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High-speed railroads will transform Europe's economy

If the "laws of the market" continue to be followed in European transport, the result will be chaos. The LaRouche plan for a Productive Triangle shows a better way out. Part I of a series.

In our Feature cover story on Aug. 3, we presented an advance release of a detailed study of a European development program that was first enunciated by U.S. political prisoner Lyndon LaRouche, in the context of the reunification of Germany. LaRouche's program is centered around a high-speed rail network running from Paris to Berlin to Vienna, the political and industrial heartland of Europe. The triangle's "spiral arms" would feed into the major centers of Western Europe and extend through the newly liberated nations of Eastern Europe into the Soviet Union.

This central triangle has an area very nearly that of Japan. It already has the greatest density of industrial infrastructure, and the greatest average level of education and culture, of any major region of the world. It includes the densest and most productive areas of northeast France, Belgium, the Federal Republic of Germany, the German Democratic Republic, western Czechoslovakia, and northern Austria.

The full report is produced by EIR Nachrichtenagentur in Wiesbaden, Germany, and in English translation is titled, "The Paris-Berlin-Vienna Productive Triangle: A European Economic Miracle as the Motor for the World Economy." This chapter of the Special Report was written by Ralf Schauerhammer and translated by John Chambless.

The development of short- and long-distance transportation in Western Europe in the past decades has followed the "laws of the market" and the interplay of power of various local and national interest groups. The overall European context was hardly considered or dealt with. The consequence is increasing traffic chaos. Even to laymen, the problem is becoming increasingly clear, as—during enforced time for reflection in the freeway congestion, or while in a holding pattern over an airport—they bitterly realize that the predicted increases in truck and air traffic within the framework of Europe '92 will probably cause only one thing: a complete collapse of the transportation system.

The political upheavals in East Europe offer the great opportunity that the abolition of the artificial traffic barriers along the Iron Curtain and the related reopening of major lines of traffic in an East-West direction, will also lead to a fundamentally new orientation for transportation policy and technology. In this connection, politicians of all parties emphasize that the errors of recent years must not be repeated in the construction of transportation infrastructure; if asked exactly how the situation is to be improved, however, they have no clear answers. The causes of the errors are not even known.

The decisive point that must be recognized is the following: Investments in infrastructure cannot be subject to the laws of the market; they follow the far more fundamental principles of the physical economy, which precede the market and create the preconditions for market events in the first place.

The fact that the market fails here does not means, of course, that arbitrary dirigist measures can be seized upon,

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as is done nowadays in ostensible or real "protection of the environment." We do not mean, for example, the "dirigistic" obstruction of truck traffic through unnecessary taxes, in order to redirect freight transportation onto the railroads, without correcting the faulty development of railroads that is partly responsible for the broad expansion of truck traffic in the first place.

To be able to judge the present state of Western European transportation system in general and the condition of the various transportation systems that are usually considered to be "competing," we must primarily consider superhighways, major arterial roads, rail lines, canals, in addition to the runways and airport terminals that have been build in the last decades. The crucial measure of any transportation system is not the transportation performance achieved in ton-miles, but rather the improvement of the route network, just as in agriculture the continual improvement of soil quality is more important than the harvest quantities aimed for, and just as expert industrialists pay primary attention to the improvement of production facilities and the qualifications of the workers.

If we take the figures from the Federal Republic of Germany as an example of the construction of the route network, we see that the network of superhighways has more than doubled since 1970. The rail network of the federal railroad, on the other hand, has been reduced by 10% in the last 20 years. This and the railroad's inadequate technical and organizational standards contributed to the fact that truck transportation is increasing 5% faster each year than the construction of the superhighway network. Air traffic would probably even double within the next 10 years, if the absolute performance limit of flight safety systems did not preclude that.

