Germany's physical economy in worst crisis since World War II

by Lothar Komp

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The structural crisis of the real economy

Drastic changes are afoot in Germany's once-strong industrial economy. While the international financial markets have gone increasingly haywire, through decades of deregulation, Germany is going through its most devastating economic crisis since World War II. At no prior time in the postwar era, has the number of business bankruptcies been as high as it is now. But given the desperate financial situation of a considerable portion of the business enterprises which were first started up in reunified Germany's new eastern states, we must now assume that the real wave of bankruptcies is still yet to rush in.

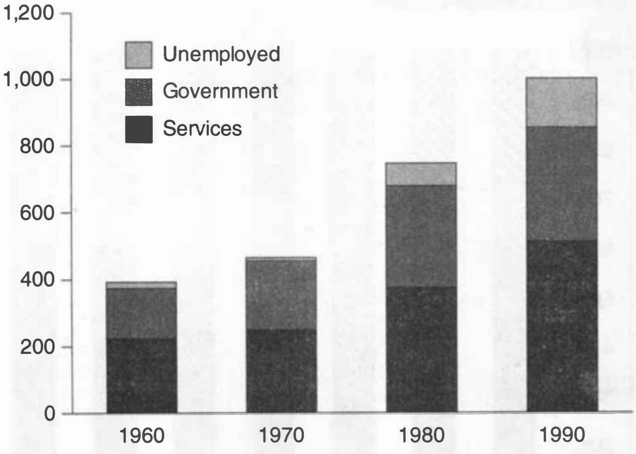
If we take into account the hidden unemployment, early retirements, and federal job-creation subsidy programs, unemployment in Germany is slowly reaching levels not known since the end of the Weimar Republic in 1933. Over a very short time, the pillars that once supported the German economy have crumbled. Within just the three years, from 1991 to 1993, two million industrial workplaces have disappeared. In western Germany, the number of productive workers in industry has collapsed from 7.5 to 6.6 million. Within the metals industry, which has been particularly hard-hit, 600,000 jobs have been liquidated: 154,000 of them in machine-production, 125,000 in electronics, and 123,000 in vehicle manufacturing. In the chemical sector, 46,000 jobs have been lost. The number of jobs in the electronic data-processing industry has collapsed from 83,000 to 53,000. The devastation in the eastern German states can be seen from the fact that out of formerly 1.8 million industrial jobs there, only 700,000 remain.

Anyone who believes that what is at issue here, is simply a painful but necessary elimination of obsolete branches of the economy, is completely on the wrong track. It is precisely the remaining portion of German high-technology, which is now feeling the blade of the axe. In the western German machine-tool manufacturing industry, no fewer than 40,000 of the previous 100,000 productive workers have lost their jobs. It is the same story in the aircraft and aerospace industries. In 1993, no other occupational groups had suffered a steeper jump in unemployment—39%—than engineers, chemists, physicists, and mathematicians.

The representatives of the ultra-liberal school, while demagogically maintaining their public image of being the ones fighting the real causes of the crisis, have taken great pains to deflect the blame away from themselves. Public expenditures for social, health, and infrastructure programs had to be radically curtailed, in order to attract "investments" from international financial speculative capital. Meanwhile, the proportion of retired people on pensions in Germany has increased alarmingly, and, cuts in old-age pensions are to be pushed through, if necessary by taking away pensioners' right to vote. Of course, the industrial collapse is celebrated among representatives of eco-fundamentalism as the victorious progress of the service economy in the process of "dematerializing" the world economy. Mass unemployment, says the "wisdom" of the liberal school, is merely the necessary consequence of increasing wages and benefits. The regulation of the labor market only needed to be broken up, and thus the labor costs reduced, in order that the "invisible hand of the free market" could then surely put things in order.

In fact, Germany's physical economy has been in a process of entropic collapse since the 1970s. To an increasing degree, the economy has lost the capacity to engender scientific breakthroughs and to assimilate technological innovations into the process of production. The ultimate blame for this lies with the utopian fantasies of zero growth and of the service economy—ideas which the ultra-liberal theoreticians are not alone in promoting. Scientific efforts to develop the "chemistry" of the twentieth and twenty-first centuries, requiring broadening and putting into practice our understanding of subatomic processes, have been sabotaged in an unparallelled manner. Some 20 billion deutschemarks (about $13.3 billion) in investments in the safest and cleanest power plants on Earth, along with an incalculable wealth of intellectual capital, has been sacrificed by opportunistic politicians to the blind fears of a whipped-up minority. Instead of introducing energy-intensive technologies, such as plasma technologies, to generate new leaps in productivity in the econo-

FIGURE 1
Non-productive employees in Germany for every 1,000 productive employees



Sources: German Federal Statistical Office, EIR.

my, today the Malthusian "solution" of "energy conservation" has been brought in, thus locking in this downward technological trend. Great research projects, from manned space travel (such as the Sänger Project), all the way to nuclear fusion power, which could serve as a "science driver" for revitalizing the productive sector, were either cut, in favor of quickly available, off-the-shelf "innovations," or else they were continually deferred, or eliminated entirely. This path of technological mediocrity caused the loss of approximately 170,000 jobs in engineering, chemicals, and other highly qualified skills. According to the president of the German Patent Office, Erich Häusser, among German managers today, in stark contrast to preceding periods, approximately 80% are purely administrators, while only 20% can be considered to be forward-driving innovators.

In parallel with the technological stagnation of the productive sector since the 1970s, the service sector has swelled enormously. A glance at the developments since 1960 makes this fact obvious: It is not the large number of pension recipients that poses the greatest threat for the German economy, but rather, the increasingly unfavorable ratio of productively employed to unproductively employed members of the labor force. In 1960, for every 1,000 productively employed workers, only 393 persons were in fact non-productively employed, that is, were not full-time employees in productive sector jobs. Of these non-productively employed, 224 were employed in service occupations, 150 were employed in public civil service jobs, and 19 were unemployed. In 1990, however, for every 1,000 productive jobs, there were already 1,001 employed in non-productive jobs, and among those, 515 were in service occupations, 338 in civil service jobs, and 148 were unemployed (**Figure 1**).

What are 'productive powers'?

Not all services, of course, are bad in themselves. Many, such as health care and education, are indispensable. Of course, most services ultimately depend upon what the productive sector produces. What is of crucial importance for ensuring the durable, successful survival of a human economy, is to guarantee its physical reproduction. Are goods being produced in sufficient quality as well as quantity, in order to ensure the maintenance of the necessary living standards of households? If we stipulate a growing requirement for employment in areas of advanced technological innovation, this living standard must obviously increase. Are there sufficient goods being produced to cover the material consumption of installed machinery, and in order to create the replacement of the plant and equipment worn out in the process? At the same time, are the necessary investments being made in the "hard" and "soft" infrastructure (including roads, rails, energy production, water supplies, health systems, education, research)? Or, have these been neglected in favor of short-sighted, temporary, and merely apparent survival? Then, after the necessary investments to maintain the productive economy are deducted, is there still a sufficient amount left over from the tangible goods produced to make further investments for the purpose of improving and advancing the productive apparatus?

Of course, this durable survival capability of a human economy cannot be measured in terms of merely how many tons or numbers of items are being produced. The necessarily continuous improvement of the productive apparatus can only be accomplished by a society that is able to bring to bear sufficient creative powers, without which it will otherwise immediately be confronted by a relative depletion of its underlying resource base. Here, ideas and decisions are required which are demonstrably "correct," in the sense of producing durable, successful survival, even though they can never be "logically" deduced on the basis of the existing level of technology. It is therefore impossible, on principle, to solve such a problem using computers alone. At root, the physical reproduction problem is therefore one that is wedded to every human society, in the truest sense of the expression "in sickness and in health."

An excellent characterization of the productive powers of human economy was presented more than 150 years ago by Friedrich List, the pioneering thinker behind Germany's industrialization. In a stinging attack upon Thomas Malthus's ideas, List wrote in his book *The National System of Political Economy:*[1]

"It is not true that population increases in a larger propor-

1. Friedrich List, *The National System of Political Economy*, Reprints of Economic Classics Series (Fairfield, N.J.: Augustus M. Kelley, 1977), pp. 128-129. Reprint of 1885 edition translated from German by Sampson S. Lloyd, M.P., and originally published in London by Longmans, Green, and Co., 1885.

tion than production of the means of subsistence; it is at least foolish to assume such disproportion, or to attempt to prove it by artificial calculations or sophistical arguments, so long as on the globe a mass of natural forces still lies inert by means of which ten times or perhaps a hundred times more people than are now living can be sustained.

