Unit V 14: The myth of unlimited economic growth

1. Summary

It is obvious that the economic boom, as the world knew it after World War II until the 1980s, is unlikely to repeat it in this way. For some time now, the "mature" economies have been showing low economic growth. It is true that there is still great growth potential in the emerging economies of China, India and Brazil. But this does not change the fact that global growth cannot continue indefinitely. In the longer term, the global economy will hardly be able to avoid a cap on economic growth. The reasons for a slowdown or even the possibility of negative growth in the mature economies are aging, increasingly precarious working conditions and thus falling incomes, the lack of raw materials or competition with growing economies, and more difficult conditions for the exploitation of capital, which can be expressed, for example, in falling profit rates. How problematic the unchecked pressure for economic growth can be is shown by "planned obsolescence", i.e. the artificial deterioration of the quality of products in order to shorten their lifetime.

2. Economic growth: myth or reality?

At least since the 1970s and the work of the Club of Rome, it has been clear to many non-economists, but also to a growing number of economists, that from the point of view of depleting raw materials, environmental pollution and also for economic reasons, unlimited economic growth in terms of time and quantity is an illusion. Even Keynes was convinced that developed capitalist societies could not grow indefinitely (see Zinn in Le Monde Diplomatique, July 2009:10).

Economic growth in most highly developed countries - such as the EU states, Switzerland, the U.S. and also Japan - has declined continuously since 1960 (cf. ► Unit V 2: "The Satisfaction of Economic and Social Needs").

Therefore, even from the effective development of (quantitative) economic growth, a question mark must be placed against unlimited growth ideas.

In principle, the following growth scenarios are possible:

1) Very high quantitative growth of more than 6%.
2) High quantitative growth between 2 and 6%.
3) Low quantitative growth between 0 and 2%.
4) Negative quantitative growth < 0%
5) Qualitative growth with low quantitative growth or zero growth.

Scenario 1: Very high quantitative growth: This scenario comes into play when an economy has large pent-up demand, for example in Germany after World War II (reconstruction), in Japan in the 1960s or more recently in China. Germany experienced growth rates of up to 12% during the reconstruction period. In China, economic growth between 2004 and 2014 was between 7% and 14%.

Scenario 2: High quantitative growth between 2 and 6% or higher: This scenario played out in many highly industrialized countries - such as the USA, the UK, Germany and France as well as Austria - between the 1960s and the 1990s or in Switzerland between the 1960s and the 1980s.

Scenario 3: Low quantitative growth between 0 and 2%: This situation applied to most highly developed countries in Western Europe and North America in the 2000s. This was the case, for example, for Germany, France, the UK, the USA, Japan and Switzerland between 1995 and 2012.

Scenario 4: Negative quantitative growth: This situation was seen during economic crises and recessions.

There were always isolated years with negative economic growth, such as 1975, 1982, 1993, 2003 and 2009 in individual countries, e.g. Germany.

Scenario 5: Qualitative growth with low quantitative growth or zero growth: This scenario is naturally the most difficult to verify because qualitative growth is difficult to measure.

However, this scenario seems to be the most likely in the longer term - if one disregards reconstruction phases after wars or other catastrophes.

But what does economic growth mean, what does sustainability mean? Economic growth is generally expressed as the annual increase in gross domestic product - i.e. all products and services produced in a year - as a percentage. In this context, there is something like an immanent compulsion for companies to grow, because equity capital and borrowed capital have to earn interest (cf. Seidl/Zahrnt 2010:24). One does not have to go as far as Miegel (2010:55), who described (economic) growth as an ideology and stated the "rapture of growth into the quasi-cultic" (Miegel 2010:56).

The term "sustainability" first appeared in 1987 in the report of the World Commission on Environment and Development WCED. Sustainable development was defined as follows: "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (quoted from Seidl/Zahrnt 2010:25).

In this context, it is immediately apparent that growth and sustainability are in a state of tension that can only be overcome by limiting growth, but by no means by rampant, unlimited growth. But what does this question look like from the perspective of economics?

Economic growth is primarily driven by the increasing demand of a growing number of people for more and more products and services. On the one hand, people's demand for more and more products and services is growing; on the other hand, the number of people - at least worldwide - is also continuing to increase. Whereas in the fall of 2011 the world's population was still estimated at around 7 billion people, in 2015 it was already assumed to be between 8 and 8.5 billion. But is it true - as Samuel Rutz and Gerhard Schwarz of the business-oriented think tank Avenir Suisse suggest in the Neue Zürcher Zeitung of July 22, 2013a - that only economic growth guarantees technological progress? This thesis is simply absurd: There are enough examples to show that mindfulness and thus thrift in the use of raw materials or energy lead to much more innovation than consumerism. As the example of obsolescence (see below) shows, too much economic growth not only destroys the environment, but also economic and technical progress. The statement of Rutz and Schwarz (in Neue Zürcher Zeitung of 22.7.2013a), according to which only massive growth can relieve future generations and "free itself from the debt to future generations ..." is completely misguided. For only non-linear growth, which must be at the expense of the environment, resources and ultimately humanity, can maintain today's material standard at all. For example, pension funds would have to achieve a return of 4.5% to be able to finance the current conversion rate of 6.8% (cf. Seidl/Zahrnt in Neue Zürcher Zeitung, July 22, 2013b). Between 2006 and 2011, however, the rate of return was below 1.7%. And such high returns would at best be achievable - nominally - with high inflation, but this does not change the fact that a real return at this level hardly seems realistic, at least from today's perspective. Seidl and Zahrnt (in Neue Zürcher Zeitung of 22.7.2013b conclude then rightly: "Here, as in other areas, politics has two options: Promote growth or restructure the system so that it becomes independent of growth."

It is also becoming increasingly clear that what was probably the longest economic upswing in human history, namely the phase from 1945 to 1970, is not the norm, as believed at the time, but rather the exception.

Already the crisis of 1974/75, which was related among other things - but not only - to the oil shortage, made it clear that the economic and ecological preconditions for limitless and continuous growth are not given.

Particularly in the "mature" economies of Europe and North America, growth has been slowing down significantly for some time now - in some cases it is below 1%. As recently as 2000, the European Council in its Lisbon Strategy considered "an average economic growth rate of about three percent ... for the coming years" (quoted from Miegel 2010:63) to be quite realistic. And in 2004, the German Trade Union Confederation declared its willingness to support "an annual, steady and sustainable growth of three percent" (quoted from Miegel 2010:63), and at the same time, the Swiss trade unions wanted to reorganize the deficit-ridden unemployment insurance primarily through economic growth. One has to be aware: an annual growth rate of 2.5 to 3.5% leads to a doubling of the gross domestic product every 20 to 20 years. According to Marco Morosini in Neue Zürcher Zeitung of 17.9.2012, in order to satisfy the material demands of developing countries, what would be needed is not a simple linear growth - which we have been experiencing for the past 50 years - but "exponential growth, that is, growth of growth. Forever!"

At the latest since the beginning of the economic crisis in 2008, people have become much more skeptical in this regard - at least in the Western industrialized countries.

