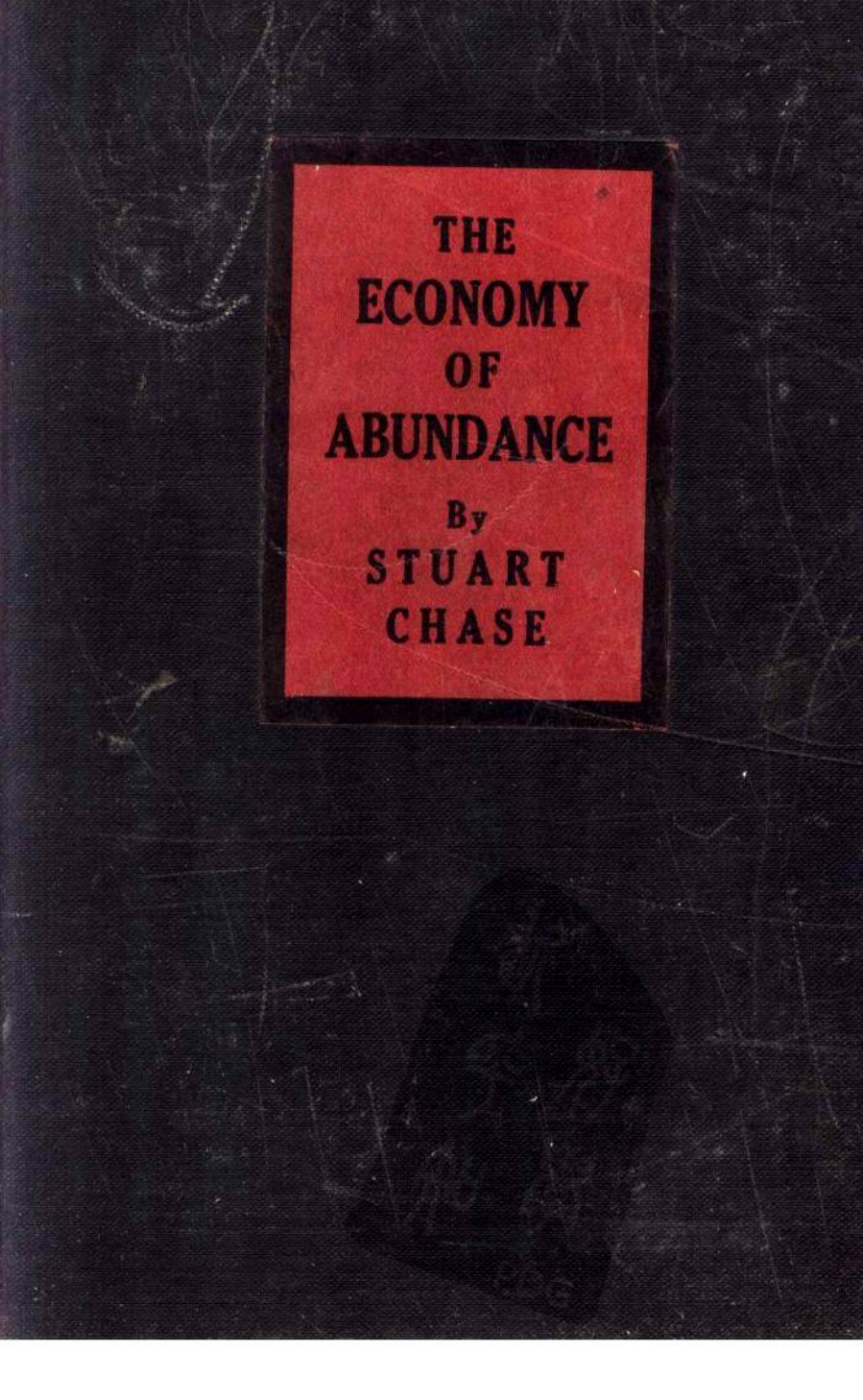
THE ECONOMY OF ABUNDANCE

By

STUART CHASE



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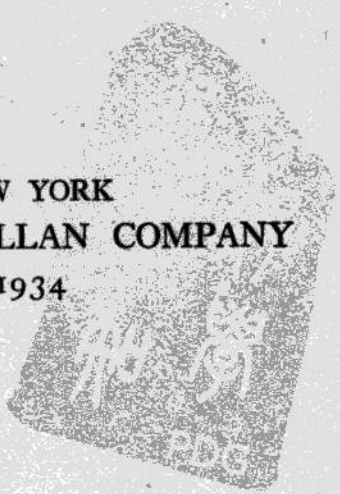
NEW YORK
THE MACMILLAN COMPANY
1934



Set up and electrotyped. Published March, 1934.
Reprinted March, 1934.

