EIR Feature

An emergency plan for China for the next 100 years

by Jonathan Tennenbaum

The following is excerpted from a draft program entitled, "The Renaissance of China: An Emergency Plan for the Next Hundred Years."

Contrary to the opinion of many supposed experts, the much-trumpeted "investment boom" in China actually marks a downward turning-point in a process of economic and social breakdown. If the present trends are not reversed in the years immediately ahead, a combination of destructive forces unleashed inside and from outside China will literally tear that nation apart.

In fact, a profound crisis has been building up for decades. In its inner core this crisis is rooted in the injuries done to the mental powers of China's younger generations under the "Cultural Revolution," in the suppression of China's classical culture, and of the best influences of Indo-European culture. These injuries, symptomized by a predominance of extreme forms of pragmatism among the nation's intellectual and managerial elites, greatly aggravate the impact of serious errors in economic policy made over the last four decades. These errors center on the refusal to carry out the kind of infrastructure-based industrialization of China's economy, which Sun Yat-sen had correctly identified in the 1920s as essential to the long-term survival of the country.

Now, by opening the floodgates to looting of China's labor force and shaky infrastructural base by foreign investors and corrupt domestic elements, the recent "liberalization" policies are acting to precipitate that slowly developing crisis into an uncontrollable explosion.

The magical aura of the "investment boom" distracts attention from the fact, that wealth is being transferred from the rural economy of the interior, to the coasts, and exported abroad; whereas the interior is starved for investment and China's essential problems—the predominantly agrarian, pre-industrial structure of its labor force and the urgent need to modernize its basic infrastructure—remain unsolved.

A digitally controlled machine tool on display at an exhibition of the People's Republic of China in New York City. China's essential problem is that the industrial base is too small to maintain itself and at the same time provide the goods and improved infrastructure which the agricultural sector urgently requires.

Meanwhile, a "get rich quick" mentality spreads everywhere, corroding the moral quality of the nation's elites, and weakening their ability to make the kind of long-term decisions upon which this vast nation depends.

That is exactly the result desired by the Anglo-American circles who originally designed the World Bank's China policy, and who have maintained a special kind of economic and cultural warfare against China for many decades. Now it appears that they have succeeded in luring China's leadership into a trap from which there is no escape.

The looming disaster has already announced itself in many ways. The crisis in agriculture is still in its early stages, but has already shaken the country. Its immediate expression is a collapse in the purchasing power of farmers. Part of this derives from the distortion of the internal economy caused by the "free trade" measures adopted by the government, especially the "boom" taking place in and around the Special Economic Zones. To this is added, increasingly, the effects of corruption and speculation on a grand scale. However, the resulting short-term destabilization of the internal economy is detonating a more fundamental, physical crisis: the growing inability of China's industrial and infrastructural base to maintain itself while meeting the increased requirements of the agricultural sector. The increasing severity of bottlenecks and even breakdowns in the vital energy, transport, and water systems signals the fact, that the basic physical infrastructure of the country is neither being adequately maintained nor expanded at the necessary rate.

At this point it would not be enough to respond to the symptoms of the crisis one by one. The modes of thinking must be changed, which led to those errors.

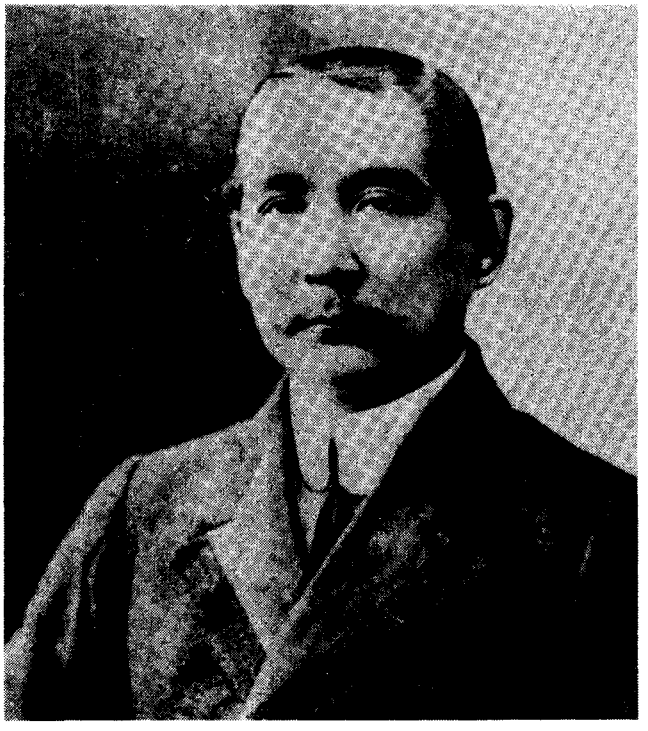
We hope this paper, which is submitted for discussion and does not claim to be the "last word," will assist in that process of reflection. It is designed to be read together with two other documents: 1) the recent work by Lyndon LaRouche, "History as Science" (see *Fidelio,* Fall 1993); and 2) an essay of Michael Billington entitled, "Toward an Ecumenical Unity of East and West: The Renaissances of Confucian China and Christian Europe" (*Fidelio,* Summer 1993).

The example of Sun Yat-sen

Dr. Sun Yat-sen's efforts to modernize China provide an indispensible, recent point of reference for the kinds of things which must be done now. China would not be in its present deep crisis, if Sun Yat-sen's policy of infrastructure development and industrialization had been followed. He clearly recognized, back in the 1920s, that China's future depended on accomplishing three interconnected *physical* tasks:

1) Modernizing the entire infrastructure of the country, with emphasis on railroads and water systems (including flood control) and upon opening the interior of the country.

2) Launching a rapid process of industrialization, employing the most advanced technologies available in the world at that time. Sun Yat-sen understood this to include a vast development of energy production and the related infrastructure.



Dr. Sun Yat-sen. His efforts to modernize and industrialize China provide an indispensable point of reference for what must be done now.

3) Urbanization, including the building of many new cities.

To this, Sun Yat-sen added what he considered to be the most important thing of all: a change in cultural outlook. We would propose to call this an "educational renaissance."

These measures, and only these measures, could enable a sufficient rate of growth in the productive powers of labor, to guarantee the long-term survival of China.

This fact is clearly demonstrated if we examine the situation of China's agriculture. It impossible for China to feed itself without moving toward vastly more capital-intensive, energy-intensive forms of agriculture—both directly, in terms of machinery, equipment, and chemical products used on the farms, and indirectly, in the form of improved water systems, energy, and transport. This process has already begun, and will accelerate greatly in the coming period.

The problem is, that China's industrial base is far too small to maintain itself and at the same time provide the goods and improved infrastructure which the agricultural sector urgently requires. This problem is aggravated by the "boom" in the Special Economic Zones, which is diverting the existing industrial activity toward export and an overexpansion of services, and even further away from the needs of agriculture. So, we witness a collapse in the purchasing power of China's farmers at exactly the time when they need to invest massively in the capital stock of their farms.

If we look, for example, at the case of Germany in the nineteenth century, we see that freeing of the peasants from "communal" feudalism, and the establishment of private family farms, was the means to dramatically increase the capital-intensity of agriculture. However, this only worked because it was part of a very conscious policy for *industrialization,* organized by Freiherr vom Stein, the brothers Wilhelm and Alexander von Humboldt and their allies, and which emphasized at the same time rapid development of infrastructure and an educational renaissance. Sun Yat-sen had very much the same kind of process in mind for China.

The mess we find now, is the accumulated result of 70 years of *not having done what Sun Yat-sen proposed.* Many useful and important things have been accomplished, but the Chinese economy still retains its predominantly agrarian, pre-industrial character—a mode in which it can no longer sustain itself.

Fortunately, China now has available a range of technologies whose productivity far exceeds anything which was available in Sun Yat-sen's time. This provides an essential means for compensating for the lost time.

