

PERIODICAL #26



Dominik von Achten
HeidelbergCement
Leonhard Birnbaum
E.ON
Ignacio Cirac
Max Planck Institute
Martin Daum
Daimler Truck

Jens Holstein
BioNTech
Antje Kanngiesser
Alpiq
Kishore Mahbubani
UN Security Council
Milan Nedeljković
BMW

Dirk Schmitz
BlackRock
Christian Sewing
Deutsche Bank
Kurt Sievers
NXP Semiconductors
Ludovic Subran
Allianz

Zeitenwende

NextGenEurope

Remember Draghi?
Whatever it takes!
Leadership.

Making decisions in uncertainty. Of course a leader can be wrong. But no decision is a decision too. And continuously too little, much too late might be the worst.

We have all got things wrong, terribly wrong. And it isn't just Merkel: we all struggle to admit our mistakes and to change course decisively. Putin, on the other hand, needs no provocation to do whatever he wants. Or rather, us showing weakness to a bully escalates the risk of escalation. All gangsters consider or respect is strength.

So, we dream of more leadership in Europe. But what crisis followed by crisis really shows is that our problem is so much bigger than one weak person here and/or a crazy person there. What we really need is to break up the European Union. It is stuck, impossible to move. If not now, when?

Instead we need a NextGenEurope. With a governance that works. A Europe able to compete and to defend itself. Just imagine Europe as a family business in its third or fourth generation. The family is growing and it's proving difficult to get rid of tricky family members. But a shareholder agreement between the leading members truly helps to keep the business going.

So, let's start with an additional agreement between some core countries. Just an agreement, no additional structure. The prime ministers of these core countries decide by a simple majority on core unifying initiatives. A joint military, for example. This might be on top of whatever happens in the European Union. Or if not, they decide together and vote en bloc. Over time, more members might be admitted. But the rules are there to stay. And maybe at some point it might just replace the European Union.

Of course, Germany needs to take the lead. But first we and then everybody else need to believe that we can do it. I know it sounds crazy to take on this task. But let's plant the seed. Let's all talk everywhere to everybody. It's only impossible until it is not.



Yours

A handwritten signature in black ink, appearing to read 'M L P' followed by a stylized flourish.

Markus Pertl
Chairman of The Stern Stewart Institute

- 3** **Zeitenwende**
Editorial Comment
Markus Pertl
Chairman of
The Stern Stewart Institute
- 6** **Europe's Destiny
in the Asian
21st Century**
Kishore Mahbubani
Former President, UN Security Council
- 14** **Financial Sovereignty
is Key for Europe's Future**
Christian Sewing
CEO, Deutsche Bank
- 22** **Quantum Computing:
Is the Moon There
when Nobody Looks?**
Ignacio Cirac
Director, Max Planck Institute

- 30** **Making Quantum
Computing a Reality**
Kurt Sievers
President & CEO, NXP Semiconductors
- 36** **The Energy Crisis – What Now?**
Antje Kanngiesser
CEO, Alpiq
- 46** **Financing the Energy
Transition Isn't Possible
Without Private Capital**
Dirk Schmitz
Head of BlackRock Germany, Austria
and Eastern Europe
- 54** **Return of the Stoics:
It's all About Balance**
Leonhard Birnbaum
CEO, E.ON

- 64** **Green Concrete:
How to Transform the
Building Materials Sector**
Dominik von Achten
Chairman of the Managing Board,
Heidelberg Materials
- 72** **The BMW iFACTORY:
Securing Production
Excellence in a Changing
World**
Milan Nedeljković
Member of the Management Board, BMW
- 80** **The Case for Hydrogen**
Why Critics Get it Very Wrong
Martin Daum
CEO, Daimler Truck
- 88** **The Good, the Bad and the Ugly
of Sovereign Debt**
The Fed's Seismic Waves to Emerging Markets
Ludovic Subran
Chief Economist, Allianz

- 96** **From Chief Financial
Officer to Chief
Transformation Officer**
Jens Holstein
Chief Financial Officer, BioNTech
- 102** **The Stern Stewart Institute
Annual Summit 2022**
Review
- 112** **Imprint**

Europe's Destiny in the Asian 21st Century



Kishore Mahbubani
Former President
UN Security Council



Despite two world wars, the 20th century was good for Europe. By the end of the century, Europe had the richest and most socially harmonious societies in the world. After the end of the Cold War, Europe joined the US in believing that it had reached the “end of history”. Hence, it was perfectly normal for most Europeans to believe that they could just switch on their “auto-pilot” mechanism and cruise into the 21st century without making any major strategic adjustments.



“The past 200 years of Western domination of world history has been an aberration. All aberrations come to a natural end.”

The main thesis of this article is that as we move from the American 20th century to the Asian 21st century, Europe will have to switch off its “auto-pilot” mechanisms and make at least three major strategic U-turns to cope with a different global environment. Yet, to make these U-turns, Europe will first have to psychologically accept that the 21st century will be the Asian century. The rest of the world outside the West, which represents 88 percent of the world’s population has begun to do so. To the surprise of my German publisher, Springer Nature, my latest book, *The Asian 21st Century*, has been downloaded over two million times in over 160 countries.

Europe must also accept that this return of the Asian century is a perfectly natural development. From the year 1 to 1820, the two largest economies of the world were always those of China and India. The past 200 years of Western domination of world history has been an aberration. All aberrations come to a natural end. Since Western powers can no longer dominate the world as they used to, it should be natural and logical for Europe to consider making strategic adjustments, even strategic U-turns.

Interests, not ideology

Lord Palmerston said “We have no eternal allies, and we have no perpetual enemies. Our interests are eternal and perpetual, and those interests it is our duty to follow.” Palmerston was absolutely right. Interests come ahead of friendships in geopolitical calculations. Yet, many Europeans believe that they should sacrifice their own national interests in favour of friendship with the US.

One core national interest of European economies is to have access to the world’s biggest markets. And the world’s biggest markets will be in Asia, especially in China. Here are two statistics that drive this home. In 2010, the size of the US retail goods market was \$4 trillion, more than double that of China’s, at \$1.8 trillion. Yet, by 2020, China’s retail goods market was \$6 trillion, larger than that of the US, at \$5.5 trillion. The second statistic is about middle class populations. In 2000, the total middle class population of the three major Asian growth economies (China, India and ASEAN, the new CIA) was only 75 million. By 2020, it had grown to 1.1 billion and by 2030, it’s expected to reach 2.5 billion. Without good access to these markets, Europe’s industries will languish.

Europe is now under pressure to cut off or reduce its links with China. This is demonstrated by the fierce criticism that Chancellor Olaf Scholz and his business delegation received from the Anglo-Saxon media when they visited China in November 2022. Many of these criticisms said that Germany had sacrificed its “values” in developing closer economic ties with China. So could Europe integrate itself with the rest of Asia and ignore China? The answer is no. The Chinese economy is now deeply integrated with the rest of Asia. Here’s another statistic that drives this home. In 2000, US’ trade with the ten ASEAN countries was \$135 billion, more than three times China’s trade with ASEAN at \$40 billion. By 2021, US’ trade with ASEAN had grown less than three times to \$394 billion but China’s trade with ASEAN had exploded over twenty times to \$878 billion. With the launch of the world’s largest Free Trade Agreement, the Regional Comprehensive Economic Partnership (RCEP) in January 2022, East Asia will be even more integrated with China’s economy.

The first strategic U-turn that Europe will therefore have to make is to decide that access to the new integrated markets of East Asia is a strategic priority. Hence, more European leaders should emulate Chancellor Olaf Scholz and lead business delegations to China and East Asia. How many will have the political courage to do so?



Geography is destiny

The second strategic U-turn that Europe has to make is to acknowledge that geography is destiny. This is why geo-politics is a combination of two words: geography and politics. And geography is more important as geography will decide where the biggest threat to Europe will come from.

China is far away geographically from Europe. Hence China doesn’t threaten Europe. By contrast, Africa is geographically closer. The biggest long-term threat to Europe will therefore come from the demographic explosion in Africa. In 1950, Europe’s population was double that of Africa’s. By 2100, Africa’s population will be ten times that of Europe’s. Nigeria’s population could be larger than that of China’s.

If Europe remains affluent and Africa doesn’t succeed in development, there will be floods of African migrants, especially Muslim North African migrants, to Europe. In their book, *The Light that Failed*, Ivan Krastev and Stephen Holmes document in detail how the inflow of illegal migrants has fueled the rise of anti-liberal populist forces in Europe. Unless Africa develops, more illegal migrants will come. Quite naturally, more Donald Trump-like leaders will emerge in Europe.

“The big strategic question Europe will have to confront is this: should it put its own national interests first? Or those of the US?”

“Unless Africa develops, more illegal migrants will come. Quite naturally, more Donald Trump-like leaders will emerge in Europe.”

Clearly, because of geography, the main strategic imperative of Europe is to develop Africa. The best natural partner for Europe in Africa is the largest new investor in African economic development: China. However, there will be a complication. The US has clearly decided to launch a geopolitical contest to prevent China from replacing it as the number one power in the world. Anyone who doubts this should read my book, *Has China Won?* Hence, the US will object to cooperation between Europe and China in Africa.

In trying to prevent China’s rise, the US is acting like any other great power in world history. Its primary goal is to protect its own interest in remaining number one. However, due to geographical differences, this is not necessarily Europe’s paramount interest. The big strategic question Europe will have to confront is this: should it put its own national interests first? Or those of the US?



Compromise is ethical

A combination of the principles embedded in the first two strategic U-turns suggested above will also lead to Europe considering a strategic U-turn in an even more sensitive geopolitical challenge: its long-term relationship with Russia. At the end of the Cold War, there was a lot of promise that Europe could work with Russia to fulfil the vision of Gorbachev, to build a “common house of Europe”. For complex reasons, the European Union (EU) failed to achieve this vision. Instead, the relationship between the EU and Moscow are worse than they were during the Cold War (where there were civilized dialogues between leaders like Willy Brandt and Helmut Schmidt with their Soviet counterparts).

The Russian invasion of Ukraine is illegal. It violates international law. It should be condemned. The people of Ukraine should be helped. Yet, while all this is true, there’s still a difference between Asian and European perspectives on Ukraine. Asians don’t see the world in black and white terms. They see complexity. Most Europeans see the Ukraine conflict as

a black and white issue. Russia is evil. The West is virtuous, defending democracy and self-determination in Ukraine. Asians don’t see the Ukraine conflict in black and white terms. And, by the way, Asia includes the world’s largest democracy, India, and the third largest democracy, Indonesia. Neither has condemned Russia. Neither has imposed sanctions on Russia.

At the same time, the war in Ukraine has also impoverished millions in the global South. Hence, many Asians believe that it may actually be ethical to seek a compromise solution that will alleviate the sufferings of the Ukrainian people and the global poor. As of now, it would be suicidal for any European leader to advocate a compromise solution in Ukraine, even though there’s a strong ethical case for it. Hence, what might be a sensible and ethical U-turn for Europe to consider is politically impossible.

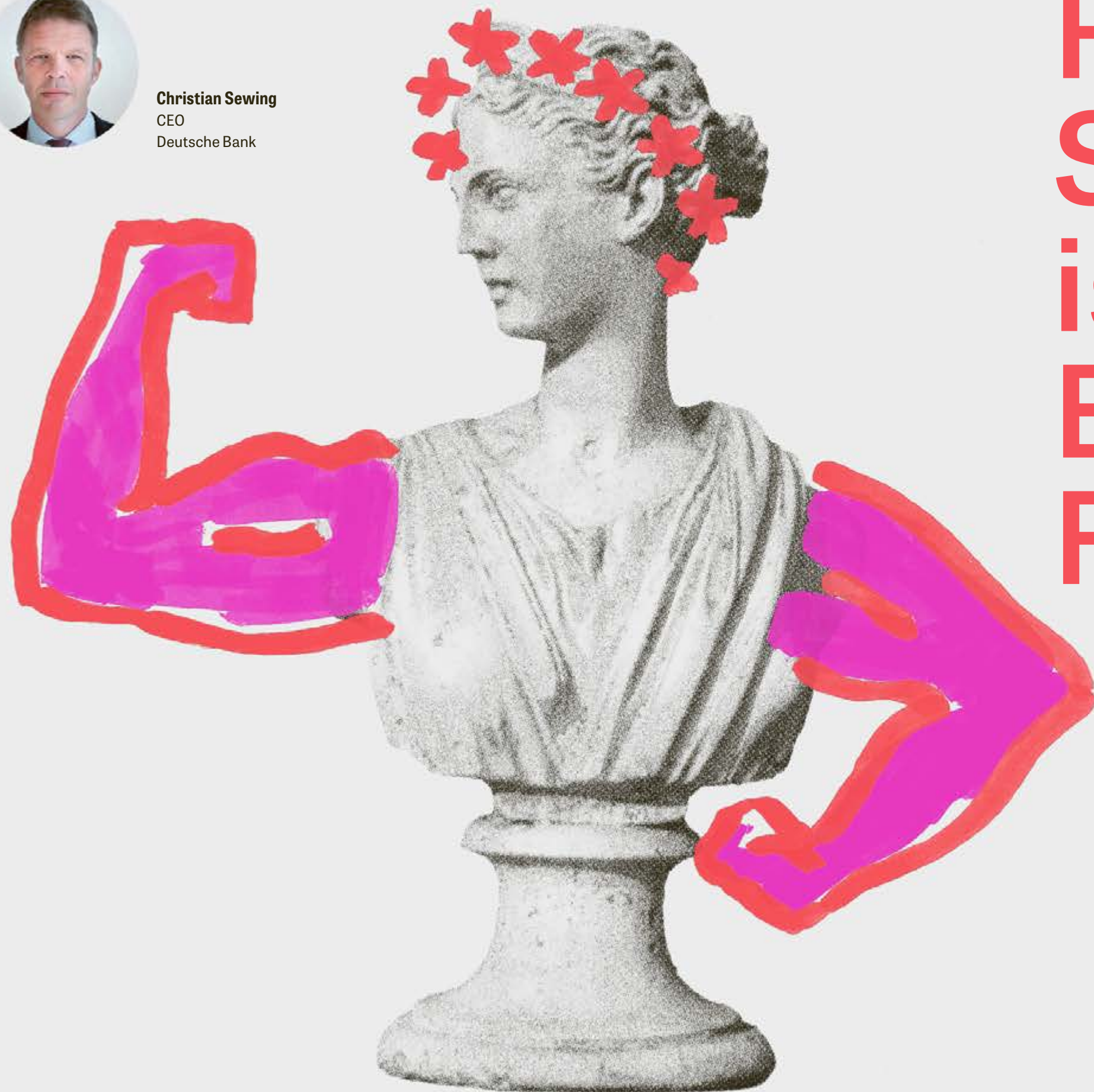
As a friend of Europe, who would like Europe to remain strong and free over the long-term, I can only suggest that Europe will have to consider painful U-turns now to prevent long-term pain later. And, sadly, if Europe refuses to consider such painful alternatives, it will be behaving like the proverbial ostrich: putting its head into the sand to protect itself. ■

Kishore Mahbubani, a Distinguished Fellow at the Asia Research Institute, NUS, is the author of The Asian 21st Century, an open access book which has been downloaded over 2.6 million times since its release in January 2022. He is also the author of Has China Won?

