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The era of deindustrialization has now reached its dead end

by Lothar Komp

The following is edited from Lothar Komp's presentation to the Dec. 14-15, 1996, conference of the International Caucus of Labor Committees and Schiller Institute, held in Kiedrich, Germany.

Once we have established a new financial system, in which national bank credit is being used for large-scale investments in infrastructure and new production facilities, and where the destructive impacts of financial bubbles are no longer tolerated, we will have institutions in every country along the Eurasian land-bridge, which will define all the details of the reconstruction process "on the ground" (see **Figure 1**).

I want to address some issues, which, in the development of the Eurasian land-bridge, are of critical importance, in particular for the western part of Eurasia, and are not well understood among those people who, for some strange reasons, happen to be our economic and political leaders.

Requirements for the land-bridge

This means, that there are certain requirements for rapid technological changes in western Europe—changes, that had been a characteristic of economic policies in most of the Western countries up to early 1970s, but had been stopped afterwards.

Remember, in the 1960s we had the Apollo program in the United States, we had de Gaulle's commitment to bring France into the nuclear age, we had a prosperous German economy, where to have 1 million unemployed people was considered as an unbearable situation. We had a sound physical infrastructure, health and education systems, and there were no problems with paying pensions, because of high investments in the productive powers of labor.

Then, in the late 1960s, we learned from the Club of Rome and other operational departments of the British oligarchy, that we had to turn around. So, the U.S. efforts to go to Mars, scheduled by Wernher von Braun for the late 1970s, were stopped. The development of nuclear technologies was blocked, quotas on steel production were introduced in Western Europe, whole industrial areas were turned into wasteland.

Today, we see the consequences of technological stagnation and deindustrialization, where, it seems that we no longer can afford to have a health system, high living standards, pensions, infrastructure investments, and so on.

Let's start with some very simple considerations on the implications of the Eurasian land-bridge development, which will already make obvious that, no matter what the 1968-generation of politicians in the Western countries might think, the era of deindustrialization has now reached its dead end.

We have 4.5 billion people in Eurasia—500 million in Europe and 4 billion in Asia. Those countries in the Far East, at least, are not willing to accept a second- or third-rate status as economies, that are based upon raw material exports, with low rates of energy consumption per capita, low industrial output per capita, and low life-expectancies. They will not tolerate the racist arguments of organizations such as Greenpeace, which say that there is no problem with world food supply as long as the Chinese don't start to eat like Europeans—that is, consume meat—and there is no need for increasing the world energy production as long as people in Asia don't try to "imitate" European standards of living.

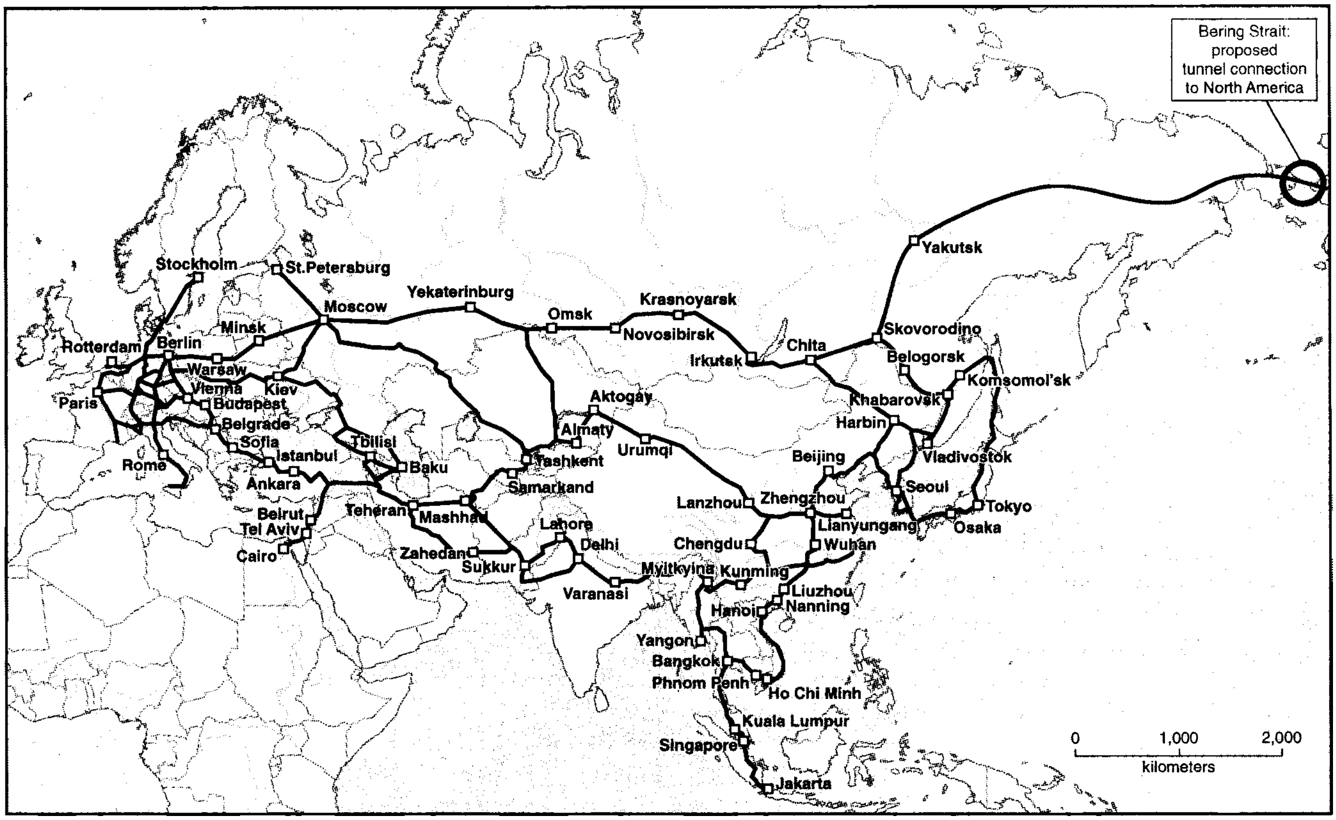
The development corridors will be built, and they will not just be routes of transport, but will include oil pipelines, electricity networks, water systems, and telecommunications infrastructure, thereby initiating the industrial development of the whole area in a range of 50 kilometers on each side of the central railway line.

