

## Preface to the English Edition

In 1972 the non-governmental organization Club of Rome published the landmark *Limits to Growth* (Meadows et al. 1972) a scenario-based analysis of 12 possible world futures to the year 2100. Its key messages were that the human ecological footprint cannot continue to grow for more than 100 years from 1972 at the rapid rate seen from 1900 to 1972; it is possible or even likely that this footprint will overshoot Earth's sustainable limits; once sustainable limits are overshoot, contraction is unavoidable, but overshoot can be avoided through appropriate global policy.

At this moment in 2013 it would appear that our world has in fact followed the business as usual scenario of *Limits to Growth*, and that we have long since entered the trajectory of overshoot. Therefore, by the reasoning of *Limits to Growth*, a contraction of our collective ecological footprint is inevitable, either in the form of a planned contraction or a collapse.

I however believe that if we act, now and with resolution, to solve the pressing trio of energy, resource, and environment problems confronting us, there is still time to avoid a catastrophic future, while at the same time maintaining the standard of living now enjoyed in advanced nations, and allowing the developing countries of the world to reach that same advanced-nation standard. For this reason I have chosen *Beyond the Limits to Growth* as the title for this English translation of my 2011 book *Nihon Saisouzou* (literally, *The Revitalization of Japan*) (Komiyama 2011). This book is by no means intended as a criticism or rebuttal of the work of the Club of Rome. Rather, I here present my own (admittedly optimistic) view of how we all, in advanced and developing countries alike, can go about achieving a sustainable world whose development is not constrained.

I believe that it is not only imperative, but also very likely, that new technologies will emerge that will allow us to exceed the limits identified by the Club of Rome and to put societies on a trajectory in which wealth is measured in terms of quality rather than mere quantity. As I discuss in this book, these new technologies will be driven by a novel “creative demand” rather than by conventional “diffusive demand” and this, in turn, will contribute to the shift from quantity to quality in terms of goods produced to meet our needs for energy, materials, and health.



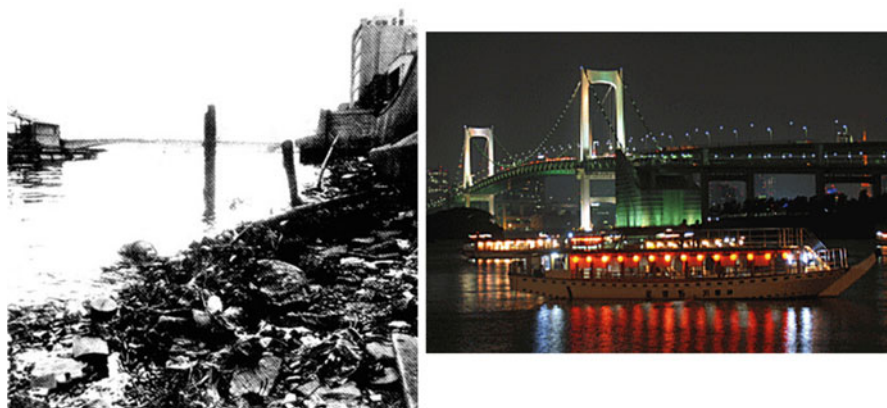
**Fig. 1** Yokkaichi City in the 1950s (*left*) and the present (*right*). Source: Yokkaichi City. <http://www.city.yokkaichi.mie.jp/kankyo/kogai/aramashi01.html>

Let me here explain very briefly why I am optimistic about the future by offering just a few examples from Japan's experience which may not be well known to non-Japanese readers.

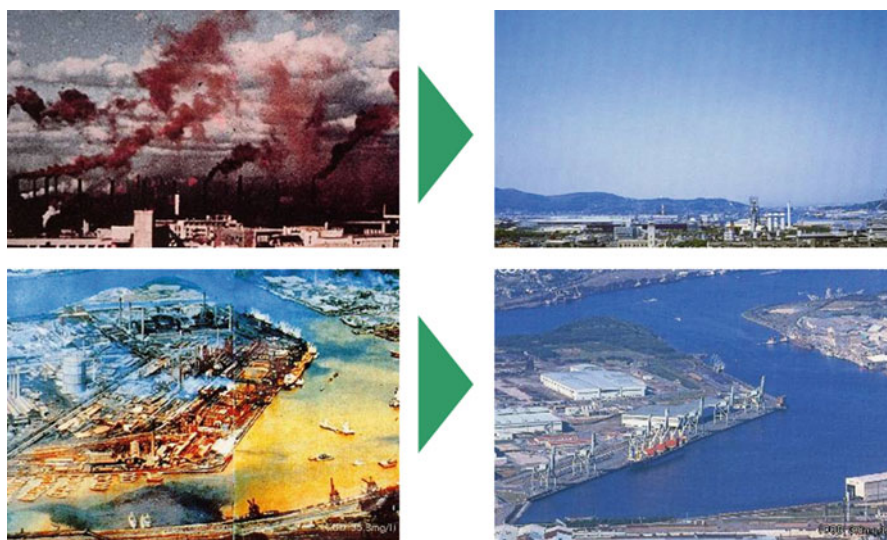
Japan rose from the ashes of the Second World War in 1945 to become the world's second largest economy in 1968 through a post-war economic miracle that began in the first half of the 1950s and continued through the 1960s. This Japanese miracle mirrored a similar phenomenon (the "Wirtschaftswunder") that also occurred during the same period in post-war West Germany.