“And, sadly, if Europe refuses to consider such painful alternatives, it will be behaving like the proverbial ostrich: putting its head into the sand to protect itself.”



Christian Sewing
CEO
Deutsche Bank



Financial Sovereignty is Key for Europe's Future

2022 will be remembered as a year marked by risks and challenges to a degree we had not seen in decades. A war in Europe and inflation rates in double digits are things we had hoped to have banished to the history books.



Instead, what had already become increasingly apparent in recent years has been painfully underlined: we are living in times of significant uncertainties and there are several major developments that are beyond our control. And these developments will continue in 2023 and beyond.

It is even more important therefore that we set the right course for those aspects we can influence – and make courageous decisions on those we can control. There is a lot at stake for Europe, nothing less than securing our long-term competitiveness at a time of tectonic shifts in the global economy.

There are reasons to be optimistic: Europe is increasingly in demand as a partner in a time of growing conflict. Our liberal values and stable democracies are respected worldwide. And Europe is a pioneer in the field of sustainability – a topic that will shape the global economy for decades. This gives us a tremendous opportunity to generate growth.

“The past few months have shown us abundantly clearly how damaging and dangerous one-sided dependencies on individual counterparts are. We must reduce these dependencies and represent our interests more confidently on the global stage.”

Reducing dependencies

To do so, we must overcome structural deficits that are holding Europe back. The past few months have shown us abundantly clearly how damaging and dangerous one-sided dependencies on individual counterparts are. We must reduce these dependencies and represent our interests more confidently on the global stage. And this must go along with a serious push for European strategic sovereignty. This issue has been discussed for more than a decade now, but no effective steps have been taken in this direction. Instead, Europe was focused on dealing with one crisis after another. So, if we are to achieve strategic sovereignty, we must rethink Europe.

Now it is time to shift focus from saving to building our continent. We need an Agenda 2030 for Europe, an agenda that paves the way to finally create a genuine common market for 450 million people and consumers that is not split in 27 different jurisdictions. Like the Inflation Reduction Act in the US, this agenda should push innovation and define the fields that are crucial to transform Europe into a continent that not only ensures peace and freedom for its people, but also growth and prosperity.

Strategic sovereignty has several crucial facets: it is about defense, which was center to the early debates in Europe; it is of course about more independence in energy supplies; it is about supply chain adjustments and about securing the supply of essential tech components like semiconductors.

The need for financial sovereignty

But we also need to talk about how we are going to finance the immense investments that are needed if we are to achieve strategic sovereignty while at the same time mastering the non-negotiable green transition. This leads to an area which is far too often overlooked in the debate. And that is financial sovereignty.

Today, Europe lacks the capital and financing structures to raise the huge sums that will have to be spent on the realignment of our energy and raw materials supply, on digitisation and, in particular, on the transformation to a sustainable, low-emission economy.

“At a time when competition between the major economic blocs is becoming increasingly fierce and market positions for the coming decades are being fought over, it would be a serious mistake to become dependent on foreign countries for financing.”

This is a highly dangerous situation. At a time when competition between the major economic blocs is becoming increasingly fierce and market positions for the coming decades are being fought over, it would be a serious mistake to become dependent on foreign countries for financing. In fact, losing financial sovereignty for Europe would be just as bad as the energy dependence that is causing us so much pain right now.

To prevent this, the strengthening of the European financial market must be a fundamental chapter of an Agenda 2030 for Europe.



Three fields of action as agenda

For me, three fields of action are central here:

1 **Firstly**, the European Union finally needs an efficient and globally relevant capital market. While a Capital Markets Union has been discussed for years, there has been no serious push towards a common market to date. This leaves the EU with its patchwork of national markets with differing jurisdictions and low liquidity which eventually makes it uninvestable for large international capital pools. This must change urgently, because without attracting private capital at scale, Europe will not be able to compete in the long term. The EU's Green Deal, which is supposed to lay the foundation for a successful economy in the net-zero age, cannot be financed through bank capital alone. It will not happen without the Capital Markets Union.

2 **Secondly**, we need European politics to recognise the important role of banks and create a level playing field with global peers. Since the financial crisis, the European banking sector has become considerably less relevant on a global stage. This has a lot to do with our own mistakes, but also with the fact that banks and banking are still being treated primarily as a risk factor, despite the progress we have made since 2008. Consequently, banking services that are essential for clients, such as securitisations or leveraged finance, are hampered. This not only hurts banks but the entire economy, especially as European corporates, in the absence of highly developed financial markets, are much more dependent on bank financing compared to other regions, in particular the US.

3 **Thirdly**, and closely related, we should ensure that we do not constrain banks' lending facilities further and further at a time when the economy is in desperate need of funds. But this is what is happening, with ever new capital buffers being introduced and bank levies rising continuously. These have significant consequences because they weaken an important pillar of the economy. Regulation has done a lot of positive things in recent years to make the banking sector more robust and secure. But now the pendulum is threatening to swing too far, which threatens to further reduce the pull of European banks.

European banks as confidence-builders

Today, there are already not even a handful of banks in the EU that can operate on a par with the global industry leaders. But European strategic sovereignty is impossible without strong banks that can support its economy at full strength in all situations. In times of crisis and growing geopolitical tensions, it would be a strategic mistake to solely rely on non-EU banks. We need domestic banks that are deeply rooted in our economies and our societies and have proven to be trustworthy partners not only to their clients but also to governments who can rely on their strategic advice.

Strengthening Europe's financial sector is crucial for the medium- and long-term success of our economies. Banks can and want to be part of the solution to the challenges that lie ahead. But we can only do this in close cooperation with businesses, policymakers and regulators. We need to work together at all levels to move Europe forward.

Finally, we should also work on our mindset. We need determination and a can-do mentality, we need courage and the willingness to take responsibility. Europe has always been strongest when it has had leaders who have taken bold steps. And this is a call to action for us all.

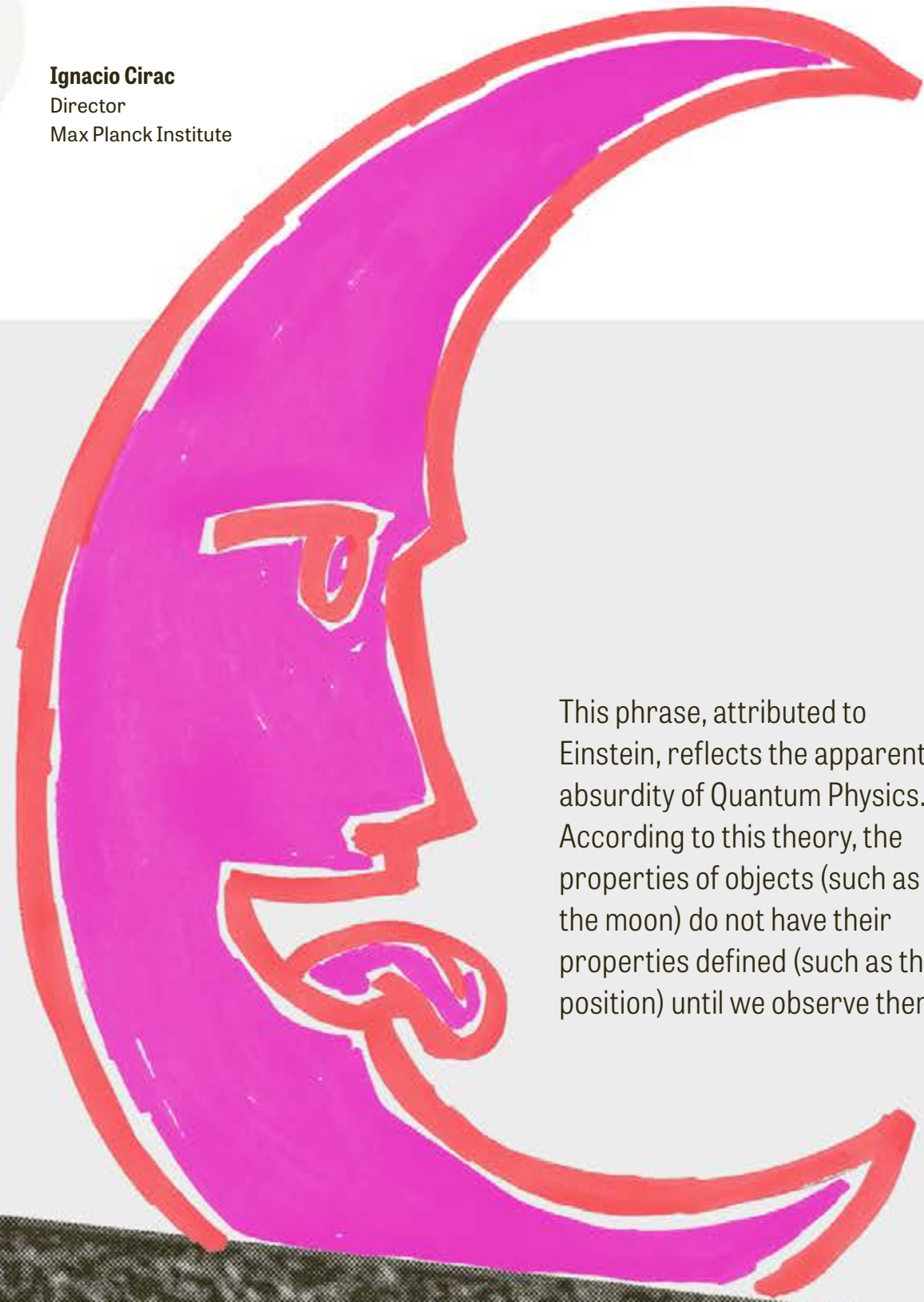
I hope that 2023 will one day be remembered as the year in which this realisation prevailed. ■



“Banks can and want to be part of the solution to the challenges that lie ahead. But we can only do this in close cooperation with businesses, policymakers and regulators.”



Ignacio Cirac
Director
Max Planck Institute



This phrase, attributed to Einstein, reflects the apparent absurdity of Quantum Physics. According to this theory, the properties of objects (such as the moon) do not have their properties defined (such as their position) until we observe them.

Quantum Computing: Is the Moon There when Nobody Looks?



Quantum computers exploit this curious feature of the microscopic world to perform calculations unthinkable even with the most powerful supercomputers available or ever to be created. But, are such quantum computers available? And if not, when will they be? And what will they be used for? We are living a very hectic time in the field of quantum computing, in which a big hype has been created based, many times, on unsubstantiated claims, and that can create many disappointments in the short term. It is time to analyze objectively what we have and what we can expect in the coming years, as well as all the uncertainties surrounding this subject.

What could quantum computers be used for?

Let's start with the last question. The quick answer is that we don't know very well. We only know of a few use cases where quantum computers could solve in a few minutes problems that would take more than the age of the universe (about thirteen billion years) on supercomputers. These problems are related to the deciphering of encrypted codes, or to questions that arise in scientific research. If we had a quantum computer today, all the cryptographic methods we normally use to communicate would no longer be secure, which would undoubtedly have a great impact on society. In addition, we could solve equations that appear in the Physics or Chemistry and that are related to fundamental questions (what are we made of?), how some materials behave in extreme conditions (at low temperatures), or how some chemical reactions proceed. It is very possible that these last two questions will have applications in the field of materials development, or drug design, something that will undoubtedly have an impact on the industry.