As recently as 2011, countries such as China, India, Brazil and some other countries in Asia and Africa were still on a strong growth trajectory that is likely to continue for some time - at least until the vast majority of their populations will have achieved a certain standard of living. Depending on the calculation, this majority includes around 1 billion people in China alone and over 500 million people in India. Although growth in China and India declined during the 2008/2009 financial crisis, it never stagnated. In Brazil, gross domestic product shrank, but by 2010 growth was already pointing steeply upward again, just as in China and India. In 2009, GDP growth in China was 8.7%, and in the first quarter of 2010 it was as high as 11.9% (Neue Züricher Zeitung, April 28, 2010a:31). In India, growth was 7.2% at the end of March 2010 (Neue Zürcher Zeitung, 28.4.2010b:31). In Brazil, GDP grew by 2% in the fourth quarter of 2009 - after a decline in GDP in the previous three quarters - and estimates for the 1st quarter of 2010 were 7 - 8% (Neue Zürcher Zeitung of 28.4.2010c:31). These figures show the still existing large growth potential in the BIC countries Brazil, India and China, which continued in 2014:

BRICS countries in comparison (2014)
The acronym BRICS stands for the group of five emerging economies Brazil, Russia, India, China and South Africa. An overview of economic performance and population figures (some rounded):
Brazil:
- Population: 200.4 million
- Gross domestic product (GDP): $2.246 trillion
- GDP per inhabitant: $11,208
- Economic growth: 2.3 percent
- Exports: $242 billion
Russia:
- Population: 143.5 million
- GDP: 2.097 trillion dollars
- GDP per capita: $14,613

- Economic growth: 1.3 percent
- Exports: 527 billion dollars

India:
- Population: 1.25 billion
- GDP: 1.877 trillion dollars
- GDP per capita: $1,499
- Economic growth: 4.7 percent
- Exports: $337 billion

China:
- Population: 1.36 billion
- GDP: 9.240 trillion dollars
- GDP per capita: 6,809 dollars
- Economic growth: 7.7 percent
- Exports: $2,209 billion

South Africa:
- Population: 53 million
- GDP: 350.6 billion dollars
- GDP per capita: 6618 dollars
- Economic growth: 1.9 percent
- Exports: 95 billion dollars

Quelle: http://orf.at/stories/2238076/2238078/

However, growth has weakened in a number of emerging states since 2014.

In particular, the export-oriented economies of India, but also the other emerging economies of Asia, Latin America and Africa show an enormous hunger for raw materials.

At the same time, very many countries in the southern hemisphere are still dependent on the export of raw materials today (cf. Hosp in Neue Zürcher Zeitung of 19.9.2015:41).

Apart from the slump during the financial crisis 2008-2009, commodity prices developed clearly upwards after the turn of the millennium (cf. State Secretariat for Economic Affairs SECO 2011:7).

Even though commodity prices moved downward again in 2014, it can be assumed that rising commodity prices can be expected in the longer term - especially if the economy in the European region picks up again.

Ralf Dahrendorf (1992:211) wrote of the growth of the 1980s: "The growth story of the 1980s was by no means linear. For many, the decade began with a deep trough. Only after

1982 can one speak of a boom throughout the OECD world. Towards the end of the decade, especially in 1988 and 1989, this reached dizzying heights. The result is an average of three percent growth in gross national product per year in most countries. This denotes enormous figures, considering that we are talking about percentages of a total that was four times as large as its equivalent in 1950. If one translates percentage growth back into the amount of additional goods and services per year, then for the most part this increased more in the eighties than in the fifties and sixties. The eighties were a decade of economic growth."

Overexploitation of ecological resources through economic growth
"Economic growth in recent decades has led to the overuse of the ecological system and many resource stocks. On the contrary, resource consumption should be significantly reduced, not just stabilized. But so far, the trend is pointing in the other direction: ambitious environmental and sustainability goals often fail because of the primary goal of economic growth.
Numerous studies show that the hope that a growing gross domestic product ... could be decoupled in absolute terms from increasing resource consumption and environmental pollution thanks to efficiency strategies has not been realized... Although a relative decoupling (lower resource use per unit of GDP) has taken place in many countries and for individual environmental problems, this has mostly been overcompensated by growth and so-called rebound effects. A direct rebound effect occurs when increased energy or resource efficiency causes the same product or service to be in greater demand, so that the potential savings are not realized or are only partially realized."
Source: Seidl/Zahrnt 2010:30.

Over the past 10 years, environmental policy has increasingly become resource policy. An integrated resource policy deals with raw materials, water, air, soil and biodiversity. Issues of energy supply, construction, industrial policy, food and agriculture, and consumer behavior play into resource policy (cf. Hofmann in Neue Zürcher Zeitung, 2.2.2013). If one adds up the resources required to maintain a certain standard of living, one arrives at a so-called ecological footprint. This expresses the resource requirements in terms of the number of square meters needed per inhabitant. For example, the ecological footprint for a Swiss person is 5 hectares. This area of land and sea is needed to accommodate the need for food, breathable air, consumer goods and waste. The ecological footprint of the world population is currently over 2.2 hectares per person and growing. But already in 2013, only 1.8 hectares were available per person (cf. Hofmann in Neue Zürcher Zeitung, 2.2.2013).

For this reason, the Green Party of Switzerland launched an initiative according to which the ecological footprint of the Swiss population should be reduced to such an extent by 2050 "that, extrapolated to the world population, it does not exceed one earth" (Hofmann in Neue Zürcher Zeitung of 2.2.2013). It is obvious that this ambitious goal cannot be achieved without governmental regulatory measures.

While part of the economic upswings that took place were based on the growing demand of large population groups in Latin America and Asia and partly in Africa, at least as large a part of the demand during the boom phases was based on the generation of new needs in the rich countries and in the upper classes of the poorer countries. For example, new groups of buyers and thus new demand groups were found for electronic media, tourism and second-home construction. But as the financial and economic crisis of 2008/2009 showed, a large part of this demand was based on credit, i.e. on growing debt, and collapsed rapidly and massively when the economic situation deteriorated.

The likelihood of successive economic bubbles and associated major and minor crises with sometimes massive collapses in demand and destruction of assets is undoubtedly much greater than long-term and sustainable growth. This is already the case because wealth is concentrating in fewer and fewer hands, which makes broad demand growth increasingly unlikely.

Only a systematic redistribution of wealth from top to bottom could partially change the picture. But even then, demand growth is likely to weaken successively over the longer term. If, on the other hand, there is no redistribution of wealth, then growth is likely to be over very soon - perhaps apart from a small luxury segment.

Seidl/Zahrnt (2010:31-34) give the following reasons why the growth paradigm is outdated and can hardly be considered a realistic perspective anymore:

- After reaching a certain production volume, prosperity, well-being, satisfaction and happiness do not increase any further. The threshold is about half of today's per capita income in the rich industrialized countries (Seidl/Zahrnt 2010:31).