If we just take here the primary Eurasian development corridors, which connect the majority of the larger metropolitan areas, we get a length of something like 60,000 kilometers. For 100-km-wide corridors, this means an area of 6 million square kilometers, 1,500 times the size of the Ruhr region. So, we are talking about many hundreds of new Ruhr regions to be developed along the Eurasian land-bridge corridors. Not that we would have coal mining and steel industry everywhere, but in terms of the density of railways, canals, medium-sized industrial companies, and, in density of productive labor, we have to achieve dimensions comparable to the 1960s Ruhr region.

If somebody is frightened by this perspective for ecological reasons, I just want to stress, that in the state of North Rhine-Westphalia, where the Ruhr region is located, more than half of the area is still used by agriculture, another quarter is forested, then there are rivers and lakes, and, all in all, only 19% of the area is taken up by housing, industry, or transportation.

Let us assume, as one of the backbones of the Eurasian

FIGURE 1
Eurasia: future main routes of the Eurasian Land-Bridge



land-bridge, we would build maglev transportation lines along the primary development corridors. In the early 1980s, the German Aerospace Research Center (DVFLR) elaborated a concept for a 5,300-km European Transrapid network, connecting 26 cities or regions in eight countries, encompassing altogether 230 million people (**Figure 2**).

In 1991, the Berlin-based Institute for Railway Technology (IFB) studied the construction of a 450 km Hamburg-Berlin-Dresden Transrapid route, based on the assumption of 1991 eastern German productivity. Over a five-year period, this approach would have created 250,000 jobs in various sectors of the economy, in particular in the construction sector, building materials, steel processing, and automobiles (see **Tables 1** and **2**).

Now, using this data, we can estimate that the construction of a 60,000 km maglev route, let us say, not in five, but in ten years, would require a workforce of more than 16 million people. With present Western European productivity standards, it would still be about 10 million jobs. Of course, most of the construction work, the delivery of steel and building materials, could be done by local industries that are simultaneously being built up, given the skilled workforce of some countries, such as Russia and India in particular.

However, even the several million new jobs needed in Western Europe to produce all the high-quality capital goods involved in the project, would require a drastic expansion of production facilities here.

As one other example, let's take a short look at requirements for steel production (see **Table 3**).

Here we have a list of different construction projects and how much steel they require. If we just take apartments: We have, in Germany today, 2.9 billion square meters of living space for 80 million people, about 35 square meters per person, on average. Of course, the average includes people, such as Princess Gloria von Thurn und Taxis, and also there is a large proportion of living space in the cities belonging to single-person households, so that working households with several children, on average, have much less living space per person than this 35 square meters.

However, if we want to transfer this standard to Asia, this would require 140 billion square meters of living space, equivalent to 10 billion tons of steel. This is 13 times the present world production per year.

Of course, we would not only build up a great number of new steel plants along the corridors; it would also be necessary to expand the production in Western Europe, because