Japan's post-war economic miracle, however, did not happen without very serious negative consequences, the environmental aspects of which are represented by three of the so-called "Big Four Pollution Diseases of Japan." These three are (1) Minamata disease, a neurological affliction caused by severe mercury poisoning, which was first identified in 1956 in Minamata City in Kumamoto Prefecture and was caused by methylmercury in wastewater discharges from a chemical factory; (2) a second outbreak of Minamata disease in Niigata Prefecture discovered in 1965; and (3) Yokkaichi asthma, a collection of pulmonary diseases (COPD, bronchitis, emphysema, asthma) caused by sulfur dioxide pollution from petrochemical facilities and refineries in and around the city of Yokkaichi in Mie Prefecture from 1960 to 1972 (Fig. 1) (The fourth of these Big Four is Itai-itai disease, severe bone degeneration caused by cadmium poisoning that resulted from mining operations in Toyama Prefecture beginning around 1912.) (Ministry of Environmental Japan Web-Site 2013).

The extent of the environmental damage suffered as a consequence of Japan's rapid economic expansion from the 1950s to the 1970s is by no means limited to only the three epidemics mentioned above. The environmental contamination of the skies and of major bodies of water, such as—among many others—Suruga Bay on the Pacific coast of Honshu near Mount Fuji, the Sumida River running through Tokyo (Fig. 2), Dokai Bay in Kitakyushu City (Fig. 3), and Lake Kasumigaura northeast of Tokyo, was absolutely dreadful, as can be seen in the nearby pictures. Indeed it would be no exaggeration to say that the pollution of that era extended throughout the entire country.



**Fig. 2** The Sumida River in 1967 (*left*) and now (*right*). Source of *left*: Ministry of the Environment, Summary of Annual Report on the Environment in Japan 1983 (JPY only). [http://www.env.go.jp/policy/hakusyo/zu/eav11/eav110000000000.html#2\\_1](http://www.env.go.jp/policy/hakusyo/zu/eav11/eav110000000000.html#2_1). Source of *right*: Tokyo Houseboat Guide (JPY only). [http://www.t-yakata.com/tyh\\_dkship.htm](http://www.t-yakata.com/tyh_dkship.htm)



**Fig. 3** Kitakyushu in 1960 (*left*) and now (*right*). Source: Kitakyushu City. [http://www.city.kitakyushu.lg.jp/kankyoku/file\\_0269.html](http://www.city.kitakyushu.lg.jp/kankyoku/file_0269.html)

Faced with these environmental problems, Japanese industry developed the technologies to remove harmful substances from the emissions of industrial facilities and eventually overcame the severe problem of environmental pollution. In Japan, because it came to a situation where people were being directly harmed, the pollution problem had to be solved; the central government imposed emissions

regulations on noxious substances, then municipalities topped these with their own strong emissions regulations, and the manufacturing industries complied with these regulations. Today, Japan is not only one of the leading industrialized nations, but it is also a country of clean urban centers and pristine rural landscapes, as the many foreign visitors to Japan each year can attest.

Just as it overcame grave environmental problems, so too has Japan surmounted equally serious energy supply crises. Japan is a country markedly poor in the hydrocarbon energy resources of oil, natural gas, and coal. With proven oil reserves amounting to a mere 44 million barrels, Japan's reserves would only meet its consumption needs for roughly ten days. As a consequence, Japan imports virtually 100 % of its petroleum. Similarly, Japan produces domestically less than 5 % of the natural gas it consumes, and about one-half of one percent of the coal it consumes.

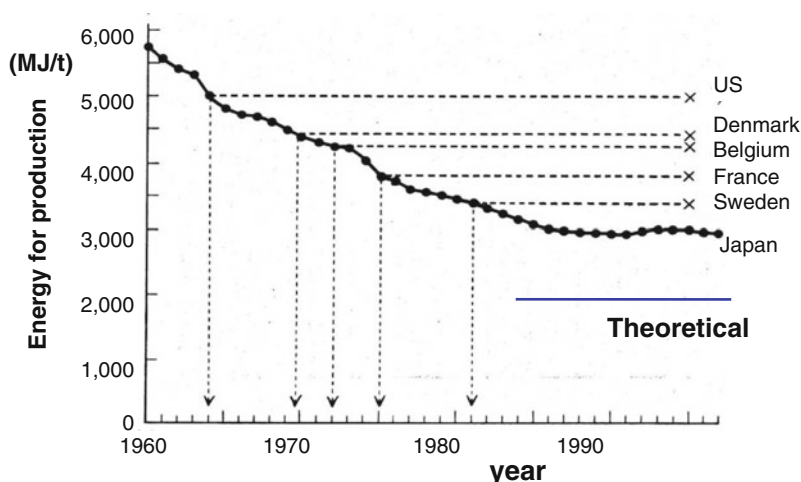
In fact, Japan has long been heavily reliant on overseas sources for its fossil fuel needs. In 1973 the First Oil Shock occurred, followed in 1979 by the Second Oil Shock, causing the price of crude oil to skyrocket. Responding to this experience, Japan developed energy-saving technologies that raised energy efficiency and was able to admirably overcome the crisis. In the manufacturing sector, for instance, highly energy-efficient production methods for materials such as cement and steel were born. In processing and assembly industries, the automobile industry developed high fuel-efficiency small cars, building the foundations to later increase international competitiveness.