To do as is usually done, and explain these structural shifts to road and air travel by means of market mechanisms, is to confuse cause and effect. Look at the case of municipal traffic development. For decades, as many broad streets and ring-roads were built as possible, so that the automobile became more attractive and municipal road construction did not lag behind the increasing use of personal automobiles. Meanwhile, city builders and traffic planners deliberately blocked street traffic with pedestrian zones, traffic islands, bicycle routes, and so forth. Even if they went to the other extreme in many places and blocked more than necessary, this process is correct in principle. What was recognized was that, otherwise, the spatial structure of every city would come to approximate that of Los Angeles. The "street auto" traffic system, exactly like any other traffic system, organizes space into a quite definite structure. The selection and combination of different means of transportation of an economy is a geometrical problem. What is important is to develop an optimal residential and productive structure. That cannot be attained through the market of competing systems, but rather demands a "grand design," in the optimization of which market incentives can be helpful.

Free travel versus the free market

We are confronted here with an ideological problem that constantly leads to short-term solutions which, in the long term, only worsen the situation. With regard to collaborating socialist-style planned economies, we in the West are inclined to recognize this ideological problem, but the dogma of the so-called free market is not examined closely. Additionally, the much-promoted "market-economy orientation" of railroads itself has decisively contributed to the undervaluation of investments in this area of infrastructure.

The laws of the free market, combined with blind trust in systems analysis methods, lead to the "right solutions," but to the wrong problems. Let us take one of the glossy brochures on the condition of transportation, furnished with various numerical tabulations—precisely printed out by a computer to many decimal places and equipped with colorful graphics—and examine which of the fundamental assumptions made are relevant, that is, in a way that they will also be true in 30-50 years, a period that is only a heartbeat in the development of infrastructure. It is not a matter of accidentally correct assumptions, but rather those that are correctly established methodologically. We quickly recognize that, thus considered, cost-price relations, taxes, crude oil prices, and so forth are relatively irrelevant, and merely create a bogus impression of precision. We recognize also that it is essential that we think in terms of the concepts of technology for the answers to the relevant questions—not in the sense of individual technical procedures, but rather in the sense of a total economic process of renewal that continually builds on itself. This was exactly the way that the "father of the German railroad," Friedrich List, formed national-economic judgments.

Systems analysis studies, on the other hand, fundamentally contradict the idea of actual entrepreneurial freedom. Such studies maintain their validity only if the economic process is in fact subject to the restraints that correspond to the model. The wealth of economic inventiveness that is lost in the process is not, for the most part, recognized, since it is strangled by "system decisions" and can never come to light. Rather than producing studies of this sort, we should investigate which technologies possess the greatest potential for further development with regard to the most important parameters, and then find out what limitations emerge with their use, that is, what "discipline" is appropriate for the individual user in the overall economic system. Once that is done, we can be confident that "the market" will take care of the exploitation of the optimal system, quite without any computer analyses. We will see an instructive example in the next few years in the case of the West German national railroad, the Bundesbahn, where the incompetence of the method criticized here, of linear systems analysis and misunderstood market analysis, can be recognized. Instead of solving the most important problem of the national railroad, a network of track preserved since the last century, by means of investments in a qualitatively new transportation technology, they trusted their managerial wisdom, which quickly recognized that many side routes are uneconomical because of low utilization. A better economic result should be produced by closing down the side routes and concentrating on the profitable main lines. But in the short or long run, this trimming down of the network will certainly lead to a reduction in the utilization of the still profitable principal lines. Consistently, we could continue with the closing down of the principal lines, and would then have solved the "railway problem"—on paper at least. Even if things don't go quite that far, the "competitive position" of rail as opposed to other transportation carriers is made worse, not improved. This example shows that the highly praised methods of systems analysis are not suitable to plan an optimal traffic network for a national economy.

A new 'European Fast Train Corporation'

The transportation planning task before us is obvious. The economic development in Europe made possible by the opening up of East and West must be exploited to build up an integrated traffic network. The backbone of this system will be a modern traffic network based on rail, to which the road network will be oriented, because rail opens up the surface area. The traffic must be connected "upward to the sky," through an optimized, worldwide air traffic system.