- Above a certain level of per capita income, economic growth hardly contributes to a high level of employment.
- In recent decades, economic growth has hardly contributed to social equalization - on the contrary, the gap between rich and poor has widened in many countries (cf. ►Unit V3: "Blind Spots").
- Due to the propagated or forced reduction of public debt (cf. Euro crisis!), demand and thus also the economic volume often decline - as in Greece or Portugal as of 2011.
- In more and more markets, economic growth is reaching a saturation point because consumption is stagnating due to the existing economic resources of consumers, but also as a result of needs that have largely been met. The same applies to the capital goods sector.
- Increasingly, economic growth is only possible through massive government or monetary intervention - for example, in the form of oversized infrastructure projects, artificial stimulation of demand and, in general, deficit spending. In the medium term, this will also be the case for the emerging economies, which will intensify competition among exporting countries.
- Due to demographic trends in many highly developed countries such as Japan, Western Europe and to some extent Latin America, the population will stagnate or even decline in the medium term, which will have a restraining effect on growth in the longer term - even if one assumes a short-term growth spurt in the old-age, care and healthcare sectors.

Apparently, however, this view has not yet caught on with many politicians: At the time, for example, the black-yellow government coalition in Berlin was still postulating tax cuts with the same or even higher benefits in its coalition agreement, which could only be achieved through massive and long-lasting economic growth - if at all. Critics have calculated that this would require economic growth of 9%! In Switzerland, the left-wing parties hope to reduce the growing deficit of the unemployment insurance ALV without reducing benefits through corresponding economic growth.

As already mentioned, a long-term expanding economic production is also in contrast to the population development in a part of the world: Many highly productive industrial countries - e.g. Japan and European countries - already show a negative population growth. It is likely that countries in the South will also face population decline at some point in the future. If one assumes that the national economy has to satisfy the needs of the population, then it is obvious to assume that in the longer term demand and thus economic production will also adjust to the declining population figures and decline accordingly. Of course, this can and will happen sooner or later, depending on the country and the existing pent-up demand.

This means that in the medium and long term, the shift of production to the emerging economies is likely to intensify and economic growth in the highly developed countries of North America and Europe is more likely to stagnate or even fall below zero in individual cases.

André Gorz (2009:18) has pointed out another problem of the current economic system: In recent years, labor productivity has continuously increased. This means that the cost of labor per unit of product has continued to fall and continues to fall. "But the more the quantity of labor for a given production decreases, the more the value produced by the worker - his productivity - must increase, so that the realizable mass of profit does not decrease. We have the obvious paradox that the more productivity increases, the more it must increase in order to avoid that the volume of profit decreases. Therefore, there is a tendency for the race for productivity to accelerate, for the employed workforce to be reduced, for the pressure on personnel to increase, for the level and mass of wages to decrease. The system is moving toward an inner limit where production and investment in production are no longer profitable enough" (Gorz 2009:18). If one considers the increasing flight of capital into risky financial products, which, by the way, was largely to blame for the enormous scale of the 2008/2009 financial crisis, then there seems to be some evidence in favor of Gorz's thesis. Gorz (2009:18) writes: "In China, the Philippines, and Sudan, the numbers testify that this limit has been reached. The productive accumulation of productive capital is ceaselessly declining. In the United States, after the turn of the millennium, the five hundred companies of the Standard & Poor index had 631 billion of liquid reserves; half of the profits of the American companies are obtained with operations on the financial markets. In France, the

Productive Investment of the companies CAC 40 (the French benchmark index of the 40 leading public companies) does not increase even when their profits explode" (Gorz 2009:18).

Gorz (2009:79) believes that the current trend points to the direction we need to take: He asks us to "imagine how we can live better by consuming and working less and differently." In doing so, he says, commodity production must fall because they cut back too much on human labor. Since only the work that increases capital is economic, the capitalist system reaches its limits here. Yet there are more and more poorly paid jobs in the service sector: "In the United States, which is often cited as a model, 55% of the working population work in this sector: as waiters/waitresses, salesmen/-women, cleaners, domestic helpers, janitors, nannies, and so on. Half of them are in precarious employment, a quarter are working poors" (Gorz 2009:80).

Or another figure: 25% of the world's economic activity is provided by 200 transnational corporations, which employ only 0.75% of the world's population (Gorz 2009:81).

Radkau (2010:46) is undoubtedly to be agreed with when he says that there is little hope that the growth dilemma of the economy will solve itself.

What conclusions can be drawn from what has been said? On the one hand, **that it is high time to say goodbye to the economic growth myth** and instead adjust to sustainable productive stability, in short: **zero growth with redistribution**. Second, **economic management instruments must be created** that make it possible **to switch to economic growth or to a reduction in economic output**, **as the need arises**. Third, **the distribution struggle for the planet's raw materials** between the emerging economies of China, India and Brazil on the one hand and the mature economies of North America and Europe on the other **will continue to intensify**. While it is not hoped that this will lead to intercontinental wars over raw materials or water, tensions between the major economic and monetary blocs will undoubtedly increase. In this context, "it is important not to render sustainability toothless as a smooth harmony formula. Instead, the problems and disputes associated with a policy of the long term, of balancing between generation and nations, and of respecting ecological limits must be clearly named and publicly discussed" (Radkau 2010:46; cf. also ► Unit V 25: "Sustainable Management").

2.1 Economic growth and risk society

Since the book "Risk Society" published by Ulrich Beck (1986), sensitivity to the connection between economic growth and risk has increased. In it, Beck posited that the environmental risks of modern society affect everyone without exception. Yet "many of the novel risks (nuclear or chemical contamination, pollutants in foodstuffs, diseases of civilization) ... completely elude immediate human perception" (Beck 1986:35). Many of these risks affect not or not only the living but also their descendants, as in the case of radioactive contamination or chemical toxicity. Yet almost all of these risks are closely linked to our mode of production and our form of economy: In practice, two things become apparent: "...first, that modernization risks are at once site-specific and non-specific universal; and second, how unpredictable, unpredictable are the convoluted paths of their damaging effects" (Beck 1986:36). This calls into question the fundamental controllability of such risks and processes afflicted with them.

Since recent disasters such as the 2010 accident on BP's Deepwater Horizon oil rig, when huge amounts of crude oil spilled into the sea, or the 2011 Fukushima nuclear disaster, public concern about disasters caused by humans or, better, by their economies, has continued to grow. Charles Perrow (1987), in his extremely readable book, Normal Disasters, did an excellent job of outlining the relationship between economic growth, technology, and disasters. Perrow argues as follows: Complex systems are often more efficient than linear systems, but they are also more prone to failure. There are complex systems that do little damage when they are disrupted, and there are complex systems that can do an extremely large amount of damage. The decisive factor in determining which applies, according to Perrow, is the type of coupling. Systems with tight coupling and systems with loose coupling show the following characteristics:

Tight coupling	**Loose coupling**
No delay of the operating sequence possible	Delays of the operating sequence possible
Unchangeability of the process	Sequence changeable
Production target can be realized only with one method	Alternative methods possible
Little leeway in operating materials, equipment and personnel	More or less margin available
Buffers and redundancies pre-planned by design	Buffers and redundancies available due to random circumstances
Substitution of operating materials, equipment and personnel limited and planned in advance	Substitution possible as needed

Source: Perrow 1987:136.