Above all, China has nuclear technology, which provides a source of power thousands of times more concentrated than any previously known. The hope for China is to mobilize the kinds of capabilities which China's scientists and engineers have demonstrated—in producing nuclear reactors, thermonuclear weapons, rockets, and satellites—and apply them broadly to the needs of the population and the economy as a whole.

The following central element of our proposed plan illustrates what kind of mobilization we have in mind.

The simplest and most easily solvable precondition for China's future is *large quantities of electric power.* China requires, going into the next century, a *minimum of 1,000 gigawatts of electric generation capacity,* provided at a fraction of the present electricity cost per kilowatt-hour in real economic terms. In the course of the twenty-first century, China's power consumption will expand still further, to many times that figure.

The initial elevenfold expansion of electricity generation can only be accomplished using nuclear energy. It requires industrial mass production of simple, robust, inherently safe nuclear reactors. This is something China could easily do, if the task were made a national priority. The most suitable reactor technologies are already known to Chinese specialists.

With that, most of the material difficulties presently hindering China's development, will easily be overcome. China need only concentrate—parallel with the expansion of nuclear power—on rapid development of high-speed railway and inland water transport and water management infrastructure. Focus a smaller, but decisive portion of that total effort on research and development of new technologies which will revolutionize infrastructure in the first decades of the twenty-first century. These include, for example: magnetic levitation; new types of high-speed ships, including magnetohydrody-

namic propulsion; controlled nuclear fusion; hydrogen technology; "clean" nuclear excavation methods, and so forth.

Provided the infrastructure effort emphasizes capital-intensive, energy-intensive forms of employment, and occurs in the context of an educational renaissance, nearly everything China needs will come into place by itself. Through the process of rebuilding and expanding the nation's basic physical infrastructure *in this energy-intensive, capital-intensive way,* we also transform the structure of employment, recruiting tens of millions of unemployed and underemployed into increasingly skilled activities, and laying the foundation for *an industrial labor force more than five times larger than China's present one.*

Infrastructure development also lays the basis for an urbanization process emphasizing the establishment of many new cities. We shall outline, below, our proposal for building 1,000 modern industrial cities based on nuclear power.

With assistance from Germany, France, United States, Japan, and other industrial countries, facilities for mass production of reactors, utilizing the most advanced production technologies, could be built up within a few years. The response of various nations and institutions to this proposal would be a good test of who is truly interested in China's development. Technology transfer and other assistance in setting up assembly-line production of nuclear power plants and related infrastructure will have a positive economic effect a million times greater than all the present investment in China's Special Economic Zones. If foreign assistance is not forthcoming, then China is perfectly capable of doing it herself; it will only take longer.

When Sun Yat-sen wrote his "International Development of China" proposal back in 1921, he emphasized that the participation of foreign countries in the infrastructural modernization of China, through investment of modern capital goods and know-how, would not only be good for China, but could prevent a deep economic depression in the industrial nations which would lead to a new world war.

This prophetic analysis of Sun Yat-sen applies also today. If the advanced industrial countries would agree to assist China in the kind of development we are proposing—instead of looting its "cheap labor" and breaking the country apart through the chaos of the "free market"—then this would greatly lessen the impact of the present worldwide economic crisis. However, this would require placing relations between China and other nations on a completely different basis than the IMF-World Bank-GATT policy, which is nothing but a reincarnation of the British Empire's infamous "free trade" policies under the umbrella of a corrupted United States.

What is required in general is a return to classical principles of *national economy,* principles which were the basis for the rise of Germany, the United States, France, Japan, and other nations as industrial powers, and which are *completely opposed* to the British "free trade" system.

These are the principles put forward by Gottfried Wilhelm Leibniz, applied by Alexander Hamilton and Mathew and Henry Carey to the United States, pioneered by Gaspard Monge and his Ecole Polytechnique in the development of France, by the Prussian reformers and Friedrich List to the industrialization of Germany, taken over by the Meiji Restoration in Japan, and so forth. They emphasize the development of *labor power,* which is based on the creative capacity of the individual to generate, assimilate, and transmit technological progress. They emphasize the role of the state:

- in promoting scientific and technological progress;
- in providing basic physical infrastructure, health and education;
- in generating credit for the expansion of the economy, directing investment preferentially into technological improvements in infrastructure, agriculture and industry;
- in regulating economic activity, maintaining a price structure coherent with the costs of production and necessary rates of reinvestment in the productive sector;
- in defending the national interest against domestic and foreign speculators and special interests, and protecting and promoting productive forms of private enterprise.

People often ask, "Where will the money come from to finance China's development?" This is a misplaced question, as Sun Yat-sen clearly understood. Money is never the problem: It is only paper. In a sovereign nation, the monetary system is the creation of the state, which regulates and directs the use of money as an instrument of the real physical-economic activities of society. Development is entirely a matter of deployment and improvement of the *labor power* of the nation, its ability to generate, assimilate, and transmit increasing rates of technological progress, which is the source of the nation's wealth.

The best and most important monetary tool for such development is the type of national banking system pioneered by Alexander Hamilton, the first treasury secretary of the United States. In this system, the National Bank introduces new issues of currency into the economy, by extending low-interest credit *exclusively* for the purpose of technologically progressive investments in the productive sectors of the economy. The functioning of such a banking system has been described in a number of documents available from *EIR,* especially our special issue dedicated to the 1791 bicentennial of Hamilton's "Report on Manufactures" (*EIR,* Jan. 3, 1992). We focus on the *priorities* for such investment, which is not limited by money, but by the available resources of labor and physical equipment that can be set into motion by suitable issuance of National Bank or other credit.

The looming disaster in China's economy

Aside from certain circles in the West who are maliciously spreading disinformation about the real situation in China,

belief in the existence of an "economic boom" results mainly from the common tendency to confuse superficial appearance with reality. On the lowest level, today's businessmen tend to think that if they and their friends are making money, then everything is fine. A close look at the agricultural and industrial figures, discounting for inflation, suggests a more sober view. But increases in material output (even measured per capita), do not in themselves demonstrate that the economy is actually growing. Relatively short-term developments in an economy must always be evaluated in the context of the "long cycles" of investment upon which the maintenance of a nation's productive base depends. Placed in that context, the present "boom" is revealed to have little real substance, diverting attention from the real problems—including a chain-reaction of breakdowns caused by neglect of long-term investments in China's basic infrastructure.

Fictitious growth

To illustrate this point, consider first a typical example from western capitalist economies.

Suppose that, as a private investor, I have acquired a railroad, perhaps through the present wave of insane privatization moves in many countries. Portions of the equipment of that railroad, particularly things such as track beds, switches and signals, bridges, tunnels, and other fixed facilities, have long life-times, 30-40 years and more. A competently run railroad must always set aside substantial sums for maintenance, modernization, or eventual replacement of this basic capital. But, suppose I simply stop carrying out all but the most urgent repairs, allowing the whole system to gradually run down and decay, and instead divert the sums formerly destined for long-term investment and maintenance, into the category of "profits"! I can get away with this—for a while!—because the effects of neglect of maintenance of "long-cycle" equipment only becomes apparent, in the form of serious breakdowns, after many years.

With these new "profits," I might do several things. I might purchase railcars and locomotives, thereby apparently expanding the operations of my railroad. I might simply pay out the money to my stockholders as earnings, or perhaps invest them in some form of speculation. In any case, I have created a "boom" for my company. My credit rating improves; my stock gains on the market. The boom lasts 5-10 years, maybe more. I must only be careful to sell my shares and get out of the business before the track bed falls apart and the bridges begin collapsing! In the end, the railroad is virtually destroyed, while I walk home a rich man.

Exactly this monstrous sort of looting process is responsible for the accelerating decay of the infrastructure and industrial base of the United States, Great Britain, and, increasingly, other western nations. In a somewhat different way, the same thing was a major cause of the collapse of the Soviet Union and has been happening on a gigantic scale in China as well.