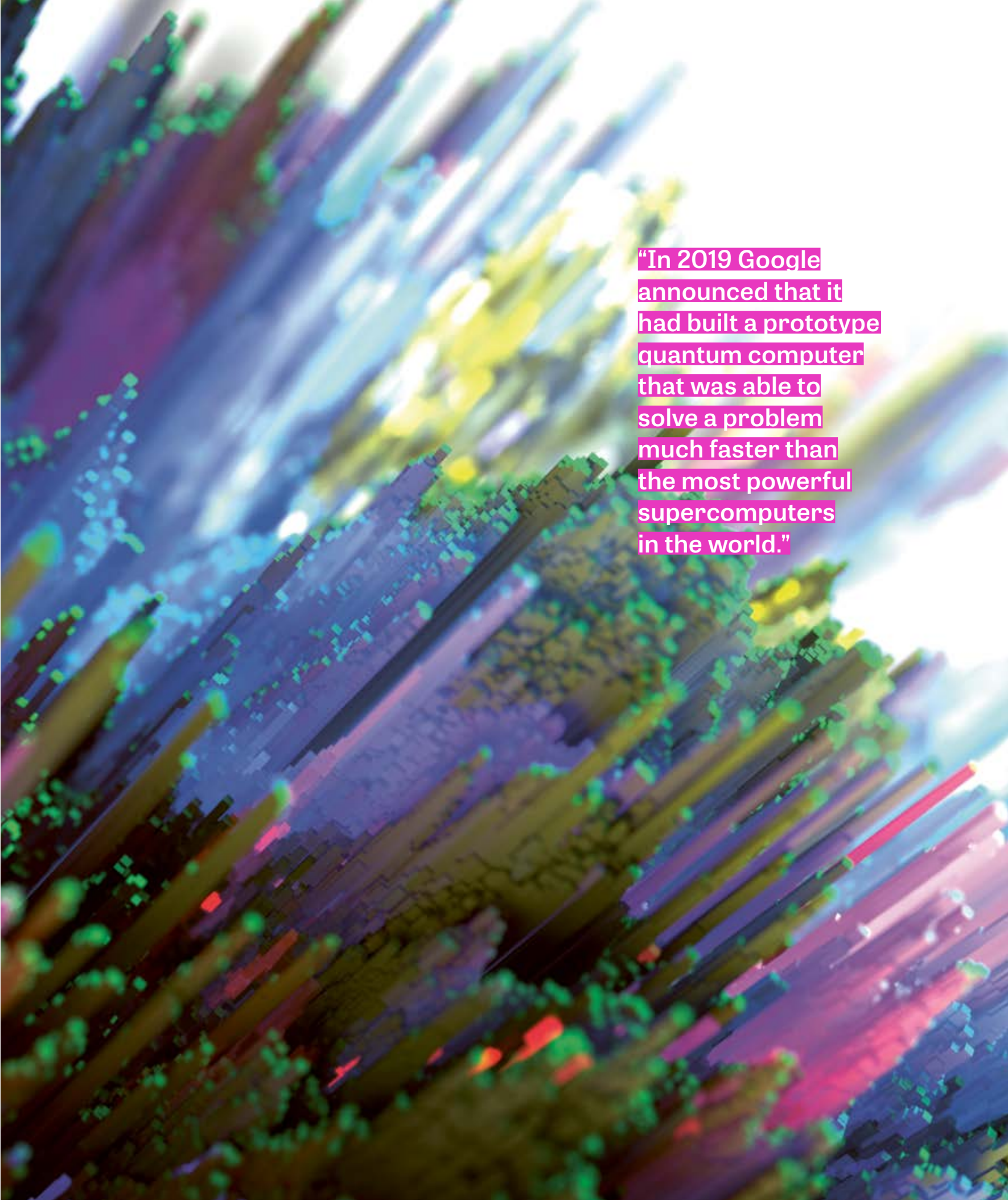
There are other industrial applications that could also benefit from quantum computers. Indeed, they can solve optimization problems, such as finding the shortest way to visit several locations, or diversifying portfolios to minimize investment risks. They occur naturally in industrial processes, as well as in many aspects of our daily lives. In addition, quantum computers can accelerate some machine learning algorithms, something that affects us more and more. However, based on what we know so far, the advantage over supercomputers in these types of problems is not as spectacular as in the ones mentioned above and may prove marginal in practice.

“We are living a very hectic time in the field of quantum computing, in which a big hype has been created based, many times, on unsubstantiated claims, and that can create many disappointments in the short term.”

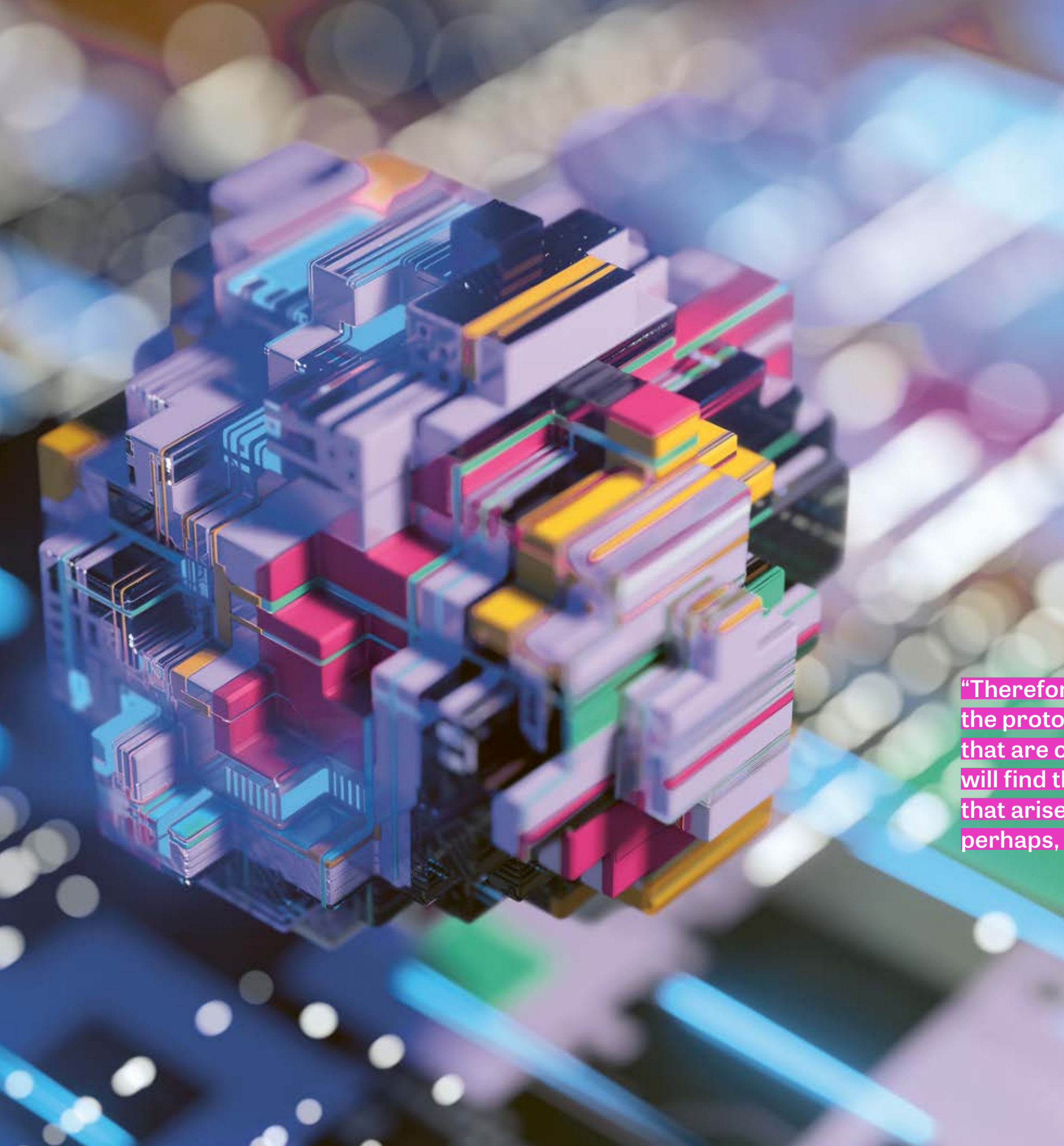
Unknown opportunities can arise

So, if we only know so few applications of quantum computers, why is there so much interest in the investment world, both public and private, in developing them? To answer this question we can go back to the forties of the last century, when the first computers were developed. At that time, very few applications were known for the computers that were being built. In fact, the main ones were, precisely, the deciphering of cryptographic codes and the resolution of problems that appear in scientific research. However, later on, many more applications were found, unthinkable at the time, and which, over time, have given rise to the information society in which we are immersed. In the same way, we expect that as we develop quantum computers, applications that are unimaginable today will appear and will lead to profound changes in society. In fact, we know very little about this type of devices and we still have a long way to go to better understand their power and, perhaps, to find other applications. Just to give an example, although these computers may not be faster for some use cases, they may have lower energy consumption, which would be an essential tool for sustainable progress.

In 2019 Google announced that it had built a prototype quantum computer that was able to solve a problem much faster than the most powerful supercomputers in the world. This was a milestone in the field and sent an optimistic message to society. However, the truth is that the problem that Google solved is purely academic, has no practical application, and was only created because it is perfectly suited to this type of quantum devices. In fact, the Google prototype had 53 quantum bits (qubits), and made several errors during execution. The quantum computers we want should have thousands or millions of qubits and make no errors. These two conditions are in dispute, which makes it difficult to move from prototypes to products. Quantum computing is based on the fact that the properties of objects are not determined as long as they are not observed, but that means that they have to be well isolated and cannot interact with anything in an uncontrolled way. As the number of qubits increases, this becomes impossible, so errors will always occur in quantum computers. Fortunately, there is a way to correct them, but this requires a large overhead, since the number of qubits required must be multiplied by a factor of thousand or more. To decipher an encrypted message, it would be necessary to have tens of millions of qubits. And this is a tremendous technological challenge. Even the most optimistic believes that this will not be possible in the next ten years. So, we will still have to wait a long time before we can enjoy quantum computers!



“In 2019 Google announced that it had built a prototype quantum computer that was able to solve a problem much faster than the most powerful supercomputers in the world.”



Powerful despite errors

Many of the current expectations of industry and governmental organizations are focused on the prototype quantum computers that are being built or will be built in the next few years. Even if these computers make errors during calculations, it may be possible for them to compensate for them with the extraordinary power they possess and thus find use cases. After all, Google in 2019 has already proven that they can obtain a quantum advantage on a particular problem. Why can't there be other problems, with practical use, where that advantage is also achieved? This has led to a proliferation of projects and companies investigating new applications for these prototypes, especially in the field of optimization. My opinion is that it is very difficult for

“Therefore, my expectation is that the prototype quantum computers that are currently being developed will find their niche in problems that arise in materials design or, perhaps, chemistry.”

advantages to appear in this type of problem unless the errors that occur are orders of magnitude smaller than they are today. After all, the problem that Google solved was specially formulated and designed for quantum computers. And optimization problems do not have these characteristics. In fact, one can study the effects of errors in the final results of the optimization and they are really dramatic, which augurs an uncertain future for this type of problems. On the contrary, those related to scientific questions have a formulation similar to the one solved by Google. Therefore, my expectation is that the prototype quantum computers that are currently being developed will find their niche in problems that arise in materials design or, perhaps, chemistry.

