

## Chapter 2

# The Eco-Dilemma

**Abstract** Although state of the art eco-technologies have been launched one after another, and many citizens have a high level of environmental awareness, the degradation of the global environment progresses steadily (the eco-dilemma). Why do we find ourselves in this situation? The reason is that eco-technologies have become like excuses—or indulgences—for consuming more, thus giving birth to a level of consumption which more than cancels out the positive contributions of technology. Part of the responsibility also lies with corporations that do not explain how properly to use eco-technologies. Are eco-technologies then an evil? It is true that eco-technologies have not been able to contribute greatly to preventing environmental deterioration, but they have surely helped nurture a high level of environmental awareness in about 90 % of Japanese citizens. What we have to consider today is how to continue a process of creative destruction to select the appropriate technologies. Today, after an era in which we pursued comfort and convenience on the basis of the insatiable consumption of resource and energy, we are experiencing the first step in this process of selection—a step which gave birth to eco-technology. But we must not rest on our laurels; the further step in selection needed is one towards the innovation of lifestyles. Today, we must make the transition to a new era in which technology assumes the appropriate responsibility for and in the creation of lifestyles.

**Keywords** Corporate brands • Eco-dilemma • Excuses for consumption • The coal problem • The uniformization of technology

### 2.1 The Global Environmental Problem and Our Way of Living

In 1992, 172 countries—more than 100 thereof personally represented by heads of state—gathered in Rio de Janeiro (United Nations Conference on Environment and Development), and jointly committed to make the greatest possible effort to create

a sustainable society. Already 20 years have passed since that event, and while many countries are indeed making significant efforts, reality is far removed from the ideals and goals discussed at Rio, and, sadly, the degradation of the global environment is accelerating. Why are our efforts not paying off? The time has come to return to basics and reconsider what must be done.

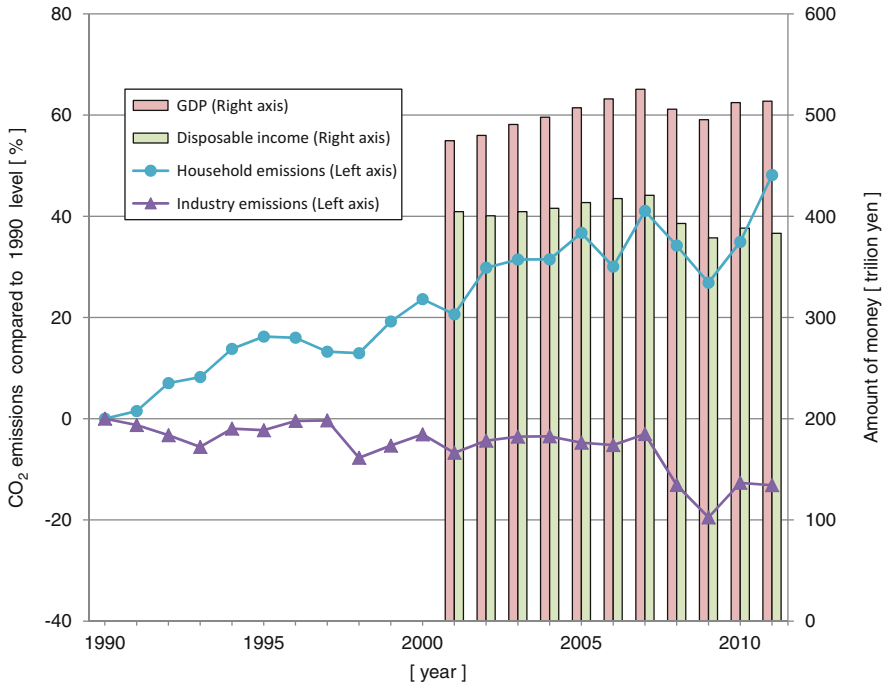
## 2.2 The Nature of the Eco-dilemma

In Japan, it is no exaggeration to say that almost all aspects of society have, recently, become eco-focused. In the business world, a company can hardly market a new product any longer unless it takes environmental issues into consideration. Needless to say, some of these products belong to the “green wash” category (products that merely pretend to be green), but at least in Japan, such products are not accepted in the market, and corporations truly are making highly noteworthy efforts.