Consider the case of Chinese agriculture. The Chinese farmers' ability to feed the population depends upon a vast infrastructure of canals, reservoirs, irrigation and drainage systems, water pumps, and so forth. This is an infrastructure which has been built up, in some cases, over thousands of years. Whatever changes are made or otherwise occur, the overall performance of that infrastructure—as measured by such parameters as irrigation water delivered per hectare (1 ha = 10,000 m^2 = 2.47 acres) and per capita of the population—must at the very least be maintained. Not only the canals, pipelines, and so forth must be repaired and replaced, but we must also correct for such effects as erosion, accumulation of silt, and salination of soils.

As agricultural production expands, and the infrastructure is expanded and improved, an increasing expenditure is required per capita and per hectare to compensate for the various processes of wear and decay. In fact, even to maintain a *fixed, constant level of agricultural productivity,* the level of expenditure would gradually increase.

Note also that the factor of variation in weather and other natural conditions must be taken into account; we cannot define the necessary level of maintenance expenditure only in terms of conditions prevailing in "good years." Recent flood disasters provide a clear lesson for that. Economic policy must take into account the implicit existence of "long cycles" of recurrence of extreme natural conditions.

These simple observations pose obvious questions: Has China been maintaining its water and related infrastructure, as measured by such long-term criteria? Or has it done the same sort of thing as the railroad owner of our earlier example: diverted resources which would be needed for the long-term portion of infrastructure maintenance, into what appears to be growth in other economic sectors? If so, then the dangerous possibility suggests itself that the accumulated "unpaid" maintenance costs—taken not only for agriculture but for the economy as a whole—might grow to be much larger than the total output of the economy. In that case, we are headed toward the physical equivalent of bankruptcy: *a physical breakdown crisis.*

Low taxes—a miracle?

Before proceeding further, let us look at some of the practices of China's "Special Economic Zones" from this standpoint. Here, for example, foreign investors are attracted by "miraculously low" tax rates, "cheap labor," and easy recuperation of profits. In exchange, the foreigners bring capital, for example in the form of modern production equipment, which China urgently requires.

Examining only one aspect of this, it would appear that the installation and operation of a modern factory increases the productivity and net output of China's economy. But such first impressions do not take account of the fact, that no factory is productive *in and of itself.* To produce requires electricity and other energy, raw and semi-finished materials, and transport infrastructure to bring those materials in and to bring out the finished product; for the factory's workers and their fami-

lies there must be housing, medical facilities, schools, and so forth. And, where does the labor itself come from?

Thus, we cannot count the output of that factory as a margin of growth, unless we consider in balance the real costs to the domestic economy taken as a whole, of providing the labor, the infrastructure, and everything else upon which that production depends. Directly or indirectly the entire economy of China—not only the local region, for example, on the coast—must pay those costs.

In a well-run economy, the taxes paid on company income cover a fair share of government-funded maintenance and improvement of basic infrastructure and other public facilities used by the company and its employees. The "miraculously low" taxes in China's "Special Economic Zones" simply signify, as in our previous example of the railroad owner, that a major portion of apparent profits being carried off by foreign (or domestic) investors, is fictitious.

In fact, the present "investment boom" is accompanied by increasing reports of severe breakdowns in transport and energy supplies. At the same time, in the interior of the country, farmers are rioting against the excessive tax burden placed on them. This symptomizes the fact, that the "boom" is based on a looting process against the infrastructure and the population of the country.

Let us look at another facet of this phenomenon.

The myth of 'cheap labor'

The appearance of a foreign investment-led economic boom is based to a large extent on the illusion that labor costs in China are low. In fact, they are extremely high, as Sun Yat-sen already emphasized when he wrote:

"It is commonly thought that China is the cheapest country to live in. This is a misconception, owing to the common notion of measuring everything by money. If we measure the cost of living by the value of labor, then it will be found that China is the most expensive country for a common worker to live in. A Chinese coolie, a muscular worker, has to work 14 to 16 hours a day in order to earn a bare subsistence. This miserable condition among the Chinese proletariat is due to the nondevelopment of the country, the crude methods of production, and the wastefulness of labor."

When millions of rural unemployed migrate from the interior to the coasts to be employed in the "Special Economic Zones," is this cheap labor? As Sun Yat-sen implies, we must measure the cost of that labor, not in the paltry money wages they might receive, but in terms of what it really costs the Chinese economy as a whole to produce and maintain those people. For example, how much labor is required, in China today, to produce the physical consumption of a worker and his family, whether employed or not, at any given standard of living? Since a nation can only deploy a maximum of 100% of its labor force, we must express this cost, in first approximation, in terms of the allotments of labor force required to produce various categories of the total consumption of households. A comparison of China with, for example, the United States or western Europe, immediately demonstrates the illusion of the concept of "cheap labor."

Take the former West Germany, for example, whose population-density is roughly comparable to the average of the central, southern and eastern provinces of China. In Germany, the farmers make up less than 4% of the labor force, or about 1.8% of the total population. On average, *the labor of a single German farmer produces the food for the consumption of 55 persons*. This is measured in terms of present German standards of nutrition. In China, 65% of the work

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force is directly engaged in agricultural production, or about 28% of the total population; which means that a single Chinese farmer feeds less than four persons on the average—hardly more than his own family—at a significantly lower level of calorie and protein intake than in Germany.

This situation is not changed, if we consider in addition to food, all other items in the "basket" of goods and energy consumed by an average household—keeping in mind that the household consumption of manufactured goods is an order of magnitude higher in Germany than in China. Approximately 12% of the total German labor force produces the household consumption of the entire population. China needs 70% of its work force to do that, at a vastly lower standard of consumption.

Thus, labor is actually *cheaper* in Germany than in China! In fact, Germany maintains a much higher *quality* of labor power at a far lower cost, than what it costs the Chinese economy to maintain its much *lower* average quality of labor.

What do we mean by "quality"?

The "quality" of a work force is not simply determined by the specific skills of its members, but rather by their ability to constantly assimilate and apply new technologies, to *improve,* in that way, *the productivity of their own labor*. This is a creative activity, based on the development of sovereign, individual mental powers. But in order to fullfill this function, the families which produce the work force must be

provided with ever-higher standards of housing and household consumption, with better health care, better and generally longer education for the children, and so forth.

A policy of "cheap labor" means technological stagnation; and that, ironically, makes "cheap labor" the most expensive labor!

Population control makes the problem worse

We wish to note in passing, that the tactic of trying to slow or even stop population growth actually aggravates the problem it is supposed to solve. Looking only at one side of the economic equation, it appears that additional population is a drain on resources. This is only true under conditions of technological stagnation, as we emphasized earlier; provided that technology advances at a sufficient rate, the "carrying capacity" of the economy grows faster than the population, because each new individual produces much more than he or she consumes. Hence, the real problem is not population growth at all.

In addition, the abrupt slowing of population growth leads within a few decades to a dangerous inversion of the population pyramid and aging of the population. That means a shift in the ratio of labor force to total population, so that each working-age person must support more and more non-working people.

Another very serious problem is created by the population control policy: In the coming period, in which the technological level of production must be increased rapidly, the average length of education must grow. That means that fewer working-age persons will actually be working, since most will leave school later. As a result, the ratio of producing to non-producing population will be even less favorable.

The only solution is to replace the policy for abrupt population control, by a policy promoting rapid progress of technology in an energy-intensive, capital-intensive mode. We shall discuss some of the key points of such a policy more further below.

China has not industrialized

For reasons of their own, some Anglo-American circles have recently been propagating the myth that China represents an "emerging superpower." The sheer geographical size and numerical population of the country, placed alongside some advanced high-technology capabilities in military-related areas, might suggest a plausible argument to that effect. Plausible or not, the implication is totally misleading. Examining the physical parameters *for the economy as a whole* reveals that in crucial respects China's development lags more than 100 years behind that of leading industrial nations such as the United States, Germany or Japan. In fact, China's economy is characterized by a thin "crust" of relatively modern science and industry, floating on a gigantic mass of pre-industrial backwardness.