"It is mere narrow-mindedness to consider the present extent of the productive forces as the test of how many persons could be supported on a given area of land. The savage, the hunter, and the fisherman, according to his own calculation, would not find room enough for 1 million persons, the shepherd not for 10 millions, the raw agriculturalist not for 100 millions on the whole globe; and yet 200 millions are living at present in Europe alone. The culture of the potato and of food-yielding plants, and the more recent improvements made in agriculture generally, have increased tenfold the productive powers of the human race for the creation of the means of subsistence. . . .

"Who will venture to set further limits to the discoveries, inventions, and improvements of the human race? Agricultural chemistry is still in its infancy; who can tell that tomorrow, by means of a new invention or discovery, the produce of the soil may not be increased five- or tenfold? We already possess, in the artesian well, the means of converting unfertile wastes into rich corn fields; and what unknown forces may not yet be hidden in the interior of the earth? Let us merely suppose that through a new discovery we were enabled to produce heat everywhere very cheaply, and without the aid of the fuels at present known: What spaces of land could thus be utilized for cultivation, and in what an incalculable degree would the yield of an given area of land be increased? If Malthus's doctrine appears to us in its tendency narrow-minded, it is also in the methods by which it could act an unnatural one, which destroys morality and power, and is simply horrible. It seeks to destroy a desire which nature uses as the most active means for inciting men to exert body and mind, and to awaken and support their nobler feelings—a desire to which humanity for the greater part owes its progress. It would elevate the most heartless egotism to the position of a law; it requires us to close our hearts against the starving man, because if we hand him food and drink, another might starve in his place in 30 years' time. It substitutes cold calculation for sympathy. This doctrine tends to convert the hearts of men into stones. But what could be finally expected of a nation whose citizens should carry stones instead of hearts in their bosoms? What else than the total destruction of all morality, and with it of all productive forces, and therefore of all the wealth, civilization, and power of the nation?"

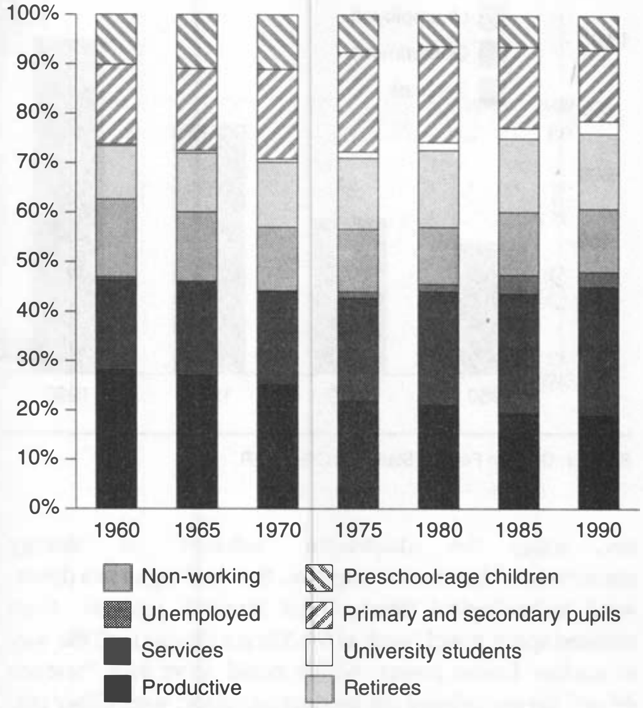
Germany's productive powers today

What is the current condition of the German economy's productive powers? For a first approximation, it may be worthwhile to look at the changes in some key "spectral" indicators over the course of time. The statistics and graphs presented here, cover the former West German region, usually up through the year 1990. The economic situation prior to 1990 of the former East German states, as well as the subsequent development of unified Germany, must be considered separately.

FIGURE 2

Composition of the population of Germany's pre-unification states

(percent of total population)



Sources: German Federal Statistical Office, EIR.

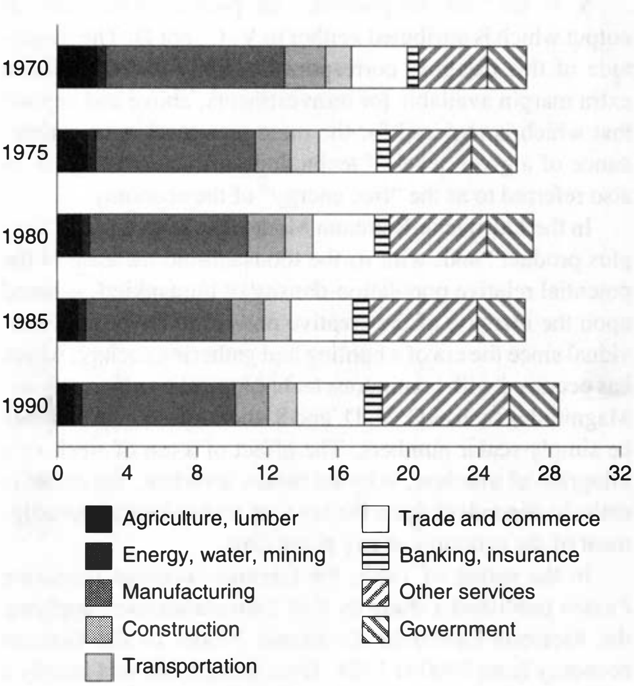
A look at the spectrum of the total population (**Figure 2**) proves that it makes no sense to talk about an "explosive growth of pensioners." The proportion of the total population over age 65 has not generally increased since 1980. However, the number of people receiving pensions grew, as a consequence of early retirement, as is usual when the real economy collapses. The only big increase has been in the proportion of persons employed in the service sector, along with students and the unemployed. Notice that besides the sharply declining proportion of young children in the 1970s demographic picture, there is a corresponding drop in the school-age children in the 1980s. While the total number of employed persons has barely grown from 1960 to 1990, from 26.5 to 30.4 million, the internal divisions within these population graphs (**Figure 3**) have undergone dramatic changes.

Measured in terms of the total population, the relative

FIGURE 3

Composition of the workforce in Germany's pre-unification states

(millions)

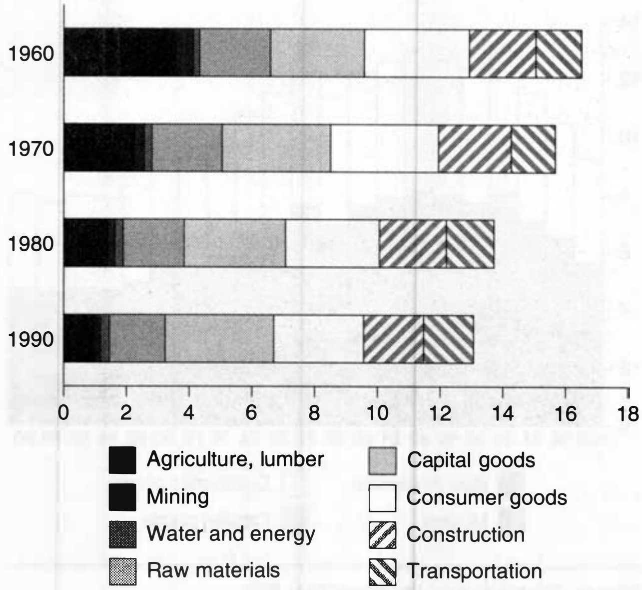


Sources: German Federal Statistical Office, EIR.

FIGURE 4

Employment in the productive sector

(millions)



Sources: German Federal Statistical Office, EIR.

share of service-sector employment grew from 19% to 26%, unemployed grew from almost nothing to 3%, while the proportion of those employed in physical-goods production declined from 25% to 19%. Certain service sectors show frantic growth, such as cleaning of buildings, maid and janitorial services (142,000 in 1970; 560,000 in 1987), insurance (55,000 in 1970; 133,000 in 1987), and various types of consulting (505,000 in 1970; 1.35 million in 1987). Faithful to the post-industrial argumentation that productive jobs are much too expensive, we observe, that during this time, both private and government investment in infrastructure and physical plant and equipment has been neglected. The amount of annual capital investment sank in comparison to the total value of the gross capital. In manufacturing, this percentage dwindled from 8.4% in 1970 to 6.9% in 1990; in infrastructure, it fell from 8.3% to 5.6%; the service sector, from 5.3% to 4.3%; and in the state sector, from 6.7% to 2.8%. Indeed, if the term "aging" is applicable anywhere in the German domestic economy, then it is with respect to plant and technology. Apart from the drop in agricultural and construction employment, the spectrum of the productive sector (**Figure 4**) expresses a depressing degree of stability.