Tightly coupled systems in which there are no buffers and no "detours" in the sequence, such as large chemical companies or nuclear power plants, require redundancies and "backup systems" or alternative functional sequences. While operating errors can usually still be corrected, this is not true for faulty systems: these can only be completely rebuilt or shut down. Perrow (1987:6ff) shows with many examples that the operators of complex technical systems have the tendency to attribute incidents to operating errors - although these are mostly due to system errors and not to incorrect handling. In addition - as was also exemplified in the nuclear disaster at Fukushima in 2011 - those responsible try to cover up incidents and usually provide information far too late and only in fragments. This is because there is always hope that the effects of an incident could prove to be limited. Union Carbide in Bhopal, for example, continued to deny that toxic substances had leaked out even after rows and rows of people were dying in the streets (see Perrow 1987:3).

Complex and closely coupled systems have the property that incidents in individual areas quickly affect other areas of the system. Therefore, a small failure in a tightly coupled system can quickly lead to the collapse of the entire system. The serious impact of a small system failure was demonstrated by the Three Mile Island nuclear power plant accident in 1978 (see Perrow 1987:37).

In loosely coupled systems, on the other hand, there is more room for improvisation. This is why large-scale facilities such as chemical plants or nuclear power plants are most at risk: here, the probability is greatest that an uncontrollable catastrophe will occur after an incident. Therefore, according to Perrow (1987:406, cf. also Kadritzke in Le Monde Diplomatique, May 2011:3): "the reasons for shutting down all nuclear power plants in the United States are openly obvious."

Perrow (1987:91) also questioned why there had been - i.e., until the mid-1980s! - hardly any major nuclear accidents had occurred. His surprising answer is: Because the nuclear power plants have had too little time to develop their catastrophic potential! Every complex and tightly coupled system needs a certain amount of time to develop its hazard potential. In the case of nuclear power plants, this means that the longer you let a nuclear power plant run and the longer you wait to shut it down, the greater the risk potential that accumulates. Or to put it another way: the longer you wait to shut down a plant, the more likely it is that a major nuclear catastrophe will occur. This is all the more true as dozens of new nuclear power plants are planned or under construction.

For a sustainable economy, this means that hazardous and complex production processes must be structured in such a way that they are loosely coupled - and that they are time-limited, i.e., that they are terminated before they can fully build up their hazard potential.

About potential victims of a major disaster, Perrow (1987:100-104) writes: Depending on the degree to which they are affected, four types of victims can be distinguished:

- First-degree victims: These include operators of the system, e.g. the employees of a nuclear power plant. Accidents are often attributed to them - rightly or wrongly. They can intervene in the events to a greater or lesser extent. They are considered - rightly or wrongly - to be the "culprits" when something happens.
- Second-degree victims: they are connected to the system as suppliers or users, but without having any influence on it. These include passengers or passengers on ships, trains or planes. They have chosen to "participate in the system" (Perrow 1987:102) and thus have taken on some risk.
- Third-degree victims: they are not connected to the collapsing system: They are, however, affected by the effects of disasters: for example, according to Perrow (1987:103), in the U.S. - and even more so in Europe - there is simply no real possibility of living outside an 85 km radius of nuclear power plants, because they are

almost everywhere, and especially because they covered almost all densely populated zones.

- Fourth-degree victims: these are usually radioactively irradiated or toxically contaminated people. "They are fetuses whose mothers have been exposed to radioactive contamination; they are the intended children who cannot be conceived and conceived by their radiation-damaged parents; stillborn or malformed children conceived after radioactive damage, and all those persons who will be contaminated in the future by residues accumulating in food chains" (Perrow 1987:103).

The example of the 2010 Deepwater Horizon oil spill shows how complex and contradictory the recovery of land and sea areas damaged by an environmental disaster can be: while on the one hand the ground surface could be considered largely cleaned in 2015, the consequences of the oil spill led to an estimated 2 to 3 square kilometers of additional erosion damage (cf. Kusma in Neue Zürcher Zeitung, 22.4.2015:50). In contrast to the coasts, which at least superficially appeared reasonably clean, in 2015 the seabed was heavily contaminated with oil in a significant radius around the well: "The deep sea has been disturbed to a much more massive extent than had been expected," said Antje Boetius of the Max Planck Institute for Marine Microbiology in Bremen (cf. Kusma in Neue Zürcher Zeitung of 22.4.2015:50). Conservative estimates assumed that between 3 and 5% of the spilled oil was distributed on the seabed over 8400 square kilometers - an area of about 20% of Switzerland's land surface. These oil deposits had and still have a toxic effect on organisms, which is why degradation is extremely slow (cf. Kusma in Neue Zürcher Zeitung, 22.4.2015:50).

2.2 Sustainable energy supply as an economic factor

According to Klare (in Le Monde Diplomatique of July 2011a:1), global energy supply "faces a whole series of barely solvable problems that have become even more acute in recent months." Klare locates these problems at two levels: First, easily tapped reserves of natural gas, oil, and coal are slowly but surely running out. On the other hand, a number of strategic and tactical misjudgments have been made at the geopolitical level in recent months and years, the effects of which have been exacerbated by rising food prices: The so-called Arab

Spring led to more or less violent unrest and military confrontations almost throughout the Middle Eastern region, including in key oil supplier countries such as Libya and Iraq. If the regime in Saudi Arabia also falters, the situation will become unpredictable.

According to a calculation by the U.S. Department of Energy, energy production would have to increase by 29% from 2007 to 2015 to 640 quadrillion BTU (British thermal Units) to meet the energy consumption of the old industrialized countries - and the U.S. in particular - and the energy hunger of the emerging countries - China and India in particular (Klare in Le Monde Diplomatique, July 2011a:1). At the same time, the near future will be characterized by three factors or events: a first energy shock could come from the oil-producing countries of Libya, Saudi Arabia, and Bahrain if political unrest intensifies. The second decisive event for the energy markets was the Fukushima nuclear disaster in Japan on March 11, 2011. If Fukushima and other nuclear reactors remain shut down, demand for oil, natural gas and coal in Japan will soar. Experts estimate that Japan would then have to import an additional 238,000 barrels of crude oil and 34 million cubic meters of natural gas per day - mainly in the form of liquefied natural gas (Klare in Le Monde Diplomatique, July 2011a:10). A third factor in 2011 was a prolonged drought in many areas of the world, namely Australia, China, Russia, and parts of the Middle East, South America, North America, and northern Europe. The associated crop failures caused food prices to reach record highs in many places, which has already led to unrest in a number of countries. Hydroelectric power generation also declined as a result, with large parts of central China already suffering from power shortages in early summer 2011, which are expected to increase. Further periods of drought are foreseeable - especially in view of climate change ¬.

According to a study published in 2011 by WWF and Ecofys (see Neue Zürcher Zeitung, Feb. 3, 2011), 80% of the energy consumed in 2011 came from fossil fuels such as oil, natural gas and coal.