This result is, of course, not accidental, but stems from a very deliberate policy of the Maoist leadership in past decades, as exemplified by the "Cultural Revolution." This policy is also completely in line with the strategy of the World Bank-IMF apparatus, which is committed by all means to prevent the transformation of China and other so-called developing nations, into modern industrial powers.

TABLE 1
Comparison of some basic physical-economic parameters: China 1953-89 vs. Germany 1853-89

	Population density persons/km²	Consumption		Rail density km/1,000 km²
		Steel kg/capita	Energy kg/capita	
China 1953	61.3	3	0.1	2.5
Germany 1853	66	6	0.33	12
China 1960	69	18	0.46	3.5
Germany 1860	70	13	0.44	21
China 1970	86	17	0.35	4.3
Germany 1870	76	32	0.72	35
China 1980	103	32	0.61	5.2
Germany 1880	83	44	1.04	63
China 1989	116	47	0.86	5.5
Germany 1890	91	75	1.42	79

In **Table 1** we juxtapose the development of China between 1953 and 1990 to that of Germany over the same timespan, only *100 years earlier*.

In spite of the relatively rapid growth of energy and other production figures—which might at first glance seem to parallel German industrial development in 1850-90—it would be not be correct to conclude that the Chinese economy has undergone a real industrialization process. Although a significant industrial sector exists, it has not transformed the essentially agrarian character of the Chinese economy as a whole.

The obsolescence and excessive age of plant and equipment throughout much of China's basic industry points to another sharp discrepancy compared to a country undergoing a real process of industrialization. The latter should show—as Germany did in the nineteenth century up through World War I—a high rate of turnover of plant and equipment associated with successive technological improvements.

Instead, in China—as in the Soviet Union—the growth of industrial production was mainly accomplished by simple multiplication of the number of production facilities; the average factory has a *very low turnover of basic equipment and low rate of technologically based increase in productivity.* This kind of "Big Bang" expansion is characteristic of war

cult to sustain as time goes on.

Thus, factories will be found operating virtually indefinitely with the original machinery installed when the plant was built, and kept running by much labor- and time-consuming repair work. As a result of this, the impressive growth of nominal production figures conceals a growing mass of technological obsolescence of the base. That mass of obsolescence exerts a tremendous drag on the economy, eating up labor, energy, and materials at low efficiency.

The low rate of technological improvements means for the worker the repetition of the same *quality* of activity from year to year. Such monotony stultifies exactly the creative component of mental powers of the workers, which is the unique source of real economic growth.

The continuation of these practices finally leads to an economic collapse.

The following analogy illustrates one aspect of this. Suppose I am a farmer, and I decide to make new improvements each day on my farm. First, I build new fences. When they are finished, I dig some new irrigation and drainage canals and put in pipes to bring water for my animals. Next I purchase more pigs and chickens. After that I install some stoves in my house to improve its heating. Then I build more sheds to house the increasing number of livestock. And so on and so forth. My whole operation is expanding impressively, but so is my work load. Nothing is truly permanent—every addition and improvement I make on my farm, increases the total effort required to keep the farm in operating condition. If I continue expanding in the indicated way, there will come a point when, even by working 24 hours a day, I can no longer maintain everything. So my farm begins to break down: The fences collapse while I am feeding the chickens; the water supply starts to leak while I am fixing the stoves; the rabbits eat holes in the shed and the animals run out, the irrigation ditches become clogged with silt and the crop is destroyed, etc.

This problem arises when the farmer (as we implicitly assumed) fails to increase the technological level of his own labor; in this case, the accumulation of capital stock eventually leads to a *decrease* in the overall productivity of the farm.

We have a case of the "falling rate of profit," which has become a monstrous problem in China.

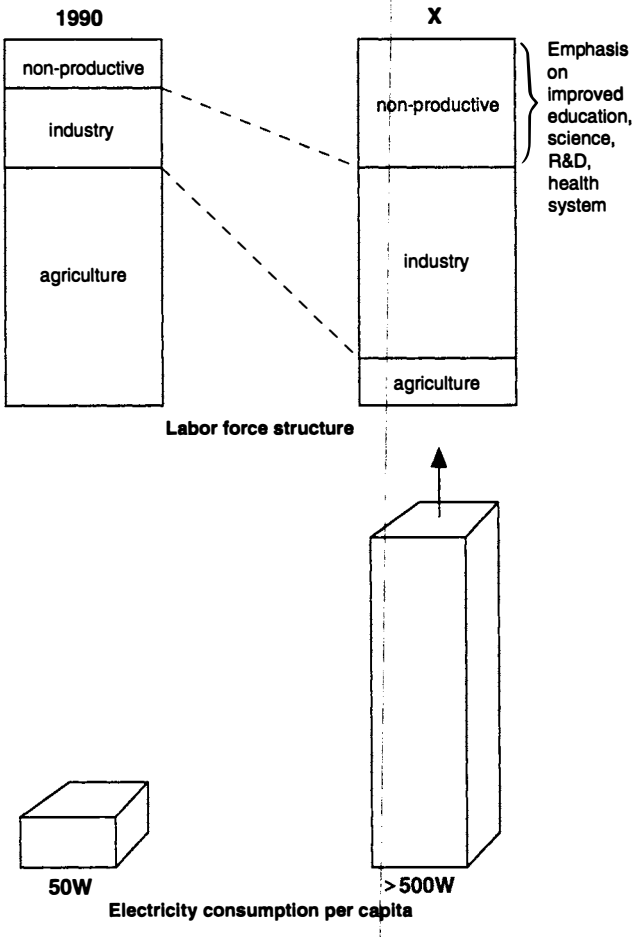
The path of solution

In "History as Science," Lyndon LaRouche writes:

"To provide an alternative to the looming collapse of China (and other nations) we require three elements:

"1) We must introduce adequate rates of scientific and technological increases of the per capita and per hectare physical-productive powers of labor, to reverse the collapsing of potential population-density to values far below the actual population-density.

FIGURE 1
The development of China's labor power



"2) We must induce adjustments in 'cultural paradigms' to the effect of motivating popular generation and assimilation of effective scientific and technological advances in productive and related practice.

"3) We must foster that 'cultural paradigm' with large-scale projects which provide the needed climate of progressive change in mankind's per capita mastery over nature.

"This latter includes a set of *priorities* for investment, placing the emphasis upon scientific progress, and upon increasing capital-intensity and energy-intensity concentrations as consistent with scientific progress. These are priorities for allocation of relatively scarce resources of investment and credit under relatively more favorable terms."

Key parameters of the development path

The path for China's future is a path of development of *labor power*. This involves a progressive shift of employment from agricultural forms of employment into industrial and infrastructural employment (see **Figure 1**). For purposes of first approximation, the development process can be

of first approximation, the development process can be thought of as *motion toward a hypothetical point "X" in the future, at which the labor force structure of China will correspond roughly to that of the major industrial nations in the late 1960s*. The development, of course, does not stop there, but the segment from here to "X" suffices to define *most* of the immediate priorities.

The structure of employment must shift in the manner described above; the percentage of work force employed in industry must shift from less than 20% today to 50% or more at point "X."

Associated with the increase of industrial employment and the overall capital-intensity of the economy, the per capita and per hectare total energy consumption must increase by an order of magnitude.

The increase must be even more drastic for electricity, which represents the highest general quality of energy use.

The average availability and quality of water supplies to agriculture, industry, and household consumption must also improve dramatically.

The intensity of transport, as measured in ton-kilometers per year, per capita, and per square kilometer, must increase by an order of magnitude. And finally, health and education systems must be dramatically improved.

