There is no future without risk

Photo: Axel Griesch

This article appeared in the newspaper Tagesspiegel on June 9, 2011.

The history of mankind is also a history of bold endeavor – without which our species would not be where it is today. From our origins in Africa, Homo sapiens has spread far and wide to populate the entire world. And we no longer need to trek on foot – we have since become motorized, and have even learned to fly. Driven by the spirit of discovery and invention, we have come a long way. Where would we be now if our ancestors hadn't repeatedly dared to be different and imagine the unimaginable?

We Germans struggle with a simple rule that former Federal President Walter Scheel so neatly formulated: "Nothing is achieved without risk, but without risk we achieve nothing." The Fukushima reactor catastrophe is a case in point: It was hard not to gain the impression from German media coverage that the thousands of victims were claimed, not by the earthquake and tsunami, but by the accident that befell the reactors. From such reactions, foreign observers are quick to diagnose a well-known malady: German angst – a collective panic response to potential threats, from swine flu to volcanic eruptions to the pathogen Ehec. Headlines such as "Deadly Germs Spreading" only serve to fan the flames of fear. The media fail to mention the fact that, in Germany alone, between 8,000 and 11,000 people die each year of ordinary seasonal influenza.

Fukushima, too, triggered far stronger reactions here than elsewhere. The recently made decision to extend the service lives of Germany's nuclear power stations was abruptly reversed – and with it the source of our energy. While experts at the National Academy anticipate that we will be able to shut down the nuclear stations in ten years, they also raise concerns about an accompanying short-term rise in CO_2. That is exactly what we were trying to prevent! In order to limit global warming to a maximum of two degrees by the end of the century, we must cut carbon dioxide emissions by half over the coming 40 years, and reduce them to zero by 2100 – according to current calculations by the Max Planck Institute for Meteorology.

In addressing the inextricably entwined problems of climate and energy, we are prepared to prioritize the short-term risk of a nuclear accident over the long-term risk of global warming. Risk researcher Gerd Gigerenzer of the Max Planck Institute for Human Development in Berlin offers this explanation: "Where many people could die all at once, we quickly become afraid. But where far more people are in danger of dying over a longer period, we perceive this as less of a threat. This may be a relic of our evolutionary history, when humans lived in small groups. If several members were to die, the survival of the group as a whole would soon be at risk."

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In our global village, however, we need different ways of thinking. For one thing, we need to plan not just for the years immediately ahead, but for the needs of our children and grandchildren. And in terms of energy in particular, we must consider the global dimension. Undertaking some savings measures and developing renewable energy sources may be enough to meet Germany's needs in the years ahead.

The global picture, however, is very different: Given the development particularly in the emerging markets, demand for energy will continue to rise steeply in the coming years. The international Energy Modeling Forum calculates that electricity demand alone will increase six-fold by the end of this century. To satisfy this increase with solar and wind energy, we would need to build 25 large solar energy plants every day for the next 90 years – or a wind turbine every ten minutes.

Let's be honest: We are not keeping pace. In order to even prepare the ground for a sustainable energy supply by the year 2100, we need a research campaign that will pave the way for new technologies. And that will take time. By way of example, researchers at the Max Planck Institute for Plasma Physics are striving to overcome the scientific and technical obstacles to the development of fusion power plants. These would allow us to safely produce vast quantities of climate-neutral electricity while conserving our resources. This goal could be reached by 2050, but only if Germany and Europe commit to massive investment in fusion research.

Biofuels could soon be extracted from lignocellulose, the basic component of straw, wood and many types of plant waste, without competing with the production of important food crops such as cereals, corn and sugarcane. Advances in biotechnology could enable us to manufacture microorganisms that convert the sugar stored in the lignocellulose into ethanol. In this way we could produce genuinely sustainable biofuel.

New ways of storing energy and, of course, binding carbon dioxide are central to the energy supplies of the future. Thus far, efforts to control the underlying chemical reactions on a large scale have proven technically ineffective. The Max Planck Society is therefore stepping up its activities in this area with a Max Planck Institute for Chemical Energy Conversion, where researchers will primarily investigate how electrical energy or sunlight can be converted into storable energy forms, such as methane and methanol. If they succeed, we can avoid the need for new power grids, electro-filling stations, etc. and simply avail ourselves of the existing logistics, such as gas pipelines and service stations. Economically, it would be a huge gain.

As these examples show, basic research has the potential to provide new technology platforms. The more technologically advanced a country is, the more its government should invest in basic research. And since tax revenues can be spent only once, we should be wary of using them to subsidize the production of industrial goods. We may gain a certain advantage in the short term, but this is not the path that will keep us at the forefront of technological progress in the long term.

Our future thus depends on our setting the right priorities: In the 1980s, Germany radically reduced its expenditure on energy research, and kept it at a low level for the past 20 years. While we spent just under 1.5 billion euros on work in this field in 1982, 15 years later our annual expenditure had fallen to just around 400 million euros. By comparison, between 1997 and 2006, Germany spent almost nine times as much money on subsidizing coal production as on energy research.

The German people themselves are not entirely in favor of unrestricted scientific research, either. An Allensbach survey recently commissioned by the newspaper Frankfurter Allgemeine Zeitung reveals that two thirds of those interviewed would like to prohibit research if the results may prove dangerous. This is alarming in that it shows that a large part of our society prefers ignorance to knowledge. Our affluent society will not get far with an attitude of "innovation, OK, but no risks please!" Especially when none of us want to accept any reduction in our present standard of living! In answer to the question of whether money would be better spent on advances in science or improving social security, less than one third would rather encourage scientific progress. That is neither a courageous response nor an adequate one. Not least because social security is a product of economic affluence, which in turn derives essentially from today's knowledge and innovations.

Basic research provides new technology platforms

Our affluence is a product of knowledge and innovation

Peter Gruss,
President of the Max Planck Society