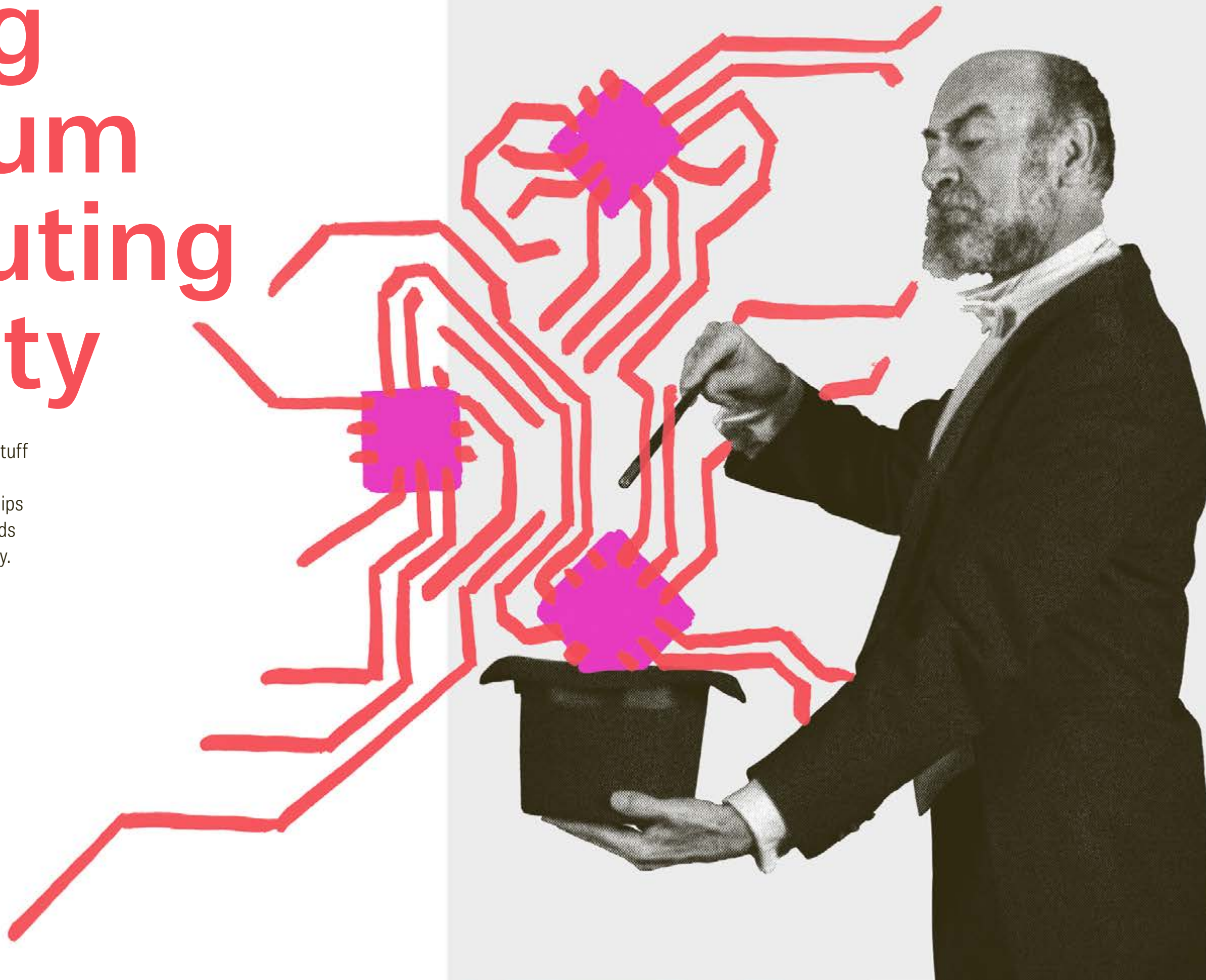
Looking to the future, what I find somewhat worrisome is the impact on quantum computing of some of the expectations that have been created in recent years. What will happen if the industry discovers that the prototypes being developed, or even the ideal quantum computers, do not deliver the applications that are being promised? Probably, the conclusion will be that these computers have lost interest and it is another promising technology that has failed. To argue against that statement, let's go back eighty years and analyze what would have happened if industry and governments had lost interest in computing because the envisioned applications were marginal. They probably would not have seen the moon even if it was there. ▀

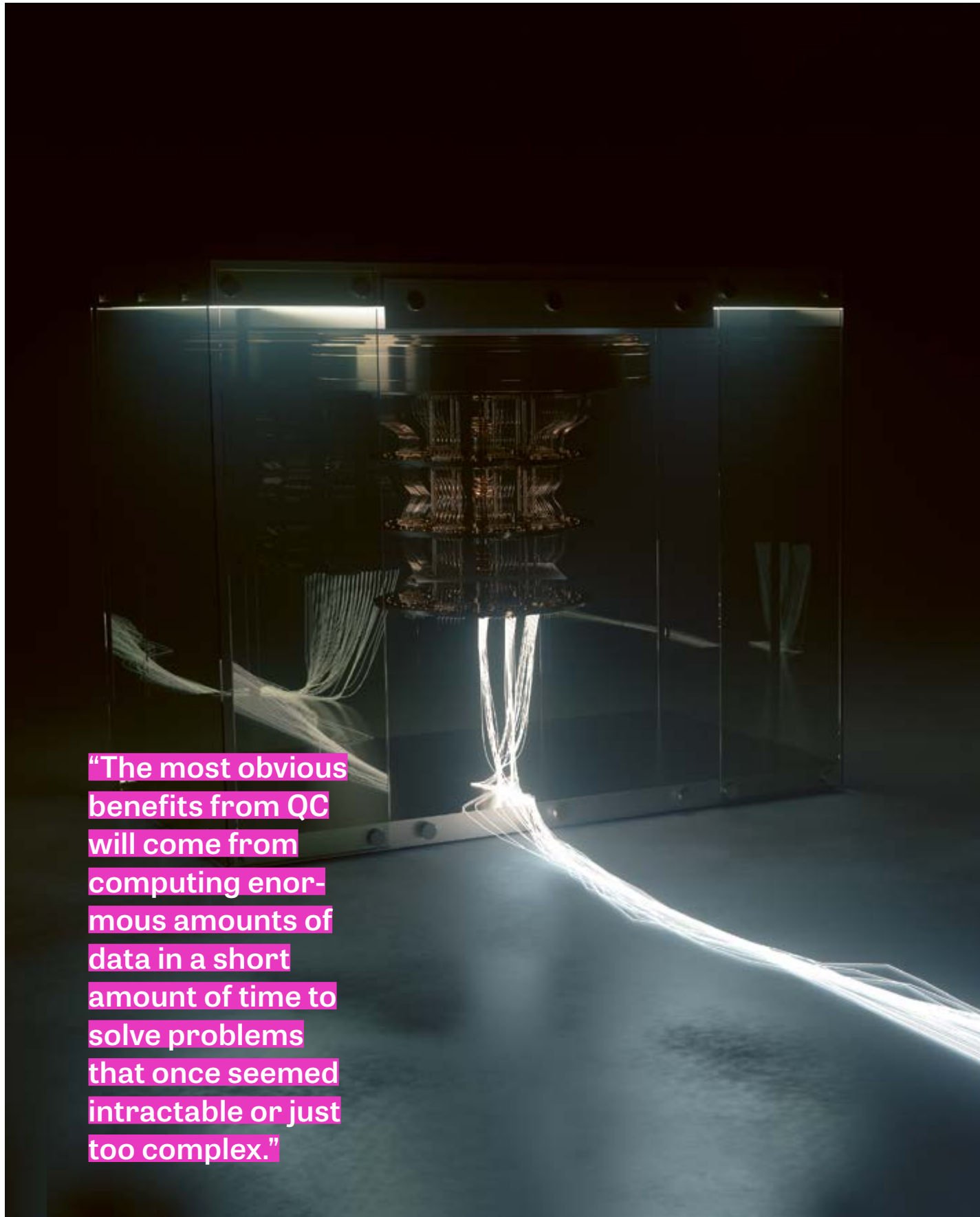
Making Quantum Computing a Reality

While quantum physics might seem like the stuff of science fiction, there is no doubt that our industry will innovate a new generation of chips that will unleash enormous processing speeds and new benefits and experiences for society.



Kurt Sievers
President & CEO
NXP Semiconductors





“The most obvious benefits from QC will come from computing enormous amounts of data in a short amount of time to solve problems that once seemed intractable or just too complex.”

This is a complex task and there’s more to it than delivering sheer computing horsepower. Innovation in miniaturization, robustness, and a solid cybersecurity strategy will be needed – in fact, a collaboration across research bodies, governments, and industries will be required before quantum computing is mainstreamed into our everyday lives.

The disruptive future has a blueprint

What differentiates quantum computers from existing computer processing?

Quantum computing, or “QC,” is a type of computation that harnesses the strange rules that govern the physical properties of atoms and subatomic particles. First articulated in the early 20th century by Niels Bohr, Paul Dirac, Werner Heisenberg and others, quantum theory explained that particles didn’t exist with set position or speed but rather possessed a “quanta,” or number of probable characteristics.

This has led to the development of experimental machines that work far faster than traditional processors, with Google announcing in 2019 that it had used QC to accomplish a processing task in 200 seconds that would have taken days or even years for a traditional supercomputer to complete. Academic researchers have proved entanglement by “teleporting information” between two quantum bits with no errors, suggesting ways to securely transmit and protect information. IBM hosts an online portal for coders to run quantum circuits either on simulators or actual quantum hardware and recently released a 433-qubit QC. McKinsey estimates that funding for start-ups focused on quantum technologies hit US\$1.4 billion in 2021, more than double from the year prior.

Quantum computing and its potential wave of innovation

The most obvious benefits from QC will come from computing enormous amounts of data in a short amount of time to solve problems that once seemed intractable or just too complex.

Consider the data involved in forecasting and tracking climate change – from the variability in weather over time, to rising ocean temperatures, to the detection of almost imperceptible patterns, the volume of data and their relationships are daunting. Could QC help us improve the future of millions and plan for the weather challenges we face? This type of research could help develop climate change models that are more dependable, convincing and timely.

The global pandemic has generated urgent scientific interest in how diseases and their variants flow through populations and change over time. QC could be harnessed to provide epidemiological insights to combat the next generation of global viruses.

Additionally, QC could help unlock some of the biggest mysteries that lurk within our DNA. The ability to understand risks, cures and treatments that would otherwise go unnoticed would also be a worthy use of QC. Gene sequencing and analyses could identify new disease vectors and treatments, and whole-body studies that yield greater understanding of the factors that maintain health.

Overall, QC can also offer richer, deeper tools to make economies run more smoothly, supply chains function more efficiently, and residential, commercial, and agricultural development plans more sustainable.

For instance, chemical giant BASF is already working on building quantum neural networks to support more detailed climate modeling once QC hardware is ready to run them. The UK plans to use QCs to speed up research on new drug treatments, find new ways to improve urban traffic, and discover improvements for its national defense capabilities. Moving past any analyses, the implications for the oncoming management of any complex system are equally immense, as they’ll not just operate better but learn faster, too.

But I’d posit that there are three other benefits to QC, any of which will have potentially even greater significance and impact on our lives.

1 First, it will change how we keep our data secure, by using the entanglement I mentioned earlier to provide cyber security that is impractical to breach (or at least breaching it without immediate evidence of the intrusion). This will allow us to trust connectivity and AI with more responsibility and engagement in our lives, thereby opening new ways for smart tech to make our lives easier, better, and safer.

2 Second, instead of looking only at big problems to solve, the development of small, stable, and inexpensive QC technology will allow us to embed far more intelligence and capability into our everyday devices. This will mean many millions of daily “smaller” problems getting solved for us, as well as opportunities identified and actuated on our behalf. Just like the early computers were reserved for “big” uses by governments and business, the lasting impact of QC may be when it’s ready for use by individuals.

3 Third, I am an unrepentant believer in innovation and in peoples’ capacity to be passionate and creative. It could be that the greatest applications for QC won’t become evident until developers have more advanced and useful tools with which to imagine those uses. Also, the ongoing development of QC will likely throw off new technologies that have their own uses and benefits. After all, the semiconductor industry owes much to the space program.

“Just like the early computers were reserved for ‘big’ uses by governments and business, the lasting impact of QC may be when it’s ready for use by individuals.”

“Realizing the benefits of a future in which QC is as common and affordable as traditional computing is a challenge of commitment and creativity, and deep technical expertise.”

The future requires quantum collaboration

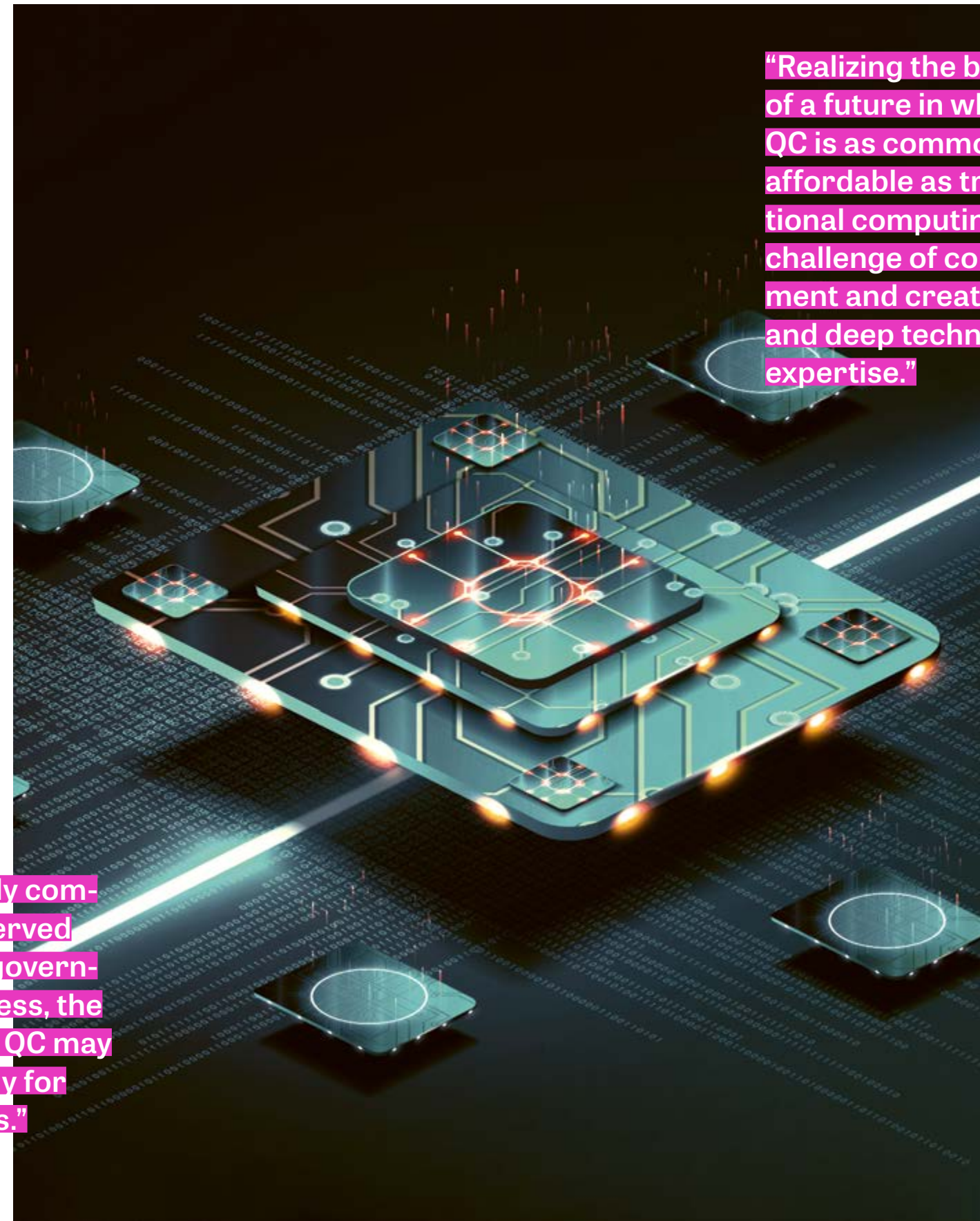
There is much work to do before we see any of the benefits of QC, and it will require the continued commitment and collaboration between governments, academia, and the business community.