The investment cycle of the economy, as reflected in the categories of physical output C, V, d, T, and S′ must satisfy the set of constraints defined by Lyndon LaRouche*:

1) S′/(C+V) must increase;

2) C, V increase, in terms of technological quality as well as quantity;

3) C/V, a measure of the capital-intensity of the economy, must increase;

4) The relative weight of capital goods-producing industries must increase relative to the consumer goods sector, as components of C;

5) d increases, with emphasis on increasing expenditures for scientific research, health and education; but, at the same time;

6) d/(C+V) must grow more slowly than T/(C+V): Non-productive activities should amplify the productivity of the productive sector;

7) the average level of technology must increase.

Four essential tasks

To accomplish the transformation of China's economy indicated above, four things are absolutely essential:

A) water and transport infrastructure

B) nuclear energy

C) urbanization

D) an educational renaissance

In order to achieve the most rapid and efficient development, these four elements must be combined into one. For this purpose we propose the following concept:

Infrastructure modernization shall be concentrated at first in a system of *development corridors* in which the relatively highest density of economic activity and the largest flows of goods, materials, and energy are generated. The system of corridors shall be designed from the standpoint of development of the country as a whole, considered also in reference to the economic-geographically defined infrastructural geometry of the Pacific-India Ocean Basin and of the Eurasian supercontinent as a whole.

The backbone of the corridors is formed by 1) high-speed railroad trunk lines (2-4 tracks in each direction) for freight and passenger transport, together with main lines of distribution of electric power, gas, oil, and later hydrogen; 2) a greatly expanded and modernized system of inland water transport and water management, including new canals and harbors, and exploiting new technologies for high-speed shipping; 3) in addition to high-speed rail, a national system of magnetic levitation (maglev) connections will be developed to provide passenger transportation between major urban centers at maximum speeds of 400-500 kilometers per hour.

The high-speed rail/maglev system is highly efficient and avoids massive, unsolvable bottlenecks and waste that would develop, if the coming dramatic increase in long-distance passenger traffic were left to road transport and civil aviation. Later, maglev will take over an increasing share of freight transport in the medium- to high-value category. In maglev systems, the motor is located in the track, permitting automatic control and a tremendous increase in the density of movement as well as speed. In this way, a single maglev line in the future will be able to transport as much freight as five or more rail lines or superhighways. An additional advantage of the maglev is that it can operate on much tighter curves and gradients than conventional rail, and thus becomes comparatively much easier to build in a rugged, mountainous terrain such as that of most of China.

Along the infrastructure corridors and especially at the "nodal points" of the corridors, nuclear power-generating centers are to be built, producing both electricity and process heat for industrial use. The most suitable nuclear technology for this purpose, available today, is the high-temperature reactor (HTR), incorporating the advantages of absolute, in-

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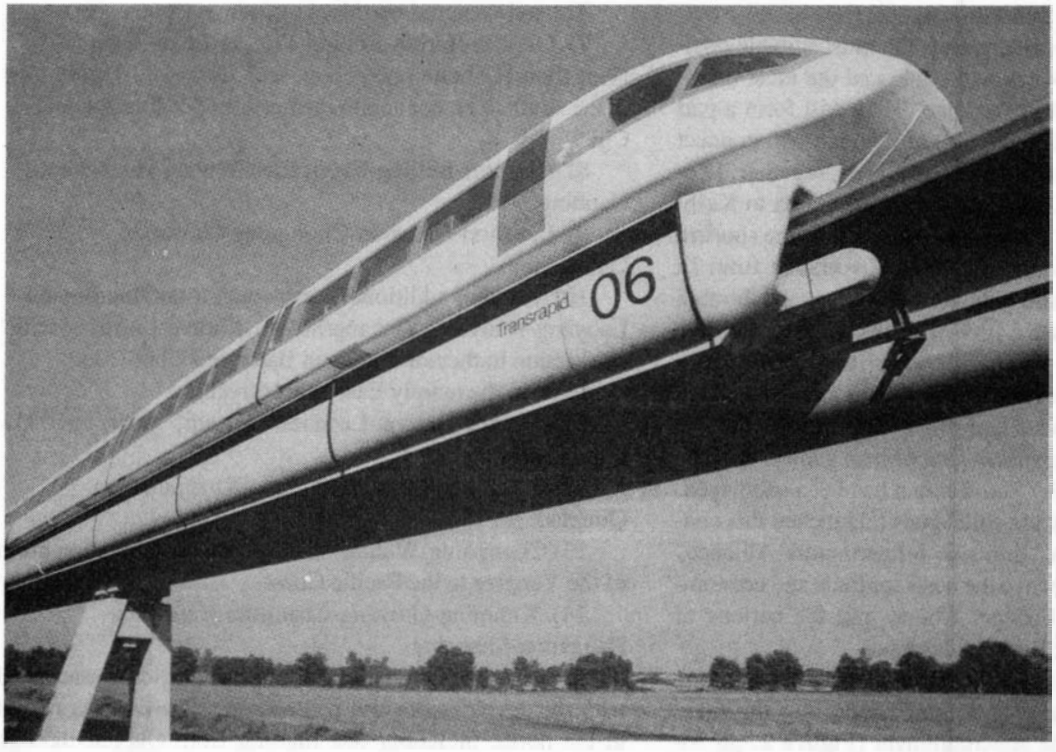
* Denote by T physical output of the economy in tangible goods and energy. Let C signify that portion of T required to merely maintain the existing capacities of agriculture, mining, industry, and infrastructure in terms of plant and equipment. Denote by V the portion of physical output which must be consumed by the households of goods-producing labor, in order to merely maintain the prevailing quality of the productive labor force. Denote by d the consumption of nonproductive activities, including household consumption of the nonproductive section of the work force, for example, administration, commerce, services, and so forth. Finally, denote by S that portion of physical output which is left over when the above expenditures are subtracted. S′ represents the margin of physical output which is available for additional investment in the expansion of the economy. See also Lyndon LaRouche, *The Science of Christian Economy*, Washington, D.C.: Schiller Institute, 1991, pages 288-89.



The German-built Transrapid maglev system. China's infrastructure corridors should include a national system of maglev connections between major urban centers.

added. New industrial cities (nuplexes) shall be developed around the nuclear centers, and surrounding each of them would be a harmonic array of smaller cities and towns. Approximately 1,000 large nuplex cities of between 500,000 and 1 million inhabitants will have to be developed over the next 100 years.

These new industrial cities shall be constructed with a triple purpose. First, they shall aim at the highest possible rates of technological progress in industrial production. Second, they shall function as living museums for the education of the population and the work force in particular; for this purpose, industrial plants and laboratories shall be organized with provision for large numbers of visitors and apprentices. Third, the cities shall be designed as architectural jewels and cultural centers for music and the arts, with emphasis on the best currents of classical Chinese and Indo-European culture. The surrounding towns shall be developed on the same principles, only on a smaller scale.

Infrastructure corridors: the general context

Infrastructure corridors are best considered as bands 75-100 kilometers in width, and centered on navigable rivers and canals, and high-speed rail/maglev connections and incorporating main lines of power and water distribution. Rail trunk lines and major rivers/canals are like the main veins and arteries of the human body. They only perform their function properly if they are extended by a vast fabric of "capillaries"—secondary roads, railroads, and canals—spread throughout the corridor's area and into the surrounding territory. The main arteries and smaller arteries of national importance must be the responsibility of the central state; while many of the "capillaries" are built and maintained by provincial and local authorities. But, like the human body, the entire network must function efficiently for the national economy, considered as an indivisible whole. It is completely impossible to develop an efficient infrastructure on the basis of "market mechanisms" or related forms of "spontaneous," decentralized decisionmaking.

The main infrastructure corridors in China should be in harmony with the economic geography and future infrastructure development of the Eurasian supercontinent and the Pacific/India Ocean Basins taken as a whole.

In terms of water transport, the enormous potential of the Pacific and Indian Oceans Basins emphasizes opening up the interior of China, via improved rivers and canals, to ocean-going shipping. In effect, large parts of China's interior become "part of the Pacific coast." Sun Yat-sen recognized the national and worldwide importance of improving and expanding China's inland waterways, whose potential is nearly unlimited. He correctly placed a high priority on making the Huang He (Yellow River) navigable for modern shipping all the way to Lanzhou, on modernization of the Grand Canal, on improvements of the Yangtze and the Xi Jiang river systems and new south-north connections linking all three basins.