The relationship between energy consumption and electrical appliances in the household may serve as a good example. In 1965, electricity consumption accounted for 22.8 % of total energy consumption in the household; in 2008 the figure was 50.1 % (in this period, population increased by a factor of 1.29 and household energy consumption by a factor of 2.2). Of household electricity consumption in 2008, air conditioners accounted for 25.2 %, and refrigerators for 16.1 %—that is, more than 40 % of the total for just these two appliances. On the other hand, in the last 15 years the efficiency of air conditioners has improved by 40 % and that of refrigerators by an impressive 80 %. In other words, a refrigerator today can operate on only 20 % of the energy used for the same size appliance just 15 years ago. These improvements are the fruit of world class technological development by Japanese corporations.

The stand-by power for electrical appliances, which some years back drew considerable attention, has also decreased by 71 % in the period from 1999 to 2008, and now is estimated to account for about 6 % of total household energy use. And this is not the end of the story—TV-sets, LED lighting and automobiles are further frontiers of eco-technology. For automobiles in particular, the hybrid car triggered an epochal shift towards eco-cars, in which even light motor engine cars (below 660 cc. gasoline engine) today aim to be green. Products across virtually all categories have become eco-focused, and in a country like Japan where citizen awareness is high, there are virtually no fake “green-wash” eco-products to be found on the market. Japan has managed to create and market a continuous stream of highly advanced eco-technologies to an extent not seen in any other country in the world. At the same time, the environmental awareness of citizens is by far the highest of any industrial country. Our own surveys reveal that approximately 90 % of people are concerned about environmental issues, and 70 % are already taking action or consider it imperative to do so.

If this synergy between the launch of eco-products and high citizen awareness were truly effective, environmental trends in Japan should have improved



**Fig. 2.1** Increasing environmental impact (CO<sub>2</sub>) in Japan. Created on the basis of “National Account of Japan” (Cabinet Office 2013), “Family Income and Expenditure Survey” (Ministry of Internal Affairs and Communications 2012), and (Greenhouse Gas Inventory Office 2013)

drastically, but reality, unfortunately, is quite the opposite. The environmental impact (CO<sub>2</sub> emissions) of households, for example, continues to increase and in 2010 reached an abominable 130 % of the 1990 level (Fig. 2.1). In Japan, one factor of importance is that, despite a decline in population, the number of households has increased, but even considering this, the deterioration of the environment has undoubtedly progressed. Why does environmental deterioration continue even in a situation where innovative eco-products reach the market and general awareness is high? This is what we call “the eco-dilemma.”

It is crucial today that we understand the nature of this eco-dilemma and, based on this understanding, make the necessary course correction. Why does this dilemma occur? Unless we understand the nature of the eco-dilemma, technologies introduced to the market in good faith may be of no use whatsoever—or even worse, they may fuel the fire of environmental destruction. In our surveys, we have discovered that the eco-dilemma fundamentally derives from two different factors. One is that, apparently, eco-products have become like excuses for consumption. People are easily tempted to consume more. When air conditioners become more efficient (and thus consume less electricity), people will buy another one for the bedroom. When the TV-set becomes more energy efficient, more and more people will buy larger sets. And when they buy an eco-car, and thus need less petrol, the distance of