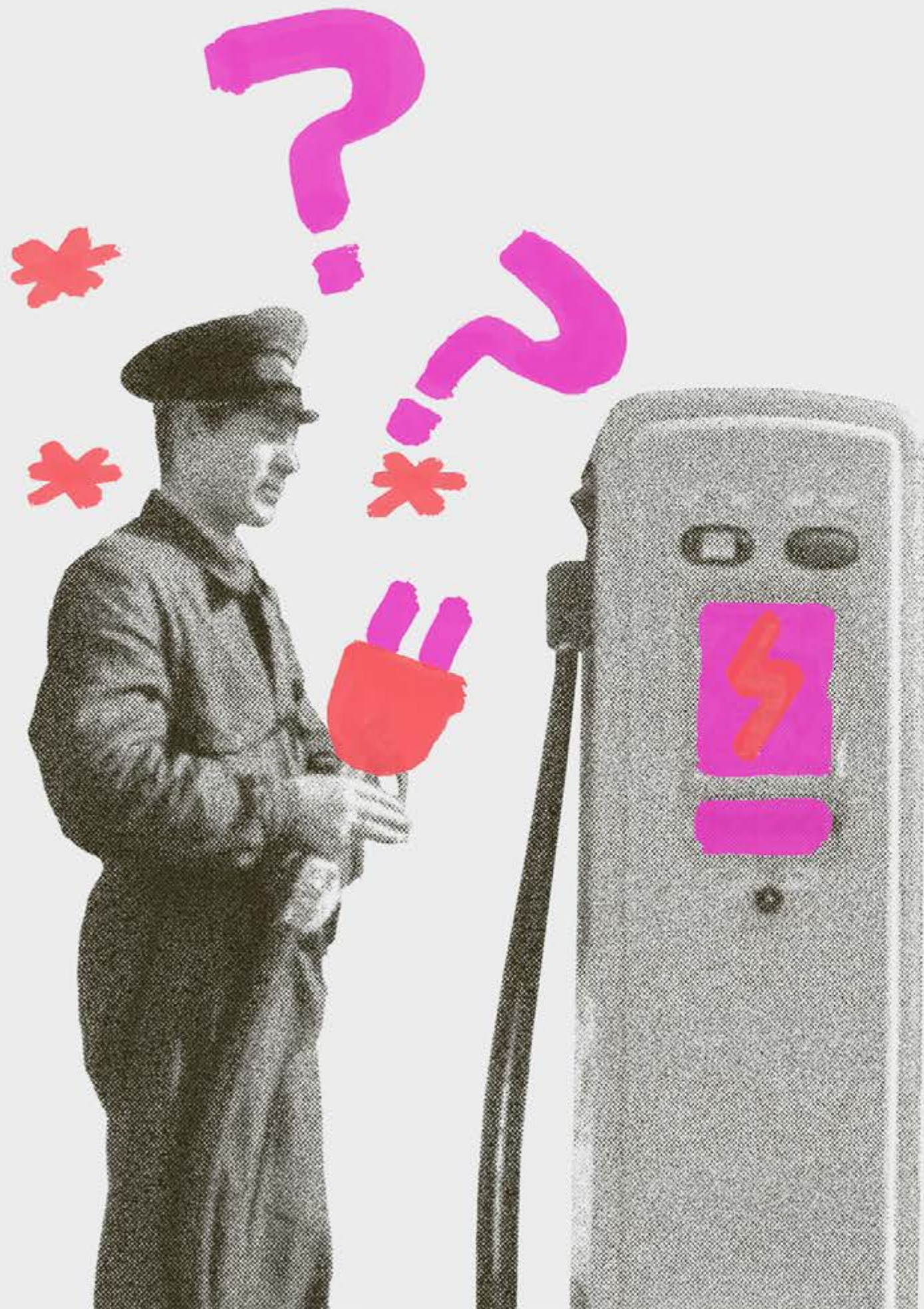
In developing its security applications, we also must address how it will impact our current cryptography practices, such as the security of passwords, digital signatures, etc.. QC’s unique qualities and faster processing speeds will make it better at hacking passwords and breaking public-encryption keys used by conventional processors, so we need to strengthen classic encryption. The field, known as “post-quantum cryptography,” is a key area in which NXP is a leader and a specialized security algorithm co-authored by NXP experts has been selected by the U.S. Government’s National Institute of Standards and Technology (NIST) to become part of an industry global standard.

Another area ripe for innovation and collaboration is the miniaturization that will allow QC to be mainstreamed into our everyday lives. One of our latest collaborations is with the German Aerospace Center and other partners to develop the first-ever miniaturized, industrially scalable components for QCs so that the devices can be built in a plug-and-play manner. Current QCs are highly fragile, unreliable, and bespoke.

Realizing the benefits of a future in which QC is as common and affordable as traditional computing is a challenge of commitment and creativity, and deep technical expertise. I am certain that we will figure out how to mainstream the technology, even if we cannot today cite exactly all of the ways such technology will be used. That’s the most inspiring aspect of all; companies, governments, and academic researchers are, quite literally, writing that future.

We will make quantum computing a reality. I can’t wait to see what we accomplish together. ▀

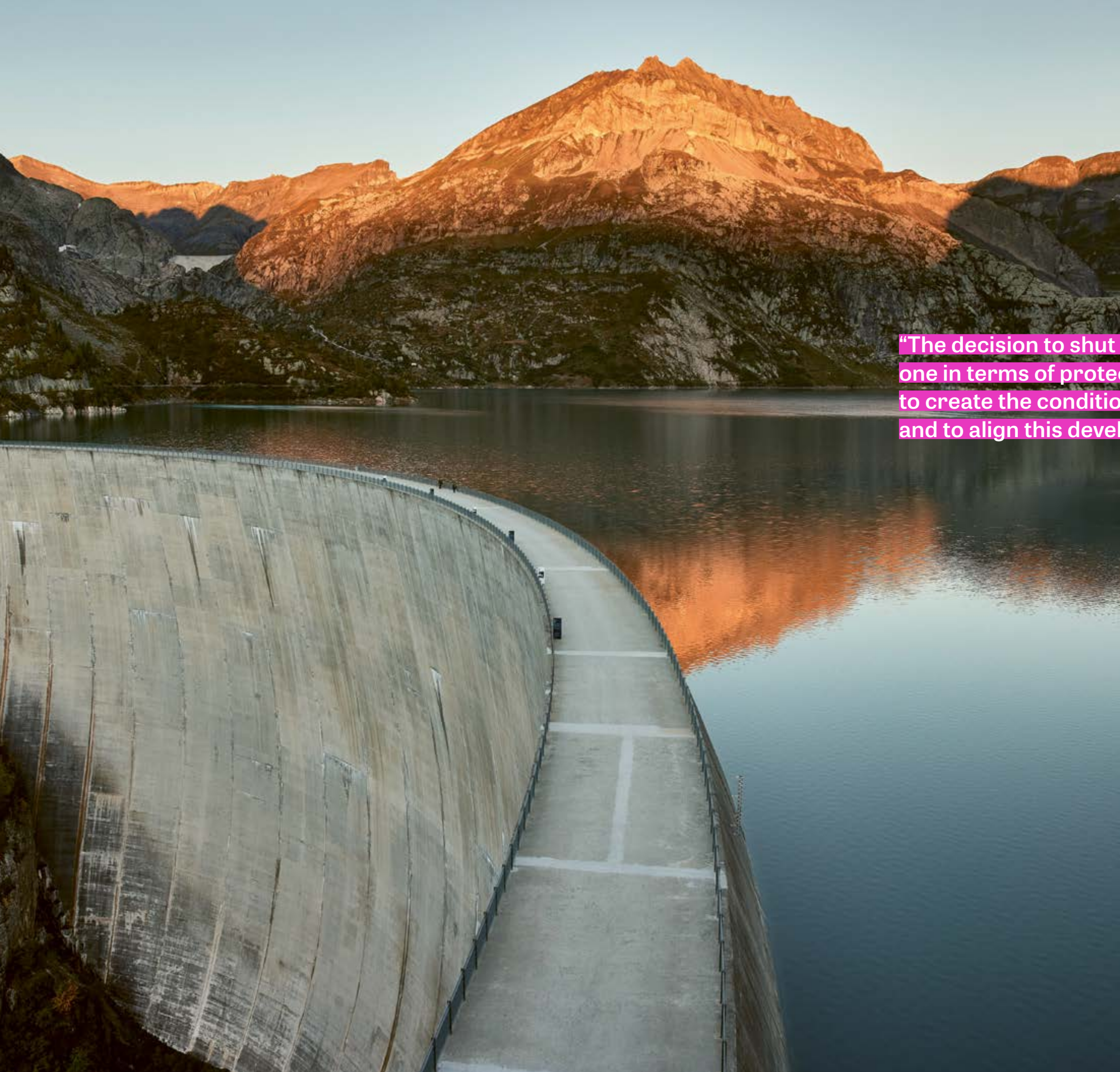




Antje Kanngiesser
CEO
Alpiq

The Energy Crisis – What Now?

Europe is experiencing its biggest energy crisis since the Second World War. Across the continent, the outlook for the next few winters is bleak.



“The decision to shut down fossil fuel plants may have been the right one in terms of protecting our climate but, collectively, we failed to create the conditions for renewable energy production to develop and to align this development with a well-staged exit from nuclear.”

Commodity, or security?

Given how important a secure supply of energy is to our society, it is hard to understand how we could have let this happen. However, this situation did not occur overnight. Its emergence cannot be attributed to a single factor or industry. And it cannot be ascribed to the war in the Ukraine. It is a home-made crisis.

In Europe, we were so used to the unlimited availability of electricity and gas that both had begun to feel like a commodity. For decades, all that mattered was the price: the cheaper, the better. However, this also left scant possibility to reinvest in existing or new assets. The decision to shut down fossil fuel plants may have been the right one in terms of protecting our climate but, collectively, we failed to create the conditions for renewable energy production to develop and to align this development with a well-staged exit from nuclear.

Instead, and even until recently, procuring gas cheaply from Russia was regarded as the ideal transition strategy to replace coal and nuclear. By pushing targets to dates far into the future, like 2030 or 2050, we intentionally ignored the urgent need to build up more production assets to cater to the increasing electrification of society caused by decarbonisation and a growing population. The perception of energy as a commodity made us believe that it was abundant. We forgot that energy policy equates to economic policy and, even more importantly, to security policy. The dependence of Central and Eastern Europe’s on energy from Russia left it exposed to Vladimir Putin’s power plays in 2021 and the subsequent supply challenges posed by the Russian invasion of Ukraine in February 2022.

In the United Kingdom, energy poverty has been increasing – one in four households was no longer able to afford to heat their homes. German companies had to anticipate supply disruptions for natural gas and risks for their entire supply chains. France, which used to be a net importer of electricity had to temporarily import electricity from abroad so that French homes could continue to be heated with electricity and businesses were able to continue to produce. Alpiq’s home market, Switzerland, depends structurally on imports of gas and electricity from its neighbouring countries and has been preparing for the worst. With the warm and windy weather conditions since October and relatively short cold spells, the situation has eased for this winter. However, this situation is prone to repeat itself.

Climate change

On top of all this, the unprecedented period of heat and drought in Europe in summer 2022 reminded us that climate change is happening – and much faster and more extreme than as modelled by climate experts. In Switzerland, this change is having an alarming effect. Historical comparisons show that the temperature in Switzerland has already risen by more than 1.5 degrees, while our glaciers lost 6% of their total mass this summer alone (compared to around 2% in previous years). Our ‘eternal ice’ has become ephemeral.

To take but one example: the reservoir formed by the Gebidem dam at the end of the Great Aletsch Glacier was overflowing for several weeks this summer. The 75m³ of water per second that spilled over the dam could not even be used to produce electricity. This water is lost forever because the meltwater storage capacity had already reached its limit. On the other hand, lack of precipitation meant that the water level at the Salanfe dam in the southwestern part of the Valais, which is not fed by a glacier, was about 15 metres lower than normal this summer after losing 8 million cubic metres of water – much of which resulted from evaporation. We are feeling the consequences of this, both in terms of the environmental impact and the enormous challenge of good water management.