To take the cement industry as an example, Fig. 4 shows the amount of energy consumed in producing one ton of cement from 1960 to the present in Japan, the United States, and several European countries. Cement is made using limestone, clay, silica, etc. as raw materials, but because it involves an endothermic reaction, energy is always required. In the production of cement, Japan's energy efficiency is overwhelmingly better than that of other countries.

Japanese cement companies, by frantically improving the production process from wet process to dry process to suspension pre-heater (SP) and then to the new suspension pre-heater (NSP) process, have up until now reduced energy consumption. At present, all of the cement plants operating in Japan have adopted the newest NSP process. As a result, energy efficiency has already come down to 1.6 times the theoretical limiting value, to the point where further reductions are difficult.

But globally speaking, there is still room for improvement. If we look at the entire world, there are many countries where energy consumption for cement production can be reduced. As can be seen in the Fig. 4, for instance in the U.S. producing one ton of cement uses 1.6 times the amount of energy used in Japan. The reason is that the U.S. has adopted a policy of holding energy prices down to a cheap level. Likewise, China, which produces more than half the world's cement, uses 1.6–1.7 times as much energy as Japan.

The very same kinds of cutting-edge solutions have been applied not only to cement-making, but also to many of Japan's manufacturing industries. Why was this so? It is because Japan had to deal with high energy prices, and in the attempt to surmount this challenge, technological improvement has been relentlessly pursued.



**Fig. 4** Energy consumption for cement production. Source: Japan Cement Association

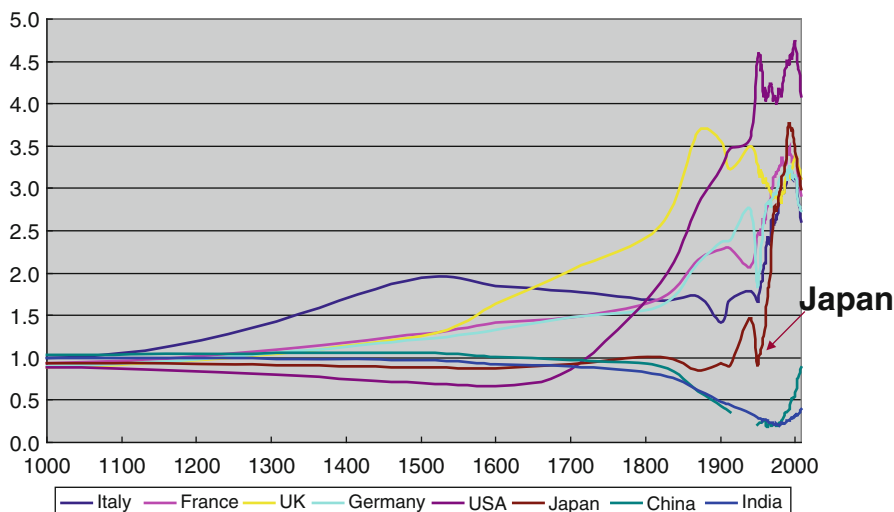
Just as Japan was able to solve the past environmental and energy problems that accompanied its post-war economic growth, I am confident that Japan has what it takes to solve the new problems it now confronts: a graying and shrinking population; the need to create new demand in the face of saturation in demand for existing products; the imperative to reduce carbon dioxide emissions by increasing energy efficiency still further and developing renewable energy sources; the establishment of a material-cycling society to cope with the mineral resource limitations of our finite Earth.

These solutions will benefit Japan directly, but moreover they can provide a model for the rest of the world, since Japan is in fact coming up against these many problems in advance of other nations; in other words, Japan is not merely an advanced nation saddled with problems, but a nation saddled with problems in advance. In thinking about this background and Japan's past achievements, I am optimistic that Japan will not remain a "problem-saddled advanced nation," but rather will use its power to leap forward as a "problem-solving advanced nation"—that is, a forerunner in addressing emerging problems in the world.

## Key Features of Our World in the Twenty-First Century

In approaching the many problems discussed in this book, it is important to bear in mind four essential trends that characterize our world as it enters the twenty-first century. Let me offer a brief sketch of these four defining features here.