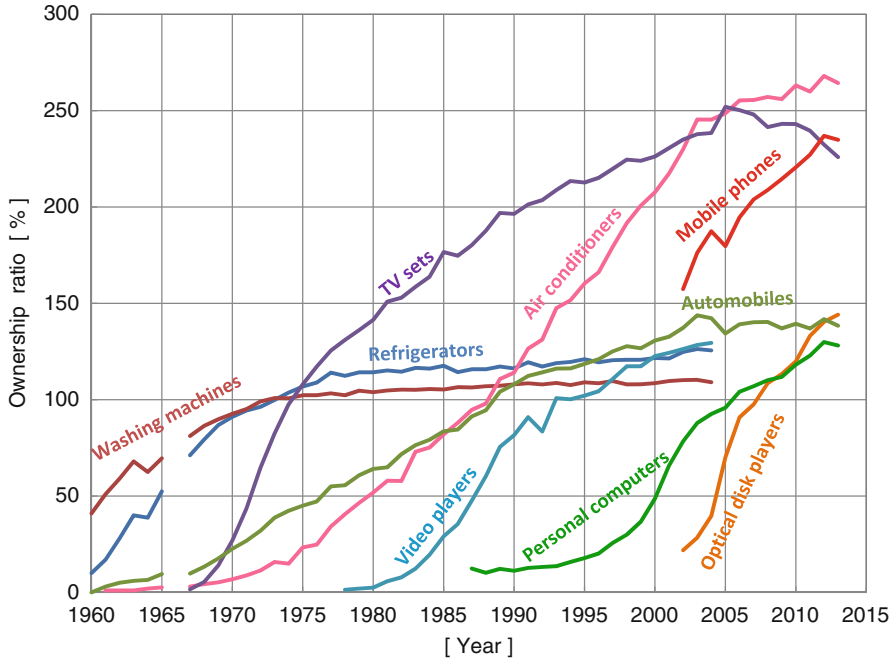
travel tends to go up. Encouraging this kind of consumption were government measures, finally discontinued in June 2011, allowing people to drive *ad libitum* on the highway during weekends for just 1,000 yen, and the eco-point scheme for electrical appliances (which awarded the consumer more eco-points the larger the size of the appliance purchased, as long as it belonged to the energy efficient category). Since the government promoted these schemes, it was easy for the general public to be lured into thinking that the more (eco)-consumption the better, and the paradoxical result has been that environmental impact is increasing. In a way, the government has issued official indulgences allowing citizens to feel comfortable consuming more.

The second factor in the eco-dilemma is the fact that the proper usage of eco-technologies and products is insufficiently explained by manufacturers. In fact it is worse than that—in some cases one might almost get the impression from operation manuals that since the product is environmentally oriented, the purchaser need not be concerned about how heavily it is used.

In Japan, 25.19 million flat screen TV-sets were sold in 2010, a whopping 185 % of the figure in the previous year. 8.24 million air conditioners were sold in the same year, both numbers being the highest in history. Considering that there about 50 million households in Japan, this means that on average every other household bought a new TV-set within just 1 year. Households with only a single occupant are increasing steadily, further fueling a growth in consumption (in 2010, the average number of household residents was 2.47). Already, there is an average of more than 2.4 TV-sets per household, for air conditioners the number has reached 2.5/household, and even for refrigerators the average today is 1.3/household. The notion that if only eco-appliances are bought by all households environmental impact would fall, is clearly an illusion (Fig. 2.2). Energy consumption has not fallen—on the contrary, it keeps rising. Even if the energy consumption of each individual appliance drops, the purchase of a larger number of units for each household combined with an increase in the number of households means that environmental impact, far from decreasing, continues its unabated increase. Obviously, an increase in the number of households leads to a rise in the number of refrigerators and TV-sets, as well as other items and appliances used in everyday life.

Even as this trend continues, 40 % of the Japanese say that they feel stressed by the excessive ownership of things and/or by being surrounded with too many devices and gadgets. TV-sets and refrigerators have become more efficient, but at the same time ever larger in size; air conditioners conserve more energy, but now adorn the walls of all rooms in the house; family size decreases, but the number of households continues to rise...

It is of course essential that each product and service becomes ecologically sound, but at the same time, we cannot ignore the importance of how they are used and what kind of lifestyles people pursue. Looking at the consumption issue in a global perspective, something similar is happening with automobiles. Fuel efficiency is improving year after year, but the rapidly increasing number of cars on the road more than cancels out the effect of this. Looking back at the 50 years from 1950 to 2000, world population increased by a factor of 2.4 from 2.52 billion to 6.06 billion, while the number of registered automobiles grew by a factor of more than



**Fig. 2.2** Electric appliances in the home ownership ratio per household. Created on the basis of “Trends in Household Consumption” (Cabinet Office 2004, 2013)

10 from 70 million to 720 million, oil consumption by a factor of seven, and electricity consumption by a factor of 21.

If this trend continues, we may develop any number of new technologies without seeing a contribution to the reduction of overall environmental impact. In the long term, this may well mean that technology itself will be seen as an evil.

