



# Sustainability – a historical overview

Guest commentary for BASF from Prof. Franz-Josef Brüggemeier  
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# Sustainability – a historical overview

A search for the term **“sustainability”** in Google yields over 1.3 billion results – a clear indication of just how widespread this word has become. Currently, there is probably not a single institute, company, political party or product that does not claim to strive towards sustainability – or at least have this expectation leveled at it. This applies equally to cars, computers, marmalade, jeans, confectionery or chewing gum as it does to fashion, chemical procedures and even marriages, all of which aspire to be sustainable. Both large corporate groups and small companies, political alliances and religious communities use this term, demonstrating the extent to which the topic of sustainability permeates our world and showing just how important the debates and activities associated with it are.

The dissemination of the term is even more remarkable when we consider its short history. The concept originates from Germany in the year 1713, when Hans Carl von Carlowitz, Head of the Saxon Mining Office in Freiberg, requested a “sustainable use” of forests in which the amount of wood cleared in a forest could only be equal to the amount that was planted. Although his forestry colleagues gradually began using the term, it remained part of the specialized language used only by experts in this field. The situation only changed almost 300 years later, when the Brundtland Commission released its report titled “Our Common Future” in 1987 on behalf of the United Nations. The document suggested that humans should act in line with the concept of sustainable development and formulated a definition which

is still vital today. Sustainable development is “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”

This report was first published in English and used the word “sustainability,” which was translated as “Nachhaltigkeit” in the German version, thus reimporting the term to the country from which it originated, yet where it was never used outside of exclusive circles. Contrastingly, the word is now spreading across the globe at an extraordinary pace and is enjoying impressive success; yet there are doubts cropping up around it. Terms which become so widespread and are used by a wide range of people and groups can lose their original clarity and distinct meaning. This is the other side of the coin of success, and also applies to “sustainability” as a term.

On a very general level, a consensus can be achieved around the suggestion of the Brundtland Commission (i.e. the needs of the present cannot compromise the living conditions of future generations). However, if we wish to explain in more detail what this really means – i.e. what makes computers, razors, confectionery or factories sustainable and which practical consequences can be derived from the term – the number of answers is incomprehensibly large, diverse and also contradictory. Everyone who follows the current debates on the subject is aware of this issue. They will encounter very different analyses, ideas and targets that did not exist when the concept was first used in 1713, long before the advent of industrialization.



# Sustainability and the world prior to industrialization

When Carlowitz spoke about the sustainable use of the forests, machines, factories or industrial products – such significant parts of our lives today – played as minimal a role as coal, oil and other non-renewable resources. The yields from agricultural activities were far more important for the survival of humanity. This was not limited to nutrition, but also applied to trades and operations which were all directly or indirectly dependent on agricultural raw materials: cotton, hemp, flax, straw and above all wood, which were harvested from the ground, but also wool, leather, bone and countless other products which were procured indirectly through animal husbandry or methods of processing animals or plants.

Wood was a particularly important product – as well as being the most important energy source, it was also the key raw material in this era. It was the construction material of choice for houses, ships, wagons and other means of transport, and was used to make everyday objects such as cutlery, tables, chairs or beds, as well as tools for trade and production. Wood was used to manufacture the spinning jenny, the first industrial spinning frame and an iconic symbol of the Industrial Revolution. The demand for the raw material was particularly high in mining, where enormous amounts of wood were used to secure tunnels and process ores and coal. It is not a coincidence that Carlowitz, himself a miner, was so worried about a sustainable supply of wood.