The first feature is the remarkable explosion of wealth that occurred first in what are now the developed nations and that is presently occurring in the developing world. As can be seen in Fig. 5, which plots Gross Domestic Product (GDP) per



**Fig. 5** Per capita GDP of select nations, normalized to that of the entire world. (Data from Angus Maddison: The Conference Board Total Economy Database (<http://www.conference-board.org/data/economydatabase/>))

person (normalized to that of the entire world) from A.D. 1000 to 2008 for the major industrialized nations as well as India and China, there is a familiar pattern to this wealth explosion.

For century after century through the Middle Ages per capita GDP was stagnant, but with the advent of the Industrial Revolution, first the United Kingdom, followed in succession by the United States, then France and Germany, Italy, and finally Japan, enjoyed almost exponential growth in per capita wealth. Of course these trajectories saw some sharp drops from the effects of depressions and wars, but the pattern is clear. Also striking is the fact that economic growth in the industrialized world has flattened out in recent years.

As still-developing nations, China and India stand in contrast to the other nations shown in the graph. Since they did not experience the Industrial Revolution in the nineteenth and early twentieth centuries, their per capita GDPs relative to that of the entire world actually began a slow decline after approximately 1800. However, it is clear from the shape of their growth curves from the late twentieth century that India and China too are embarking on the same trajectory that the world's industrialized nations followed decades earlier. We may expect that in time China and India too will reach the status of industrialized nations just as Europe, the United States, and Japan did previously. In the conditions of developed countries, normal citizens have access to food, clothing, shelter, mobility, and information. Once these basic material needs are met, what people desire is satisfaction. I believe that this desire will create new demand for growth.

The second key feature of our modern world is longevity, a natural consequence of the wealth explosion. Figure 6 shows the change in life expectancy for several countries over time. The huge leaps upward in life expectancy are most pronounced in the industrialized world. For instance, Japan's life expectancy in 1950 was 61 years,



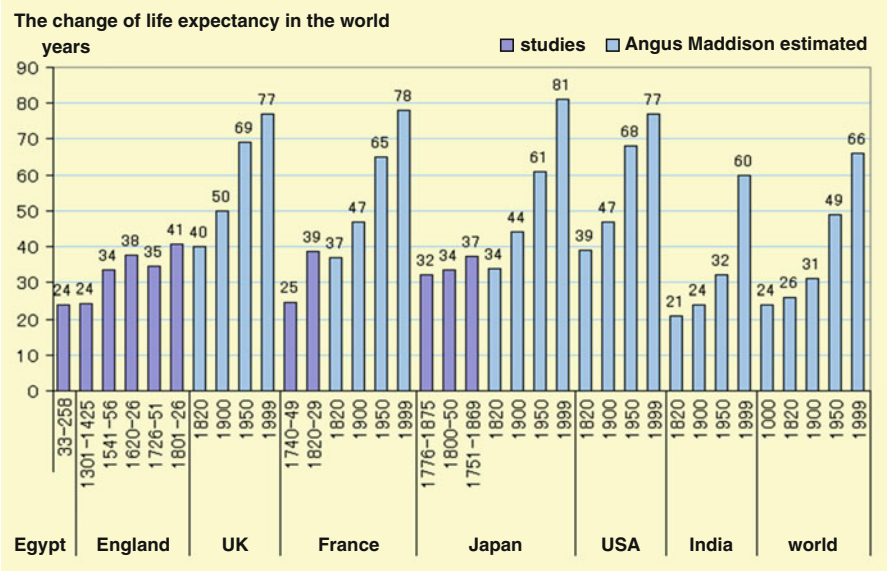


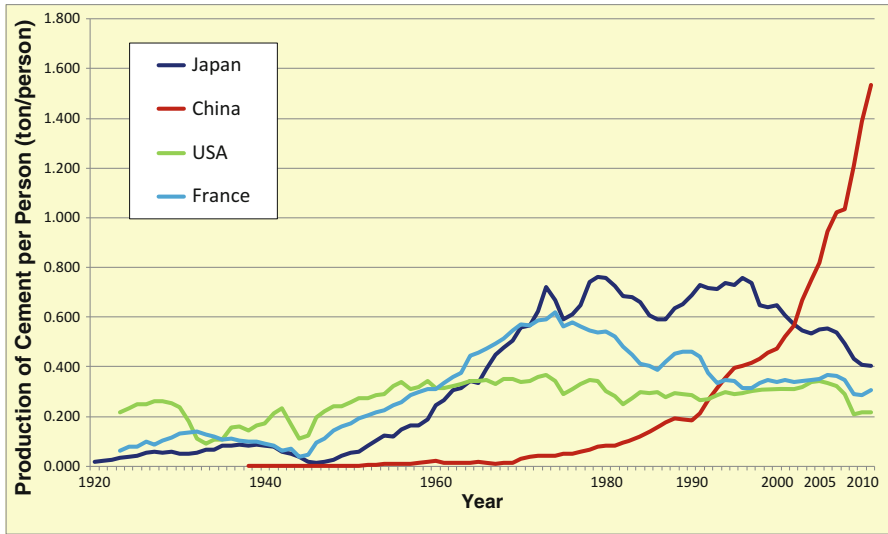
Fig. 6 Change in life expectancy. Source: <http://www2.tcn.ne.jp/honkawa/1615.html>

the shortest among industrialized countries, but by 1999—in the span of just two generations—it had jumped to 81 years, at that time the longest in the world.

