated. We can also anticipate a change in the internal combustion engine to allow greater latitude in fuels; it is not yet clear what fuel will dominate, but do not discount alcohol, methane produced from organic wastes, synthetics derived from coal, and hydrogen produced by electrolysis of water. My own bet is on hydrogen, and also on the presence of one internal combustion vehicle and one electric vehicle in every two-car family garage by the year 2005 A.D.

Movements of cargo are another matter. There is certainly going to be a shift to modes which prove to be most efficient in energy expended per ton-mile. Sites for factories and warehouses which give access to energy-efficient modes are going to be sought. Let me avoid saying which modes -- it is more factual to say that under certain circumstances each mode is the most efficient for those circumstances, so every traffic and trade route needs analysis. I will make some comments soon about modes.

I think we will also establish computerized clearing houses for all freight movements, to minimize empty backhauls. To be specific, at this moment a loaded vehicle is leaving New York bound for Chicago, and a loaded vehicle is leaving Chicago bound for New York. Both those vehicles will return empty. We will use the computer as a matchmaker, to insure that such opportunities are not missed, and we will also discover triangular and quadrilateral and even pentagonal movements which get us better use of our rail and highway facilities. We have hardly begun to apply the mathematics and the data processing and the communication required to get the most from our transportation capital.

In the next 25 years we will also change our right-of-way limitations. Over the most heavily traveled routes we may see special roads and special