This modern rail network must consist of two components that are technically different and should be sharply separated organizationally. One component is the conventional rail network, which must be supplemented with high-velocity lines. The transportation lines between East and West, which were cut back or completely eliminated as a result of the division of Europe, must be reactivated as quickly as possible. All the new high-speed routes of this network must be laid out with regard for long-term development of mixed traffic, that is, in order that both passenger and freight trains can operate simultaneously.

The second component that will be dominant in the long term is a magnetically levitated rail system that is to be newly created.

Passenger traffic between the centers of the "Productive Triangle" should principally take place on high-speed trains. In the first phase, passenger and freight transportation will occur simultaneously, for most routes, along the same tracks. To the extent that rapid freight traffic increases, passenger traffic will be transferred to the magnetically levitated rail routes, making possible an expanded capacity of high-speed routes for freight traffic. In this way, "traffic pipelines" will increasingly come into existence along which magnetic levitation, high-speed transportation, and even expressways will run, spatially close together, but individually optimized for different transportation purposes. On the most important routes (for example, the connections of Berlin-Frankfurt am Main, Berlin-Dresden, Berlin-Hamburg, and Berlin-Munich), construction of the magnetic levitation routes should be begun immediately.

A European Fast Train Corporation, in which the railroads of the various nations as well as the various national air lines and private firms will hold stock, should be founded for establishing organization and international coordination. Additionally, an agency must be created that provides for uniform standards for magnetic levitation technology and cooperates with the appropriate institutions on other continents, particularly with Japan. This European Fast Train Corporation will have the job of building up a rail transportation system with those six nodal points that were named earlier in the discussion of program priorities [see *EIR*, Aug. 3, 1990, "The economic geography of Europe's 'Productive Triangle,' "]. Additionally, a unified rate system must be created that encompasses rail traffic and road traffic and that, through appropriate taxation, takes into consideration the real national economic costs of the different traffic carriers—including realistic appropriations for road costs, accident costs, environmental costs, and so forth.

Parameters of the traffic system

The importance of the present, generally underrated, railborne traffic will become clear by looking at the the fundamental parameters of the traffic system. Traffic and transportation change along with technological development. What remains invariant, is the job of transporting a certain volume and weight as economically as possible over the necessary distance.

The fundamental reference points for evaluation of the efficiency of a transportation system are therefore, in the first approximation, the number of ton-kilometers produced, as well as the ton-kilometers produced per hour in the entire economy. Second, transportation costs per ton-kilometer will decide the economically favorable choice of individual means of transportation and, related to the average costs, of the economy of the transportation system. In the assessment of costs per ton-kilometer, however, the rates to be established could be misleading. For example, after deregulation of air traffic in the United States, the cost for ton-kilometers of air freight apparently sank, but increased in terms of the national economy.

A further crucial parameter concerns the traffic network of the various systems, not only the rail network, but also the road network, the pipeline network, and so forth. The spatial density of the route network and the temporal density of the connections operating on it are the leading measure for the quality of a given traffic system. The corresponding values for the connected network of all systems together yield a measure for the flexibility of the national economy as a whole. Traffic routes that are per se productive and well laid out, but that are not connected into a network, are significantly less efficient than an interconnected network, even if the individual routes of this network are apparently unproductive. A good example for this is the construction phase of the German rail network in which the massive increases in transportation did not occur as a function of the construction of new routes, but rather precisely in the years around 1850, when the most important routes were joined together.

If the "market" cannot make the qualitative decision on traffic infrastructure, the question arises: According to what criteria are investments in infrastructure made, and according to what fundamental principles must traffic be organized? Elsewhere in this report, the fundamental principles of physical economy are explained with which these questions can be answered. It will suffice here to consider the most important parameters for the different components of the traffic system. These parameters are the technical and organizational boundary conditions for the density functions previously referred to.