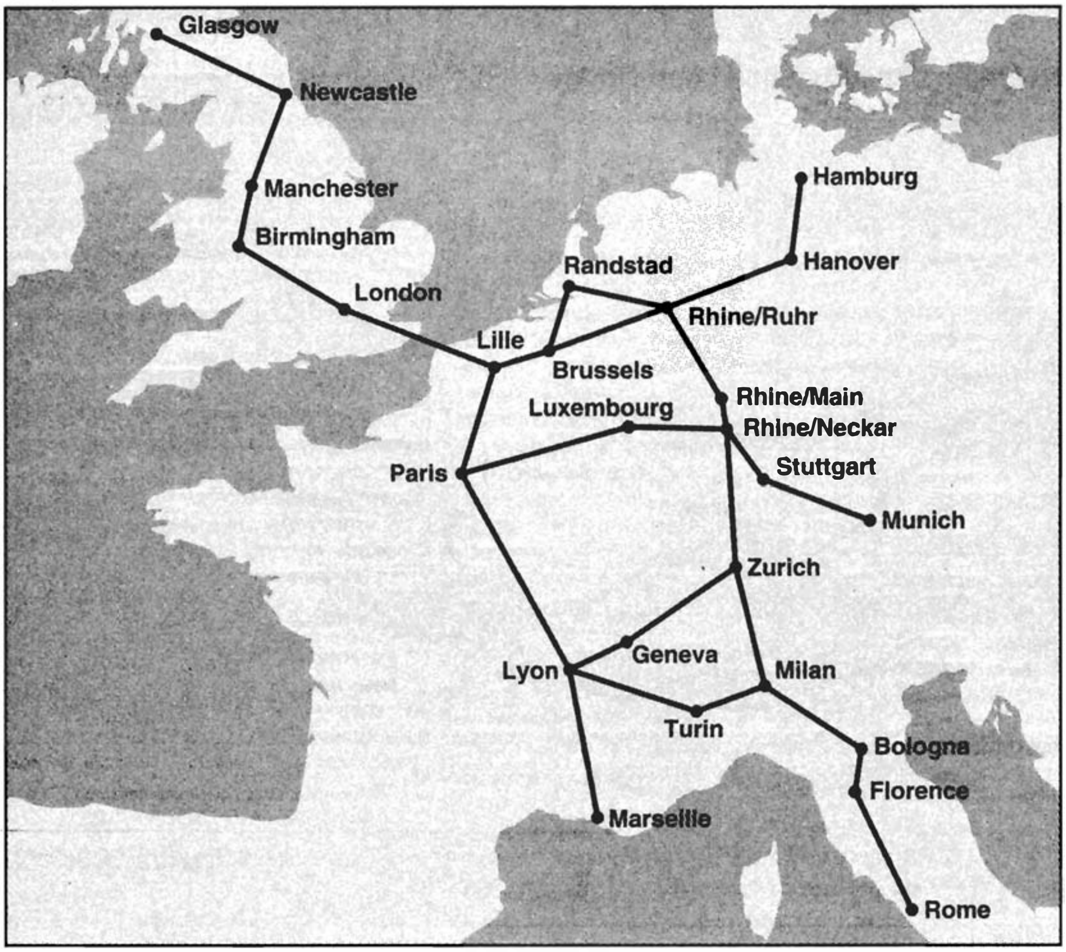


FIGURE 2
The German Aerospace Research Center's concept for European Transrapid routes

TABLE 1
Participation in maglev construction, by sector and type
(percent of total maglev investment)

	Construction	Steel construction	Electrical engineering	Metals	Automobiles, machines	Others
Railway construction	14.9 %	8.94%	–	–	–	5.96%
Tunnels, bridges	3.85	2.31	–	–	–	1.54
Railway equipment	–	–	–	10.14%	–	0.76
Energy systems	–	–	10.24%	1.28	–	1.28
Transportable factory	2.9	0.83	0.84	–	2.9 %	0.83
Buildings	3.42	0.57	0.57	–	0.57	0.57
Vehicles	–	–	–	–	8.9	–
Others	1.96	1.54	3.35	0.09	–	8.54

Sources: Thyssen Henschel, EIR.

certain classes of high-quality steels can only be made, so far, by a few producers worldwide.

Similar considerations can be made for energy, water, and other categories.

Conveyors of new technologies

What does this mean for the Western European economies? Of course, there will be a huge demand for high-quality capital goods, which will have a very healthy effect on the

TABLE 2

Jobs that will be created by constructing the Hamburg-Berlin-Dresden maglev (450 km)

Sector	Jobs created
Machines, automobiles, steel construction	53,000
Construction	53,000
Electrical engineering	39,000
Light industry	19,000
Services	18,000
Transport, communication	18,000
Building materials	17,000
Metals	10,000
Chemicals	6,000
Others	17,000
Total	**250,000**

Sources: IFB, EIR.

TABLE 3

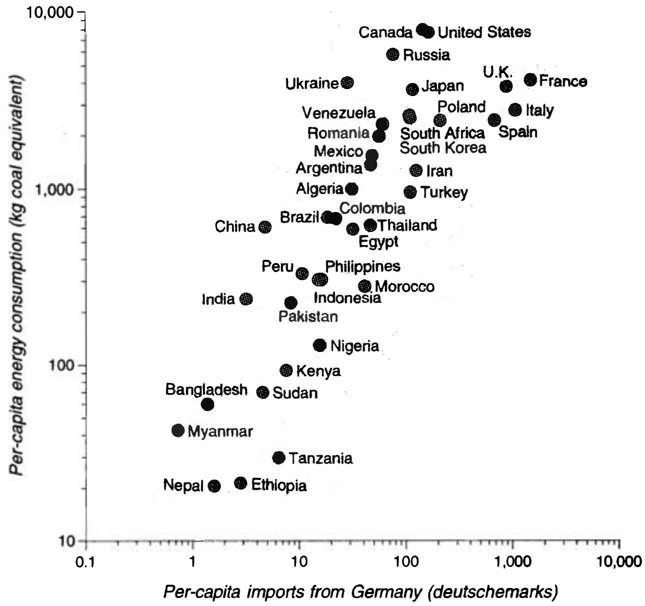
Specific steel consumption comparisons

Pipeline (400 mm diameter)	60 tons per km
Rails (single-track)	120 tons per km
Rail cars	20 tons each
Electricity net (380 kV)	50 tons each
Steel bridges	10 tons per meter
Industrial sites	450 kg per m^2
Office buildings	170 kg per m^2
Apartment buildings	70 kg per m^2

FIGURE 3

Energy consumption of selected nations, compared to their per-capita imports from Germany

(as of 1992)



Sources: *Human Development Report 1995,* German Federal Statistical Office; EIR.

export sectors of France, Germany, Italy, and other European countries. In general, as can be seen from **Figure 3,** the more industrialized our trading partners are, the more they will import from us.