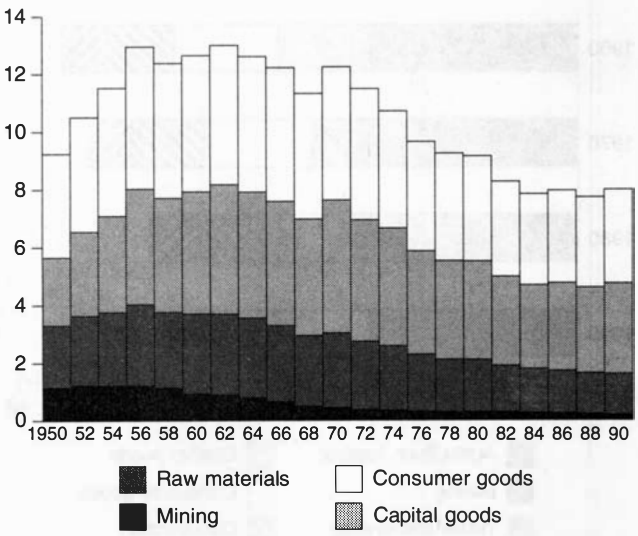
Contrary to the usual practice, we relegate the automobile manufacturing sector not to the producer goods sector, but rather to the consumer goods sector. The "post-industrial" trend of the 1970s is especially significant, if, instead of looking only at the numbers of employed, we consider the hours of labor performed each year in the productive sector (**Figure 5**). Despite a gradually increasing population since 1970, one sees a precipitous collapse, from 12 billion to 8 billion hours.

The illusion of Gross Domestic Product

Is the German economy today already producing below the level required for its successful reproduction? If the Gross Domestic Product, which has been continually, and indeed exponentially, growing in recent decades, is used to measure our future economic prospects, then the present crisis comes as a complete surprise. In point of fact, due to the extensive decoupling of the financial markets from the real economy, most such economic parameters have long lost their ability to predict anything. So, first of all, in order to get a proper view of the dangerous state of the German economy, we must sweep aside the shadow-world of monetary aggregates. Obfuscatory concepts such as Gross Domestic Product, which makes no differentiation between economically benign and economically destructive activities, therefore have no place at this table.

The LaRouche-Riemann Economic Model, developed by Lyndon LaRouche, begins its consideration of a national economy's growth potential, with an analysis of the demo-

FIGURE 5
Total hours of work performed, by sector
(billions of hours)



Sources: German Federal Statistical Office, EIR.

graphic composition of its households. What portion of the population is engaged in education? How large is the proportion of persons of working age, and how large is the number of children and retired persons? These proportions will shift, depending upon changes in the technological level and the standard of living. Then, households are divided into two functional categories, depending upon whether the household members are productively employed. Finally, the goods produced by the productively employed are to be examined from the standpoint of economic reproduction. To that end, the total material output of the economy, T (including energy), is split up into the categories V, C, D, and S′, where:

V = the material consumption of households necessary to maintain the requisite quality of labor-power to carry out the production of consumer goods.

C = the material inputs required to maintain the means of production, and also to compensate for the increased costs to extract the same quantity of raw materials.

The sum V+C corresponds to the consumption necessary for the mere maintenance of the society at existing levels of technology. Subtracting this sum from the total material production T, what remains is S=T−V−C, the economic surplus of the productive sector. This, in turn, is consumed within the following functional divisions:

D = the material consumption of all households and activities which do not directly participate in the process of the production and transportation of consumer goods. To this belong: commerce (excluding transportation), banking, health services, education, research, administrative and other important functions of government (e.g., police, defense), as well as other necessary (and also unnecessary, or even detrimental) service industries, and criminal activities.

Finally there remains:

S′ = the "surplus product," the portion of the material output which is attributed neither to V, C, nor D. The magnitude of this category corresponds roughly to the available extra margin available for reinvestments, above and beyond that which is required for the mere preservation or maintenance of a given level of technology of the economy. S′ is also referred to as the "free energy" of the economy.

In the LaRouche-Riemann Model, the source of the "surplus product" and, with it, the thousandfold increase of the potential relative population-density of humankind, is based upon the increase of the creative powers of the human individual since the era of a hunting and gathering society, which has occurred with continuous technological transformations. Magnitudes such as C, V, D, and S′ therefore cannot possibly be simply scalar numbers. The effect of a ton of steel, or a kilogram of uranium, is by no means invariant, but rather is entirely dependent upon the level of technological development of the economy at any given time.

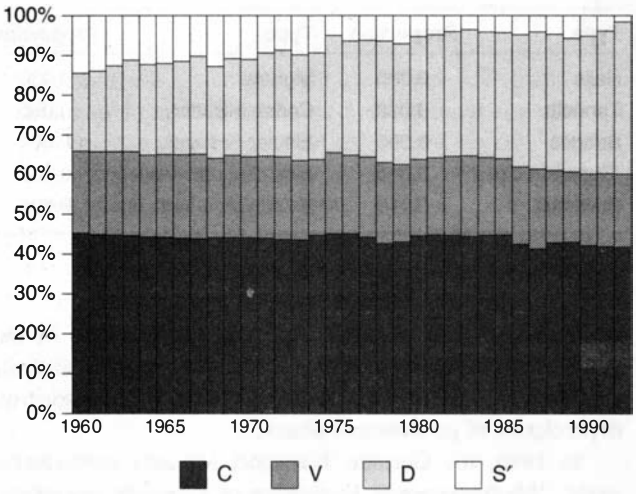
In the spring of 1986, the German-language magazine *Fusion* published a study by Ralf Schauerhammer, applying the Riemann-LaRouche Economic Model to the German economy from 1960 to 1984. Even though this was merely a first approximation, the results already revealed a dangerous trend. In the study, the parameters C, V, D, and S′ were all associated with available statistical data from the German Bureau of Statistics. "Constant capital," C, consisted of the consumption of capital goods, raw materials, auxiliary consumables, and fuels, within the productive sector of the economy. This included agriculture, the lumber industry, fishing, mining, energy and water utilities, transportation and communications, construction, and manufacturing. "Variable capital," V, was determined on the basis of private consumption, and was considered to be supplied only by productive economic sectors, as well as wholesale and retail trade. The category D consisted of those material goods produced by the productive sector which needed to be applied toward maintaining non-productive but socially necessary activities, such as for banking and insurance, certain other services, and government.

With the aid of those definitions and sources indicated by Schauerhammer, the author of the present study has extended that work to include the years up through 1992. Discrepancies between the earlier study's results and the present one, stem from two causes: 1) a different extrapolation of the material consumption for the productive as well as unproductive sectors of the economy, figures for which are not directly available in the same form for all the years under consideration; 2) the limitation of V to the material consumption which is necessary for the maintenance of productive households. The material consumption of households which are

FIGURE 6

Parameters of economic reproduction in Germany

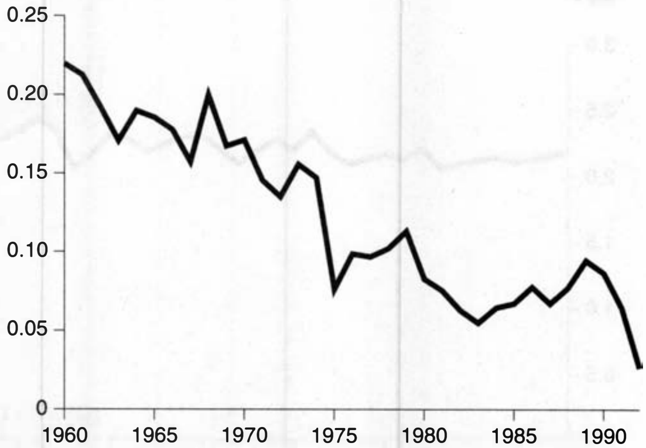
(percent of total product)



Source: EIR.