Area use and traffic density

For the area use of different modes of traffic, a series of factors must be considered that will simultaneously show us where the inherent advantages and disadvantages of each mode of traffic are. For the general comparison, we cite figures from the Bundesbahn for comparison of area for a 300 km route:

Freeway: 1,172 square meters per person; (calculating a highway 37.5 meters wide, 300 km long, with 2×2,400 cars per hour in both directions, and two passengers per car);

Airport: 1,020 square meters per person; (using the example of Munich II, 13.87 km^2, 34 flights per hour, each with 200 passengers on two runways for takeoffs and landings);

ICE train: 469 square meters per person; (12.2 meters wide and 300 km long for 2×6 trains, with 650 passengers each, in both directions);

Transrapid maglev: 355 square meters per person; (11.8 meters wide and 300 km long for 2×6 trains,each with 830 passengers each, in both directions).

The calculations contain an error, because it is obvious that, for airports, the area needed for operations buildings and terminals must be added in, while for surface transportation, only the road itself is included. This mistake is not serious, however, since for surface transportation, the operations buildings takes up a very small portion of the total area. Additionally, this error is more than overriden by another one, insofar as the calculations obviously do not take into consideration that two airports are needed for one flight—namely, one for takeoff and one for landing, and that the area needed for the aircraft must therefore be doubled. Here, it is, of course, true that the average calculated area needed for air traffic decreases with greater flight distances. Finally, the assumed vehicle density given for personal automobile traffic is considerably above the average traffic density on the West German superhighways. The area use of personal autos is thus, in reality, larger than given in this example.

The Patriots for Germany election poster for the first all-German elections. The headline reads "Peace means development." Beneath the depiction of the Paris-Berlin-Vienna railroad triangle appears, "The Productive Triangle, locomotive for the world economy."

Despite all objections that we might raise, this simple example of calculation by the Bundesbahn brings out a crucial advantage of rail traffic: The small area use, which most importantly enables a strong concentration in crowded regions and therefore higher traffic density. It may be surprising that air traffic comes off so badly here. Area use in crowded regions is, in fact, the major defect of air traffic and not its high use of energy, as many assume. For example, someone who takes a plane for his vacation or a business trip, consuming approximately 70 kilowatt-hours (kWh) per 100 person-kilometers, uses less energy than someone who travels by car, which on the average uses 100 kWh per person-kilometer. The problem with the increase in air traffic is that the total area use of air traffic is necessarily incurred only in the immediate vicinity of populated regions. Airfields are the bottleneck; they obstruct the concentration of air traffic. Previously, this was not so conspicuous, since air traffic in Europe overall involved only a quite small portion of total traffic, and because, in areas where air traffic is particularly strong, such as in the United States, this concentration problem is not so clearly obvious where there is lower average population-density.

The advantage of air traffic is high-speed transportation. In the coming decades, air traffic will be able to use this advantage only if passengers and air express goods are brought to large airports in "symbiosis" with fast train systems and, most importantly, with maglev rail systems, in which the airports are located far enough from crowded centers that expansions necessary in two or three decades can be undertaken.

The large area use of trucks is recognized, and comes most clearly to light in city traffic. Without productive and heavily subsidized short-distance transport systems, automobile traffic today in crowded centers would have already collapsed. The example of Los Angeles documents, conversely, that without short-distance transport systems, the increase of auto traffic takes up so much space for roads and parking to the point that a further concentration is impossible. At that point, more auto traffic leads to longer roads. Only an area-dense means of transportation can help us out of this vicious circle.

It would be shortsighted, however, if the attempt were made to reduce the high proportion of auto traffic in European cities primarily by legal and bureaucratic prescriptions, for which ideological justifications can be given. The alternative can only be to improve the traffic system and make it cheaper, more flexible, and more efficient for the economy. The crucial parameter for a concentration and increase of area density is the route performance of a means of transportation.