Let us put it this way: Prior to the Industrial Revolution, people mainly used organic raw materials which grew back and were therefore renewable in the current sense of the word. However, these materials only grew back slowly, had limited availability and required careful use. Despite this, it was frequently the case that more resources were used than grew back. This resulted in overexploitation, which was only possible for a few years before endangering livelihoods and triggering catastrophic events. To avoid these scenarios, societies had to use their resources sparingly or, as we say today, sustainably. Carlowitz may have been the first

person to formulate the concept of sustainability, but the practical meaning of the word has existed since time immemorial and was a prerequisite for survival in the long term. At the same time, the proposal of Carlowitz heralded an important development. He wanted to conduct the previously used method in a more systematic manner and precisely determine the amount of wood which grew back in the forests. His focus was on wood as a raw material and not the forest as an ecosystem, or even general ecological sustainability. Neither did the term have the same inherent meaning as it does today when used in an economic, political or societal sense. This is understandable, as the sustainable supply of wood and other resources was simultaneously both very precarious and highly important, which meant that it demanded all the attention. There was a frightening dependence on nature, wind and weather, rain or dry periods from our current standpoint. Bad harvests were a frequent occurrence, storms and severe weather caused great damage, and illnesses and diseases were a part of daily life, while life expectancy was shockingly low at just 30 to 40 years.

In other words, in the period before the Industrial Revolution, companies had to use the available resources sparingly and in a sustainable manner. However, the sustainability of these products was strictly limited and did not provide the same level of stability and security we associate with the current interpretation of the term. Sustainability as it was understood in that era was fundamentally dependent on the resources and harvests provided by nature. This was subject to significant fluctuations and the people knew both good times and times of extreme difficulty, meaning sustainability in that era was precarious and always in danger. Today, we possess far better economic, technical and scientific methods, while the political relations are far more stable, meaning the aim of sustainability has a far more solid foundation upon which we can build. Despite this, the challenges we face are significantly greater, as the Brundtland Report vividly showed.



# Industrialization and sustainability

## Growth and prosperity

When the Brundtland Report was published in 1987, just over 200 years had passed since the beginning of the Industrial Revolution. A short period in the grand scheme of the Earth's history, yet a period in which the world underwent fundamental change, not least through continuous economic growth. This growth was not linear, but was, and is, characterized through reoccurring crises, such as the Great Depression in the 1930s, which resulted in massive economic downturns and millions of people becoming unemployed. Crises of this nature still occur today. Still, the continuous economic growth since the beginning of the Industrial Revolution is impressive and has resulted in fundamental changes, including effective medication and therapies, an increased level of education, numerous technical innovations, scientific progress and the overcoming of grinding material poverty, including concern about famine, thus bringing about a far higher quality of life. We take all this for granted today, but from a historic standpoint it represents a fundamentally new phase which only began in Germany around 150 years ago. It took many years before the changes were felt, and even longer before they reached the lower classes in society. Other disadvantages and social inequality continue to exist, mainly due to age, descent or sex. However, despite this, the quality of life has improved significantly compared to the eras prior to the Industrial Revolution.

An important reason for these changes was the rapidly increasing significance of non-renewable energies, amongst

which coal became the main driver of industrialization. This provided a virtually inexhaustible amount of resources which did not have to be renewable; although these did not quite eliminate the dependence on nature and the weather, they reduced it considerably. After all, coal and other fossil fuels were not only used to warm houses and provide a source of heat, but also to power machines, enable trains and steamboats to achieve previously unimaginable speeds, create light, mine and process huge amounts of ore, drive the development of modern chemistry and, in general, establish a type of economy which still continues to use renewable raw materials, but is no longer completely dependent on them.





# Environmental problems and fear of catastrophes

However, ongoing economic growth also brought about a constant deterioration in the environmental situation. The scale and types of impact on the environment increased; slowly at first, but ever more quickly during the course of the 20th century. For many years, high hopes were placed in the “self-cleansing” properties of rivers, which were able to break down pollutants. The distribution of emissions using tall chimneys also provided a temporary solution. However, the rivers had to absorb ever greater amounts of pollutants until even the Rhine, with its huge masses of water, was unable to cope, and fish began dying. The emissions in the air also increased and spreading them around was no longer a solution, but rather resulted in even distant areas becoming affected by them. Ever more products were manufactured, and ever greater amounts of pollutants released – which were no longer based on natural sources, but were the result of modern chemistry and overburdened the possibilities of self-cleansing. Particularly in the years after 1945, modern chemistry experienced numerous scientific and technical breakthroughs and completely new products were manufactured. These included nylon, PVC and numerous medications which provided both important relief and previously unimaginable medicinal success, or pesticides which enabled agricultural processes to become far more productive. However, the other side of this success is that these products interfered in natural processes. As a result, ever fewer amounts were broken down and this led to mutations in animals, plants and humans.