The study authors conclude that by 2050, almost 100% energy supply would be possible through a combination of renewable energy, i.e. energy from the sun, wind, water, tides, geothermal energy and plant products. The calculations were based on technologies that are already available or under development today.

Currently, only 0.02% of the world's consumed energy is generated by solar energy - by 2050, this share could increase to 50% of the world's energy. Wind energy meets 2% of electricity demand today; by 2050, this share could grow to 25%.

After the Fukushima disaster in March 2011, the solar energy industry hoped for a rosy future. But things turned out differently - at least in the short term: At the end of 2011, many solar companies were fighting for their existence, some like Solyndra and Evergreen Solar in the USA or Solar Millenium in Germany already had to give up (cf. Müller in Neue Zürcher Zeitung, 19.11.2011). In Germany, established companies such as Solon, Conergy and Q-Cells were at risk, and the situation was similar for supplier companies. Müller (in Neue Zürcher Zeitung of 19.11.2011) identified two causes for this development: On the one hand, Chinese suppliers of solar cells became a decisive force worldwide due to the huge hunger for energy and the associated promotion of solar energy in China and were able to increase their market share to around 60%. On the other hand, the price development of silicon as a starting product for solar cells led to a new starting situation: Due to the development of solar energy, almost 90% of polycrystalline silicon was now consumed for the production of solar cells, which led to a considerable price increase. At the same time, supply could not follow demand fast enough. In 2008, the price of silicon reached $475 per kilo, after years of hovering around $30. Now that supply was increasing and demand for silicon was decreasing due to newly developed thin-film technology, the price dropped back towards $30. In addition, interest in shale gas rose again during this period, and the pendulum swung back to fossil fuels. Thus, according to Müller (in Neue Zürcher Zeitung, Nov. 19, 2011), solar energy lost interest again.

At the time of the study - i.e. in 2011 - electricity covered less than 20% of the energy consumed worldwide; by 2050, this share is expected to increase to almost 50%.

According to the WWF Ecofy study (see Neue Zürcher Zeitung of 3.2.2011), the first priority should be the modernization of the power grids and their international interconnection. This is in order to balance the production fluctuations of the various sources and to deliver the energy to where it is needed. The study estimates the need for investment in power grids and infrastructure at US$4.7 trillion annually over the next 25 years. Today, US$1.4 trillion is spent on this worldwide. From around 2040, the savings are expected to exceed the costs.

Second, energy consumption would have to be reduced by 15% by 2050, which the study authors believe is possible despite population growth. This could be achieved by using low-energy and recyclable building materials, passive-energy construction, and switching transportation to electricity as much as possible. Bioenergy should only be used where other renewable energy sources are not available and when it does not threaten food and water supplies.

It is likely, but still controversial, that energy consumption can be effectively reduced through incentive taxes. In Switzerland, for example, the canton of Basel-Stadt has had an incentive tax on electricity consumption since 1999. Depending on the consumer category, electricity consumption is taxed by 3.1 to 6 centimes per kilowatt hour, which corresponds to an average 20% increase in electricity prices. Thereby, currently (2012) an amount of Fr. 44 million per year is retained, which is refunded to the companies via a per capita amount of Fr. 72.- for private persons and via a compensation of 0.38% of the ALV payroll (cf. Brutschin in Neue Zürcher Zeitung of 15.10.2012). In 2010, this led to a 1.1% decrease in electricity consumption in Basel-Stadt, while 4% more electricity was consumed nationwide in the same year. However, Brutschin (in Neue Zürcher Zeitung of 15.10.2012) points out, not without reason, that a stronger taxation of energy consumption - as demanded, for example, by the Green Liberal Party of Switzerland - for example instead of the value-added tax can lead to a reduction of the tax substrate in the longer term, namely when the energy saving effect is successful. A neutral incentive tax along the lines of the Basel model would therefore be better.

In principle, the quality of life should not suffer, only meat consumption should be capped.

2.2.1 Fossil fuels

In connection with the civil war-like outbreaks of violence in Libya, the price of crude oil rose on February 22, 2011, almost to the peak of late summer 2008. According to agency reports, Libyan oil terminals on the Mediterranean ceased operations at the end of February (see Neue Zürcher Zeitung, February 23, 2011). Shortly before, the country had declared that it had imposed an export freeze. At the beginning of 2011, total production was 1.6 million barrels per day.

Due to the expected energy gap and the temporarily high oil prices, a new method of oil extraction was propagated and used, the so-called "hydraulic fracturing", also called "fracking". This method uses a cocktail of chemicals in large quantities, injected into the subsoil at a pressure of 1,000 bars, and its effects are incalculable: "According to Exxon itself, this includes carcinogenic hydrocarbons such as benzene and toluene, as well as acids and plant poisons that ... are supposed to prevent unwanted bacteria from re-clogging the fine cracks that have burst open. But if these poisons get into the water, the groundwater of entire regions is at risk, warn drinking water suppliers such as Gelsenwasser AG, which supplies millions of people in the Ruhr region" (Wyputta in Le Monde Diplomatique, July 2011c:11). Fracking consumes vast amounts of water and causes major environmental problems. In the U.S., as of mid-2011, at least 80 serious accidents had been recorded at the 500,000 existing wells (Raoul in Le Monde Diplomatique of July 2011b:10). These ranged from uncontrolled gas leaks, to groundwater contaminated by fracking wastewater, to buildings destroyed by explosions and poisoned animals (Raoul in Le Monde Diplomatique of July 2011b:11). In the 2010 documentary "Grasslands" by Josh Fox in the USA about the fracking method shows alarming things: In it, one can see tap water being ignited with a match, poisoned well water, leaked benzene, people falling ill near boreholes, etc. But also the soil is massively contaminated by "fracking". For example, in Williston, North Dakota, one of the centers of the U.S. fracking boom, neutral experts found benzene, methane, chloroform, butane, propane, toluene and xylene in the soil, all substances used in fracking. In addition, the well water contained large concentrations of sulfates, chromium and strontium. Individuals examined contained neurotoxic substances in their brains, and traces of heavy metals were discovered in their blood (see Robin in Le Monde Diplomatique, September 2013b:1). To develop and exploit a single well using fracking in North Dakota requires 20 million liters of water, 235 tons of sand, and 12 million liters of chemical additives (Robin in Le Monde Diplomatique of September 2013b:1/16). In 2013, experts estimated that the U.S. would produce 99% of its own energy needs by 2030 (see Genté in Le Monde Diplomatique September 2013a:17).