Route performance is central

If we consider concentration, that is, performance per route, and flexibility, rail is superior to road transport in route performance. Taking off from the total traffic density on the superhighways today, approximately 2,000 tons per hour can flow over a superhighway section if each truck can be loaded on the average with 10 tons. That is no problem for the train since this amount could be transported on a single long freight train. Today, the limit of efficiency is approximately 12 trains per track per hour, and, that is, in fact, because of the operational system, virtually independent of the velocity of the trains. If we assume, as with truck transportation, an average velocity of 75 km per hour, then the railroad has available a productivity limit that is higher than the highway by a factor greater than 10, given today's operational technology. Through use of modern operational technologies and methods for conducting trains, route performance per track can be multiplied even further.

Transportation time and network density

If the advantage of higher density through concentration is not to be lost again, certain demands will be made on the switching and loading technologies. Even today, the longer switching and waiting times are the crucial disadvantage of rail in comparison to truck transportation. Goods on the train "wait" an average of 80% of their transportation time on the right connection or are switched around in various ways; the actual travel time is only 20%. That has misled even so-called experts into making the senseless argument that the increase of transportation velocity on the route network of the rail is quite pointless economically since the overall transportation time will not be significantly improved. In reality, this proportion shows that the operational and switching technology is not even appropriate for today's transportation velocities.

The growing proportion of individualized travel is primarily connected with the fact that the advantage of technically realizable higher productivity densities of rail-borne systems is not realized, because the network density is low and is concentrated too much on the highly productive main arterials. "The train is twice as fast as the car," the railroad company asserts, and everyone wonders why citizens insist on driving cars. Why indeed—the reason is faulty network density. Twice as fast as the automobile, that is calculated perhaps on inter-city routes from one large city to another. But if we add a further short-trip connection, the time calculation is no longer valid—above all if the trip out or back does not take place at peak hours and longer waiting times are added for the connecting train. The calculation also hardly works if the trip first begins with an drive to the rail station in the center of town, where the car is supposed to be left in the nonexistent parking lot at the station. There is no way to get around having a spatially tight network with the least number of transfer points and trains in tight temporal succession for long- as well as short-distance travel.

A further problem of network density and concentration is the simultaneous conveyance of passengers and freight, that is, of vehicles of very different speeds on the same network. This dynamic can be studied quite well by the layman on the uphill areas of the freeway when slow truck traffic gets in the way of fast passenger autos, and often even widening the road from two to three lanes cannot prevent both traffic streams from being joined together, much to the regret of the automobile drivers. On the railroads of Western Europe, freight and passenger traffic take place on the same network, and are separated only by the fact that freight is chiefly moved at night, and otherwise, passenger traffic has the priority. With increasing speeds in passenger travel, it is, however, becoming increasingly difficult to fit slow freight trains into the travel schedule, and a separation of the passenger and freight traffic systems will necessarily ensue. In France, this separation has been consistently done with the TGV high-speed train, whose routes are only laid out for passenger traffic.

The concept of a rail-borne transportation system being a "rolling warehouse" for industry also speaks in favor of this separation. The warehouse provides a buffer inventory, which is necessary because of delays in the control of production processes. The warehouse must compensate for fluctuation in production or for operational breakdowns or disruptions. The more rapidly management reacts, that is, the quicker the necessary raw materials or replacement parts arrive, the less the inventory need be. Mass is replaced with velocity. Especially with finished goods, replacement machines, and repair parts, which cannot be continuously transported, rapid transportation is important. This can only be attained by rail if the system is optimized for freight.

Travel dynamics

Travel dynamics, even more than the highest velocity, is crucial if we are concerned with creating the tightest possible network with the least possible number of transfer points. Inside our "Productive Triangle" important stopping points are separated on the average by 130 km; however, often the distance is only 80 km, and occasionally only 60 km. If we wish to travel rapidly and nevertheless build a tightly meshed network where the passenger does not have to change to the local train, moving at high speed will not suffice. The time necessary for acceleration and deceleration takes on a great importance.