There is much to be said that the burden on the environment reached its new zenith in the 1960s and 70s in industrialized countries, including in the Federal Republic of Germany and the GDR. Accordingly, more and more people protested against the pollution of the environment and wanted to undertake measures to avoid it, including doctors, scientists, engineers, public authorities, the media and increasingly also civil initiatives. These protests were nothing new as they had existed since the beginning of the Industrial Revolution, but they did not receive widespread support for many years and usually focused on individual issues. A general awareness of environmental issues, which encompassed numerous problems, only came to the fore slowly. Environmental protection played a minimal role as late as the 1969 Bundestag election campaign in Germany, with a survey held in 1970 showing that 60% of those questioned

had not even heard of the issue. And this despite the growing reports of catastrophes in Germany and across the world.

At the time, people feared a population explosion which would result in millions of deaths from starvation, complained about poisoning through environmental toxins, reported on increasing levels of radioactivity and warned of an ecological catastrophe. Der Stern reported on a “Toxic war in Germany” in September 1970, while in the same year, the Süddeutsche Zeitung described a ticking time bomb: “Strontium in milk and oil in the Baltic Sea, smog in towns and slow-moving traffic on crowded roads always have a shocking impact.” In October 1970, Der Spiegel reported on global environmental catastrophes and growing health risks. Even the rather conservative paper, Bunte Illustrierte, wrote on December 8: “We are destroying ourselves. Our environment is poisoned and humanity is in great danger.”

These fears were further supported by the “Report to the Club of Rome” entitled “The Limits to Growth,” published by Americans Donella and Dennis Meadows in 1972. They had been tasked with determining the implications of continued worldwide growth and set about this task with the help of numerous colleagues and highly complex computer models before coming to a clear conclusion: Should humanity continue developing at the same rate, the ecological, social and economic equilibrium would be in great danger. Humanity would reach the limits of growth and would jeopardize its own existence.

This publication took the debate on environmental issues to the next level. According to the report, the future of mankind was in great danger – not just on a local, regional or national level, but on a global scale. And the previous attempts at finding solutions to these issues were insufficient, according to the authors of the report. They proposed the development of a global system which had to be “sustainable” in order to prevent a sudden and uncontrollable collapse. This was the first time that the adjective “sustainable” was used in such a prominent fashion.





# Development and growth

## Zero growth?

The increase of environmental problems was only one of the possible consequences described in the report. The main concern was a different aspect: Continued growth would result in raw materials running out in the foreseeable future. To prevent catastrophic crises, industrialized countries were therefore to stop the growth of their economies, with zero growth being an absolute necessity.

This demand was met with particularly sharp criticism, especially as it directly contradicted the positive experiences that had arisen from growing economies from the beginning of the Industrial Revolution and in particular since the end of the Second World War. Critics warned against forcing large parts of the global population to live in poverty. They insisted that economic growth, further research and improved technologies were absolutely necessary to solve the problems in less developed countries in particular – with the possibilities of increasing production efficiency, consuming fewer resources and developing alternatives all being underestimated by the Report to the Club of Rome.

## Development and growth

These arguments were shared by the Brundtland Report, which added developmental aspects to the understanding of sustainability and spoke of sustainable development. At first glance, this addition almost seems meaningless, however it carried significant import. By adding “development” to the term, it implied that further technological progress, economic growth and other changes were not just options, but requirements. Only by following this path could new ways be found to safeguard the opportunities of subsequent generations and to achieve sustainability.