FIGURE 7

Germany's rate of profit: S′/C+V

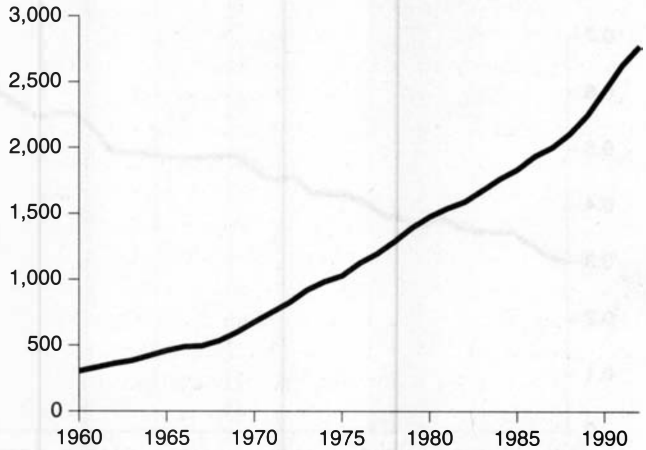


Source: EIR.

FIGURE 8

Germany's Gross Domestic Product

(billions of deutschemarks)



Source: German Federal Statistical Office.

not active in the production process, was therefore assigned to D.

Figure 6 represents the distribution of the total material production, T, into the categories C, V, D, and S′. It is immediately evident that one can scarcely talk about a bloated V—i.e., excessively high wages. Also, that portion of the total product applied to maintaining "constant capital," C, did not increase. The relative expenditure of goods for unproductive households, enterprises, and government, on the other hand, nearly doubled between 1960 and 1992. The "free energy," S′, available for improvement and expansion of the productive apparatus, has meanwhile undergone a frightening decline.

This trend is even clearer in **Figure 7.** The relationship S′/(C+V) denotes the "surplus product" in the economic reproduction process, relative to the productive inputs. In a healthy economy, in which the "free energy" is produced with increasing efficiency, this ratio should be continuously growing. But the opposite is the case here. Shocking losses of "free energy" were caused especially by the oil price hikes of 1973, and then again in 1979. Following 1983, there was slight recovery, which ran through the "unification boom" of 1989-90. But this boom was short-lived, and was more of the nature of a "last gasp."

Let us now compare the changes in "free energy" over this period, with the absolutely meaningless Gross Domestic Product curve, which leads into delusion (**Figure 8**).

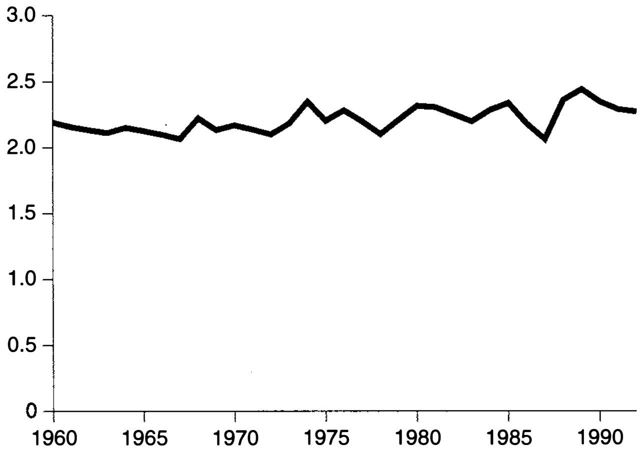
In the course of technological improvements, the capital intensity, C/V, should also continuously increase. As **Figure 9** shows, this is definitely not the case here.

The usual, monetarist-conditioned definition of "capital intensity" is clearly misleading. The primary cause of the loss of "free energy" is revealed by tracing the ratio D/(C+V) (**Figure 10**).

An ever greater portion of the economic surplus of the productive sector, was diverted into puffing up the nonproductive sector. Of course, a healthy economic development process is also characterized by a rising ratio D/(C+V), since the relative expenditures for education, research, and health care, will rise. But that increase is only sustainable when the

FIGURE 9

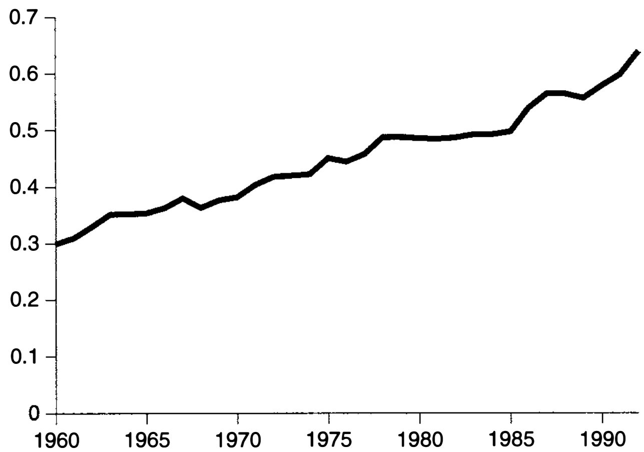
Capital-intensity of the German economy: C/V



Source: EIR.

FIGURE 10

Expense ratio of the German economy: D/(C+V)



Source: EIR.

"free energy" ratio $S'/(C+V)$ is growing even more quickly than $D/(C+V)$. In the case of the German economy, on the other hand, the relative growth of D is a result of Germany's march into the "post-industrial society."

Of course, these results are only a first approximation. For example, the "free energy" in the German economic reproduction process has probably long since crossed over the zero-line into negative values. Thus, the necessary expenditures by the public sector required for maintaining infrastructure are not reflected at all. Also, in keeping with international statistical practice, since the depreciation of the value of roads, bridges, tunnels, and waterways is difficult to calculate, this is not reflected at all in the statistics on depreciation of government assets.

TABLE 1

Annual maintenance costs for Germany's rail infrastructure, as a proportion of cost of equivalent new construction

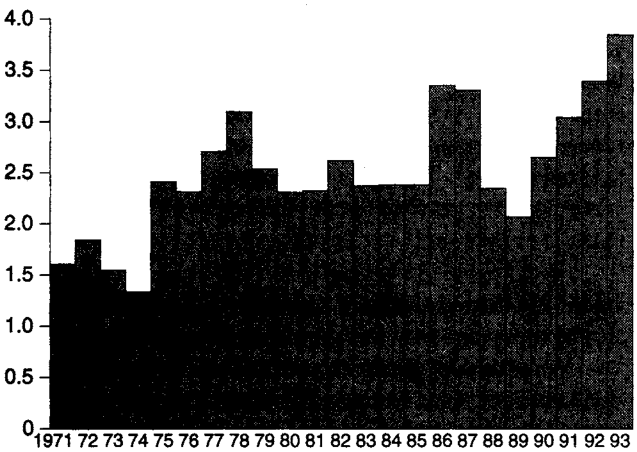
Type	Proportion	Type	Proportion
Rails	0.005	Signals	0.030
Tunnels	0.002	Communication	0.050
Bridges	0.006	Electricity supply	0.004
"Superstructure"	0.044	Electrical power lines	0.030
Buildings	0.040	Noise abatement, dams	0.001

In 1986, the German Transport Ministry published a study, "Macroeconomic Evaluation of Transport Infrastructure Investment," which provides some further insight in this regard (**Table 1**). The replacement costs for transport infrastructure are calculated at approximately 1.2% per year of the new construction cost.

In the case of new railway construction, the cost outlays break down as follows: roadbed 18.6%, tunnels 36.2%, bridges 13.1%, rails ("permanent way") 4.4%, buildings 1.2%, signals and communications 7.2%, electrical equipment 3.2%, and environmental protection 3.2%. The remaining 9.3% goes into planning and land acquisition. Based on these figures, the approximate annual costs for replacement and maintenance for Germany's entire railroad infrastructure can be set at about 2% of the cost of new construction. Assuming a typical railway construction cost of about DM 20 million ($13.3 million) per kilometer, this corresponds to a necessary annual maintenance investment of DM 400,000 ($267,000) per kilometer of rail. Based on the current total track length in Germany's rail network, this works out to something on the order of DM 10 billion ($6.6 billion) per year.