However, commodities do not produce commodities. Therefore, for Western Europe to become a producer of high-tech capital goods for the Eurasian land-bridge, certain pre-conditions have to be fulfilled. And the outlook for these is not really optimistic these days.

Here we come to a crucial point: In order to really function as development corridors, the corridors not only have to be instruments for transporting goods, but, much more important, they have to be active transmitters of technology and productive potential. But, how can we spread new technologies along the development corridors, if, on their western end, here in Europe, the supposed origin of that technology transfer, technological advance is no longer taking place? Therefore, Western Europe has to be rapidly reestablished as a source of scientific discoveries and technological change. A quantum jump is needed in Western Europe, to achieve a reindustrialization of the economies at a higher technological level.

By doing this, we will have to revive all the concepts that were seriously discussed in the 1960s and 1970s for advanced, energy-intensive, industrial processes. Concepts, that had been developed to overcome all the potential obstacles of a world with 6 billion people or more.

For example, look at nuclear technologies. There can be no question, that the high-temperature nuclear reactor, the HTR, will play a major role in electricity generation worldwide in the early twenty-first century. If Germany and other Western countries are not doing it, China will do it. Apart from the proven advantage of being an inherently safe producer of nuclear electricity, the HTR promises a revolution in the generation and distribution of heat energy, both for industry and private households, because the coolant for the HTR (typically this is helium) operates at the high temperature of about 1,000°C.

In the first half of the twenty-first century, tens of thousands of such HTR modules could be operating worldwide. Plans were made, back in the mid-1980s, to mass produce small HTR modules, at shipyards, of about 200 megawatts each, which could then be transported overseas and could even be permanently stationed along the coast of the receiving country.

The mass production of HTRs to supply heat energy, would also result in much greater impetus to create new kinds of temperature-resistant materials, such as ceramics. Estimates that were done recently, came to the conclusion that there is a so-called technical market potential of 2,000 HTR modules (400 GW) in the chemistry and related sectors alone, another 8,000 HTR modules (1,600 GW) for other non-power applications, and 30,000 HTRs (6,000 GW) for intensive, worldwide coal refining efforts.

Some of these technologies were especially aimed at expanding the availability of certain raw materials for a rapidly growing and developing mankind.

As an example, coal gasification with HTR: Instead of just burning coal to produce heat, we could use the heat from the HTR coolant to produce steam, water vapor, and thereby transform coal into the gases hydrogen and carbon monoxide, which are the bases for the production of a wide range of chemicals. This would also drastically reduce the CO_2 pollution from coal power plants and certain chemical plants.

In 1973, the company Mannesmann-Anlagenbau had developed a generator for HTR-based coal gasification. Between 1984 and 1987, an engineering study on nuclear coal gasification was undertaken by four companies—Mannesmann, Didier, Uhde, and Ruhrkohle. It all worked fine, but because of the prevailing economic policies, the files on this matter were closed.

Another application is heavy oil production by HTR steam flooding: With present technologies, only one-third of the world's oil fields are accessible. In Canada, Russia, and Venezuela alone, there are several hundred billion tons of heavy oil, that would require such steam-flooding methods. Also, oil fields in China, the United States, and Indonesia are interesting in this respect. In the case of steam flooding, 200-300°C heat is driven into the oil reservoir, thereby sharply reducing the oil's viscosity. The oil can then be accessed by normal pumping. A single 400 MW HTR could produce 250 tons of injection steam per hour, thereby generating a half-million tons of oil per year.

Desalinating seawater with HTR

Extremely important for many areas in the world, such as the Middle East, Northern Africa, and California, is the capability of HTR reactors to turn seawater into freshwater. This not only concerns coastal regions, because seawater can be transported by pipelines or canals over long distances. A complex of six small HTR modules could produce enough water and electricity for a city of 1 million people: I mean, there *are* certain inalienable human rights. And, having been in places in eastern Europe, where you can turn on the tap for 23 hours a day, and not a drop of water comes out; the same with flushing the toilet, or taking a shower—hot water only for a single hour every day. So, I ask myself, why are these politicians in the German parliament, who seem to be so eager to fight for human rights in some exotic places deep in the Himalayan mountains, why are they not sometimes concerned with that sort of human rights violation caused by the lack of industry and infrastructure? Anyway, HTR-powered freshwater production could help.

What happened to all the nuclear container ships, that were developed in the late 1950s and the 1960s? Nuclear-powered container ships can move around the globe many times without having to stop for refueling. In the case of non-nuclear container ships, the sea routes are pretty much determined by indispensable fuel stops. From a certain level of speed and transport weight onward, traditionally powered ships no longer make sense, because the volume of consumed fuel approaches the volume of transported goods. You need

Industrial applications for HTR process heat

Process: hydrogenation
1. District heat (cogeneration)
2. Drinking water from seawater
3. Process steam (cogeneration)
4. Refinery products from crude oil
5. Extraction of heavy oil
6. Oil products from oil shale

Process: methane re-forming
7. Methanol CH_3OH from natural gas and CO_2

Process: Methane cracking and methane synthesis (EVA-ADAM) reversible cycle
8. Long-distance energy transport