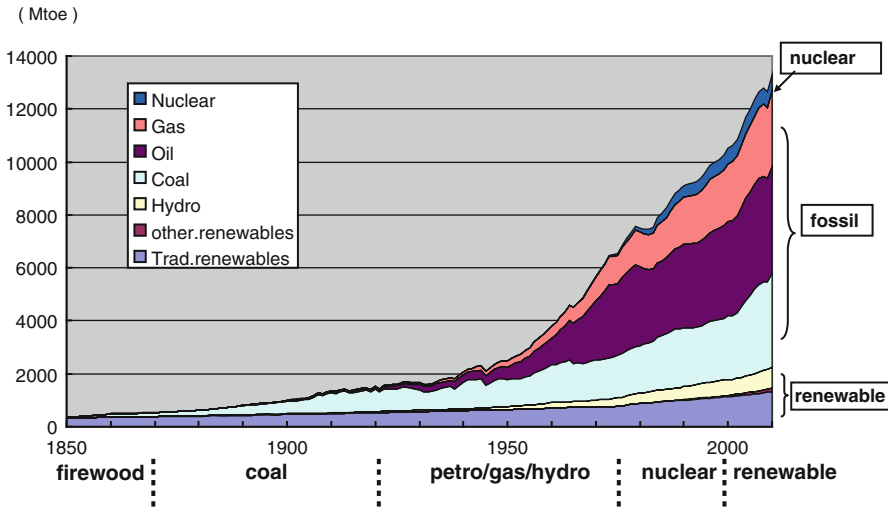
Although the gains in longevity are largest in the industrialized world, industrializing nations like India are also enjoying the lengthening of life spans. Just as China, India, and other developing countries are now tracing the upward trajectory in wealth that was experienced earlier in advanced nations, so too will they follow the same course of expanding longevity. Long life in itself is an undeniably good thing. The challenge, as I discuss in this book, will be in re-ordering our societies in such a way that the growing numbers of elderly citizens can find satisfaction in their lives and continue to contribute to community life.

The third feature is the saturation of man-made objects that inevitably occurs in developed countries. Whether the man-made object (i.e., the product) is a television, an automobile, housing, or a building material such as cement, when the product is first introduced no one yet possesses it, but it begins to diffuse throughout society and rather quickly reaches the state of saturation, wherein new demand for it can no longer grow. An example of this phenomenon is shown in Fig. 7, which plots cement production per person over time in Japan, the U.S., France, and China.

Cement production in the U.S., Japan, and France shows a similar pattern of growing from near zero but then eventually reaching a plateau, which corresponds to the demand arising from the need to replace old, existing concrete structures. Clearly China is still in a phase of expansion, but someday soon it too will reach saturation. The key issue for the world in the twenty-first century related to this saturation phenomenon will be how to cope with the corresponding demand ceiling. In this book I propose a way out through “creative demand” for new products that will be invented to deal with the needs of the future.



**Fig. 7** Production of cement per person. (Data of Cement production volume: United Nations Statistical Yearbook. Data of Population: UNSD Demographic statistics, United Nations Statistical Yearbook)



**Fig. 8** World primary energy consumption, 1850–2010. (Data from Arnulf Grubler, 1998 BP Statistical Review of World Energy, 2008 and others)

The fourth and final main feature of the twenty-first century world is the ongoing progression in energy sources that humanity uses to meet its needs. For millennia humankind used biomass in the form of wood. Then with the Industrial Revolution began the widespread use of coal, which is still very much with us today as a fuel



for base load electricity production. For other purposes, such as rail and sea transportation, coal steadily gave way to petroleum beginning in the early twentieth century. Recent years have seen the increased use of natural gas as a fossil fuel source. Starting in the 1950s nuclear power was introduced as a civilian energy source, and now accounts for just over 5 % of the world's total supply of primary energy. These trends can be seen in Fig. 8.

It seems quite likely to me that the world will undergo a shift from fossil-based fuel sources to renewable fuel sources in the twenty-first century. This will happen as a result both of the slow depletion of non-renewable and low-cost fossil sources, and also of humankind's efforts to reduce carbon dioxide emissions. How this fundamental shift in the world's energy supply can be brought about is a central topic of this book.