Concern about this eco-dilemma is not a new phenomenon. In 1865, William S. Jevons wrote a book entitled “The Coal Question”. At the time, people who were concerned about the depletion of coal reserves due to the diffusion of the steam engine, argued that the development of more efficient engines would help alleviate this problem. Jevons, however, objected to this view. Certainly, he said, if you look at each individual steam engine, coal consumption will drop. The problem was that more efficient engines would become more convenient and economical to use, and thus be more widely adopted in society, in turn leading to a situation in which the increase in efficiency is more than cancelled out by the growing number of engines in use. In some cases, what is beneficial in a micro-perspective, may not be so when we look at the macro-perspective.

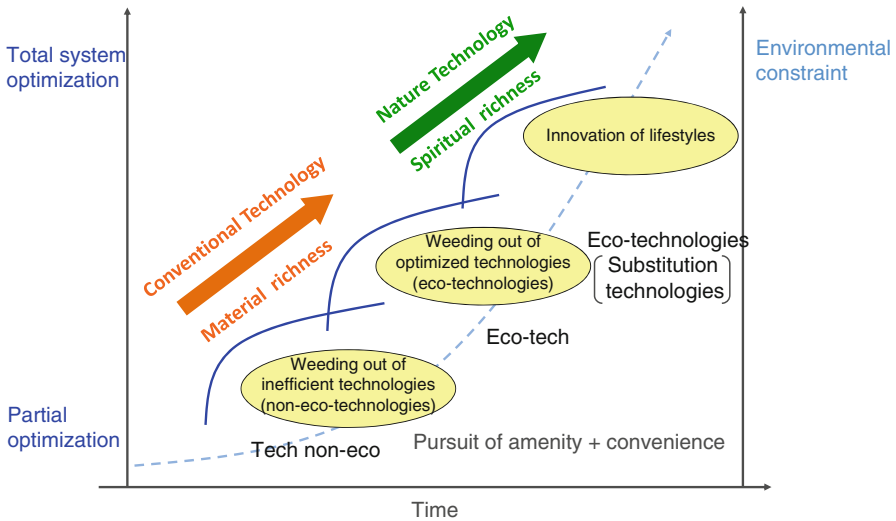
Enhanced efficiency in individual devices may well trigger a rebound effect in which more widespread usage causes overall environmental impact in society to increase. The discussion concerning Information and Communications Technology (ICT) in the 1990s is of a similar nature. The so-called Constant Time Budget

Hypothesis argued that the average time an individual traveled/moved per day is about 75 min, regardless of culture or level of economic development. People on low incomes may have no choice but to walk, while people on higher incomes use automobiles or airplanes to travel. The intriguing discovery, however, was that, regardless of the means of transportation, average time of travel/movement per day was approximately 75 min. The key factor here is not distance, but time. Following this theory, even if telework (powered by ICT) allows people to reduce their time of travel to and from work, the extra time gained will merely be used for other travel purposes. As a result, also, of the increased speed of travel made possible by less congestion, total distance traveled will actually increase, leading to a corresponding rise in CO<sub>2</sub> emissions. This is the rebound effect that may well occur. For corporate leaders, efficiency may have risen, but the evolution of ICT has not contributed to a decrease in environmental impact. On the contrary, it has made employees busier than ever, and the supposed increase in time available for leisure does not appear likely to materialize.

Let us return to the main story—why is it important today to refocus on the eco-dilemma? The reason is that the dilemma derives from the finite nature of the global environment. All things upon which the survival of humanity depends, from resources and energy to biodiversity, are finite, and we know that the risk of their depletion is increasing day by day. In this situation, we can no longer tolerate the existence of the eco-dilemma, and if technological development contributes to the aggravation of the dilemma, we are ourselves about to trigger severe environmental destruction and the collapse of modern civilization.

So, does that mean that the eco-dilemma as such is of a malign nature? We do not believe that is the case. Eco-technologies were born from a sincere reflection on the way we have been burdening the environment through the limitless use of resources and energy driven by our single-minded pursuit of comfort and convenience. Such a shift in thinking has also taken place in the minds of citizens—in Japan, for example, as mentioned above, close to 90 % of people already show a high level of environmental awareness. This shift is indeed very significant, but technologies that simply substitute one for another end up becoming excuses for consumption without contributing to a decrease in environmental impact. According to the Nikkei Newspaper (Oct. 12, 2012), the reduction of CO<sub>2</sub> achieved through the eco-point scheme was a mere one thirteenth of the initial projections made by the Ministry of Environment. This figure, one might say, is quite emblematic of the situation caused by the eco-dilemma.