PRINTED IN THE UNITED STATES OF AMERICA
NORWOOD PRESS LINOTYPE, INC.
NORWOOD, MASS., U.S.A.

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CHAPTER I

FORTY TO ONE

SUPPOSE that the thirteen million people living in the United States in 1830 had awakened on the morning of January 1, 1831, with forty times the physical energy they had gone to bed with the night before. An active picture meets the mind's eye; a very active picture. A lumberman can fell forty times as many trees in a week, a housewife sweep forty times as many square feet of floor; forty barns can be built in the time hitherto required for one—and forty chests, and forty chairs. Porters can transport forty times their accustomed load in a day; weavers ply their shuttles forty times as fast—if the shuttles can brook the strain; and children raise forty times their normal rumpus.

Assuming no increase in the invention of labor-saving devices—and where would be the point with such an exuberance of labor available—what might we logically expect in the way of economic changes in a culture essentially handicraft? From an economy of scarcity, with barely enough to go around, the young republic would almost immediately enter an economy of abundance. The food supply could be increased, not forty-fold, due to the lack of tools and cleared land, but perhaps five-fold, in a remarkably short time; whereas to double it would probably provide a plethora for all. Every family could have a fine house,

filled with fine handmade colonial furniture; every man could have a fine coat, one for every day in the week; and every woman a chest of linen as big as a box stall. . . . Fine horses and fine carriages, books, flat silver, tapestries, gardens, great public buildings, medical attention, education.

The new energy would get through to everybody. It would flower at once into goods for the ultimate consumer. Workshops must be enlarged, tools added to, new houses, roads, capitols, libraries, theaters, hospitals, built. In a fairly simple economy such as that of 1830, the standard of living for the whole community could not fail to mount enormously within a relatively short time.[1] Indeed, a very high standard in terms of the forthright and durable articles of the day could be achieved with only a fraction of the energy delivered. Rather than forty-fold, perhaps five-fold, or even less, would be enough to achieve the standard, so rapid and direct was the conversion into consumers' goods at that time. Hours of labor could be cut to two or three a day, and still the citizens would have to take to climbing mountains or organizing expeditions to the unknown west, or playing the most strenuous variety of games, or writing long epic poems, or painting miles of murals like Diego Rivera, or even dispensing with work animals, to spend their surplus vitality.

Today, in the United States, we have precisely this equivalent of energy per capita. It is not in our muscles, but in our delivered power resources.

[1] 1830 was not a pure handicraft society. Prime movers were just coming in, but their frailty is demonstrated by the historic thirteen-mile race on August 25, 1830, in Baltimore, between Tom Thumb, the first locomotive built in the country, and a horse and carriage. The horse won.

Observe that it is not a potential total of installed horsepower, but actual coal, oil and natural gas burned, and water turbines turned. If we counted *capacity* to deliver work, the ratio would be greater than forty-fold.[2] This energy is given, and has been used, every foot-pound of it. Yet the average standard of living, while including more commodities and services than that of 1830, is still below the margin of health and decency; millions are acutely undernourished, miserably housed, deplorably clothed, while economic insecurity clutches at almost every heart.

Energy, the capacity to do work, is here, a living, demonstrable reality, but it has not got through to the wayfaring man as expressed in his standard of living; the essential work has not been done.[3] Even in 1929, with an average wage of only $1300, it obviously had not been done. The furnaces roar, the turbines whirl, the compression chambers stiffen to the shock of the explosion, but life is a more uncertain business than it was a century ago, and that happiness which Mr. Jefferson bade us pursue is as remote as when he wrote the Declaration of Independence.