## Overview of This Book

In Chap. 1 I begin by explaining the true nature of the demand shortage in advanced nations. Introducing the concepts of “diffusive demand” and “creative demand”—namely, demand for things that already exist and demand for things that have not yet taken shape, respectively—I explain that diffusive demand will necessarily saturate as a given man-made object, such as an automobile, a house, or a television, reaches every part of the population in sufficient quantity. When a man-made object reaches saturation, new demand, which arises when people who do not possess something acquire it for the first time, vanishes, leaving only replacement demand, which comes from replacing or renewing something acquired previously. Concrete examples of the saturation process for housing, automobiles, and televisions in Japan and other advanced nations are given. I argue that the fundamental shift in the nature of demand to replacement or renewal demand, caused by the saturation of population and of man-made objects, lies at the heart of the demand shortage that plagues advanced economies.

Moreover, many advanced nations such as Japan are now seeking relief from the demand shortages they are experiencing in their saturated domestic markets by expanding into developing countries such as China and India. However, by looking in detail at examples such as cement and automobiles, I show that developing nations like China are themselves following the same trajectory toward saturation that Japan once traced. Therefore, sooner or later China and other developing nations will likewise reach a condition of saturation.

Furthermore, because the quantity of demand is necessarily higher before the saturation condition is reached as compared to after it is reached, an overcapacity of production is bound to be introduced in the pre-saturation phase that will saddle the economy in the post-saturation phase. As an example, Japan's automobile industry has been able to cope thus far with the saturation of the domestic market (and accompanying domestic production overcapacity) by using the excess capacity for exports first to the United States, and now to China, and to India in the future.

But because the global market will saturate one day, likely sooner than is generally thought, this is not a sustainable strategy for all time.

Having described the above situation, I suggest at the close of the first chapter that a solution for Japan lies in stimulating “creative demand” for products that have not yet come into existence. In fact, because problem-saddled developed country Japan is preceding the rest of the world in running into problems of a graying society, and energy and resource scarcity, and the environment, it is in an optimal position to generate new “creative demand” by working out solutions to these burdensome issues. Indeed, it is this very demand that will become the foundation on which Japan can break loose from the past decades of economic stagnation and once again prosper.

In Chap. 2 the discussion continues with the identification of what I believe the new paradigms of the twenty-first century will be: exploding knowledge, limited Earth, and aging society. Chapter 2 considers in detail the first of these paradigms, that of exploding knowledge. Although the explosive growth in human knowledge has been undeniably beneficial, it has brought with it a negative legacy as well: the problem that an increase in knowledge has made it extremely difficult to grasp the whole picture.

Furthermore, by discussing the past Nobel Prize-winning achievements of the discovery of penicillin, the invention of the transistor, and the meson theory of nuclear interactions, as compared to the more recent neutrino experiments, I argue that as science has developed and become compartmentalized into numerous specialized areas, the distance between human values and science has gradually increased.

Since it is unlikely that we will ever get rid of compartmentalization, what is important is whether we can integrate a vast body of compartmentalized knowledge in accordance with our objectives and create the whole picture as a solution for achieving our objectives. Humanity must work seriously on creating a method that makes this possible; I call this method of integrating compartmentalized knowledge “knowledge structuring.” Humanity will be able to solve many of the problems it confronts today if knowledge is structured, if Information Technologies (IT)—which is particularly good at accumulating and searching for information—is used successfully, and if meaningful discussions are carried out that can bring a flash of insight, neither deductive nor inductive, from a small number of clues at hand.

Since the end of the twentieth century, the speed of information transmission has exceeded the speed at which Adam Smith’s “invisible hand” operates—the mechanism by which the free market achieves an optimal distribution of resources through intermediaries of the price, regardless of individual wills. In consequence, as was revealed by the financial crisis in 2008, a mechanism has been established whereby the informationally strong obtain information instantly by taking advantage of an information divide (informal gap) and use it to exploit the informationally weak. As a result, the market, far from coming into equilibrium, has often run away and become more uncertain. The consequences of this acceleration of information speed on the energy situation are also discussed.

In concluding Chap. 2, I show how information technology has the potential to solve many problems in society by presenting the Japanese example of Tōno City in

Iwate Prefecture, which has managed to cope with a shortage of doctors using the Internet. In a similar way, information technology may be able to provide fundamental means for solving problems in many areas besides medical care, including education, transportation, and agriculture.

Chapter 3 takes up the second of the big paradigms, that of the limited Earth, and introduces “Vision 2050” as a proposed solution to the three interrelated problems of energy, resources, and global warming. “Vision 2050” is a comprehensive model for achieving sustainable societies, which was originally proposed in 1999 (Komiyaama 1999). This model has been disseminated not only as the Japanese-version original book, but also in an English version as well as a Chinese version (Komiyaama and Kraines 2008) (Komiyaama 2001). Under assumptions of growth in developing nations and maintenance of living standards in developed nations, the model envisions attaining sustainability by 2050 by meeting three main challenges: (1) triple energy efficiency, (2) build a system for material cycling, and (3) double the use of non-fossil fuels.