The melting of our glaciers is not only an issue for the Alpine regions. Snow and ice are vital components of the Earth’s climate system and, like the loss of ice over on the Arctic Ocean, the erosion of the glaciers will be felt in all regions of the world through the increase in global warming.



“We continue to believe that we can get free, or cheap, lunches by neglecting the obvious and leaving our children with a huge bill to pay. And this is before we even touch on the issue of security.”

High price to pay

The homemade supply shortages in Europe have led to unprecedentedly high price levels that have serious consequences for people’s cost of living and catastrophic consequences for the economy, above all for the production industry. High prices are driving average inflation rates into double figures.

There is no easy way out. Politicians’ initiatives to cap electricity prices will discourage the necessary investments in production. Capping gas prices will only lead to a situation whereby LNG¹ tankers are delivering their load to those continents who pay more. The price of LNG is generally double the price of pipeline gas and its availability is limited due to infrastructural and supply capacity constraints.²

¹ Liquefied Natural Gas.

² The recent deal between Germany and Katar for a supply of 2 mio. tons LNG per year for 15 years which accounts for 2% of Germany’s needs of 40 mio tons LNG necessary to replace the 50 billion cubic meters (bcm) of pipeline gas it used to get from Moscow.

For some, the solution is simply to build additional pipelines stretching across the Mediterranean to carry gas from Eastern Europe to Sicily. These pipelines might increase the diversification of supply, but will they reduce our dependency? Will they futureproof us against climate change?

Even if we accept that there is no easy alternative to natural gas at the moment, what levers can we pull to make sure we invest more energy and money in innovate climate solutions than in fossil fuels emitting CO₂ and CH₄ emissions on a large scale? After all, on top of the cost we pay today for each kWh of fossil fuels we consume, we will also pay an extremely high surcharge in the future – not just in monetary terms but in terms of our health and our lives in Europe and beyond.

Yet we seem to find it very difficult to act in accordance with this knowledge. Take Switzerland, for example: it does not have any natural gas resources or gas storage facilities and used to be proud of its CO₂-emission-free electricity production based on hydro and nuclear power. However, faced with the looming shortage of gas and climate change, the Swiss government recently approved the construction of eight thermal assets of 35 MW each that are powered by fuel oil and gas. A tender for further gas-fired plants is in preparation.

The size of the assets calls into question the true motivation for the initiative – is it really about the security of supply or is it about proving the government took action? Climate impact? Sustainable public spending? Who cares? It seems we are putting a lot of effort into committing the same mistake again. We continue to believe that we can get free, or cheap, lunches by neglecting the obvious and leaving our children with a huge bill to pay. And this is before we even touch on the issue of security.

Innovation mindset

It is crucial that Europe plots its future course around the generation and storage of renewable energy, thereby making full use of the opportunities presented by the circular economy when it comes to precious natural resources. It won't be cheap. It won't be immediate. And it won't be easy. But it will be sustainable. And we often need to take one step back to take two steps forward.

**“It won't be cheap.
It won't be immediate.
And it won't be
easy. But it will be
sustainable.”**

It seems to be difficult for elected politicians to share bad news. As companies, we can support them. The faster we bring all our scientific and engineering power to bear on our current business models and processes in order to have a positive impact on energy consumption and climate change, the earlier we can ensure economic success. Given the current energy prices, now is the time to shift from a price and risk-based approach to one in which we seek out business opportunities through innovation.

The pace is now being set by the United States, whose Inflation Reduction Act of 2022 will raise USD 738 billion and authorise USD 391 billion in spending on energy and climate change alone to reduce carbon emissions by roughly 40% by 2030. The impact on the economy is being felt across the globe, attracting business and innovation to the USA as intended. This is not the first smart move by the USA when it comes to energy security, but it's the first that has taken climate change and the appropriate actions into account. Fifteen years ago, the United States faced a similar challenge of soaring energy costs. In response, they invested heavily in shale gas and in the intervening years they have become a net exporter of energy.

In Europe, we face a very different set of conditions which, taken together, make fracking for shale gas a less viable option on this side of the Atlantic. But let's be clear about this: Europe's only chance of ending our dependence on other parts of the world in the long term is to invest massively in renewable energies and storage facilities and to encourage energy efficiency and technological innovation along the whole supply and value chain. We need to push ahead rapidly with the development of infrastructures and technologies to generate and store energy from our natural resources such as the sun, wind, water, biomass and geothermal, without releasing harmful carbon emissions into the environment.

Renewables the only route

As the CEO of an energy business whose very purpose it is to contribute to a better climate and an improved security of supply, I focus on impact. In the short term, we at Alpiq are doing everything we can to maximise the security of supply this coming winter, whether by postponing importance maintenance work on our assets to avoid untimely reductions in water and electricity, helping our customers to find the best solutions to manage the current situation, or targeting ambitious energy savings in our own operations. But there's clearly much more at stake than merely getting through the winter ahead. Europe needs to find sustainable and cost-effective energy solutions for the long term that will enable it to drastically reduce its dependence on fossil fuels.

In Switzerland, hydropower has been the backbone of our electricity supply for decades and is our most important domestic renewable energy resource. It is carbon-free, efficient and highly flexible. But energy efficiency is not simply about generating power, it's also about minimising loss. Remember: Switzerland's glaciers lost 6% of their mass this summer – which means vast quantities of water that we need to be able to store.

Alpiq is partnering with other stakeholders in Switzerland's energy industry to build the *Gornerli*, a unique multi-purpose³ reservoir above Zermatt. This reservoir, which will take only three to four years to build, will enable the storage of around 150 million additional cubic metres of water for the winter.

Likewise, we need to use the power of the sun where it is present all year round, above the fog and clouds in the Alps. Solar radiation is significantly stronger at high altitudes, with studies showing that production from high-alpine solar facilities is almost two times higher than production on the Swiss Plateau. Our *Gondosolar*⁴ project in the Valais Alps to build Switzerland's largest photovoltaic installation – at an altitude of between 2,000 and 2,200 metres above sea level – has already had an impact even before its construction. It has become a showcase project for the energy transition, attracting many interested observers around the world.

Getting projects like *Gornerli* or *Gondosolar* off the ground takes major investment of the kind that has been lacking in recent decades. For the most part, Switzerland and its European neighbours have relied on the work of our grandparents and ignored the risks we face. But we cannot afford fossil fuels anymore and we cannot afford to ignore our technological capabilities in the areas of production and storage anymore.

³ This storage project will also act as a flood retention basin, protecting the village of Zermatt and the surrounding valley below, while providing water for drinking and irrigation purposes.

⁴ *Gondosolar*: Hochalpine PV-Anlage für mehr Winterstrom.

We are all part of the solution

Nobody has the overall solution to the problem in their own hands. What is needed is considerate action, taken in a spirit of solidarity, across the board. The most necessary decisions are almost always the most unpopular. The green electorate in Germany demonises every operation of a nuclear power plant and fabricates high-security dangers. The population in the Dutch region of Groningen, worried by earth tremors, wants an end to natural gas production. And large swathes of society want to avert their eyes to the crisis and be protected by new subsidies and regulations. But this is not how we are going to resolve the crisis.

Making demands of others but not making any (political) sacrifices at home is no longer an option. Germany cannot push France to build a new gas pipeline to Spain or press for higher imports from neighbouring European countries, while at home limiting the continued operation of three relatively new nuclear power plants. These would not only be useful in Germany but could also help to close the supply gaps faced by its neighbours. The Netherlands, on the other hand, could agree to a temporary extension of gas production, even if this is unpopular politically in the country. For their part, the large hydropower producers Norway and Switzerland could help out their neighbours by allowing more flexible access to their plants and summer surpluses.

If each country in Europe looks at its energy decisions through the lens of its neighbours and acts boldly, the continent will navigate the crisis much more easily. The European model is facing perhaps its greatest test: our freedom and independence must be defended, even if this comes at a cost, and not sacrificed on the altar of short-term gain. This can only be achieved if the European continent pulls together. Politicians and associations must stop selling supposedly 'free' lunches.

As companies, however, we cannot wait for this to happen. We must position ourselves now, by shifting our business models and implementing sustainable investment strategies. The financial market has never been more open to this, especially the banking sector, which now finds itself back in a friendly interest-rate environment and can thus demonstrate how strongly its own commitment to sustainability holds true.

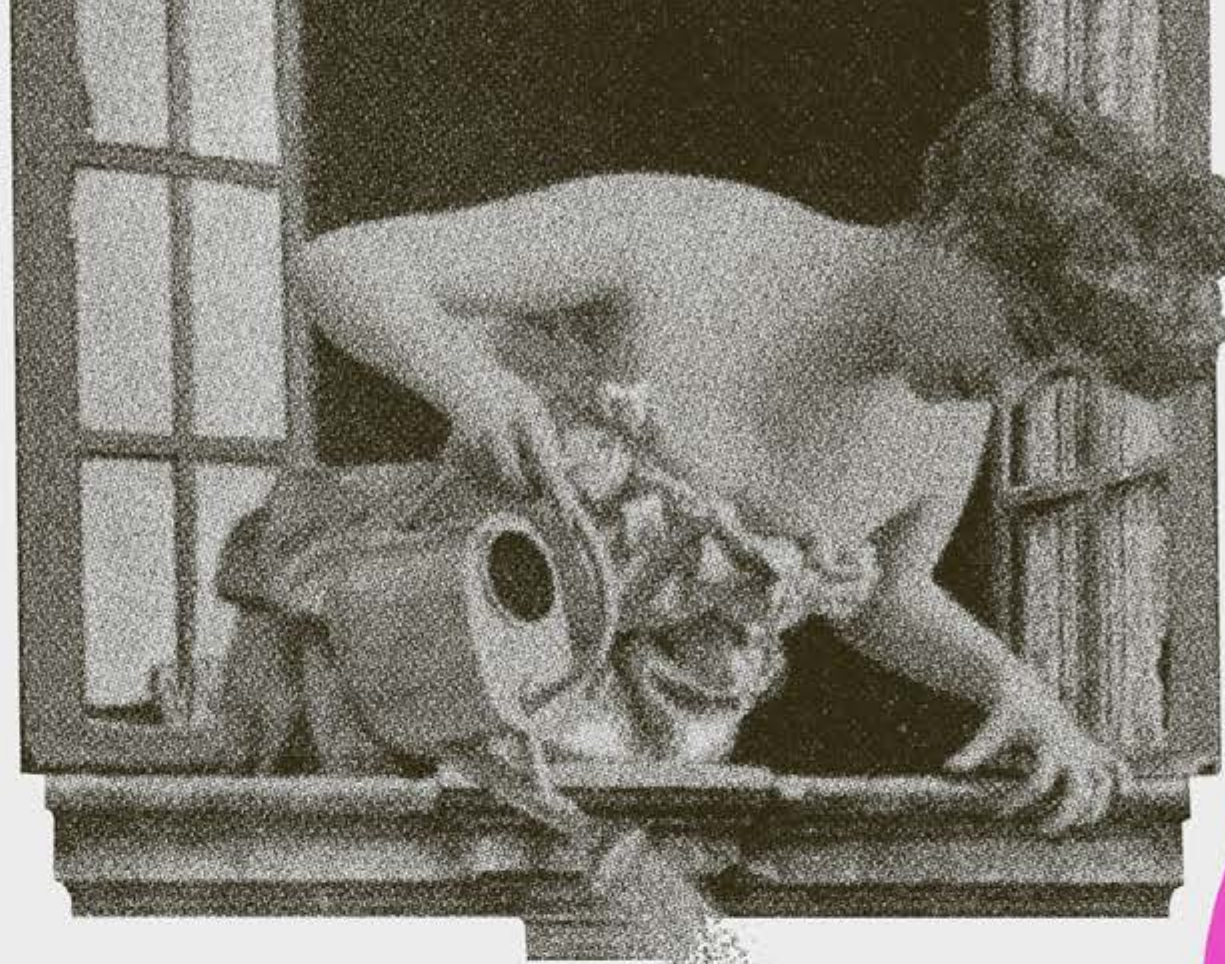
For all of us, be it companies, banks, politicians, authorities or citizens, this willingness to demonstrate our commitment is what it will all come down to. Ultimately, we will all have to 'walk the talk'. The current crisis is the last great opportunity for a genuine new start towards a secure, affordable and climate-friendly energy supply in Europe. ▀





Dirk Schmitz
Head of
BlackRock Germany, Austria
and Eastern Europe

Financing the Energy Transition Isn't Possible Without Private Capital



Delivering the energy transition is a Herculean task. Vast amounts of capital will be needed to meet the goal of net-zero emissions in the fight against climate change. But despite all the challenges, an investment and innovation agenda could provide cause for optimism – and, if we play our cards right, could even see Europe increase its economic clout. In the meantime, new forms of investment are helping to raise capital.





“Right now, the goal must be to create a spirit of optimism around the energy transition.”

Net-zero goal highly capital-intensive

It is also important to recognize that the current situation demands even greater commitment than before in the transition to renewable energies. Decisions that are necessary in the short term to ensure energy security and lower prices must not jeopardize the long-term goals and stall the energy transition. Every euro now has to be used in a way that also supports the transformation in the long term.

Right now, the goal must be to create a spirit of optimism around the energy transition. A report by the World Meteorological Organization highlights how important this is. It found that the global mean temperature in 2022 was 1.15°C above the pre-industrial average. Concentrations of the main greenhouse gases also reached record levels in 2021. Yet, according to climate researchers, global warming needs to be capped at 1.5°C to avert the worst impacts of climate change.