The capacity to produce goods, furthermore, is not measured by raw energy alone. Also important

[2] Walter N. Polakov, writing in the *New Republic*, January 4, 1933, gives the average working hours for all central power stations as 2800 a year. The total number of hours in a year are 8760, so the ratio of use to full capacity is only about 32 percent.

[3] According to Professor A. B. Lamb of Harvard, the maximum potential energy of high handicraft cultures, including manpower, work animals, windmills, water wheels, etc., is about 4,000 kilogram calories per capita per day. This is our 1830 base. In 1929, the energy in coal, oil, natural gas, and waterpower actually consumed was 156,000 kilogram calories per capita per day. Adding the original 4,000, we get a total of 160,000, which is forty times greater than in 1830.

is the skill of the mechanism which takes the energy and shapes the product. To use a homely illustration: I can mow about an acre of pasture in a ten-hour day. My neighbor, a farmer all his life, can mow two acres in an equal time, with a smaller expenditure of energy. His muscles are trained to the scythe, where mine are not. Similarly, in the field of mechanical operations, engineers have devised increasingly skilful methods of utilizing a given quantity of energy. For the twenty years from 1909 to 1929, for example, F. G. Tryon in *Recent Social Trends* computes an increase of 66 percent in kilowatt hours secured from every ton of coal used for the generation of electric power, and a 47 percent increase in railroad haulage per ton of fuel burned.

But multiplying energy, however efficient its application, cannot proportionately multiply standards of living in industrial societies. Such societies are subject to extreme specialization, and great quantities of energy are required to link the specialized processes together, especially in the form of transportation. The United States has been justly called an "experiment in transportation." Whereas in 1830, the forges of Connecticut obtained iron ore almost in their backyards, and delivered horseshoes and hinges to the man across the street, the steel mills of the 1930's haul iron ore by boat and rail from northern Minnesota, coke from Pennsylvania, manganese from Russia, and sell rails, girders, sheet steel and tin plate from Florida to Oregon. Most of the sheet steel goes to Detroit to be made into motor cars, which in turn are shipped to every corner of the nation. It takes energy to mine these raw materials—including the coal which is potential energy itself—to fabricate them in scores

of interlocking processes, and to haul both the partly finished, and the completed article, all about the map.

So in the best ordered of societies devoted to technology, output for the consumer could not increase so rapidly as total energy. A philosopher would, however, expect to see living standards increase directly with energy delivered, but at a somewhat slower rate. Swinging his dispassionate eye upon the United States of America, he finds a forty-fold increase in energy per capita and a standard of living which, in terms of material wellbeing, is still deplorably low.

How great is the unavoidable loss due to specialization and to absorption in the process of transforming raw energy into useful heat and work? Even if we assume that this fraction is as large as 75 percent, which would seem generous, a forty-fold increase in energy would result in a ten-fold increase in living standards. But the actual increase in material wellbeing of 1930 over 1830 is probably not more than two-fold.[4] Ninety-five percent of our energy is doing us no good.

Something is wrong here; something very wrong indeed. The experiment in transportation could never account for such a difference. Where has the balance of delivered energy gone? This is no academic question. Somebody has robbed us of that which is more vital than gold. A ton of coal can perform as much mechanical work as 1,000 men. "The energy basis," says E. W. Zimmerman, "is truly the foundation of civilization. It determines the choice of materials which can be utilized; it sets a definite limit to the size of performance; it governs the degree of mobility,

[4] See Chapter IV for a description of pre-machine standards in America.

and in general controls the arts, and through them shapes the institutions—material and non-material. . . . It may be said that, in its widest sense on its material side, history is the story of man's increasing ability to control energy." [5]

Observing a hypothetic community specifically designed, in the words of Buckminster Fuller, "to get the most for the least," and then observing the real America of today, it is reasonably clear what direction the vanished energy has taken. It has disappeared down fifteen paths, as follows:

1. In the construction of factories, railroads, skyscrapers, stores, warehouses, oil wells, mines, in excess of prudent requirement and use. Capacity enormously exceeds output.

2. In constructing the plant in uneconomic locations, involving wasteful crosshauling of both raw materials and finished product.

3. In building Megalopolis, the machine age city. Upwards of 30 percent of all energy delivered to it must be used solely for the purpose of preventing citizens from expiring of congestion.