By examining in detail the case of automobiles as an example of energy consumption during product use, we show that in the future, even if the number of vehicles in the world grows to triple the current number, because the amount of gasoline consumed by each is expected to be one tenth the level now, the total energy used will be about one third. Similarly, taking cement as an example of energy used to produce something, it is seen that there is still great room for reducing energy consumption in manufacturing through the adoption of advanced technology. The improvement of the entire world’s energy efficiency can be brought about by the development of state-of-the-art technology and the transfer of established technology.

The construction of a “material cycle system,” i.e. a recycling society, is next explained. Considering the costs of manufacture vs. recycling for steel and aluminum, the two metals used in greatest quantity, we show that recycling vastly reduces energy consumption—by a theoretical factor of 27 for steel and a practical factor of 30 for aluminum. In this chapter, I explain how “urban mines” are no urban myth, as discarded industrial objects contain a much higher concentration of precious materials like gold and lithium than mineral ores do. Three requirements are necessary to successfully re-circulate resources: a societal system for recovering resources, product design that allows for easy separation of resources, and the technology for separation.

Turning to the third goal of doubling the use of non-fossil energy, we note that in around 2050 roughly three times more energy than now will be used on Earth, but consistent with the first “Vision 2050” aim of tripling energy efficiency, the total amount of energy consumed in 2050 will be no different from the present. Given this, the proposal of “Vision 2050” is to reduce the share of fossil fuels from the current 80 to 60 %, and to raise the share of non-fossil fuels from 20 to 40 %. Nuclear fission will likely be necessary as a transitional energy source until the twenty-second century. I further argue that there are only four types of renewable energy that during the twenty-first century can grow to the scale of at least one percent of total energy supply: hydro, solar, wind, and biomass. Regarding biomass,

I explain why using food crops for fuel is not an option; instead I propose that for the large-scale introduction of biomass, using seawater to grow algae in the desert is full of promise.

It is shown that carrying out “Vision 2050” will lead to a 25 % reduction in worldwide carbon dioxide emissions by 2050, leading to a carbon dioxide concentration of 460 ppm. This stands in sharp contrast to a business-as-usual scenario (really a breakdown scenario) in which emissions more than triple and the carbon dioxide concentration reaches 600 ppm. I argue that this is a vision on which advanced and developing nations can agree, as energy consumption in advanced nations will be reduced by two thirds and their carbon dioxide emissions will be cut by 80 %. At the same time, in keeping with the due right of developing nations to continue growing in order to become advanced nations, the two-thirds reduction of energy consumption in the developed world will be allotted to developing nations to support their economic growth.

The topic of fostering “creative demand” in the areas of environment and resources is explored in Chap. 4. I propose to break down energy consumption from the perspective of making things and daily life, and I discuss how the relative size of these two broadly defined end-uses differ in China, the U.S., and Japan. Considering the world situation and the differences among countries, it is concluded that the strategy Japan should adopt is to lead the world in energy saving in making things and to reduce greenhouse gas emissions in daily life.

The structure of energy consumption in households and in office space is discussed. Since air-conditioning accounts for 30 % in both cases, the theoretical limit of an air-conditioner’s performance is explained, showing there is still great room for improving energy efficiency.

Next the Porter Hypothesis is introduced, which says that environmental regulation of domestic companies leads to their enhanced international competitiveness (Porter 1991). In support of this hypothesis, the cases of automobile exhaust gas regulations by Japan’s Clean Air Act and of environmental regulations for cultivating Dutch tulips are raised.

Returning to air conditioning in Japan, it is shown that because insulation is poor for historical reasons and there is easily room to increase energy efficiency threefold by improving insulation, and because the efficiency of the air-conditioning unit itself can be raised fourfold, it is quite possible to reduce energy consumption for air conditioning to one-twelfth the present level.

The discussion of the first segment of Chap. 4 is summarized in three conclusions: (1) room for innovation lies in the difference between the theoretical limit and the current reality of a product; (2) a rational technological prediction is important in imposing environmental regulations; and (3) the technological prediction is also important in making a policy in light of the economic impact of environmental regulations.

As a case study of a past failure of Japanese industry in “diffusive demand,” the history of DRAM (dynamic random access memory) manufacturers is introduced. Next the Galapagos syndrome is discussed, referring to the fact that Japanese products, in spite of their high performance, have not become the global standard as they have evolved endemically in an island and are highly priced. One key cause of the

high price is the large number of Japanese manufacturers of a given product, leading to small production volumes for a given unit and therefore a higher unit cost. This problem could possibly be solved by bringing about a consolidation of manufacturers in an industry into perhaps two companies. Related to this issue of the need for company consolidation, the recent declining state of the Japanese solar panel industry is also discussed.