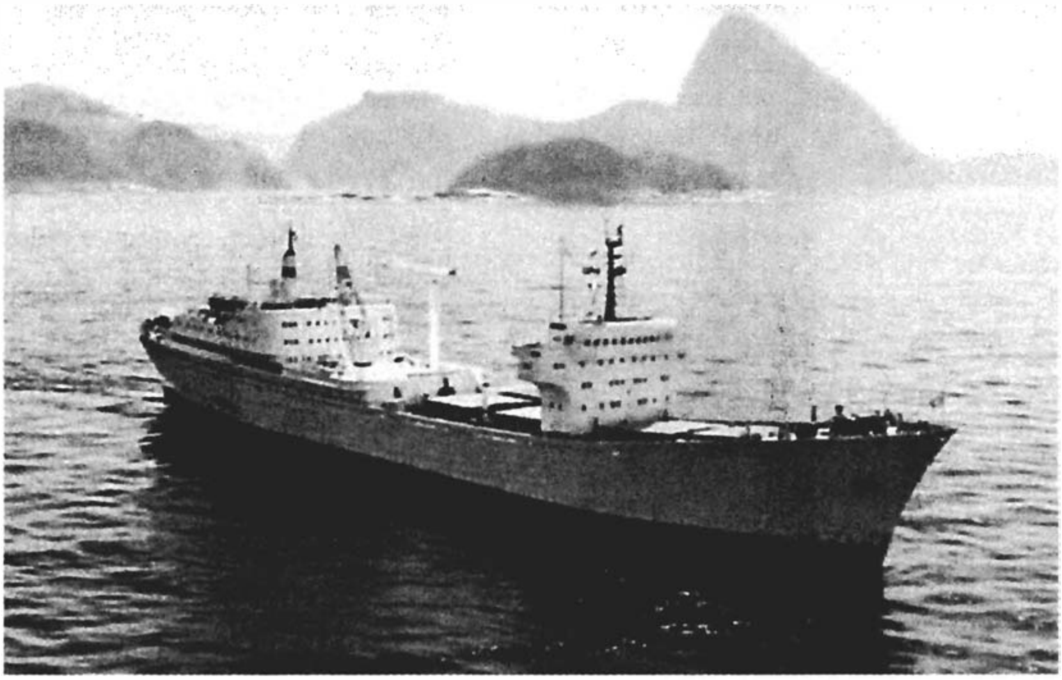
Process: methane cracking
9. Ammonia NH_3 from natural gas

Process: hydrogenating coal-gasification
10. Aluminum-oxide from bauxite
11. Synthetic natural gas or hydrogen from lignite

Process: steam-coal-gasification
12. Hydrogen or methanol and coke from anthracite; partial gasification and its multiple applications were developed and proven.
13. Methanol and pig iron in integrated complex from anthracite coal.
14. Synthetic natural gas, hydrogen or methanol from anthracite coal (reduction of CO_2 emission).

Process: thermochemical process
15. Hydrogen and oxygen from water

Source: *Advances in Energy Technology,* Kugeler Publishing, Neis, Ballensiefen, KFA-Jülich, 1993.



The nuclear-powered cargo vessel Otto Hahn, *built at the HDW shipyard in Kiel during 1963-68, sailed 250,000 nautical miles (i.e., 10 times around the globe) before it had to refuel. Whenever the* Otto Hahn *would put into a harbor in the early 1970s, a boom of demand for German goods would be created in that country.*

a higher degree of energy intensity. It's a similar situation in space flight, where tasks such as reaching Mars in a few days, can only be accomplished by nuclear technologies, but are in principle impossible if we rely on lower forms of energy density, such as chemical energy.

As for the Vulkan shipyard in Bremen, it has to be noted that, only four days ago, it was decided on behalf of the European Commission, that the Vulkan shipyard is not allowed to build any more container ships and therefore will be essentially shut down in July 1997. This was part of the European Commission's conditionalities to permit the state to subsidize Vulkan in order to prevent immediate bankruptcy. Between 1963 and 1968, the German nuclear-powered ship *Otto Hahn* was built at the HDW shipyard in Kiel, using a 38 MW (thermal) nuclear reactor. The *Otto Hahn* was the first nuclear ship in the world to use the advanced concept of an integrated pressurized water reactor. Between October 1968 and September 1972, the ship would sail 250,000 nautical miles, that is, something like 10 times around the globe, before it had to refuel. There were never any problems with the reactor. In effect, the operation of the nuclear reactor turned out to be much simpler than conventional power sources. It was a common saying in the early 1970s, that the *Otto Hahn* was the most successful promotional campaign for the German export industry. Whenever the *Otto Hahn* would put into a harbor, a boom of demand for German goods would be created in that country. In 15 years, the *Otto Hahn* had travelled a total of 600,000 nautical miles, while consuming only 55 grams of uranium fuel, the equivalent of less than three liters in volume.

What happened to the plans for building fully reusable hyper-sonic rocket-planes, such as the Sänger project. Many countries had started efforts in this direction. In Germany, the program was shut down shortly after reunification.

In general, what we need in order to increase the productive powers of labor here in Western Europe, is to develop and introduce the next higher order of energy-dense technologies.

To demonstrate this, look at chemistry today: not only are we still relying on using up biomass, such as coal, oil, and gas, in energy production, but these substances are also the basis for most of the chemicals we use. There are about 10 million different chemical substances known today, and 98% of them are derived from carbon. Somehow, the characteristics of the chemical element carbon allow the synthesis of an extremely rich family of carbon-related substances—all the plastics, most of ceramics, and so on.