4. In reclaiming and irrigating agricultural lands for crops which never should be grown—not for "market" reasons, but because they cannot be consumed. If we ate all that our reclaimed acres could grow, we should be seized with national stomach ache.

5. In maintaining plant projects 1, 2, 3 and 4 above. Excess capacity demands its upkeep.

6. In cutting forests beyond prudent needs and requirements, and fighting fire in the resulting slash.

7. In the operation of competitive establishments—duplicate haulage, selling forces, branches, advertising

[5] *World Resources and Industries.*

outlays, administrative and clerical forces. The waste here is predominantly human, but no little energy is required to transport and supply the competing corps.

8. In a monumental obsolescence rate. The building and tearing down of plants, houses, machines, equipment of all kind. Much of this is due to shoddy construction, much to the salesman's demand for a high replacement rate.

9. In energy delivered to the financial structure: bank buildings, telephones, telegrams, cables, radios, airplanes, crack express trains, elevators, tickers, Wall Street "extras." There are about 1,000,000 persons in this sector at the present time to be supplied and energized.

10. In style changes—goaded by salesmanship rather than human nature. Energy losses are fantastic in this department, as any textile mill executive can tell you. A factory's output for weeks may be rendered worthless because the designers guessed wrong.

11. In competitive small scale farming and its mechanized equipment—tractors used only a few hours in the year, for instance.

12. In overproduction—actual goods spoiled, burnt and dumped. We are not allowed to add this to our standard of living, much as we might like to.

13. In exports for which no exchange in imports is accepted. A favorite pastime of generous Uncle Sam. Goods *for* foreigners, but no goods *from* foreigners. The spirit, of course, is charming, but gifts on this scale require large blocks of energy.

14. In pleasure motoring. This is perhaps the greatest single consumer of the new energy. Obviously it is not all waste. Some of it comes under the head

of death and destruction, with 30,000 citizens killed on the roads; some under the head of escape from intolerable cities, intolerable homes, and intolerable monotony; some under the head of putting one's neighbor's eye out, and some under the head of genuine pleasure and use. With all due allowances, the last item bulks large, and so adds to material wellbeing, and a genuinely higher standard of living. What this fraction may be, no sensible statistician would dare to compute.

15. Finally in the factor of conversion loss—probably the only item which is strictly unavoidable. About 15 percent of all electric power generated is lost in transmission to the ultimate consumer. A locomotive turns only some five percent of the potential energy of the coal it burns into actual mechanical work. (A turbine does much better.) The same holds true for the human engine, however. The potential energy of the food we eat suffers large losses before the residue appears as muscular work. We must also remember that a great fraction, approaching half of all modern energy, is devoted to heat, not to mechanical work. The steel industry is a ravenous consumer of energy in the form of heat for its furnaces. Energy so utilized is not necessarily wasted; it is cardinal in the technological process, but one must beware of considering the forty-fold increase as being all devoted to mechanical motion.

Adding these fifteen categories together, a reasonably complete story appears of where energy has been dissipated, and why so little gets through to the ultimate consumer. It is perfectly obvious that his wants and desires have never been central in the

picture. The plant has been built with other ends in view; a crazy patchwork, magnificent in bulk, superb in some of its detail, but not designed for securing the most for the least.

The modern standard of living comprises no more food than that of 1830, though the variety is greater, the balance somewhat better dietetically. Living quarters are more crowded, but with better heating facilities, and with a marked improvement in water supply and sanitation. Conveniences and labor-saving devices in the home are impressive—electric power, telephones, radios, refrigerators. Nine farmhouses out of ten, however, are still without electric power connection. Clothing is flimsier and less durable, but perhaps more comfortable and certainly more hygienic, except for shoes. Schools are greatly improved, and reading matter omnipresent—with the reservation that most of it is not worth reading. Health services are often magnificent; but two persons in five, according to the Committee on the Costs of Medical Care, are unable financially to avail themselves thereof, while mental diseases are on the increase. Facilities for recreation have expanded greatly, primarily as commercial enterprises. Sociologists are inclined to doubt, however, whether play is as rewarding to the individual as it was in simpler cultures.