Chapter 4 concludes with a treatment of Japan's world-class energy saving devices in the important household water-heating domain, namely Eco-Cute (an electric heat pump for water heating) and ENE-FARM (a residential fuel cell), and what should be done for such energy-saving equipment to capture the world market without repeating the earlier failures of dynamic random-access memory (DRAM) and solar cells. It is absolutely vital to think thoroughly about how to forestall the low-cost imitation of these products by overseas makers and seize the global market, on the assumption that ENE-FARM and Eco-Cute will be copied. Specifically, an attempt should be made to reduce costs through their introduction to the Japanese market through citizens' action and governmental support.

Chapter 5 addresses the fact that Japan has a society that is aging at a rate unprecedented in any country. Scientific research results indicate that people can age in good health if five conditions are met: (1) nutrition, (2) exercise, (3) communication with others, (4) openness to new concepts, and (5) positive thinking. These conditions can be called the "five conditions for happy aging."

It is suggested that senior citizens may be able to contribute to education in a broad sense by taking advantage of their wisdom developed as a social resource. Since school teachers today are stretched by their duties, participation in school education by people having sufficient social experience would produce significant synergies in coordination with teachers. Moreover, in recent years educational venues have been losing diversity both on the teachers' side and on the students' side; people with more diverse experiences, such as senior citizens, might help to correct this situation.

It is advisable to send about three sufficiently experienced working people, for instance, to each elementary school or junior high school as instructors to give lessons at least three times a week. In the new educational system, once chosen as teachers, experienced working people would of course take charge of fewer class sessions than regular school teachers, but should be prepared to stand on the lecture platform even for a single class session throughout the year. Their annual income might be \$10,000 to \$20,000 at most: many senior citizens have generous financial resources, including annuities, and thus want to contribute something to society rather than expect monetary rewards. The point is that the involvement of committed senior citizens in education would contribute significantly to bringing diversity to educational venues, as well as making their lives worth living.

Agriculture, forestry, and fisheries are also industries that can make efficient use of the abilities of senior citizens. As various proposals are considered for increasing the productivity of agriculture, such as facilitating the entry of private businesses into the market or introducing efficient large-scale agricultural systems, and for restoring the forestry industry, such as establishing a Forest Stewardship Council

(FSC)<sup>1</sup> certification system, senior citizens should be given opportunities to participate in these new agricultural and forestry initiatives. They might work as either regular employees or volunteers. If the work is physically too demanding, they should not be required to work every day or on a full-time basis. They may engage in growing high value-added safe and delicious farm products that require special care and close attention to cultivate.

The chapter concludes with a plea not to fear globalization. There is an opinion that globalization will damage Japan's agricultural industry as much cheaper farm products would be imported; however, Japanese consumers would not choose products based only on price, as products can also compete in terms of security, safety, and delicacy. Not all products need to be evaluated globally on the basis of price alone. In discussions over globalization, we tend only to fear that price competition would prevail in the market, eliminating less competitive businesses. I believe that markets will be divided into two groups in the future—one that is standardized globally and is composed of globally competitive markets and the other which consists of localized markets.

The final chapter introduces the "Platinum Society Plan," a vision for simultaneously solving the serious problems arising from the new paradigms of the twenty-first century—"exploding knowledge," "limited Earth," and "aging society." These problems include a declining population, a rapidly aging society, deteriorating urban infrastructures, sagging dynamism of local cities, dilapidated farmlands, expanding budget deficits, and growing global environment problems.

To generate creative demand, I propose the idea of the "Platinum Society," which pursues the construction of a comfortable life in each region. The word "platinum" implies an exceptionally high-quality comfortable society realized by organic combination of three innovations: "green innovation," pursuing an ecological low-carbon society; "silver innovation," intending to achieve a dynamic aging society in which all people participate; and "golden innovation," designed to build a society where people keep developing themselves by effectively using IT.

The purpose of the Platinum Society Plan is to improve the lives of citizens at their initiative through coordination with industry, government, and academia. However, their activities would not bear fruit if they are carried out separately in individual regions, because the amount of data and information owned by each region is so limited that sufficient demand would not be generated to create new industries or raise a voice strong enough to reform the legal and social systems. Thus the Platinum Society Network was established in 2010 to facilitate the solution of common issues facing various regions through exchange of information and ideas. The accumulated efforts of all regions to improve daily lives would stimulate enormous demand to develop new industries.

A brief overview is given of how the Platinum Society Network seeks to meet its objectives through such activities as the Platinum Vision Working Group, the Platinum Vision Handbook, and the Platinum Vision School.

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<sup>1</sup>The Forest Stewardship Council is an international NPO headquartered in Bonn, Germany, that was established in 1993 to further the sustainable management of the world's forests. One of its main activities is the certification and labeling of sustainable forest products.



Just as the key to revitalizing and strengthening Japan lies in the courage to create the society we Japanese ourselves want and the power to make from scratch the things to support that society, so too must other advanced countries themselves determine their own future. I sincerely hope the people of other nations feel drawn toward our concept of a Platinum Society. Because Japan's problems are ultimately the world's problems, I believe the concept may be more widely accepted by the world.

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