The emerging countries in Latin America, Asia and Africa valued this approach in particular, as they had to and have to attain secure livelihoods for their people. This position was also officially supported at the “United Nations Conference on Environment and Development,” which was held in Rio de Janeiro in 1992 and during which the Rio Declaration on Environment and Development was produced. The document is still important today and states at the very beginning that “human beings are at the center of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature.”

The declaration not only underlined the necessity of further developments, but also supported an expanded concept of sustainability which comprises more than just the safeguarding of basic ecological principles. In order to live a healthy and productive life, sustainability would have to be ingrained in society, politics and the economy. Since then, sustainability has been based on three elements: ecology, economy and politics/society. In other words: Life in a future world is not desirable and therefore not sustainable if ecological goals are met, yet at the same time political suppression is rampant, inequality and injustice are widespread, or discrimination due to age, sex, descent or religion prevails.





# Sustainability in the economy, in politics and in society

A glance at the more recent history of Europe shows just how important this comprehensive understanding of sustainability is and how the three elements are interlinked. Historically speaking, Europe not only experienced the emergence of an industrialized world with its remarkable economic growth, but also bitter struggles for democratic participation, greater legal security and increased equality. These goals were gradually met over time in the face of great resistance, with most only being achieved after 1945, although there are still shortcomings today. Despite this, we have since experienced decades of peace, political and social stability and significant improvements in society – all factors which were, and still are, vital prerequisites for economic growth and successful environmental policies.

The expanded meaning of sustainability is often criticized, as it is seen to endanger the priority assigned to ecological targets. Initially, this criticism appears justified and is currently widespread amongst followers of the Extinction

Rebellion movement. However, ecological goals can only be met with the broadest possible consensus, political stability and diverse participation options. Only when this is in place can the necessary but often painful steps on the path to sustainability be implemented. Accordingly, the Brundtland Report states that “sustainable development is a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development; and institutional change are all in harmony.” This could help us “enhance both current and future potential to meet human needs and aspirations.”





# Challenges and opportunities

In applying this comprehensive understanding of sustainability, it cannot come as a surprise that the term is now used across almost all areas. This development may be irritating, but should be welcomed, as sustainable development and a desirable future can only be achieved if this development takes place simultaneously across numerous areas and results in diverse changes. However, this increases the uncertainty as to what the specific implementation methods should be, whether priorities exist and, if so, what they are, and how the numerous, oft deviating objectives can be linked. While there are no contradictions on a general level, in practice there are numerous challenges. To pick out a single area as an example: What does a sustainable fiscal policy entail? Should governments reduce their expenditure and avoid deficits so that subsequent generations are not saddled with debt? Or should they not only accept debts, but increase them to help finance infrastructure, education or environmental protection projects, therefore helping create better conditions for future developments?

Another example is the fundamental question as to whether further economic growth should take place. The Club of Rome issued warnings against it and, in light of the now significant environmental issues, this warning has received increasing support. Yet the counter-arguments from the less industrialized states in Latin America, Asia and Africa still apply: Economic growth has proved to be the best option for improving the living standards of poorer people, but this does not mean that everyone will benefit equally, as many experiences have shown. This is not an argument against growth, but an indication of the importance of political control, or the expanded concept of sustainability, in order to fairly share the bounty of growth.

At the same time, economic growth is a very general term which comprises areas that do not necessarily need to expand, including the use of disposable items, rapidly shifting fashion trends, plastic waste or vehicles with high fuel consumption. Qualitative growth would appear to be desirable. This aspect is the subject of many debates as to where growth should take place, but the

devil is in the detail here too. Should the use of electric cars and scooters be promoted, and with it, private use? Or would it be better to invest more money into expanding the local public transport networks? Should people be restricted from traveling to far-flung countries on vacation, as this causes greenhouse gases to be emitted? Or should we continue to support opportunities to meet new people and gain greater understanding of other cultures?