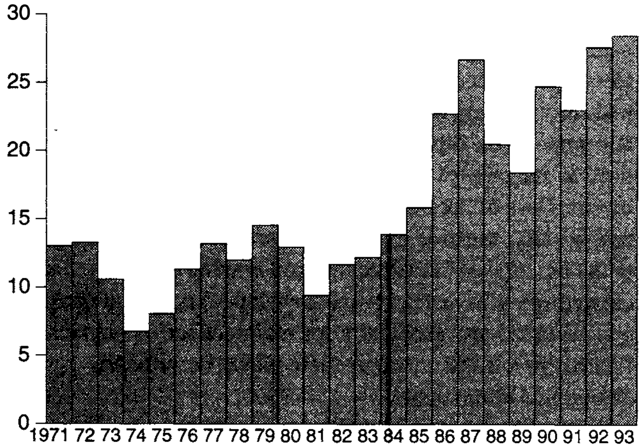
For roads, the average normal maintenance cost, including winter services, is put at an average of DM 40,000 per kilometer per year. The costs for resurfacing roads, which occurs less frequently, is DM 120,000 for major highways, and DM 40,000 for other federal roads, per kilometer per year. Applying these figures to the total 9,000 kilometers of major highways and about 30,000 kilometers of federal roads in Germany's pre-unification states, yields an overall annual required maintenance and resurfacing investment of DM 4 billion. Since the total length of the non-urban road network is another four times greater than the combined length of major highways and federal roads, and since we must also include the upkeep of urban streets, we can easily add another DM 10 billion for maintenance of the entire road network.

FIGURE 11
Tons of copper that a developing country must export in order to purchase one ton of German construction machinery



Source: EIR.

FIGURE 12
Tons of rice that a developing country must export in order to purchase one ton of German construction machinery



Source: EIR.

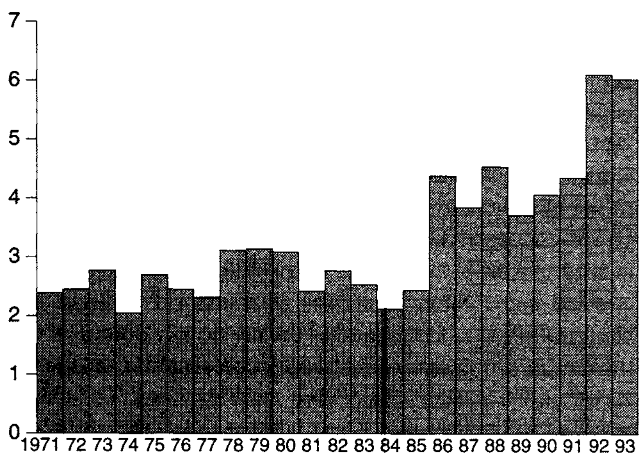
It can be stated without equivocation, that in past decades, the German economy has not paid its maintenance bill for its transport infrastructure, for roadways, railways, or for its inland waterway system. The current long-term German Unity Transport Projects infrastructure program, which foresees a total investment of around DM 450 billion for rails and roadways, is likewise an expression of these earlier mistakes. The program also continues to neglect investment in the water supply system, where the catch-up requirement is estimated at around DM 300 billion.

Finally, we have to take into consideration the collapse of raw materials prices, as a result of the unjust world economic order. If we compare the evolution of prices of any export products of the German capital goods industry, with the prices paid to the sellers for any raw material one might choose, we will always get more or less the same result, as shown in **Figures 11, 12,** and **13.**

In each case, the raw materials exports, measured in tons, which a nation needs to export in order to acquire a ton of a German product, have grown many times over. Of course, we are only dealing here with rough approximations, since raw materials are priced in dollars, and the value of manufactured items is in deutschemarks, while the German Central Bank's annual average currency exchange rate has been used. But it is nevertheless clear, that the unjustly low raw materials prices are obscuring the actual collapse of "free energy" in the German economy. Conversely, this situation has been a serious impediment to German exports into those countries.

In sum, it is clear that physical output of the German economy is no longer sufficient to maintain physical reproduction at the current level.

FIGURE 13
Tons of cotton that a developing country must export in order to purchase one ton of German construction machinery



Source: EIR.

Energy: after the oil shock, now an eco-shock?

Since the U.S. elections in November 1994, the U.S. Congress has been invaded by a group of babblers who, in earlier times, would only have elicited a faint smile, before the men in the white coats came to take them away. These ultra-conservatives, gathered around Republican Speaker of the House Newt Gingrich, are unabashedly proclaiming the arrival of the "Third Wave," which is supposed to sweep away the last vestiges of industrial society, and which supposedly marks the beginning of the new Information Age. Henceforth, according to them, production and transport of real, physical goods will have only minor importance. Anyone who, on the other hand, controls production and distribution of megabytes of electronic data, belongs to the new master class of "brain barons." Along with the end of industrial society, the time is also supposedly come to say goodbye to the practice of State intervention into the economy. Public expenditures for research and development, health care, social security, and especially for maintenance of physical infrastructure, must also, in their view, be radically cut, or abandoned altogether.

Take the neo-conservatives' rhetoric, and merely replace some of their all-too-explicit passages with nice-sounding eco-, bio-, and environmental buzzwords, and you essentially get the programs of the "energy revolution" and "transport revolution" pushed by the German Green party. The result of both programs is the same: accelerated collapse of the physical economy, and a massive lowering of the average standard of living.

In other words, the "German Newt Gingrich" is none other than Green party chief Joschka Fischer.

There is a crucial, axiomatic fallacy built into every one of the Greens' arguments: their neurotic fixation on a state of equilibrium which, in fact, occurs nowhere in nature. What is generally meant by such concepts as "carrying capacity," "sustainability," or "recycling economy," can perhaps have some validity for non-living substances. But the development of the biosphere on our planet makes a mockery of all these Green concepts. One example of this is the case of solar energy. Nature's technological revolution of photosynthesis enabled some microorganisms to transform sunlight into chemical energy. Compared to the previously dominant fermentation processes, this change represented a drastic increase in the energy flux within the biosphere. The closed world of limited resources was burst asunder, thereby creating a potential for growth which would never have been possible with the previous technology, not even with a massive increase in the quantity of resources available to the old technology. Henceforth, inanimate materials such as carbon dioxide and water could be ingested as food, and, with the aid of chlorophyll's energy technology, could be transformed into organic material.

But the use of solar energy was associated with an ominous side-effect: Huge quantities of a dangerous gas, which had previously been present in the atmosphere only in traces—namely, the highly active gas oxygen—were released into the air. The entire composition of the Earth's atmosphere, which initially consisted mostly of carbon dioxide and nitrogen, was turned topsy-turvy by this exponentially growing release of "poisonous waste" being excreted by the new, irresponsible consumers of solar energy. The Earth's entire surface was chemically assaulted: It *rusted.* Huge deposits of ores began to form; countless microorganisms died. If a climatologist had been around at that time, and had extrapolated his calculations into the future, he would have come inexorably to the conclusion that the Earth was in danger of burning to death as a result of the poisoning of the atmosphere with oxygen, unless there were an immediate moratorium on the use of solar energy. Did the introduction of photosynthesis, then, really deserve to be called "sustainable"?

TABLE 2
Energy flux densities of various technologies

		Output (kilowatts)	Flux density (watts per m²)
Windmill	(1750)	2	100
Water wheel	(1800)	30	8,000
Steam engine	(1860)	120	600,000
Marine diesel engine	(1930)	1,000	3,000,000
Nuclear reactor	(1980)	1,000,000	60,000,000

Once oxygen levels in the atmosphere climbed to the "Pasteur level" of about 1%—which geologists believe happened about 1.5 billion years ago—yet another technological revolution took place: respiration of oxygen. The "poisonous gas" became a giver of life.

The development of humankind has been similarly marked by successive technological advances, which have led to a thousandfold increase in its relative potential population-density. In the non-human biosphere, such changes were always associated with the formation of new species. In man, however, they arise as willful decisions which result in improvements in living standards and economic practice. These deliberate changes are based on new, better hypotheses about universal natural law. Hence, if any economic theory presumes fixed technologies and material resources distributions, it is fundamentally contrary to nature, inhuman, and incompetent.

Table 2 demonstrates this principle, by showing energy flux-densities of a successive series of energy utilization technologies. With our current level of knowledge, we can already predict the next two breakthroughs in energy output and flux-density: controlled nuclear fusion, and the mastery of matter-antimatter reactions.