2.2.2 Nuclear energy

Following the March 11, 2011 earthquake and tsunami in northeastern Japan, several Japanese nuclear power plants experienced accidents. Cooling systems broke down in at least three, but probably more, reactors. Several reactors experienced core meltdowns and leaks in the reactor casings that leaked radioactivity. In reactors shut down before the earthquake, fuel rods caught fire after water in the cooling pool evaporated. A total of 6 of 10 reactor units have had trouble with their cooling systems since March 13. On March 15, Japanese experts detected massively elevated radioactivity. Step by step, the evacuation area around the two nuclear power plants Fukushima 1 and 2 was extended first to 10, then to 20 and later to 30 kilometers. In the process, 170,000 people at the first nuclear power plant and 30,000 people at the second nuclear power plant had to leave their homes. Although the nuclear power plants in Japan were designed to withstand earthquakes of magnitude 8.25, the most recent earthquake was 8.8, and after March 15, experts feared radioactive contamination of all of Japan. As late as June 2011, new leaks kept appearing at the contaminated nuclear reactors, causing radioactivity to escape.

At the end of March, radioactivity in certain regions of Japan was up to 1000 times higher than normal. None of the six reactors at Fukushima was under control until the end of March 2011 - more than two weeks after the disaster - and uncontrolled amounts of radioactivity continued to enter the environment.

In mid-April 2011, the operating company began pumping out highly radioactive water from the shafts of reactor 2, removing 200 tons of a total of 60,000 tons of highly radioactively contaminated water (Neue Zürcher Zeitung, April 14, 2011). At the same time, the water temperature in the decay pool of reactor 4 rose again to 90 degrees, and the radioactivity in the air also increased. The operating company could not give any reason for this. All these reports prove that the situation in Fukushima is still out of control.

International reactions to the Fukushima nuclear disaster could hardly be more different: On March 15, 2011, the German government announced that it was immediately taking all nuclear power plants built before 1980 off the grid for three months and suspending their operating lives, which had been extended shortly before.

A note: Using the same strict criteria, three of the four remaining nuclear power plants in Switzerland would have to be taken off the grid, namely Beznau 1 (built in 1969), Beznau 2 (built in 1971) and Gösgen (built in 1979). Even the newest nuclear power plant in Switzerland - Leibstadt - is already 31 years old (built in 1984)! Thereby, a shutdown date is not at all in sight (cf. Scruzzi in Neue Zürcher Zeitung of 21.8.2015:13.

On June 30, 2011, the German Bundestag, at the request of the government, decided to phase out nuclear power by 2022 with the votes of the CDU, FDP, SPD and the Greens with 513 votes against 79. At the same time, it was decided that the seven nuclear power plants that had already been shut down would no longer be connected to the grid and that the remaining nine nuclear power plants would be shut down successively, most of them in 2021 as well as in 2022 (cf. Schmid in Neue Zürcher Zeitung of July 1, 2011). The Swiss government also decided in principle to phase out nuclear power. The Italian population rejected the construction of nuclear power plants in a referendum at Whitsun 2011 with 94.6% of the votes cast. On the other hand, the governments of France, China and other countries insist on operating partially obsolete nuclear power plants and on the planned construction of further nuclear reactors.

Apart from Germany, Austria - which itself has no nuclear power plants - and Switzerland, the nuclear disaster in Japan hardly seemed to make an impression on the governments: The U.S. wanted to build 20 to 30 new nuclear power plants, Poland wanted to build 2 new nuclear reactors by 2030, France stuck to its nuclear policy, and Russia, India, China and Brazil are planning and planning dozens of new nuclear power plants.

However, the question is whether and for how long the populations will continue to support this short-sighted energy policy. With every further nuclear accident, acceptance will continue to decline - and further nuclear accidents are only a question of time. It is completely absurd that nuclear power plant proponents today want to propagate nuclear energy as "green" energy against the background of climate change! Because the dangers remain.

The possible effects - and thus also the economic consequences - of a core meltdown are unpredictable, as was shown in Japan. "In a core meltdown, the fuel rods of a nuclear reactor overheat. In the process, they liquefy and can turn into a radioactive molten mass. This means that nuclear fission can no longer be controlled. A mixture of fissile material and metal at a temperature of up to 2000 degrees Celsius could thus eat its way through the protective shell of the reactor core and escape into the environment" (Zentralschweiz am Sonntag, 13.3.2011). In the event of a core meltdown, enormous amounts of radioactivity can be released into the atmosphere and into the ground. In addition, fuel rods contain plutonium after a few hours of operation. On the one hand, plutonium is probably the most toxic element and on the other hand, it has a half-life of 24,000 years. In recent years, nuclear power plant operators have started to use fuel rods - so-called Mox fuel rods - which contain between 5 and 7% plutonium. This percentage increases by another 2% with operating time. According to Boos (in WochenZeitung of 24.3.2011), 32 of 177 fuel rods in Gösgen today are Mox fuel rods, in Beznau I it is 12 of 121 and in Beznau II 32 of 121. While uranium fuel rods melt at 1100 degrees, this is already the case with Mox fuel rods at 700-900 degrees. Mox fuel rods are associated with three additional problems:
- The reactor is more difficult to handle.
- The fuel must be stored temporarily for up to 100 years because the heat generation is greater.
- Long-term storage is even more difficult because Mox produces more neptunium-237, which is highly mobile and has a half-life of more than two million years (Boos in WochenZeitung, March 24, 2011).

Conclusion: The **Swiss nuclear power plants** are **not only obsolete and fire dangerous**, but they are additionally **operated with the highly dangerous Mox technology**. If other sectors of the economy were working with similar risk potentials, the highest safety precautions would certainly be taken - but not in nuclear power plants.

But what were the reasons for the nuclear disaster in Fukushima? For the time being, the following reasons for the nuclear disaster in Japan can be identified:

- The emergency power systems provided to maintain reactor cooling in the face of external influences are inadequate, unsafe, and often poorly maintained.
- For hours and days after the earthquake, little accurate information was available about what was happening in the reactors and nuclear power plants - apparently even from the operating companies and the Japanese government.
- Nuclear technology remains far too complicated, difficult to control, and almost impossible to manage in the event of an accident. Even decommissioned reactors (as in the case of reactor 4 at Fukushima 1) pose a major risk because the fuel rods still need to be cooled.
- The effects of major accidents are unpredictable. Therefore, nuclear energy as a whole is far too dangerous and carries an incalculable risk potential.

Nuclear energy is also uneconomical: Economic studies on nuclear energy conclude that - in addition to the technical risks and the unsolved problem of storing radioactive waste - there are three central risks: The enormous costs of construction, uninterrupted operation and uncertain electricity prices could bring even the largest operator to its knees, according to Citigroup. Since 2003, construction costs for nuclear power plants have increased by an average of 15% per year, as an MIT study showed (see Müller/Frommberg in Schweizerische Handelszeitung, March 17, 2011). For example, the expenditure for the newest nuclear power plant in Finland increased from the planned 3 to 5.3 billion euros, and instead of going online in 2009 as planned, the commissioning was delayed by years. An investigation of the French nuclear program by Anulf Gubler found the following: From the 1970s until 2000, France had built 58 nuclear power plants. As experience grew, construction costs should have dropped. Instead, Gubler noted a "negative learning effect": "The nuclear power plants became more and more expensive. Operationally, nuclear power plants are not getting cheaper either. One of the central cost drivers here is the uncertainty regarding regulation. Stricter controls lead just as often to interruptions in operation as higher safety standards, which make retrofitting necessary. If a nuclear power plant has to be taken off the grid, this has a massive impact on its profitability because of the high fixed costs" (Müller/Frommberg in Schweizerische Handelszeitung, 17.3.2011).