From the standpoint of Eurasia's land infrastructure, we would first like to quote Sun Yat-sen:

"Regarded from the principle of 'the most suitable posi-

would first like to quote Sun Yat-sen:

"Regarded from the principle of 'the most suitable position,' our projected railways will command the most dominating position of world importance. They will form a part of the trunk line of the Eurasian system which will connect the two populous centers, Europe and China, together. [Referring to his projected line from Northeast China to Kashi (Kashgar), Sun Yat-sen continued:] This will be the shortest line from the Pacific Coast to Europe. Its branch from Ili will connect with the future Indo-European line, and through Baghdad, Damascus, and Cairo, will link up also with the future African system. . . . There is no existing railway commanding such a world-important position as this."

Due to two world wars and other wars in this century, and decades of Anglo-American geopolitical games, the Eurasian system described by Sun Yat-sen has been sabotaged. Recently, the author and his colleagues relaunched this concept in a proposal for a "Eurasian Infrastructure Alliance" which would greatly improve the basis for trade and economic cooperation among Europe, China, and the nations of South and Central Asia, Russia, and Japan.

There are, in fact, three main transport corridors running from the Atlantic to the Pacific and connecting the main population centers of the supercontinent (**Figure 2**, pp 36-37). Within those corridors (i.e. within 50 kilometers of a future system of trunk lines) live nearly 25% of the total Eurasian population and an estimated more than 70% of the urban population. The mean population-density within these development corridors is approximately 150 inhabitants per square kilometer, or 15,000 inhabitants per kilometer of the trunk line.

Infrastructure corridors in China

The location of the future main axes for infrastructure development for China, requires detailed study; here we wish only to provide a very rough first approximation (**Figures 3** and **4**).

Inland water corridors include:

1) Huang He (Yellow River), to be made fully navigable by modern shipping all the way to Lanzhou, plus development of Wei River.

2) Yangtze river system, to Yibin; future connections to Chengdu and to various north-south waterways.

3) The Xi Jiang river system, navigable for modern shipping from Guangzhou to Nanning, plus north-south connections.

These mainly east-west water corridors complemented by:

4) Fully modernized Grand Canal.

5) Additional north-south waterways, including a Xi Jiang-Yangtze connection and proposed Yangtze-Huang He water transfer routes.

6) Development of the Liao River and a combined Yalu-Sungari-Amur system.

The rail-centered corridors include:

7) Qiqihar-Harbin-Beijing-Tianjin-Jinan-Xuzhou-Hangzhou-Fuzhou-Guangzhou, with improved connections to the south to Hanoi and to the north to Vladivostok and Chita.

8) (Harbin)-Beijing-Zhengzhou-Wuhan-Guangzhou-Nanning.

9) Lanzhou-Chengdu-Chongqing-Guiyang-Guangzhou.

10) A major additional north-south trunk line Baotou-Luoyang-Nanyang-Yichang/Shashi-Xinhua-Liuzhou, with connection in the north to Ulan Bator and Ulan-Ude.

Plus, in the mainly East-West direction:

11) Beijing-Baotou-Lanzhou-Urumqi, with continuation to Alma Ata.

12) Lanzhou-Xi'an-Zhengzhou-Xuzhou-Jinan-Qingdao.

13) Chongqing-Wuhan, with suitable continuation north of the Yangtze to the Pacific Coast.

14) Kunming-Guiyang-Changsha-Nanchang-Hangzhou-Shanghai.

In the future there will be additional corridors associated with the development and colonization of present dry areas in the north, including one running from Qiqihar through Inner Mongolia into Xinjiang, and eventually extending into a reclaimed Takla Makan, and at least one corridor extension connected with the development of the Ordos region down to the Qinglingshan Mountains.

One thousand nuclear-powered cities

It is impossible to develop a modern industrial labor force suitable to China's needs, without dramatically increasing the rate of urbanization from the present 26% to over 70%. This could never be accomplished without the contruction of large numbers of new cities. In fact, if we look forward at the next 100 years, taking into account even a modest increase in population, it is clear that we shall need new cities for 1 billion people!

At the same time, China's per capita consumption of energy must rapidly increase by an order of magnitude from its present "nineteenth-century" level to a level characteristic of the advanced industrial nations. Once that point "X" is reached, energy supplies per capita will continue to increase many-fold again, to levels required by the technologies of the mid-twenty-first century.

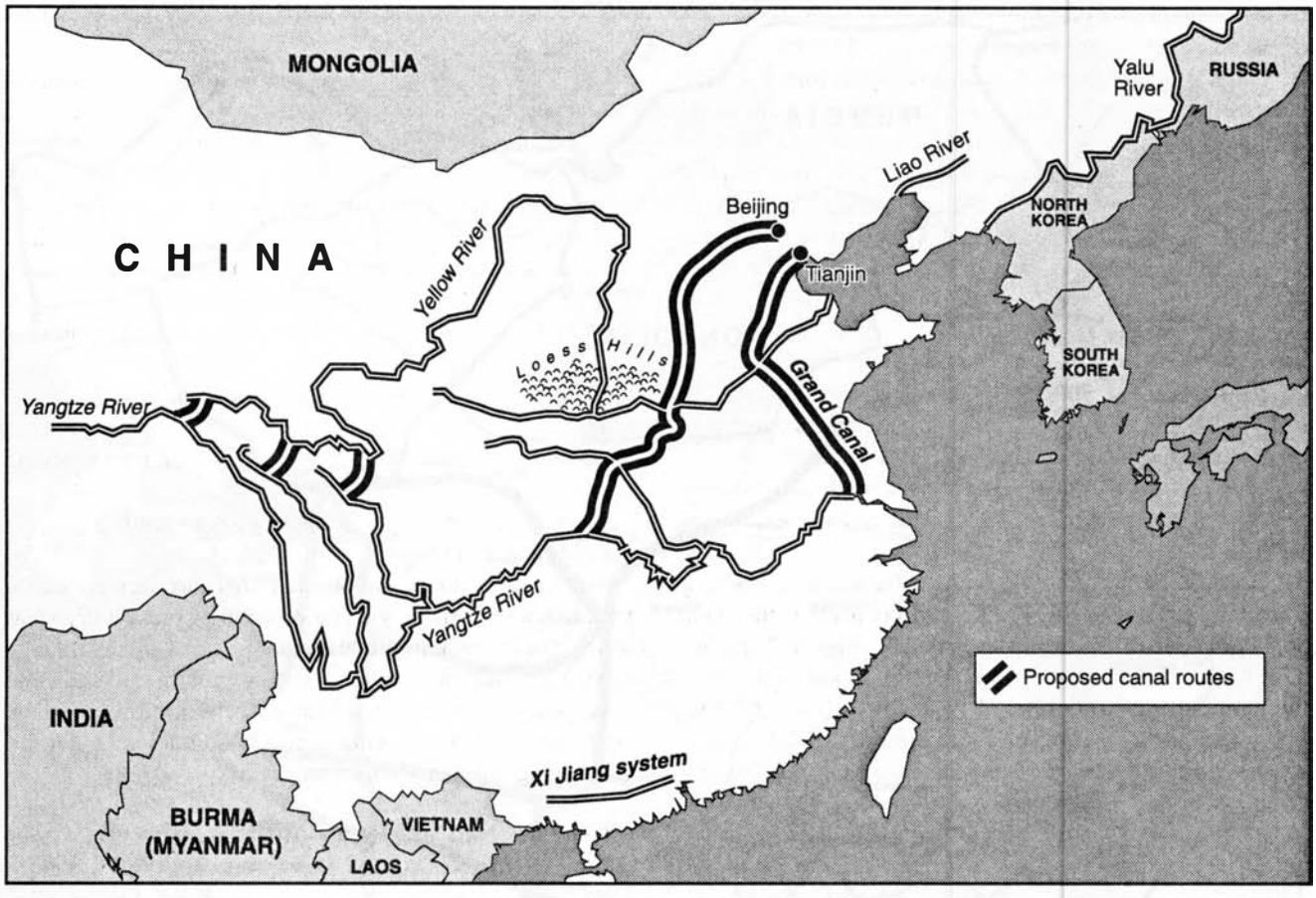
The most efficient method available to accomplish these combined tasks is to develop industrial cities based on nuclear energy. We could call this "nuclear-powered urbanization."