Riding through North Carolina not long ago, I saw a bright blue motor car, resplendent with chromium fittings, in the yard of a dilapidated shack constructed of rough logs and plastered with red mud. The car and the hut belonged to the same share cropper. It struck me as a not unreasonable summary of the net gain in living standards since 1830. Measured in tonnage and variety, the wayfaring man has un-

doubtedly improved his position, but in fundamental wellbeing, I hold to the conviction that doubling the standard is a fair estimate.

These immense new powers have run to immense new wastes. Our very junk piles would have ransomed a king in the middle ages, with their stores of metal and findings. The state of New York undoubtedly contains more fabricated "wealth" than did all Europe in 1400 A.D. But, for all its due capitalization, it is not wealth in terms of human use and enjoyment. It is largely misplaced energy crystallized in stone and steel. The United States was a poor country in 1830 and is a poor country today in terms of the human calculus.

Ten definitions

The Economy of Abundance is self defined. It means an economic condition where an abundance of material goods can be produced for the entire population of a given community, a condition never obtaining anywhere until within the last few years.

Behind this obvious definition, however, lurk a series of more subtle connotations. The smooth optimism of the phrase is seriously disturbed when, for instance, we set technological abundance into a background of prevailing financial habits. These habits were laid down in an Economy of Scarcity, and clash bitterly with the facts of plenty. Abundance is not alone a promise to mankind, it is a savage threat to the real or supposed interests of special and powerful groups of men everywhere. Let us select a series of these more realistic definitions, including both promises and threats. Abundance may be defined as:

1. A condition where the bulk of economic work

is performed not by men, but by inanimate energy, drawn from coal, oil and water power. Such a condition was reached in the United States towards the close of the nineteenth century, *circa* 1880.

2. A point at which living standards per capita reach an average which is, at least potentially, twice as high as ever obtained under scarcity conditions. Reached *circa* 1900.

3. A point at which the curve of invention, following, as it does, a geometric increase, becomes the dominating factor in economic life—precisely as the Nile was the dominating factor in the economic life of Egypt. *Circa* 1870.

4. A point at which the scientific method supersedes the use and wont of the craftsman in the production of most material goods. *Circa* 1900.

5. A point where output per man hour becomes so great that total productive labor must thereafter decline, even as output grows. A point at which labor ceases to be a measure of output—as it always has been in preceding ages. *Circa* 1920.

6. A point at which overproduction carries a more serious threat to the financial system than shortage. *Circa* 1880.

7. A point at which specialization has destroyed all practicable local self-sufficiency and made economic insecurity for all classes latent, growing, and ultimately intolerable, given no change in financial methods. *Circa* 1900, with the closing of the American frontier.

8. A point at which consumption becomes a greater problem than production. *Circa* 1920. "Our economy," says F. L. Ackerman, "is so set up that it produces goods at a higher rate than it produces income with which to purchase them."

9. A point at which the industrial plant is, substantially, constructed, requiring relatively smaller outlays for capital goods in the future, and where pecuniary savings are not only unnecessary in their old volume, but seriously embarrassing. *Circa* 1925.

10. A point where, due to the pressure of the technical arts, costs, prices, interest rates, debts, begin a descent with zero as their objective. *Circa* 1920. (Hidden for a time by the credit inflation of the New Era.)

The Economy of Abundance is a composite of all these definitions. The date of its appearance on the American scene varies as one definition or another is chosen. A simple average of all ten dates gives the year 1902. The concept has more substance when taken in the light of the first five definitions, which deal with physical facts. In view, however, of the practical problems now confronting not only America, but all industrial nations, the last five definitions, dealing as they do with financial institutions, are significant. It is interesting to note that the dates of the first group average earlier than those of the last. Abundance was in operation for some years as a physical reality, before it began seriously to obstruct the financial mechanism.

Before proceeding to a categorical analysis of the effects of Abundance upon prevailing institutions, financial and otherwise, let us cast an inventory of what energy and the technical arts might do in the way of living standards, using the existing plant. How abundantly could we live, if the powers of Abundance were permitted freely to function in our behalf? We might or might not be ten times better

off in a pure technical Utopia; how much better off might we be tomorrow? Engineers have been presenting us with hopeful promises for years. What is the best they can do for us without starting from the beginning and building the plant anew? Of all the questions which the Economy of Abundance has raised, this is one of the most relevant.