What, then, is to be done? If partial optimization (as in the case of increased efficiency of individual appliances) ends up leading to an increase in the overall deterioration of the environment, we will have to reconsider what total system optimization (total-system improvement) means. Eco-technology is only one step on the way forward; we now need to move on to the next stage of creative destruction. This evolutionary step involves the creation of new, innovative lifestyles (Fig. 2.3). From the viewpoint of manufacturing, our range of choices is extremely limited. Technology must assume responsibility for lifestyles, and that, in turn, means that corporations must make clear what kind of lifestyles they aim to promote and launch



**Fig. 2.3** Further weeding out, beyond eco-technologies, is required

technologies that help realize such lifestyles. So far, the main focus has been on how to use already existing technologies in society. As a result of this approach, human activities have swollen, thus causing the global environmental problem. Prosperity as such is necessary to enable decent, humane lives, and technology supposedly exists to help create this prosperity. Technology really is nothing more than a set of tools enabling human lives. Recently, however, we live in a technology-centered world in which most people believe they cannot live satisfactorily without great material wealth. We are thus in the process of creating a society in which technology, based on the supremacy of production, becomes the main actor. Of the Seven Deadly Sins Mahatma Gandhi warned the world of, we do indeed seem to be conducting “Commerce without Morality” and “Science without Humanity.” We live in an era in which we seriously need to reconsider the significance of ethics and morality in manufacturing.

The difference between partial optimization and total system optimization in action taken to protect the environment, corresponds well to the difference between thinking based on forecasting and on backcasting, as we shall discuss in a later chapter.

While partially optimized eco-technologies have aimed for a balance between the provision of prosperous lifestyles and the protection of the environment, the end result has been the creation of eco-dilemmas. The biggest problem here is that the definition of a “prosperous lifestyle” is vague, allowing eco-technologies to be developed on the basis of the idea that “people’s desires=convenience and comfort=a prosperous life”. As long as material desires and convenience serve as the basis for action, achieving a balance between the provision of prosperous lifestyles and protection of the natural environment will be extremely difficult. If we look at

the same issue from the perspective of total system optimization, it becomes clear that the basis for action must be “the finite nature of the Earth’s environment”. We need to acknowledge the existence of unavoidable environmental constraints before we can seriously consider the issue of what constitutes prosperous lifestyles, or of how to develop the technologies to allow for their realization. From this angle, prosperity is not the same as convenience. In some cases, a certain degree of inconvenience requiring human engagement (instead of a technological fix) may indeed lead to the feeling of true prosperity, arising from, for example, the commitment and affection born in the engagement. That, in turn, means that technology must no longer merely pursue micro-level efficiency, but must aim to contribute to a new form of prosperity while assuming responsibility for the role it plays in lifestyle creation.

### **2.3 Eco-products May Lower Corporate Brand Value**

For corporations, a larger issue appears on the horizon—that of the uniformization of technology. If the development of eco-products becomes the ultimate goal, all manufacturers are obliged to develop more or less the same type of eco-technologies. For example, technologies that are resource efficient, energy conserving, thin/flat and light-weight, or that use biodegradable plastic, etc. All manufacturers will rush towards the same kind of technology development targets, killing individuality and creativity in the process, while generating uniform lines of eco-technologies. This is what we call the uniformization of (eco-)technology. When this happens, the only frontier of competition becomes the price of a product, thus inviting a fierce struggle to lower prices. In this kind of business-as-usual scenario, corporations have to mass produce in order to lower costs and survive cutthroat price competition, and the end result is conventional manufacturing with a thin layer of eco-camouflage. Continuing along this path may initiate a vicious cycle in which corporate brands are adversely affected. The FY2012 business results of major Japanese electronics manufacturers, some of whom fell deeply into the red, display this unfortunate trend all too clearly. Why was nobody able to foresee what now seems so obvious?