But, if we look at the Periodic Table of chemical elements, we see that carbon is followed by the element silicon, indicating that carbon and silicon belong to the same family, and have certain properties in common (**Figure 4**). In effect, it is expected that, based on silicon, another extremely rich array of new artificial materials could be produced. As an example, silicon carbide, used in HTRs due to its extreme heat resistance, belongs to this group. And, in this case, we do not have only a relatively tiny layer of fossils as reserves, but a silicon reservoir a billion times greater.

All our stones and sand are made out of silicon-derived substances. The only problem is: to break up stones, in order to get our new basis for chemical synthesis, we need much higher energy per volume than in processing oil or coal: That is, the jump from a carbon-based chemistry toward a silicon-based chemistry requires a higher energy density of our industrial technology. We will also need higher energy densities in

FIGURE 4

The Periodic Table of Elements

	1A	2A	3B	4B	5B	6B	7B	8B	8B	8B	1B	2B	3A	4A	5A	6A	7A	8A
1	1 **H** Hydrogen																	2 **He** Helium
2	3 **Li** Lithium	4 **Be** Beryllium											5 **B** Boron	6 **C** Carbon	7 **N** Nitrogen	8 **O** Oxygen	9 **F** Fluorine	10 **Ne** Neon
3	11 **Na** Sodium	12 **Mg** Magnesium											13 **Al** Aluminum	14 **Si** Silicon	15 **P** Phosphorus	16 **S** Sulfur	17 **Cl** Chlorine	18 **Ar** Argon
4	19 **K** Potassium	20 **Ca** Calcium	21 **Sc** Scandium	22 **Ti** Titanium	23 **V** Vanadium	24 **Cr** Chromium	25 **Mn** Manganese	26 **Fe** Iron	27 **Co** Cobalt	28 **Ni** Nickel	29 **Cu** Copper	30 **Zn** Zinc	31 **Ga** Gallium	32 **Ge** Germanium	33 **As** Arsenic	34 **Se** Selenium	35 **Br** Bromine	36 **Kr** Krypton
5	37 **Rb** Rubidium	38 **Sr** Strontium	39 **Y** Yttrium	40 **Zr** Zirconium	41 **Nb** Niobium	42 **Mo** Molybdenum	43 **Tc** Technetium	44 **Ru** Ruthenium	45 **Rh** Rhodium	46 **Pd** Palladium	47 **Ag** Silver	48 **Cd** Cadmium	49 **In** Indium	50 **Sn** Tin	51 **Sb** Antimony	52 **Te** Tellurium	53 **I** Iodine	54 **Xe** Xenon
6	55 **Cs** Cesium	56 **Ba** Barium	57 **La** Lanthanum	72 **Hf** Hafnium	73 **Ta** Tantalum	74 **W** Tungsten	75 **Re** Rhenium	76 **Os** Osmium	77 **Ir** Iridium	78 **Pt** Platinum	79 **Au** Gold	80 **Hg** Mercury	81 **Tl** Thallium	82 **Pb** Lead	83 **Bi** Bismuth	84 **Po** Polonium	85 **At** Astatine	86 **Rn** Radon
7	87 **Fr** Francium	88 **Ra** Radium	89 **Ac** Actinium	104 **Unq** Unnilquadium	105 **Unp** Unnilpentium	106 **Unh** Unnilhexium												

58 **Ce** Cerium	59 **Pr** Praseodymium	60 **Nd** Neodymium	61 **Pm** Promethium	62 **Sm** Samarium	63 **Eu** Europium	64 **Gd** Gadolinium	65 **Tb** Terbium	66 **Dy** Dyprosium	67 **Ho** Holmium	68 **Er** Erbium	69 **Tm** Thulium	70 **Yb** Yttrbium	71 **Lu** Lutetium
90 **Th** Thorium	91 **Pa** Protactinium	92 **U** Uranium	93 **Np** Neptunium	94 **Pu** Plutonium	95 **Am** Americium	96 **Cm** Curium	97 **Bk** Berkelium	98 **Cf** Californium	99 **Es** Einsteinium	100 **Fm** Fermium	101 **Md** Mendelevium	102 **No** Nobelium	103 **Lw** Lawrencium

order to transform places that today are hostile to most living beings, such as deserts or huge northern stretches of Siberia, or to build cities on the Moon and Mars, or, if we choose to colonize the oceans.

In general, we have to reestablish in Western Europe, something we still had in the 1960s: a culture of solving the problems of the world economy by generating scientific discoveries and introducing completely new forms of technology.