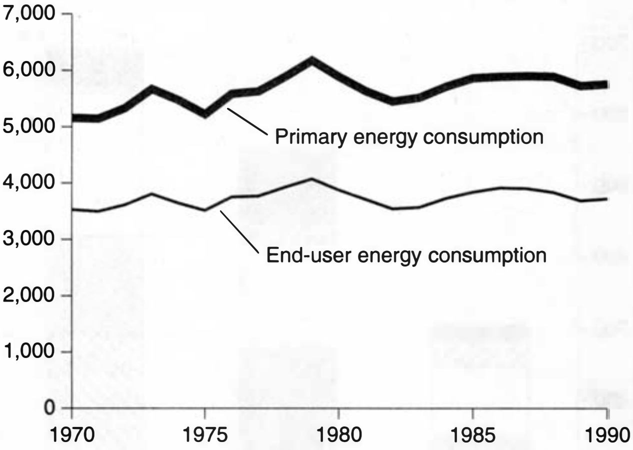
Energy consumption in Germany

In 1990, the distribution of end-user energy consumption in the states of pre-unification Germany was as follows: 25%

FIGURE 14

Energy consumption per capita and unit time

(watts)

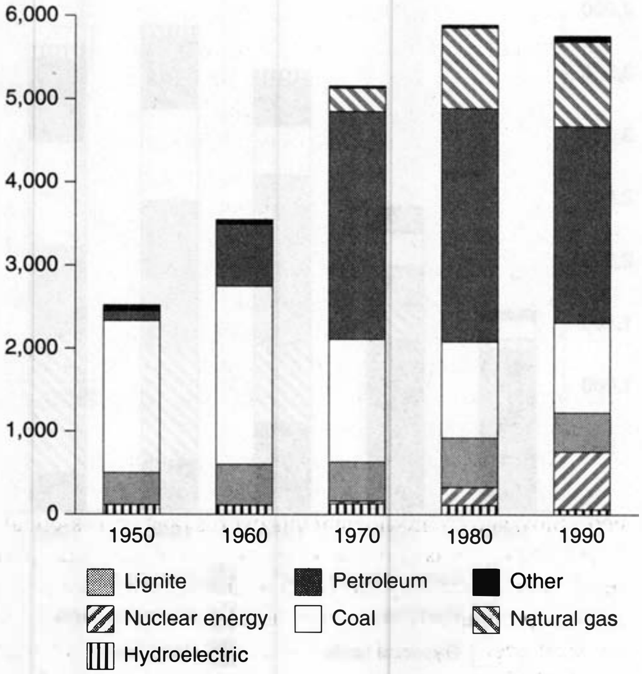


Source: AG Energiebilanzen, EIR.

FIGURE 15

Primary energy consumption, by source

(watts per capita)



Source: AG Energiebilanzen, EIR.

in private households, 17% for small-scale users, 30% in industry, and 28% for transportation. The share used by industry has continuously dropped since 1960, when it stood at 48.5%. In 1990, twenty-nine percent of this industrial energy was used for space heating, 25% for process heat, 39% for powering machinery and vehicles, 5% for hot-water heating, and 2% for lighting. Household energy use was distributed as follows: 49% for heating, 35% for automobiles, 8% for water heating, 7% for household appliances, and about 1% for lighting.

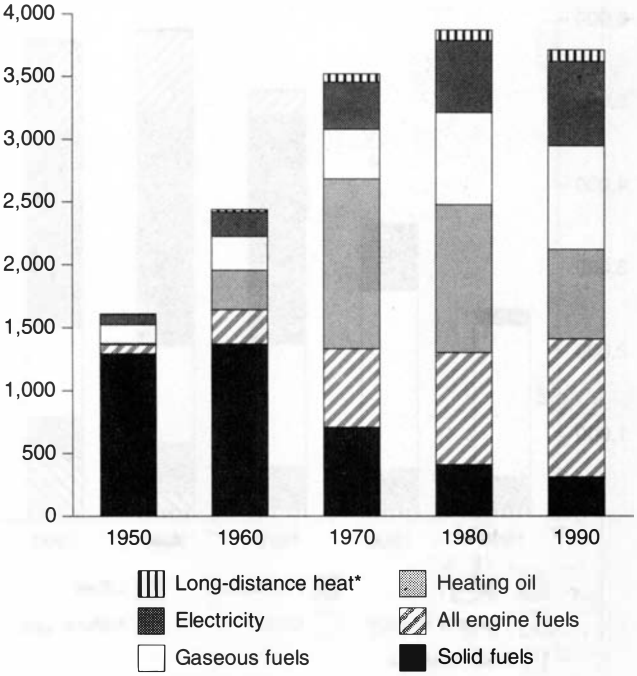
In 1950, fully 94% of all primary energy consumed in Germany came from domestic producers. Since then, this proportion has fallen drastically, because of the shutdown of coal mining, especially between 1960 (75%) and 1970 (44%). Today, Germany must import two-thirds of its primary energy supply.

In absolute per-capita and per-unit-time numbers, this looks as follows: At any one moment, for each German citizen there is an energy flux of almost 6,000 watts. Applying the proportions listed just above, each citizen personally consumes about 1,500 watts, while the other 4,500 go for the production and transport of the goods which are necessary for his existence, as well as for services. There must be a continuous influx into Germany from abroad, of approximately 4,000 watts per citizen, in order to guarantee that current modes of physical reproduction are maintained. **Figure 14** shows that between 1970 and 1992, the per-capita energy flux has continued to hover between 5,000 and 6,000 watts; only once—in 1979—did it exceed that value. In other words, per-capita energy flux in the German economy is stagnant. If one excludes non-energy-related uses of energy carriers, losses during conversion, and electricity producers' own consumption, one arrives at a per-capita energy flux in 1990 of about 3,700 watts—significantly less than what it was in the late 1970s.

The internal composition of primary and end-user energy consumption, broken down according to energy carrier type, and once again measured per capita and per unit time, is shown in **Figures 15** and **16.** Since 1950, fuels have taken up an ever greater proportion of end-user energy consumption, and have even significantly encroached upon the use of electricity. This has been caused by increased consumption for transportation, and especially for commercial trucking. If it were not for this special factor of increased transport without any concomitant expansion of production, the decline in energy flux over the past few years would have been even more marked. In fact, since 1973, industrial energy consumption has declined by 20%.

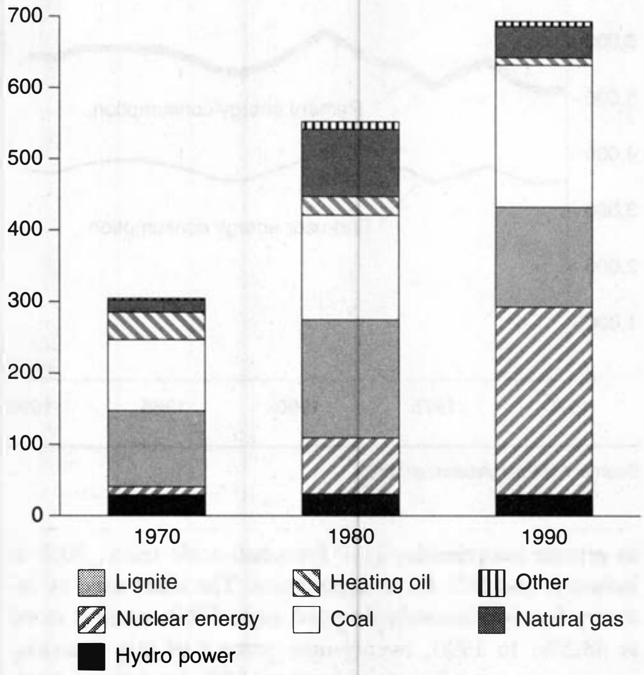
In 1990, the average electricity flux per German citizen was almost 700 watts, of which 29 watts was from hydro power, 263 watts from nuclear power, 140 watts from lignite, 200 watts from anthracite coal, 10 watts from heating oil, 44 watts from natural gas, and 7 watts from other energy sources (see **Figure 17**). In households, electricity use has climbed steadily, resulting in a significant easing of the burdens of household chores, without which today's great

FIGURE 16
End-user energy consumption, by source
(watts per capita)



* E.g., piped steam for heating buildings and for industrial processes.
Sources: AG Energiebilanzen, EIR.

FIGURE 17
Gross electricity production for public use, by source
(watts per capita)



Sources: Deutsches Atomforum, EIR.