Speaking at COP27 recently, UN Secretary-General António Guterres said that the world is “on the highway to climate hell with our foot still on the accelerator.” One constraint on attempts to escape this climate hell is the financing of the energy transition. A forecast by the Glasgow Financial Alliance for Net Zero (GFANZ) reveals the huge sums required. To achieve net-zero emissions by 2050, \$125 trillion will need to be invested in low-carbon energy, according to GFANZ, with a quarter of that – \$32 trillion – required by 2030.

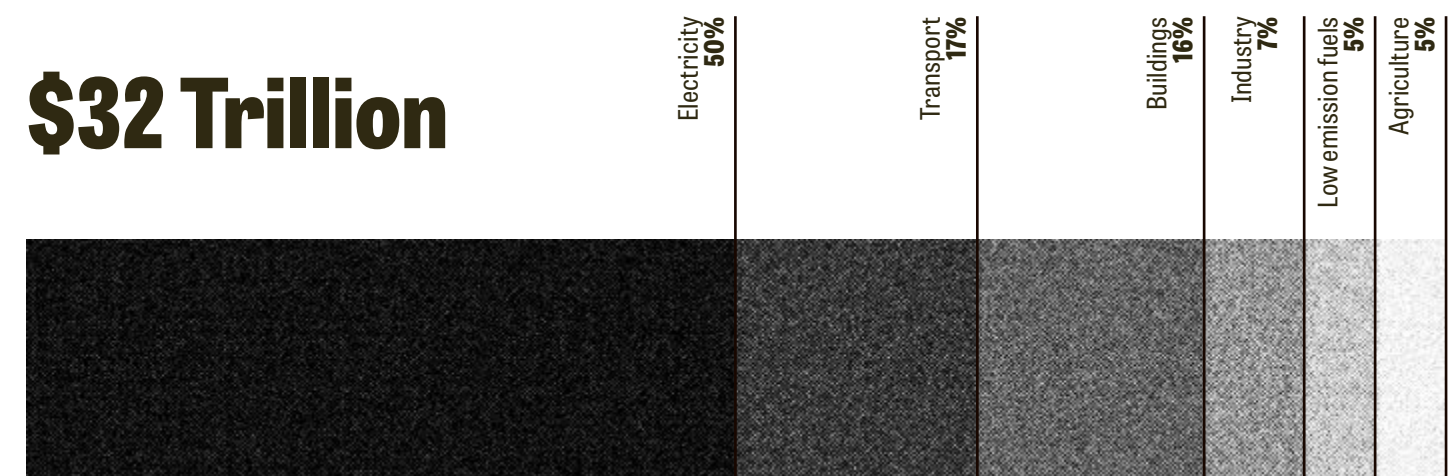
Dirk Schmitz Financing the Energy Transition Isn't Possible Without Private Capital

The world is changing at a pace that is almost unprecedented in recent decades. 2022 has seen major upheavals, particularly at geopolitical level because of Russia’s war against Ukraine. Our economy is also under severe pressure due to the reversal of the trend in interest rates and the rise in inflation.

As a result of these shifts, the energy sector in particular is undergoing a radical transformation. The war and the change in economic conditions have accelerated a process that was already under way. Ultimately, these two factors have made the West realize just how important energy self-sufficiency and affordable energy are for social harmony.

These developments mean that the green transformation of the economy now has an extra task: safeguarding energy security and independence. It should be noted that the issues referred to above are interconnected. The move away from Russian energy imports is creating an additional supply shock in a situation that was already tight due to supply chain bottlenecks. This is pushing up inflation and holding back economic development.

Breakdown by sector of net-zero investment required by 2030



Sources: BlackRock Investment Institute and the Glasgow Financial Alliance for Net Zero, February 1, 2022. Note: The charts show the estimated capex needed across economic sectors and actors by 2030 to be on track for achieving net-zero emissions by 2050 according to GFANZ

A coherent climate agenda could help boost the EU as a business location

Huge sums like this sound like a major financial hurdle on the path to a successful energy transition. But if all stakeholders work together, this money can be raised. There is significant interest among private capital to invest in the energy transition. All the more so because climate risk is an investment risk, and change also offers attractive investment opportunities. These are two reasons why BlackRock offers our clients a wide range of investments that incorporate sustainability criteria, including opportunities to invest specifically in climate infrastructure.

As well as their long-term financial goals, many pension funds, insurers, and other institutional investors are looking for ways to finance projects that make a contribution to the transformation. This is important because the energy transition cannot succeed without private capital. Synergies arise when private capital is combined with public funds, leading to widespread acceleration.

One example of this is the Climate Finance Partnership, managed by BlackRock Alternatives Climate Infrastructure team, which also has public investors on board. Aimed at accelerating the transition to carbon neutrality in emerging markets, the partnership mobilized \$673 million last year, exceeding its target. This is proof of the high level of demand among investors for climate infrastructure investments.

Focusing on the fact that change always offers opportunities as well as risks should inspire even more confidence that the goals can be achieved and the desired spirit of optimism generated. An ambitious climate agenda combined with Germany's deep-rooted technical and engineering expertise can provide a basis for positioning both Germany and Austria, but also Europe as a whole, as climate technology pioneers.

This would make the EU – which is being particularly hard hit by the high energy prices – more attractive as an investment location. It is encouraging to observe that seemingly a lot can be achieved when the pressure is on. The speed at which LNG terminals are springing up in Germany points to this conclusion, at least. Ideally, this level of momentum should be the norm when it comes to the energy transition, mobility of the future, and digitalization.

“The energy transition cannot succeed without private capital. Synergies arise when private capital is combined with public funds, leading to widespread acceleration.”



Innovation as well as investment

It is also worth pointing out that energy expenditure in Europe as a share of GDP has risen to around 9%, the highest level since the 1980s. Another challenge for Germany in particular is its significant proportion of energy-intensive industries. This creates disadvantages when fossil fuel prices rise, but also means there is huge potential for CO₂ savings and increased sales of renewable energy.

It should be borne in mind that higher fossil fuel prices also make renewable energies more competitive on the market, in the same way that growing market share does. It therefore makes sense to consistently gear regulation and investment incentives toward leveraging the available potential.

In our efforts to overcome the climate crises facing us, we should also remember that science and research harbor immense potential. Bridging the gap between researchers and entrepreneurs can help to tackle major societal challenges, as illustrated by the development of coronavirus vaccines. It can therefore be lucrative to pair an investment agenda with one for innovation aimed at strategically linking research and development spending to economic and societal goals.

“It should be borne in mind that higher fossil fuel prices also make renewable energies more competitive on the market, in the same way that growing market share does.”

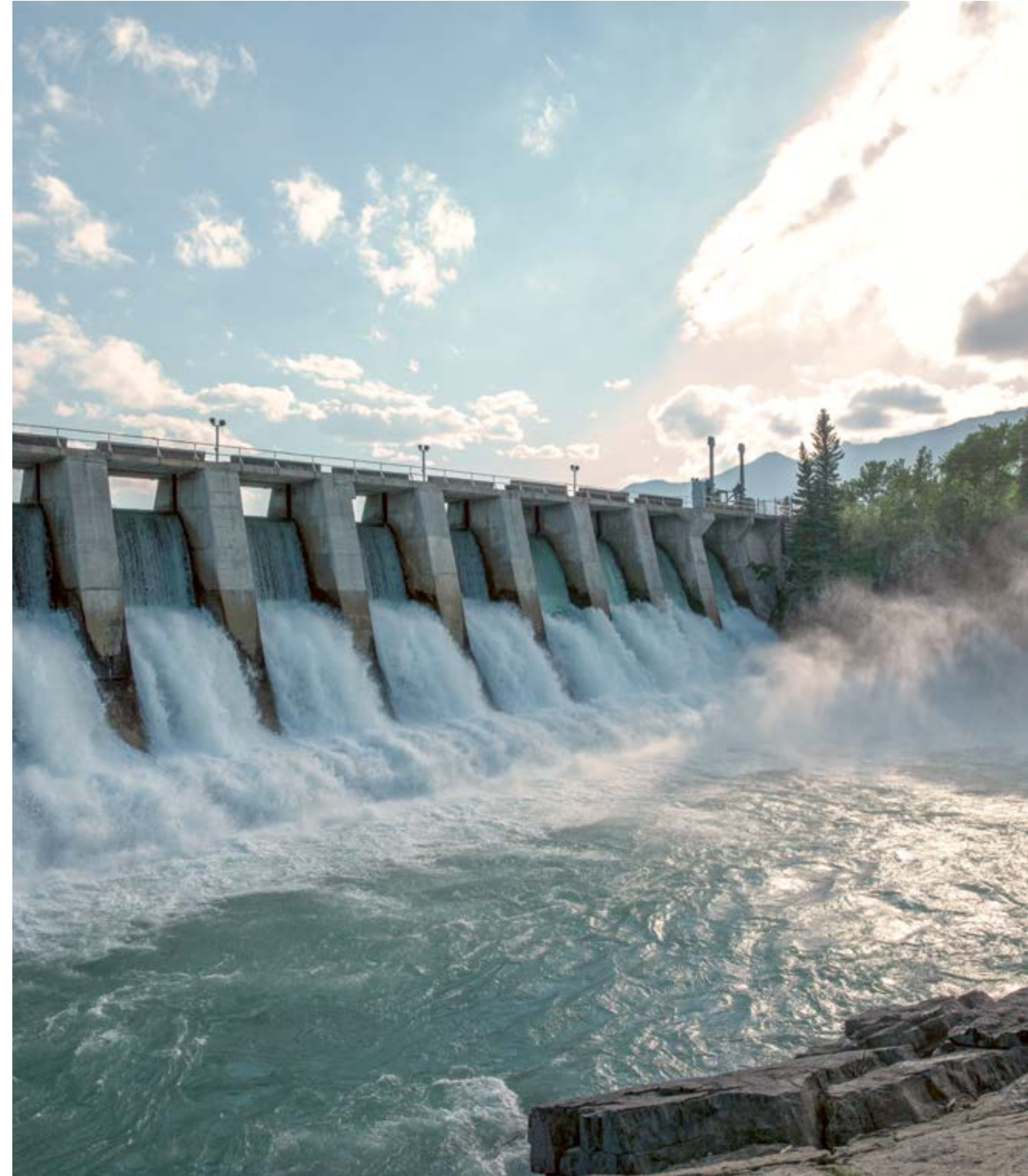
Ways to help raise capital

We are still a long way from a solution. Clear policy frameworks for the use of funds to address the challenges would be a step in the right direction. Thoughtful and sensible regulatory provisions are needed, as well as clear guidelines on approval procedures for renewable energy investments such as wind turbines and solar plants.

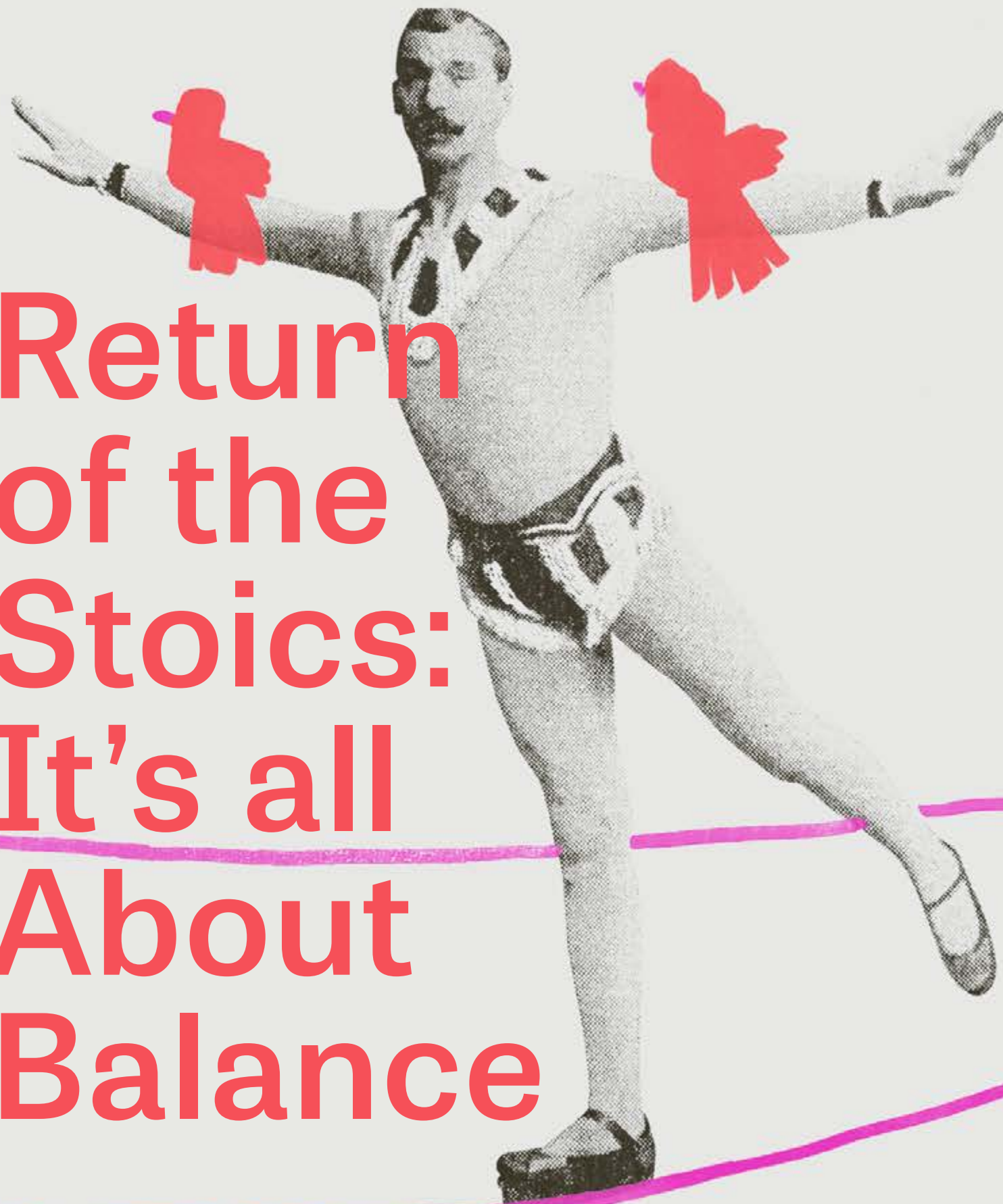
New investment vehicles that can help with financing are a positive development. These include, for example, European long-term investment funds (ELTIFs), launched specifically for long-term infrastructure investments and whose terms and conditions have recently been made even more market-friendly. ELTIFs are designed to direct funds toward long-term investment projects and so are well suited to supporting the financing of sustainable and digital change.