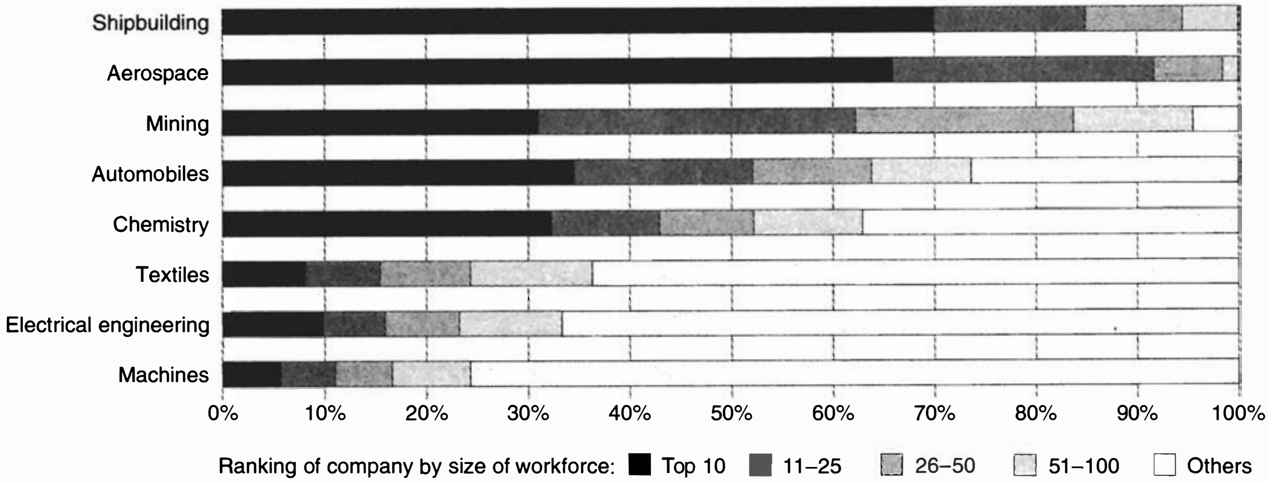
Machine-building and the 'Mittelstand'

Now we come to the last, very important, requirement in the Eurasian land-bridge buildup, perhaps the most serious bottleneck: In order to generate the necessary level of permanent technological improvement, we have to revive an institution that, in Germany, is called the *Mittelstand.* These are technology-oriented, medium-sized companies, with a highly skilled workforce, in particular, in the machine-building sector.

Figure 5 shows that in the case of shipbuilding or aerospace, the 10 largest companies alone account for 70% of the number of people employed in that sector. In the machine-building sector, this is completely different. There, we have about 6,000 companies in Germany, employing 1 million people, and almost all of them are medium-sized companies. The reason for this dominance of small and medium-sized companies in sectors such as machine-building, is a special quality of the *Mittelstand* companies, that we can see all over Western Europe, but in its most elaborated form in Germany, northern Italy, and Switzerland. In the United States, such a structure existed during the Apollo space program In **Figures 6** and **7,** you see that a small number of relatively small countries—Japan, Germany, Italy, and Switzerland—in total not more than 5% of the world population, export 70% of all machine tools worldwide.

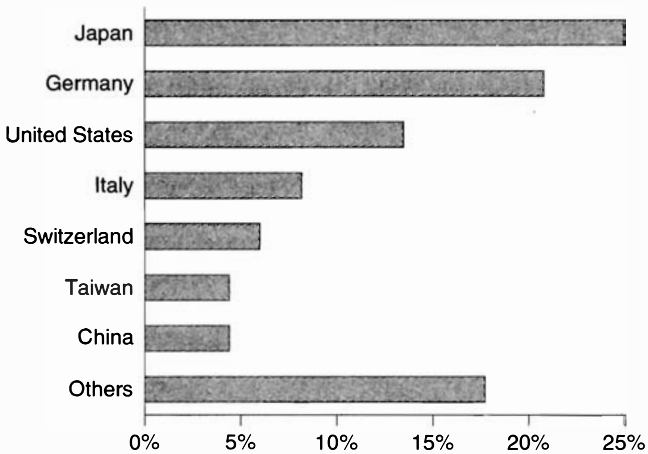
There are many hundreds of such *Mittelstand* companies in Germany, most of them having between 200 and 500 employees, which by themselves control the world market in their particular area. A large part of these companies are in the machine-building sector. And, it is important to note that they achieved a share in the world market of 30%, 50%, or even 80%, not by outsourcing of jobs, or by otherwise cutting costs, but, quite the contrary, by paying the highest wages to their employees, and by paying strong attention to the education and training of their workforce. Actually, a recent review of the German machine-building sector revealed that all those firms which cut costs by outsourcing labor, completely failed, and they lost their long-standing customers, because they were no longer able to keep up their flexibility and rate of technological innovation.

FIGURE 5
Share of top companies in employment, by sector, in West Germany, 1990
(percent of total workforce)



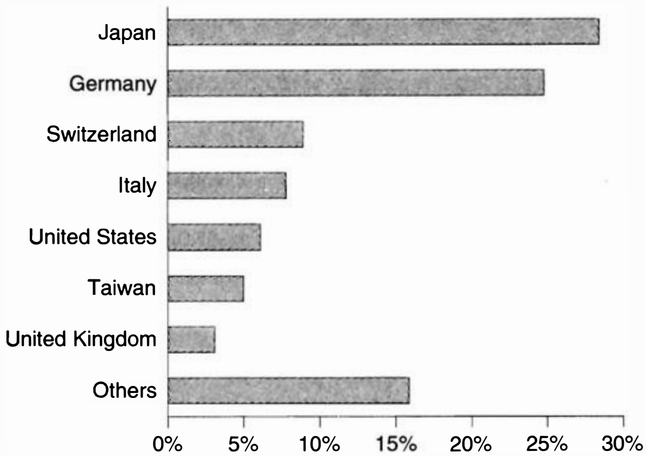
Sources: Federal Statistical Office, EIR.

FIGURE 6
World machine tool production in 1995
(share of total world machine tool production)



Sources: VDW, EIR.