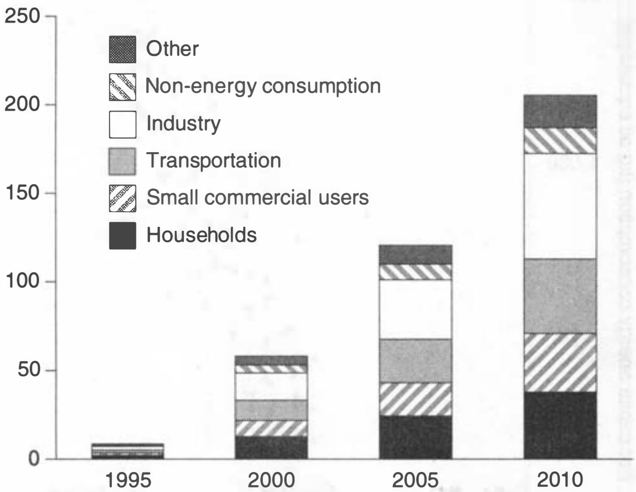
number of people holding two jobs would scarcely be conceivable. Some 24% of household energy consumption goes for space heating, 23% for refrigeration, 13% for hot water used in cooking and bathing, 9% for electric stoves, 7% for washing machines and clothes dryers, 6% for lighting, 5% for televisions and radios, 2% for dishwashers, and 11% for other appliances. The expansion in the use of nuclear energy has played an important role in this increase in per-capita electricity consumption since the 1970s. But no new nuclear plants have been built since 1990, nor are any being planned.

Ecological tax: Morgenthau Plan, take two

On March 28, 1946, the Allied Control Council, in the spirit of the Morgenthau Plan, announced its "first industrial curtailment program" for occupied Germany. According to this plan, industrial production was to be reduced to 50-55% of 1938 levels. Manufacture of ball bearings, aluminum, heavy machine tools, and tractors was completely forbidden. Germany was permitted to manufacture a maximum of 40,000 new passenger vehicles and 40,000 trucks per year. The production of machine tools was not to exceed 11% of the 1938 levels; primary chemicals production was limited to 40% of the 1938 level, and electricity production had to remain below 9,000 megawatts—one-sixth of the level in 1938. A limit was set of 1.7 pairs of shoes manufactured per capita. As for any productive capacities which exceeded these limits, they were to be dismantled or destroyed.

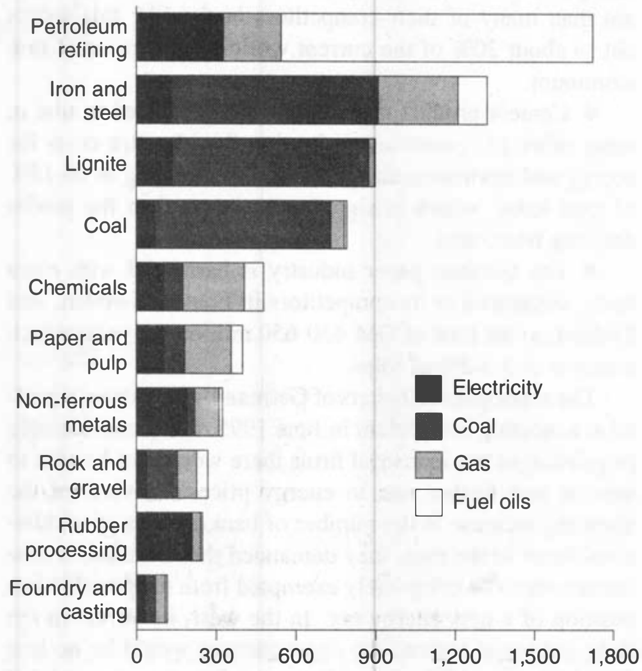
Today's eco-fundamentalists share the same bias against the production of goods and means of transportation, and are calling for a comprehensive "energy and transportation revolution" in Germany. But instead of using legal bans and outright dismantling to achieve their aim, they want taxes to do the trick. Approximately 3 million energy-intensive jobs in German industrial firms are threatened with immediate elimination: more than 800,000 in the woodworking and paper industries; 600,000 in petrochemicals; 600,000 in iron, steel, and non-ferrous metals production; 400,000 in energy and water supply; and another 300,000 in stone, ceramics, and glass. Energy consumption in Germany is already today burdened with DM 88 billion each year in taxes. Of this, DM 30 billion is paid by industry, and the remainder is borne by households. If Germany went along with the proposals of Greenpeace and the German Economics Institute (DIW) in Berlin (a private think-tank), there would be an additional energy tax, which, after a 15-year transitional period, would

FIGURE 18
Projected energy tax revenues, according to the DIW-Greenpeace model
(billions of 1995 deutschemarks)



Sources: German Economic Institute (DIW), EIR.

FIGURE 19
'Energy spectra' of selected German economic sectors
(energy source in kilowatts per worker)



Sources: German Federal Statistical Office, EIR.

put an additional DM 205 billion annual tax burden upon the German economy (**Figure 18**). This would translate into an additional DM 5,000 average annual tax burden per household. The chemical industry would have to pay an additional DM 23 billion, the steel industry DM 11 billion, the cement industry DM 2.1 billion, and the paper industry about DM 2 billion more per year. According to the Greenpeace-commissioned study issued in 1994 by the DIW in 1994, all consumption of energy, with the exception of the use of so-called "renewable" energy resources, will be slapped with a punitive tax of nearly DM 16 per gigajoule, or about 6 pfennigs (about 4¢) per kilowatt-hour, calculated using 1990 prices.

According to the model plan presented recently by the Greens, by the year 2004 the price for a liter of gasoline will skyrocket to DM 5, thanks to a new energy tax and other increases in the petroleum tax. The price of electricity is supposed to go up to 38 pfennigs per kilowatt-hour. Already in the first year their program goes into effect, eco-tax revenues are expected to amount to DM 69 billion: DM 18.5 billion from the energy tax, DM 40.5 billion from transportation taxes, and DM 10 billion in savings through reduced subsidies, especially those going to commercial aviation. The "transportation revolution" is to go hand-in-hand with massive cutbacks in public road construction. Then, by the year 2005, after continual increases in the eco-tax rates, a level will be attained at which the astonishing sum of *DM 300 billion* will be withdrawn each year from the productive sector of Germany's economy.

The consequences of such an "eco-shock" would be catastrophic. Energy prices in Germany are already too high today. Electricity prices, for example, are about 50% higher in Germany than they are in France, which produces 70% of its electricity with nuclear power. For large sections of German industry, therefore, an additional energy tax would make the tax load unbearable, leading to a massive corporate exodus out of the country.

Figure 19 gives an idea of the energy-intensity of some German economic sectors, as of 1994. What is shown, is their energy consumption per man-hour of labor, broken down by energy source.

At the beginning of 1995, the Association of Industrial Energy and Power Producers (VIK) summed up the already existing impediments to German industry's competitiveness, such as high energy costs and excessive environmental-protection standards, as follows:

- For steel production, the local extra costs, as compared, for example, to those in France, for electricity and environmental protection, work out to about DM 80 per ton, or 7% of total sales at current prices.
- For the chemical industry, the extra costs for electricity alone, in comparison to neighboring European Union countries, amount to DM 2.4 billion per year. The costs of anti-

pollution measures for the identical large-scale chemical production facilities in Germany, are up to 20 times higher than they are in neighboring European Union (EU) countries.

- In the aluminum industry, the comparative figures are the same: For electricity and anti-pollution measures, German producers are incurring costs of about DM 410 more per ton than many of their competitors in the EU; this works out to about 20% of the current world market price of raw aluminum.
- Cement production in Germany, compared to that in some other EU countries, is burdened with extra costs for energy and environmental protection, amounting to 10-15% of total sales, which is significantly more than the profits deriving from sales.
- The German paper industry is harnessed with extra costs, compared to its competitors in France, Sweden, and Finland, to the tune of DM 450-650 million per year, which amounts to 3.5-5% of sales.

The economics ministers of Germany's new states reported at a meeting in Potsdam in June 1995, that a considerable proportion of the industrial firms there would not be able to survive any further rise in energy prices. In view of the alarming increase in the number of bankruptcies of middle-sized firms in the east, they demanded that Germany's new eastern states be completely exempted from the possible imposition of a new energy tax. In the west, however, in the Ruhr industrial region, the consequences would be no less dire. In the city of Duisburg, for example, it is estimated that unemployment would rise to 30%.