Using the high-temperature so-called "potato reactor," it is now possible to construct nuclear sources of power, that:

1) are simple, fool-proof and inherently safe;

2) can be constructed in large numbers using industrial mass-production methods;

FIGURE 3
China's infrastructure corridors: waterways



capacities;

4) can be installed without danger in the major population centers;

5) generate no atmospheric or water pollution;

6) can use thorium as well as uranium fuel;

7) generate thermal output at more than 700° C for high-efficiency electricity generation or direct use as industrial process heat;

8) are ideal power sources for integrated industrial complexes operating at very high efficiencies in terms of utilization of energy, materials and labor.

China is presently constructing its first HTR reactor.

In the typical case, an industrial complex with adjoining urban center will be built around a group of HTR modules, each in the range of 100-500 MW of thermal output. More modules can be added as the industrial city expands.

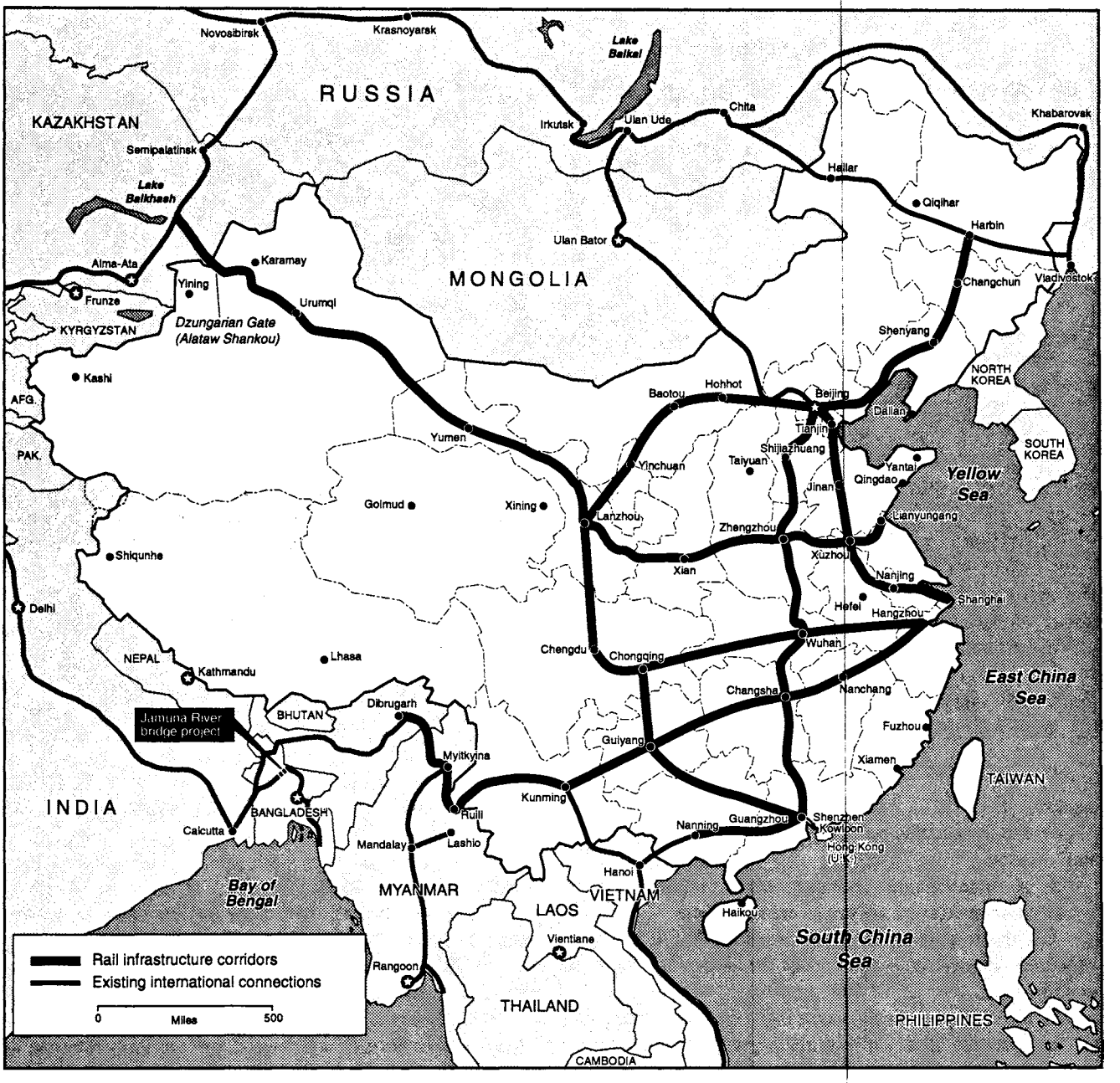
Now, with the emergence of "second generation" nuclear technology, typified by thermodular HTR, the advantages of nuclear-powered cities have greatly increased. Within the infrastructure corridors described above, the average density of new cities will eventually reach 3 per 10,000 square kilometers, or an average distance between cities of approximately 70 kilometers.

Why nuclear energy?

Without a "crash program" for nuclear power generation there is no solution for China. The present official energy policy, whose central pillar is a massive expansion of conventional uses of coal, would constitute national suicide if continued into the medium-term. The emphasis on coal (and, to a limited extent, hydroelectric power)—even though China possesses all the know-how and technology for nuclear energy and has already built its own nuclear power plants—is typical of the short-sighted pragmatism of present policymaking. One cannot go into the twenty-first century using the technology of the nineteenth century.

What is wrong with relying on coal? We have already pointed to the criterion of *energy flux-density* or *power density* which delimits the level of productivity attainable in a given technology. The problem is, that the power density of coal (and other conventional fossil fuel technology) imposes such a low level of productivity that the Chinese economy

FIGURE 4
China's infrastructure corridors: railways



will collapse, if it continues to base itself on that mode of power production.

We might illustrate the principle involved with a simple analogy. Why are there no coal-fueled, steam-powered airplanes? The answer is, that steam engines are too heavy to power a usable airplane. More precisely, the *power to weight ratio* of steam engines—a parameter closely related to energy flux-density—is too small.

Similarly, China's economy will never be able to "take off" without going to nuclear energy. The present economic policy is doing the equivalent of trying to power an airplane by using a steam engine! We might embellish the analogy by adding, that the "China airplane" is becoming heavier all the time, and if it does not take off soon, it will sink into the mud.

The simplest illustration of the vast superiority of nuclear technology is the fact, that *per unit of thermal (or electric) power generated,* a present-day nuclear power plant requires

approximately *60,000 times less fuel by weight* than a power plant using coal, oil, or gas. This fact reflects the vastly larger energy flux-density intrinsic to nuclear reactions as compared with processes of chemical combustion.

For example: A coal power station producing 1,000 megawatts of electric power, consumes 3 million tons of coal per year (about 38,000 railroad cars), whereas a nuclear power plant generating the same power of 1,000 MWe requires merely 50 tons of uranium fuel per year, (including the weight of transport containers).

The much higher energy flux-density of nuclear processes is reflected also in the parameters of nuclear power stations—although the implicit advantages have been limited so far for technical reasons. The core of a nuclear reactor is typically an order of magnitude smaller than the combustion chamber of a fossil fuel plant.