Similarly difficult questions are posed in the fields of science and technology. Here there are also areas subject to great criticism, such as genetic engineering. Yet this procedure also provides important opportunities for manufacturing effective medicines or in the search for renewable energies. In general, both science and technology have had a significant impact on the environment since the dawn of the Industrial Revolution – but they have also provided myriad solutions. These include improved methods of discovering previously untapped sources of coal, oil and gas; sources which the Report to the Club of Rome predicted would soon be exhausted. Subsequently, the concern about the end of these raw materials dominated the global environmental debate for many years. On multiple occasions it appeared that “peak oil” had been achieved (i.e. the zenith of oil extraction) and that rapid decline was imminent. While these arguments still continue today, we are now facing an almost completely contradictory challenge. The current concern is not that we will run out of oil or coal, but that too much is available and is used. When combusted, these fossil fuels emit CO<sub>2</sub>.





# Challenges and opportunities

This is probably the most important challenge with regard to sustainable development: the imminent rise in global temperatures. There are many causes for this increase, and equally as many suggestions for halting it, including the aforementioned discussions on air travel and electric vehicles. The expansion of renewable energy sources and the avoidance of coal, gas and oil are of paramount importance. But here, too, the specific implementation of solutions raises difficult questions. How long will we need to rely on fossil fuels to ensure our energy supply in light of insufficient energy storage options? Which costs are acceptable and how will this affect the different sections of the population? What will happen to the jobs in coal power plants and former mining areas? Which alternatives can be found for the population and who will pay for them?

It is also difficult to deliver answers to these questions because, so far, no convincing and above all cost-effective technological solutions have emerged that effectively reduce greenhouse gas emissions. When the goal was to resolve the previous sources of environmental pollution, the requisite technologies were developed and proved very effective. These solutions included filters which trapped pollutants, effective treatment procedures, the cessation of problematic manufacturing procedures, the development of alternatives which hardly produced any hazardous emissions and products which had as small an impact on the environment as possible. Currently, it does not seem likely that similar procedures for greenhouse gases will be available in the foreseeable future. In an attempt to reduce emissions, it may be required to make comprehensive changes to the economy, society and politics and, for example, restrict consumption in general, cease using certain manufacturing methods, or even stop the production of problematic products altogether.

There is certainly no lack of ideas, as a quick search on Google will confirm. However, the large number of potential

solutions also indicates that there is no silver bullet we can fire to suddenly achieve sustainability. The challenges are far too complex and diverse for this and can only be mastered if sustainable developments are viewed as a process – as the Brundtland Report highlights. Process characteristics are often overlooked, yet are key. After all, “process” means ongoing change, during which the goals change as well as the associated procedures and technologies; change which knows both success and failure, which disappoints expectations and brings about new opportunities, and knows erroneous paths, but also previously unimagined solutions.

Achieving sustainability therefore demands openness in place of blinkers and experimentation instead of (claimed) certainty. Scientific findings will provide an important orientation guide along this path and can help warn us of potential errors. However, they cannot replace the required decisions. These can only be made after comprehensive discussions, disputes and even arguments. Only then will we be able to use the available technological, scientific and economic opportunities, reach the consensus required and therefore ensure not only ecological, but also economic, social and political sustainability.





# Curriculum vitae

## Franz-Josef Brüggemeier

1951

### Born in Bottrop

Study of history, social sciences and medicine

1982

Work as physician

1983

Work at distance learning university FernUniversität Hagen

1994

Work at the University Hannover

1998

He was a **professor of economic, social and environmental sciences** at the University of Freiburg between 1998 and 2018 and has published numerous books and essays on these topics for the period between the 18th and 20th centuries. He also examined the importance of sport in modern societies and the United Kingdom in the 20th century. His most recent publication is on the coal era in Europe from 1750 to the present day. In addition, he also managed multiple large historical exhibitions and was a visiting professor at Harvard in the summer term of 2012.

2018