FIGURE 7
World machine tool exports in 1995
(share of total world machine tool exports)



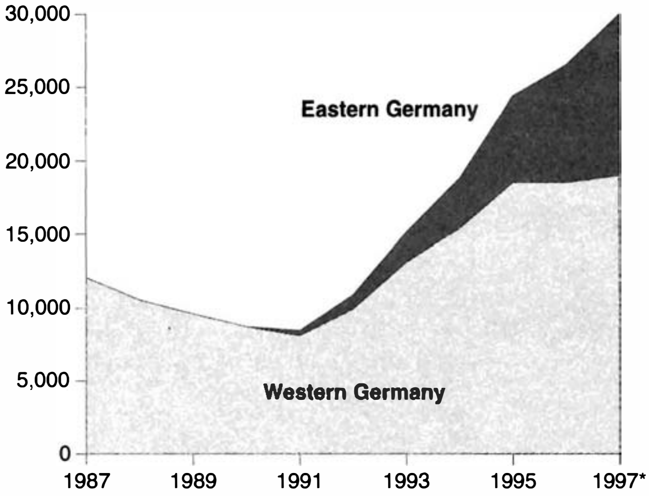
Sources: VDW, EIR.

A quality of leadership

Now the problem is, that this quality of the *Mittelstand* companies cannot be achieved by cutting up a big company into small pieces of 200 employees or so. This, by itself, doesn't work, because the quality doesn't come about as a function of company size; rather, it is a result of individual traits—that of the company leadership.

If you look at a typical *Mittelstand* company in the German machine-building sector, you have a one-man leadership, where the person who runs the company, at the same time owns it, and thereby ties the fate of his family entirely with the long-term success of the company. There are no "shareholders," who are just interested in next quarter's profits. In most cases, the head of a *Mittelstand* company is

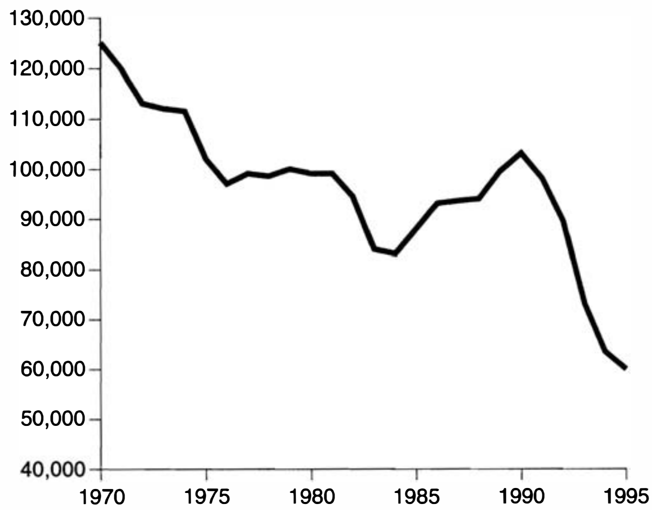
FIGURE 8
German corporate bankruptcies
(number of bankruptcies)



* Estimated

Sources: German Federal Statistical Office, Hermes, EIR.

FIGURE 9
Employment in western Germany's machine tool sector
(number of employees)



Sources: VDW, EIR.

an engineer, or has a scientific education. Often, he himself, or his father or grandfather, has contributed crucial improvements to the production process, by which the specialty of that company was transformed on a world scale.

However, there is no way of learning how to become the successful head of a *Mittelstand* company by attending a special university course. It is more a kind of cultural achievement, which is transmitted from father to son, or from company head to one of his employees, by experiencing a successive chain of technological changes. The flexibility of the *Mittelstand* companies, allowing a very specialized basket of consumer and capital goods, and their ability to introduce technological advances into the production process at a high frequency, is a crucial factor for every advanced economy.

In the 1970s, we still had companies in Germany, such as AEG, MBB, or Krauss-Maffei, which acted as permanent generators of new technologies. Different maglev concepts were studied by MBB and Krauss-Maffei. MBB was developing the Sänger project, while AEG was developing all sorts of nuclear technologies. Today, these companies no longer exist as independent units. They were bought up, and then either drastically scaled down or even completely shut down, as in the case of AEG. Those high-tech producers closely collaborated with a wide range of small and medium-sized machine-tool shops, that were able to find a workable solution to any technical problem that occurred.

New scientific principles were introduced into the economy as new technologies, by the efforts of such machine tool companies. The problem today is that our economies are no longer dominated by technological change, which is a precondition for the fostering of *Mittelstand* companies. In periods of technological stagnation, they are no longer needed. When the economy is spiralling downward, when primitive cost-cutting measures, rather than the efforts to improve the productive powers of labor, are the decisive factors for so-called economic success, *Mittelstand* companies will not survive (**Figure 8**).

This is even worse in the machine tool sector. As a result of the prevailing economic policies worldwide, we saw during 1991-93 the biggest drop in global machine tool production since World War II. In only five years, employment in the German machine tool sector was cut by 40% (**Figure 9**).

Therefore, the reindustrialization of Western Europe, by introducing the most advanced concepts of industrial technologies, as well as spreading this principle into the East, is an urgent task, for which we must keep this highly valuable cultural achievement, the *Mittelstand,* alive. The Western European economies were built up by focussing on the improvement of the productive powers of labor and by maintaining a high rate of technological change. The most promising task, to revive this type of successful economic policy today, would be to develop all the technologies needed to conquer the solar system, starting with the Moon and Mars. If we choose the other alternative, that is, a downward cost-cutting spiral—cutting budgets, and cutting jobs—then Europe as we know it will disappear.