This can be shown by means of system data from the Intercity Express (ICE) and Transrapid maglev (source: Traffic Committee of the German Bundestag, January 1990). Let us assume that both trains run between stops at their maximum velocities, that is, the ICE at 300 kmh and Transrapid at 500 kmh. Transrapid reaches the velocity of 300 kmh in less than 2 minutes over an acceleration distance of 5.1 km, while the ICE needs almost 9.5 minutes and a distance of 30 km. A stop after 80 km or even 60 km would drastically increase the overall high velocity travel time of the ICE. Transrapid has a significantly more flexible travel dynamic. Over a distance of 160 km, and for these acceleration values and at a constant speed of 300 kmh, the ICE requires something more than 36 minutes. Transrapid covers this distance in 35½ minutes despite requiring 5 minutes and half the distance to come to a stop.

Demands on the future traffic system

In summary, the following fundamental demands will be placed on a future transport system:

1) It must be an area-dense system that allows high concentration. With the technologies developed today, that means a strong emphasis on rail-borne traffic.

2) The travel velocities must be high enough that enough time is available for concentration, that is, for transfers or switching or reloading, that the overall travel time is shorter than with direct individual travel.

3) Passenger and freight traffic must be separated in high-speed areas.

4) Data processing and a high level of organization must make it possible to operate the rail-borne system with flexible schedules.

A high-speed rail system for Europe

The development of rail-borne transport has been systematically neglected in Europe for decades. This area is an excellent example of an error that today dominates all the national economies of Europe. Erroneously, there is talk of economic development that is fairly solid, while, in reality, the innovations appropriate to necessary technological progress are lacking. European railroads have, in contrast to other economic areas, one advantage: They already have gone through the "rude awakening" that must necessarily follow such a phase of incomplete innovation. In the meantime, the recognition has been made that, in Europe, the railroad, in contrast to other transportation systems, rapidly loses its attractiveness and can only remain "capable of surviving by offering something qualitatively new."

In the early 1970s, people began to seriously reflect on the problem, and finally seized on a concept that had already been realized in Japan in the Shinkansen trains: the concept of "high-speed trains."

In Italy, they responded in 1970 by beginning construction on the "Direttissima" from Rome to Florence (with the opening of the route estimated as 1990); in France, the beginning of construction of the TGV from Paris to Lyons came in 1976, which has since become famous.

In Germany, we went to work carefully and painstakingly, and in the 1980s seriously began the construction of high-speed routes. In the meantime, of the 27,000 km network of the German Bundesbahn, 610 km could be traveled at speeds of 200 kmh. Concentration recently has been on the "intercity concept," in which there is little investment in new roads; rather, the schedules of passenger traffic are brought into harmony with those of short-haul traffic. That this perfectly obvious idea was celebrated with great fanfare as a new "concept" proves what level the railroad management was on.

Throughout Europe, there is a similar picture. The International Railroad Union (UIC) did produce a "Guide for European Railroads of the Future," in which, in the framework of the European Community, agreement was made on "pan-European arterials," but in the 10 years since, virtually nothing has happened. As of now in Europe, the various signal systems, operational systems, and electrical systems are obstacles, and make the economical deployment of the railroad on a Europe-wide scale more difficult. The attempt is being made to overcome the limitations created by the four important electrical train systems of 15 kV at 16.33 Hz, 25 kV at 50 Hz, 3 kV DC, and 1.5 DC with multi-system locomotives. A still greater barrier is presented by the differences in the different railroads' safety and operational systems. In the last 15 years, the volume of truck traffic that crosses national borders has increased by a factor of 10 while rail transport has stagnated, and that despite the fact that average transportation distances are optimal for train transportation. For this development, various explanations and reasons can be put forward, but however we twist and turn, this development is and will remain a documentation of the incompetence of European railroad managers.