Most likely, the automobile industry will soon move down a similar path. Based on the equation that a good fuel economy = an eco-car, the high-cost hybrid car with a combined petrol engine and electric motor has become the flagship of eco-cars. The hybrid car does indeed boast an advantage in terms of fuel economy, but since the end of 2011, even gasoline engine light motor vehicles with an excellent fuel economy of more than 30 km/L have been brought to market. Will the next battlefield for eco-cars also be cost and price? Why have there not been other forms of value creation with more diverse forms of measurement—like beginning with the question of whether one really needs 1.5 tons of equipment to move an individual weighing some 60–70 kg? Is it ecological, even in the name of safety, that a car must be burdened with several hundred kilograms of safety equipment? Invariably, all things are being looked at through conventional lenses, when, in reality, we need to think of how technology should evolve in relation to changing environmental constraints.



Who could have imagined just 10 years ago that in agriculture, to take but one example, urban citizens would be willing to actually pay to experience rice planting or harvesting? New approaches will not appear when forecasting in a straight line from the present; only when we backcast from a desired future will new worlds of opportunity be revealed.

Ecology, or environmental consideration, is not a final goal to aim for, it is the point of departure, the starting line. Ecology is the natural state of affairs and must function as the foundation for manufacturing and corporate management. Only with this foundation can we start building wholesome, fulfilling lifestyles for people. Looking at the nature of the eco-dilemma, it is clear that an era has arrived in which technology, as mentioned above, must assume responsibility for lifestyles.

The eco-dilemma may be so evident partly because of the existence of detailed statistics in an industrial country like Japan. In any case, however, it is hard to believe that this situation is unique to Japan. If, sooner or later, not only the industrialized countries but a much wider circle of nations experience the same structural problem, we believe Japan has a role to play as a representative of the industrialized nations in facing the eco-dilemma squarely. In our view, it is no exaggeration to say that we in Japan should take on the role of creating a new approach to and new values for manufacturing.

## Bibliography

- Francesco Nachira, Paolo Dini and Andres Nicolai (2007) A network of digital business ecosystem for Europe, Digital Ecosystems Org. 1–20
- Electronics and Information Technology Industries Association (2011) Kadenseihin no hanbai-jisseki suii (Trends in actual sales of electric appliances). Electronics and Information Technology Industries Association, Japan
- Energy Conservation Center (2010) Handbook of energy & economy statistics. Energy Conservation Center, Japan
- Ministry of Economy, Trade and Industry (2010) Energy Whitepaper 2010. Agency for Natural Resources and Energy, Japan
- National account of Japan, Cabinet Office 2013
- Family income and expenditure survey, Ministry of Internal Affairs and Communications 2012
- Ferguson N (2009) Manee no shinkashi (The ascent of money), Trans. Senna, Osamu, Hayakawa Shobo, Tokyo
- Gesell S (2007) Jiyuchi to jiyukahei ni yoru shizenntekikeizaichitsujo (Die natürliche Wirtschaftstordnung durch Freiland und Freigeld), Transl. Aida, Shinichi, Pal Shuppan, Tokyo
- Ishida H, Furukawa R, Dentsu Grand Design Laboratory (2010) Kimi ga otona ni naru koroni. Kankyou mo hito mo yutaka ni suru kurashi no katachi (By the time you grow up – a way of living that makes both the environment and people rich). Nikkan Kougyou Shimbun, Tokyo
- Labor and Welfare Statistics Association (2010) Nihon no setaisuu no shourai toukei (Future statistics of the number of Japanese households). Labor and Welfare Statistics Association, Japan
- Peart S (2006) Jebonzu no keizaigaku (The Economics of W.S. Jevons), Trans. Ishida, Haruo; Sekiya, Kizaburou and Kurita, Zenkichi, Taga Shuppan, Tokyo
- The Cabinet Office (2010) Consumer confidence survey. The Cabinet Office, Japan
- Trends in household consumption, Cabinet Office 2004, 2013
- Transition of carbon dioxide excretion, Greenhouse Gas Inventory Office 2013
- Uzawa H, Uchibashi K (2010) Hajimatteiru mirai (The future that has already begun), Iwanami Shoten Publishers, Tokyo

Nature Technology

Creating a Fresh Approach to Technology and Lifestyle

Ishida, H.; Furukawa, R.

2013, XIII, 174 p. 70 illus., 59 illus. in color., Hardcover

ISBN: 978-4-431-54612-2