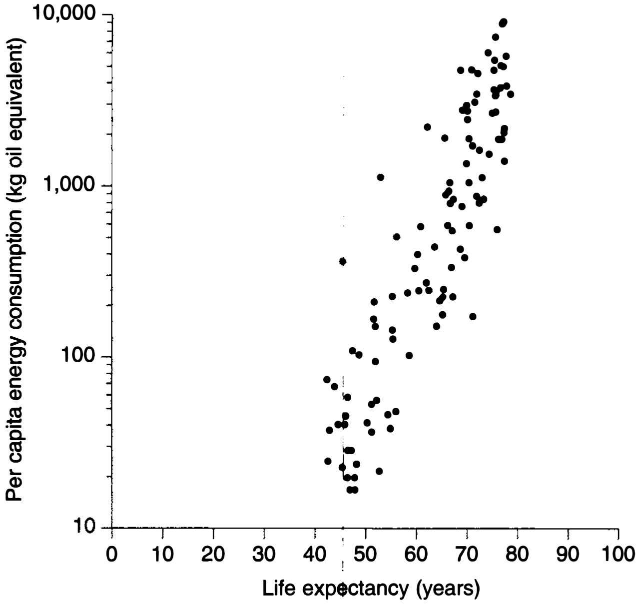
In any economy, increases in energy consumption per capita and per unit-area of land-surface used for productive activity, are the preconditions for raising relative potential population-density. This goes hand-in-hand with increases in the citizen's average standard of living and life expectancy. All human development to date, reflects this connection, and explicitly so. Just compare the life expectancies of people in countries with low per-capita energy consumption, such as in large parts of Africa, with the situation in the leading industrialized countries.

Figure 20 shows figures for all 109 nations for which 1991 per-capita energy consumption was reported in the United Nations *Human Development Report 1994*. The statistics show industrial energy consumption only. With surprisingly little deviation, the increase in life expectancy is roughly proportional to the logarithmic scale of per-capita energy consumption. If the average life expectancy in a country such as Uganda, which is currently not even 43 years, is to rise to equal that in the West, it will be necessary to set into motion a development process within of agriculture, industry, infrastructure, health care, etc., which is characterized by exponential growth in per-capita energy consumption. To put it even more concretely: Countries with twice the industrial energy per capita, show life expectancies which are approximately four years longer. Conversely, a 19% reduction in energy consumption reduces a citizen's lifespan

FIGURE 20

Correlation between countries' per capita energy use and life expectancy

(each dot represents one country)



Sources: *Human Development Report 1994*, EIR.

by approximately one year. According to one scenario worked up by Greenpeace, by the year 2030, worldwide primary energy consumption should be reduced from today's 2,100 watts per capita, to 1,400 watts. According to the calculations above, that would mean a 2.3-year reduction in the average life expectancy of every man, woman, and child on Earth. According to A. Lovins, by then, the world's population should be limited to only 650 watts of primary energy consumption per capita, which would shorten everyone's lives by almost seven years. If one applies this kind of popular eco-apocalyptic methodology to the current world population, then Greenpeace's policy would cost the lives of 3 million human beings each year, while Lovins's would kill 11 million each year.

Nuclear power versus solar

In the March 10 issue of the German Industrial Association's *VDI-Nachrichten,* Horst Niggemeiner, a Social Democratic (SPD) Member of Parliament in Bonn until 1994 who had headed the public relations office of the energy and mining workers union up to 1987, demanded that his party reverse its 1986 resolution opposing all nuclear energy production. "Without nuclear energy," he wrote, "the workers won't have bread." A constituency-based organization such as the Social Democratic Party simply cannot afford "to let dogmatic narrow-mindedness cloud its view of the realities of energy policy." He recalled "that around the world, 74 new nuclear power plants are currently under construction, and another 54 are in the planning stage. These come in addition to the 417 nuclear plants already operating in 29 countries, where the politically responsible authorities have no intention of deviating from peaceful use of nuclear energy."

In the 1960s and the early 1970s, similar views were the norm among the SPD leadership. While Erhard Eppler was attacking the federal government for not developing the fast breeder reactor quickly enough, Chancellor Willy Brandt wrote in his 1967 book *Friedenspolitik in Europa* (*Peace Policy in Europe*): "It is our generation's task to prevent the military abuse of nuclear energy, and to promote its peaceful use. The Federal Republic of Germany is ready to support anything which prevents that abuse. It is *not* prepared to accept anything which hinders its peaceful use. The future of the F.R.G. as a modern industrial nation depends on it." And in fact, the lion's share of Germany's nuclear plants were contracted under SPD cabinet officials. In the Ruhr region, the development of the high-temperature reactor, which, in addition to electricity, can simultaneously produce huge quantities of process heat that could be used, for example, for the coking of coal, was considered to be the region's guarantee of long-term job security.

Numerous multibillion-deutschemark projects have already fallen victim to the fundamentalist opposition to the peaceful use of nuclear energy, with the immediate damage done amounting to DM 15.3 billion: the fast breeder in Kalkar (DM 7.1 billion), the high-temperature reactor (HTR) in Hamm Üntrop (DM 4.2 billion), the reprocessing plant in Wackersdorf (DM 3.2 billion), the HTR fuel element plant for research reactors in Hanau (DM 100 million), and the uranium processing plant in Hanau (DM 500 million). A further DM 11.3 billion in nuclear-related investments are currently in jeopardy, because of political shenanigans: the MOX fuel element plant in Hanau (DM 1.1 billion), the Mülheim-Kärlich nuclear plant (DM 7 billion), the Gorleben final disposal dump (DM 1.6 billion), the Schacht Konrad disposal dump (DM 1.2 billion), and the Gorleben pilot conditioning plant (DM 400 million).

Of the 21 nuclear power plants currently in operation in western Germany, nearly all were commissioned between 1964 and 1975. Later commissions were only granted for the GKN-II in Neckar, the KKI-2 in Isar, and the KKE in Emsland, all of them in 1982. Since 1989, not a single new nuclear power plant has gone into operation in Germany (**Table 3**). In the meantime, not even the greatest optimists among the green energy strategists dare to hope that so-called "renewable" energy resources will be able to reach even a 10% share of total energy consumption. In fact, this level will surely never be achieved, and the reason is not any lack of research efforts: Between 1955 and 1988, DM 36.9 billion of public money was spent in West Germany on nuclear fission and fusion research, DM 2.3 billion on "renewable" energy sources, and another DM 800 million on "rational" energy use. Up to 1994, approximately DM 4 billion of research funding went into alternative energy. But even with so many billions in research funds, physical law would not let itself be overturned. Namely, the energy flux-density of solar energy is simply too low, by several orders of magnitude. To replace a standard German nuclear power plant's 1,300 megawatts of output, would require a surface area of about 300 square kilometers. But because of the low average hours of sunshine in Germany, such a solar power plant would actually have to have a capacity of 9,500 megawatts. The land area required by a nuclear power plant, on the other hand, is only about 0.3 square kilometers.

TABLE 3

Nuclear plants constructed in Germany's pre-unification states

(megawatts capacity, not including shut-down reactors)

Years	Commissioned	Put on-line
1964-69	3,709	357
1970-74	10,437	672
1975-79	5,479	7,047
1980-84	4,128	4,816
1985-89	0	10,861
1990-94	0	0

If, instead, one were to replace a nuclear power plant with wind energy, one would need 18,000 wind power units, each with 250 kilowatts of output. In order to produce 1,000 megawatts of electric current using wind energy, assuming a maximum utilization of 10-20%, about 500 square kilometers would be required. Does the "energy revolution," then, mean that Germany will be entirely covered by concrete? But not only that: Besides the amount of surface area required, the quantities of materials consumed by "renewable" resources per unit of output, is orders of magnitude greater than with nuclear energy. So, in the final analysis, sunshine, as such, is simply not a useful energy source. Even photosynthetic organisms must first develop complicated electrochemical factories, called chlorophyll, in order to utilize the energy from sunbeams.

At a meeting of the Evangelical Academy in Loccum in June 1994, Prof. Wolfgang Kröger of the Cooperative-Technical College in Zurich presented a rundown of the material inputs required for constructing nuclear and solar energy plants: "In order to maintain an electrical output of 1 megawatt for one year, with nuclear energy production (light water reactor) one requires 386 tons of concrete and 67 tons of metal; to produce the same amount of energy using photovoltaic cells would require 4,192 tons of concrete, 546 tons of steel, 62 tons of other metals, 192 tons of plastics, 423 tons of glass, and 15 tons of silicon. So what do the adjectives 'renewable' or 'regenerative' mean in this context?"