Already, our observation concerning fuel consumption has rather obvious implications for China. At present, even with China's extremely low per capita energy consumption, about 50% of China's railroad capacity is tied up by transportation of coal. Under the present policy, urgently needed expansion of rail capacity will simply be swallowed up by the increase in coal consumption.

The more profound implication is for the productivity of labor. Compare the "energy productivity" of a coal miner with that of a uranium miner. How many thousand times more energy can be produced from the uranium mined by one worker, compared to the coal miner's output? What happens to the effective productivity of an average railroad worker, if the railroad is used to move high-quality goods instead of hundreds of millions of tons of coal?

A similar remark applies to the productivity of land use. The mining, transportation, and distribution of coal take up considerable areas of land. What happens when we try to raise the per capita energy consumption by a factor of five? What will that look like in the densely populated cities and provinces of China, where land is scarce, and where the burning of hundreds of millions of tons of coal is already producing a severe degradation of the environment?

Effectively, the decision to rely on coal is a decision *not* to raise per capita consumption to the levels needed for China's industrial transformation.

Concerning hydroelectric power, it is often said that this is the cheapest source of electricity. But, taken in an overall context of physical economy, that is not generally true. The first point is, that hydroelectric power is fixed to a very limited range of physical locations, and thus lacks flexibility. This is particularly true when there is a tradeoff between water control and water power functions. Second, hydroelectric power stations require on the order of 10-20 times more material for their construction than nuclear plants—not counting additional expenditures caused by possible need to transport power from a remote site to centers of consumption. Finally, the construction of hydroelectric power stations involves a lower technological quality and mostly a relatively low quality of labor power compared with nuclear. Thus, to the extent we consider infrastructure construction additionally as a *means to educate and develop the work force,* the potential impact of hydropower construction is much smaller. Nuclear energy is associated with a high level of qualification, a larger percentage of engineering, technical and scientific labor in the total bill of labor.

This is not to say that hydropower plants should not be built. For example, where flood control and water management requires the construction of dams, we should obviously exploit the hydropower potential also. But the main emphasis for China's national energy policy must be a massive expansion of nuclear power. The hydroelectric power from the planned Three Gorges Dam, once completed, would only provide about 2% of the additional power China will need, going into the next century.

Water, energy and productive power

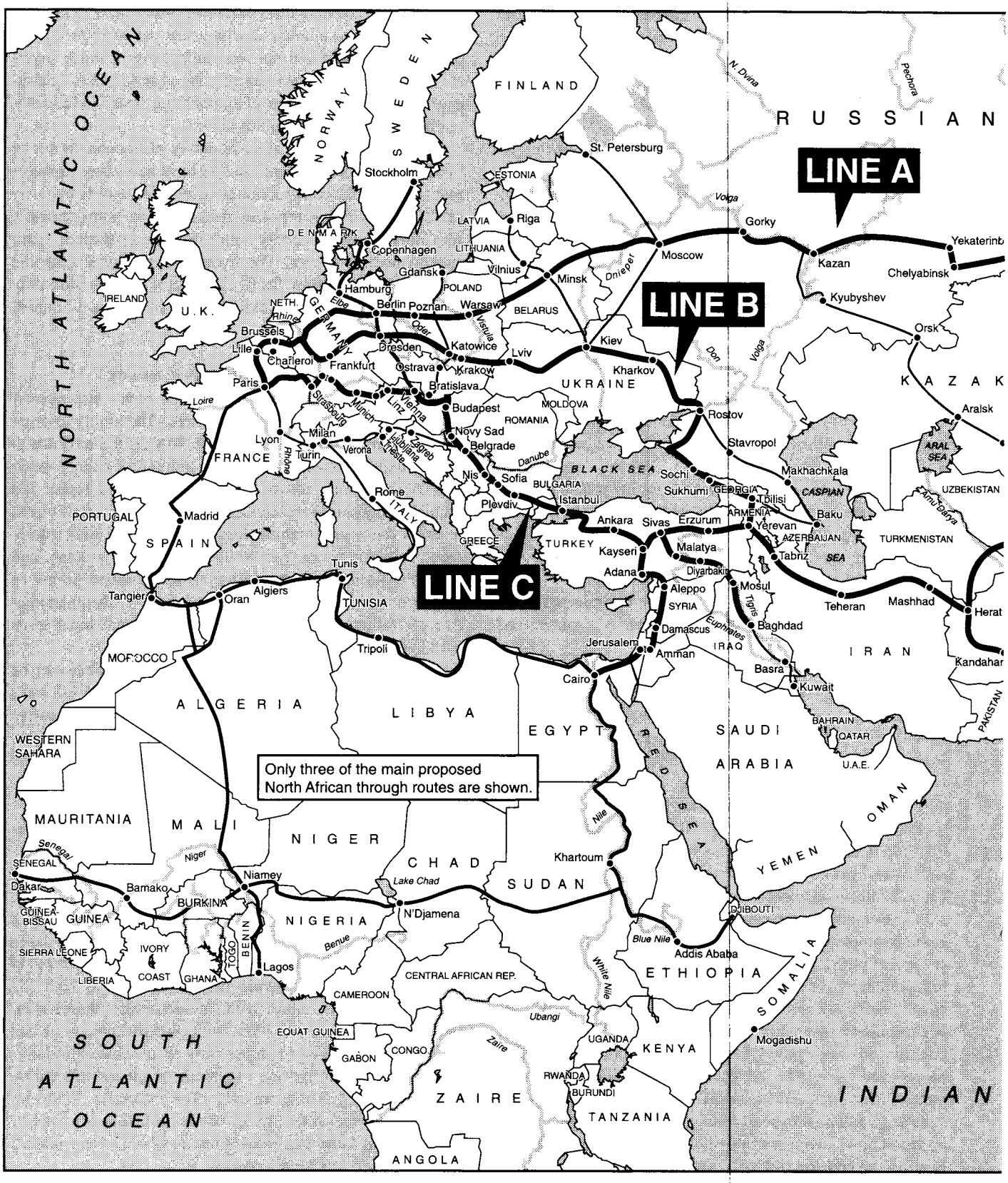
The converse relationship between water and nuclear technology should be emphasized here. The ability to organize and improve the overall water flow on the territory of China, depends specifically on the amount of energy available per unit area and per capita of the labor force. We require energy to move earth, to produce and install pipes, to build dams and manufacture water management equipment, to pump water, for treatment water and sewage, and so forth. Reliance on primitive, labor-intensive forms of employment in water projects leads exactly to the phenomenon of "falling rate of profit" and to the breakdown crisis we have described above.

Looking at this the other way, consider what can be done, if the potential of nuclear energy is applied on a large scale to such urgent undertakings as comprehensive management of the combined Huang He and Yangtze basins. We can grasp this in one way, by regarding large-scale nuclear-powered pumping of water as the inverse of hydroelectric power.

If the total hydroelectric potential of China is approximately 380 gigawatts, consider what could be done, if we used a few hundred gigawatts of nuclear energy to pump water where we want it! It will be no problem, for example, to move great quantities of water into the dry north, using pipelines and aquaducts. One gigawatt of power can pump 100 cubic meters per second of water over a height of 1,000 meters. This would provide irrigation water to feed 1-2 million persons or more, using modern agricultural techniques for dry climates. Also, with plentiful power we can tap subterranean water sources on a large scale. Similarly, we gain the power to drain vast areas which are affected by chronic flooding. These are only a few examples. When we can apply power on this scale, where and when we want it, we can finally tame the forces of nature which have produced such suffering in China's past.

FIGURE 2

The Eurasian rail system: locomotive for development and peace




F E D E R A T I O N
Ob
Yenisey
Vilyuy
Lena
Irtysh
Upper Tunguska
Aldan
Krasnoyarsk
Omsk
Novosibirsk
Lake Baikal
Irkutsk
Ulan Ude
Chita
Amur
Sakhalin
Khabarovsk
Ulan Bator
M O N G O L I A
Harbin
Ksyl Orda
Urumqi
Alma Ata
Changchun
Vladivostok
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Yumen
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