In November 2014, the Swiss Federal Audit Office criticized the funds covering the decommissioning and disposal costs of nuclear power plants. Today, the costs of decommissioning and disposal of nuclear reactors are estimated at around 20 billion Swiss francs (Scruzzi in Neue Zürcher Zeitung, 27.1.2014:9). The Swiss Federal Audit Office criticized, among other things, that the cost forecasts were too low and unreliable, which is why a safety margin of 30% had to be added to the cost forecasts (cf. Scruzzi in Neue Zürcher Zeitung of 27.1.2014:9). Later, the provision rate had to be increased further.

Nuclear power plants cannot be operated profitably without state subsidies. The state is not only liable for the financial risks of building nuclear power plants, but also for the costs of a major accident. In the event of damage exceeding the insured 1.8 billion Swiss francs, the power plant operators are liable, and if their capital is insufficient, the state. In addition, the economic costs of final disposal are incalculable. In France, too, the costs and especially the follow-up costs of nuclear energy were completely underestimated. After the Court of Auditors criticized the insufficient provisions for the demolition of nuclear power plants and for final storage, Paris unceremoniously extended the deadline for the formation of provisions for operating company EDF from 2011 to 2016 (Bläske in Neue Zürcher Zeitung, July 14, 2011). According to estimates, nuclear energy in France was subsidized to the tune of more than €50 billion from 1946-1992. Analysts do not consider nuclear energy profitable, taking into account the subsidies and the costs of decommissioning, retrofitting, dismantling and disposal. UBS also advises private investors against investing in new nuclear power plants: €7 billion in capital costs, long planning and construction phases, and political uncertainties pose incalculable risks (Bläske in Neue Zürcher Zeitung, July 14, 2011).

Nuclear power plants exert a further negative influence on real estate prices: A study by the University of Bern and the real estate consulting firm IAZI found that nuclear power plants near residential properties cause their value to decline. In particular, houses located 2.5 to 3 km from nuclear power plants are worth 9% less than comparable houses located at least 15 km from the nuclear power plant. At a distance of 5 km, the loss in value is 6%, and at 10 km, 1.1%. Surprisingly, the value then increases again in the immediate vicinity of a nuclear power plant (i.e. up to 2.5 km). As a reason for this effect in the immediate vicinity of the nuclear power plant, the authors of the study cite the increased demand of nuclear power plant employees for residential property in the immediate vicinity of the nuclear power plant and lower tax rates in the siting municipalities thanks to compensation payments. The study is based on 37,000 changes in ownership between 1981 and 2007 (Neue Zürcher Zeitung, 10.2.2011).

2.2.3 "Bioenergy"

The question arises whether the impending energy shortage can be overcome with the help of "bioenergy". Classical bioenergy is produced from carbon dioxide, water and sunlight, in which plant "biomass" is produced and converted into "biogas", alcohol or "biodiesel". In 2011, Brazil already used one tenth of its cultivated area to produce fast-growing sugar cane in order to ferment the sugar thus obtained with yeast into alcohol (cf. Schatz in Neue Zürcher Zeitung, Aug. 22, 2011). In this way, the country at least achieved that "bioalcohol" can compete with gasoline without government subsidies. In the cooler U.S., corn is used as a feedstock for bioalcohol, while European countries rely on oleaginous crops. Schatz (in Neue Zürcher Zeitung, Aug. 22, 2011) rightly pointed out that "bioenergy" produced in this way is not as ecological as it seems: for example, the plants used for this purpose usually store less than 1% of the incident sunlight, and sugar cane plantations produce less than one liter of alcohol per square meter per year in the best case. In addition, intensive production requires the use of vast amounts of water, often forces soil erosion, and the use of fertilizers often contaminates groundwater. Not to mention the fact that in various countries the agricultural land needed for the production of "bioenergy" is then lacking for the production of food.

All this shows that agriculturally produced "bioenergy" is unlikely to be a sustainable solution to the energy question.

2.3 The problem of "planned obsolescence"

In September 2012, the National Council - i.e. the large chamber of the federal parliament - dealt with a motion by the Green politician from Vaud, Adèle Thorens Goumaz, on the problem of "planned obsolescence". "This is a strategy to maintain demand by deliberately manufacturing the life of products to wear out prematurely," explains the Green politician (see Moneta of 21.11.2012:8). It is historically documented that after World War I, light bulb producers such as Philips, Osram and General Electric decided to limit the life of light bulbs to 1000 burning hours, and this despite the fact that Edison's first light bulbs in 1881 already lasted more than 1500 hours (cf. Moneta of 21.11.2012:8). In the GDR, light bulbs burned for an average of 2500 hours and in China even 5000 hours (cf. Reuss/Dannoritzer 2013:23). In 1953, the U.S. manufacturer General Electric was convicted in an eleven-year trial for illegal price fixing, and at the same time the court also banned artificially reduced lifetimes for products ("planned obsolescence"). But that didn't help much. For example, the chemical company DuPont developed fine pantyhose whose plastic mixture was subsequently modified so that consumers had to buy pantyhose more frequently (see Moneta, 21.11.2012:8). But there are also many more recent examples. Epson, for example, installed a chip in the machine that paralyzed the machine after a certain number of printing operations - and repair was either not possible or too expensive (cf. Moneta of 21.11.2012:8). In the 1980s, rumors circulated that certain car manufacturers deliberately degraded the exhaust to reduce its service life. Andreas Lorenz-Meyer (in Neue Luzerner Zeitung of 18.9.2013) cited the following examples of artificial quality deterioration or deliberately making it more difficult to repair products:

- Bonding of built-in components or the housing of laptops to make repair more difficult or impossible.
- Springing of on/off switches on computers or monitors made of plastic instead of metal, leading to premature material fatigue.
- Weak joints between headphone cables and plugs, causing the cable to break quickly.
- Soft plastic gears in the worm gears of hand mixers instead of metal gears, which break quickly.
- Poor quality of shoe soles or the glue of shoe soles, so that they are defective more quickly.

For sure there are a lot of other examples, which have just not been made public. One can imagine the enormous economic and especially ecological damage caused by such practices.

Case study: obsolescence in hiking boots
A few years ago, I bought a pair of brand-name hiking shoes. Although I wore them little, on the same day first the front half of the shoe sole on the right shoe came off and 10 minutes later the front half of the shoe sole on the left shoe came off, exactly in the same place. Other than that, the shoes were perfectly fine. A production defect on two shoes is rather unlikely after all, and the simultaneity of the detachment indicates that the temporal "runtime" of the shoes was exactly planned - e.g. by a time-limited adhesive ability of the glue.

Another form of obsolescence is the massively increased willingness to simply throw things away: From disposable razor blades (since 1891!) to disposable tableware, disposable lighters to disposable cameras and disposable cell phones, the wear and tear is immeasurable. As early as 1928, the American web magazine "Printers' Ink" wrote: "An article that does not wear out is a tragedy for business" (quoted from Reuss/Dannoritzer 2013:29). To put it somewhat exaggeratedly: many companies live from the fact that previous consumer goods - which can usually be used for many years - are turned into consumer goods so that they can be replaced as soon as possible. This is precisely where the capitalist system leads itself ad absurdum, and it ultimately becomes an obstacle to progress.

In the 1930s crisis, there were even ideas to overcome the depression, to give all products a state expiration date, and to punish all who used it longer with fines or imprisonment (cf. Reuss/Dannoritzer 2013:40/41)! The modern economy has achieved this goal much more efficiently and subtly: if a color-matching Swatch watch is bought for every piece of clothing, or if everyone uses sunglasses that specifically match the outfit, their sales skyrocket massively.

Vance Packard has described three types of obsolescence (cf. Reuss/Dannoritzer 2013:47): First, functional obsolescence: This occurs when a new product performs more or fulfills its function better than the previous product. This type of obsolescence often - but not always - makes sense: for example, in the case of more powerful medical devices. But this is not always the case: if, for example, the computer industry produces ever more powerful PCs or notebooks equipped with new operating systems on which previous programs no longer run, only to be able to process larger amounts of data - e.g. from computer games - this makes no sense for all those users who do not consume PC games. Because the industry succeeds in implementing ever higher standards (processor performance, graphics cards, memory capacity, etc.), there is a tremendous amount of wear and tear. If you only want to write a few letters on your word processor, you don't need 90% of the functions of modern word processing software.

Secondly qualitative obsolescence: This kind of obsolescence leads to the fact that a product fails after a certain, planned time - e.g. a printer, which is blocked after a certain number of printed pages, although nothing is defective and only because a chip in the device or in the ink cartridge artificially causes the blockage.

Thirdly, psychological obsolescence: This most sophisticated form of obsolescence leads the consumer to believe that a qualitatively still functional and optimal product appears to be obsolete - for example, because it no longer corresponds to current fashionable ideas (design!). If, for example, I still use a second-generation cell phone to make calls, even though the latest generation of smart phones or I-Phones can do much more - and I shy away from using my outdated cell phone in public, then that is psychological obsolescence.

Psychological obsolescence ("obsolescence of desiderability"; cf. Reuss/Dannoritzer 2013:56) arouses the consumer's willingness to replace his or her purchased (and functioning!) product with a new one. This brings us to the realm of marketing: the focus is not so much on the product as on influencing the psyche of the consumer.

2.4 Ethical conclusions

Business ethicist Johannes Wallacher (in Herder Korrespondenz 12/2011:610) has pointed out that growth should never be an end in itself and is never a sufficient condition for greater prosperity and quality of life. Growth "can certainly be an important means to this end, but it requires ethical guard rails in two directions: First, growth must be broadly effective, i.e. it must reach the breadth of society and not increase inequality ever further; as far as possible, everyone should benefit from growth. Secondly, growth must be environmentally compatible, resource-conserving or resource-efficient, and climate-friendly, so as not to reduce the prosperity opportunities of future generations" (Wallacher in Herder Korrespondenz 12/2011:610). And thirdly, all products should also be technically optimized in such a way that their service life is extended as far as possible and in no case deliberately shortened by measures on product components.

Basically, the consumerist worldview - "I consume, therefore I am" and the self-image dependent on consumption power (i.e.: financial resources) should be changed in the direction of sustainable frugality, in the sense of "frugality = quality of life". This does not mean - as is often assumed - a reduction in the (material) standard of living, but a reduction to the essentials and equal consumption opportunities for all.

2.4.1 General implications for the energy sector

In order to achieve a restructuring of energy production and consumption in the direction of renewable energies, suitable control instruments are needed. These should

- promote the expansion and renewal of electricity grids,
- support the decentralized production of renewable energy,
- reward energy saving and
- help reduce transportation and mobility.

It seems crucial that renewable energy be made cheaper rather than artificially increasing the price of fossil and nuclear fuel. Every effort must be made to win homeowners and private transportation operators over to a new energy policy - and you get them on board by showing them alternatives to current practices, not by simply making current practices unaffordable. For example, penalizing homeowners through tax or fiscal charges for poorly insulated homes only dries up the housing market while making housing unaffordable. Additional tax breaks for low-energy properties, for example, would be conceivable.

But this also requires creating adequate metrics. For example, the current practice in Switzerland of measuring heating energy consumption by square meter of living space is nonsensical because, for example, older houses have room heights of 2.8 m or 3.2 m - they have higher heating energy consumption than houses with 2.4 m high living spaces simply because of the larger volume.

2.4.2 Conclusions for nuclear energy

Eike Bohlken rightly demanded (in Herder Korrespondenz 5/2011:228) that nuclear energy should not be judged in isolation from other ecological issues such as climate change. From an ethical point of view it has to be taken into account that nuclear energy - in case of an accident possibly for thousands of years - and in normal operation for years to come prevents the development of renewable energy. If one takes into account that the real costs of nuclear power are much higher, if one includes the costs of accidents, the storage of radioactive waste and the dismantling of nuclear power plants, than this is reported and practiced today. Like any other energy source, nuclear power must be subjected to a rigorous life cycle assessment, including the considerable CO2 emissions from uranium mining. Then, at the latest, the allegedly "environmentally friendly nuclear energy" is revealed for what it really is: an extremely expensive form of energy that is burdened with incalculable risks.

But what would assessment criteria for sustainable energy look like? According to Bohlken (in Herder Korrespondenz 5/2011), all criteria important for the common good, in particular ecological, economic and social criteria, would have to be included. Only what serves the long-term survival of all people and our planet deserves the designation sustainable.

3. Control Questions

1. Which production factor is likely to limit economic growth?
2. Which countries or groups of countries have the greatest growth potential today?
3. How has economic growth developed in China, India and Brazil since the financial crisis of 2008/2009?
4. How have commodity prices developed since 2000?
5. What influence will socio-demographic developments - in particular the ` age trend - have on economic growth in the major economic areas?

6. How would a stronger redistribution of wealth and income from top to bottom affect economic growth?
7. Why can falling profit rates affect growth?
8. Why are accidents in complex chemical companies or nuclear power plants so dangerous?
9. What three factors worsened the global energy supply in 2011?
10. What does "planned obsolescence" mean?
11. Name and explain the three types of obsolescence according to Vance.

4. Links

Sichert ständiges Wirtschaftswachstum den Wohlstand?
http://www.wissenschaft-technik-ethik.de/wirtschaftswachstum.html

Wirtschaftswachstum
Wachstum, Quantitatives Wachstum, Qualitatives Wachstum
http://www.bpb.de/wissen/ZUKJJM

Wirtschaftswachstum und Nachhaltigkeit: ein Widerspruch?
Artikel von Mathias Binswanger
http://www.mathias-binswanger.ch/inhalt/Zeitungsartikel/dieVolkswirtschaft_08D_Binswanger.pdf

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