BlackRock itself is working on a perpetual infrastructure strategy aimed at institutional investors, targeting investments in energy transition and energy security, as well as digital and community infrastructure, sustainable mobility, and the circular economy.

This project is just one example of how we are helping our clients to invest in the energy transition. To recap, positioning ourselves as a pioneer in sustainable investing is based in part on the belief that climate risk is investment risk and on the fact that we see attractive investment opportunities in a transforming world. These two insights should help public and private capital work together to raise enough funds to finance the energy transition. ▀



Return of the Stoics: It's all About Balance



Leonhard Birnbaum
CEO
E.ON



We have faced multiple crises in recent times, more – and on a bigger scale – than in previous decades. The military invasion of Ukraine is undoubtedly the most dramatic.

In assessing what we deem unbearable in terms of the issues directly affecting us here in Germany, we should consider for a moment what many people in Ukraine have been suffering for the past nine months and more. The intensified, targeted attacks on Ukraine's supply infrastructure are horrendous, especially amid the onset of winter. They are clearly aimed more at wreaking destruction than achieving military objectives, and the narrative of so-called "liberation" sounds cynical to say the least. As appalled as I am, I do at least take comfort from the great commitment shown by many people to assisting those in need. I observe this throughout our group as well, especially in the neighboring countries where we operate. Our local subsidiaries have launched support initiatives, and many employees are getting personally involved. It makes me proud to see how many are doing their bit without a second thought.

As much as we are all moved by these events, I do not wish to write about geopolitics – others are more qualified to do that. I want to focus on a very different crisis: energy. Many see this entirely as a consequence of the war, which is wrong, as I will explain later. The energy crisis is directly affecting people, households, and businesses, and the impact on energy supply is particularly severe in Europe. We are concerned about the economic consequences, about security of supply, but also about whether the crisis could undermine our efforts to tackle climate change.



After the crisis is before the crisis?

This crisis caught us largely off guard. During the pandemic, we were focused on when lockdowns and restrictions would finally be over and looking forward to the time after the crisis. But no sooner had something resembling normality returned than we found ourselves in yet another crisis. And this one is different from the others we have experienced recently. At the World Energy Council, we survey the world's energy leaders each year about their priorities and uncertainties – essentially, what keeps them busy by day and awake at night. And right now, I am noticing that many European politicians and business leaders are working flat out on pressing short-term issues – and worrying about them at night too.

“The energy crisis began back in autumn 2021, when the simultaneous global recovery after the lockdowns caused energy demand and therefore energy prices to rocket.”

We tend to think that the Ukraine war triggered the energy crisis. This is not true and goes to show what short memories we have: the energy crisis began back in autumn 2021, when the simultaneous global recovery after the lockdowns caused energy demand and therefore energy prices to rocket. As a result, many electricity discounters went bankrupt. They didn't fail because their prices were so low, but because they had speculated that they would be able to buy at some future time volumes they had already sold – in the expectation that prices would be cheaper then. Their customers were unaware of this. This is not a serious way to do business, and that is why our state regulation is so important: after all, we are supplying a systemically vital commodity. Many well-run utilities stepped in to rescue tens of thousands of stranded and desperate customers. E.ON alone took on a million customers in multiple markets and gave them quick, effective assistance. Since we are no longer a producer ourselves, we had to buy the new volumes at much greater cost – like many established suppliers and municipal utilities, we are not in the business of speculation. So it is perhaps understandable that we were not best pleased recently when a municipal utility canceled the contracts of thousands of customers in the run-up to Christmas, expected us to take on their supply, while at the same time asking the very customers they had abandoned to sign up to an arrangement whereby they would be returned automatically to their original supplier as soon as it could offer them a better deal again. An isolated case, say other municipal utilities and consumer advocates disapprovingly. This is not how solidarity works.

The perfect storm

So in fact this part of the energy crisis was actually a liquidity crisis, which generated a big stir at the time but then seems to have been quickly forgotten. When the war broke out in Ukraine, the markets' mounting (and justified) uncertainty about gas supply caused prices to explode. On top of this, there was reduced electricity supply in France owing to drought and maintenance work. This alone would have been enough to trigger an electricity crisis, but combined with shortages on the European gas market it led to a mutually-reinforcing double whammy – the perfect storm.

In any vessel on choppy seas, it is important that someone is at the helm, takes responsibility and steers the ship safely through the storm. That means navigating with foresight, being mindful of one's crew, drawing the right conclusions and showing leadership. Conversely, frantic and mindless maneuvers will cause the ship to capsize. Anyone in a position of responsibility, whether it be in politics, society, or business, has to chart a clear course that keeps the vessel steady. Instilling confidence is vital, all the more so in times of uncertainty and crisis when different developments can occur at any moment. It is my duty, and our duty, to look to the future, identify constructive solutions and implement them with vigor and determination.

A word of caution is needed here. The more urgent the problems affecting households, small businesses and many others, the more obvious it seems to help them out with ad-hoc measures. Of course, the affordability crisis requires political intervention. People have to be able to pay for the energy they need and keep their businesses running. But that does not mean that governments can simply offset the impacts by handing out money. We need a smart mix of instruments that strike a balance between affordability and incentives to reduce demand. On the other hand, some experts don't want to see any interference in price impacts, which is not a good solution either. Meanwhile, a whole other set of trade-off decisions need to be made, for example between the targeting of support in a way that is perceived as fair for all individuals concerned versus the speed and general feasibility of implementation. In the context of this crisis, and also more generally, our data protection rules are not always helpful.





Careful intervention required

At a time when the state is shouldering huge burdens, it understandably wants to compensate for this by siphoning off profits from precisely those producers whose revenues have soared while their costs have barely changed. But caution is needed here too: if not done right, this will unsettle investors and hold back the urgently needed expansion of renewables. Another idea, perfectly understandable in theory, is that of wanting to curb rising prices at a time when there is limited flexibility in supply and demand and shortages are pushing prices ever higher. However, changing the merit order system without careful consideration to be able to better control producer prices is risky. Handled wrongly, interventions have the potential to wreck the markets, which is by no means the lesser evil. A look at countries that acted quickly to counter rising gas prices and shortages shows that good intentions do not always translate into good outcomes. In Spain, the cap on gas prices caused gas consumption for electricity generation to rise sharply, which was far from the intended effect.

The important thing is not to have easy answers ready for the next talk show featuring anxious billpayers but to manage the situation responsibly. That means being mindful of long-term affordability as well as security of supply and also environmental impact. Ultimately, this energy trilemma always comes down to balance. Energy policy has always been successful in the past when it has struck a balance between these three goals. Any policy that ignored the trade-offs between goals over an extended period in favor of a one-sided focus has had to suddenly and frantically change course as soon as a neglected goal got out of control.

“Phase-outs were in vogue while security of supply was ignored, or dismissed as a private matter for companies. This is now coming back to bite us.”

This is precisely the mistake we have made. For two decades, our public discourse focused solely on environmental and climate change issues because this was people’s primary concern. We took the other two goals for granted. Society demands we end nuclear so we phase out nuclear. The issue of coal is in the spotlight so we phase out coal. All quite understandable, but rather than moving away from these energies once we had created the alternatives, we chose to do it straight away, as if the two were somehow unrelated. And sometimes we don’t know ourselves what we want. In general, we want to expand wind energy and build more power lines to drive the energy transition, so we set high targets for this. But then we want to take account of all local opposition so we slam the brakes on.

A lack of balance

It is often suggested that purchasing cheap Russian gas led to the energy crisis. But I can't see anything wrong with sourcing cheap energy; the markets determined the prices and Europe aligned itself with these and purchased accordingly. The mistake was obstructing and opposing alternatives. Gas storage facilities, LNG terminals, investment in infrastructure and alternatives... these were all politically undesirable until a year ago. Phase-outs were in vogue while security of supply was ignored, or dismissed as a private matter for companies. This is now coming back to bite us. Once again, the mistake was a lack of balance and forward planning.

The war in Ukraine is now forcing us to make radical U-turns, but what we need, at long last, is a balanced energy policy. The energy transition will work if we enable innovation and investment. Indeed, the current crisis offers growth opportunities, especially for a company like E.ON: we need to step up the pace to drive the energy transition forward. That requires full commitment from the company. Yet this perspective is worthless if we fail to navigate the business through the storm in the short term, and that cannot be done with frantic maneuvering at the helm. Desperate citizens and companies are not helped by hastily contrived solutions that will fall apart in no time. What is required is carefully considered action. We need optimism for the future during the crisis, without naively foundering on the challenge of our current predicament. We need an absolute commitment to doing whatever it takes – but also the ability to let go and sleep at night afterwards. And that brings us to the Stoics. The Stoic perspective can be helpful in many situations, namely that one should remain calm and composed in all circumstances and that happiness can be achieved through practice. I do not want to labor the image too much and I by no means wish to advocate sleepwalking; it is important to realize that there are two parts to this picture. No holding back, inaction, or obstruction, but rather listening carefully, understanding the complexity of the decisions in terms of society, climate change, and the economy, and then doing what is necessary, while always remaining mindful of balance. If we do this, we will chart a successful course into the future. ▀

“Desperate citizens and companies are not helped by hastily contrived solutions that will fall apart in no time. What is required is carefully considered action.”





Dominik von Achten
Chairman of the Managing Board
Heidelberg Materials



Green Concrete: How to Transform the Building Materials Sector

The challenge is immense: Climate change and the increasing demand for housing, infrastructure, and renovation – especially in metropolitan areas – drive a global need for high-quality sustainable building materials. As Heidelberg Materials, we want to invent and scale the solutions.



Our core product, concrete, has major ecological advantages: It is long-lasting, fully recyclable, and a locally created product that does not need to be transported long distances. It's resilient to extreme weather events such as droughts and heavy storms, and thus plays an important role in mitigating climate change. Since concrete is also affordable, it can provide both mature and emerging markets with solid infrastructure at a reasonable cost.

However, the production of cement, the “glue” in concrete, is highly carbon-intensive – and as a result, the building materials industry is one of the largest emitters of carbon dioxide. While this represents a considerable challenge, it gives cement and concrete producers the opportunity to make a very significant contribution to climate neutrality, and to spearhead the green industrial transformation. At Heidelberg Materials, we are meeting this challenge with our full energy and dedication. Our role as a technology leader enables us to take the lead in the worldwide decarbonization of our industry.

To this end, we are gradually replacing fossil energy sources in our plants with alternatives, including bio-based fuels and green electricity. But how do we deal with the two-thirds of carbon emissions that occur during the combustion process in the cement kiln and which cannot be avoided by technical means? This is where CCUS – Carbon Capture, Utilization and Storage – comes into play. Alongside geological storage, the best option from a sustainability point of view is to put the captured CO₂ to good use; in other words, to turn it into a valuable raw material – for example, by making synthetic fuel for aviation. That is something we are already working on intensively.

“The production of cement, the ‘glue’ in concrete, is highly carbon-intensive – and as a result, the building materials industry is one of the largest emitters of carbon dioxide.”

Our low-carbon vision: Products that benefit society as a whole

We are committed to transparent business practices. That is why, for example, we do not offer climate-neutral concrete purchased with offset certificates. Instead, we rely on technology and on the entrepreneurial spirit of our team at Heidelberg Materials to produce truly carbon-free concrete. There is no hiding the fact that we are not there yet and that our industry as a whole still has a way to go. Yet, with our strategic focus on carbon capture, circular economy, and alternative processes and fuels, we are on the right path.

The main questions guiding us on this journey must be the following: How can we successfully deploy smart decarbonization technologies around the globe? How do we take all markets and stakeholders along – while considering specific geographical conditions, and ensuring the right choice of technology for each location? How do we take concrete action?

“We want to reduce our CO₂ footprint by 50% by 2030, compared to 1990.”



Leading the way with the most ambitious reduction target

At Heidelberg Materials, we are committed to lowering our CO₂ footprint at all locations worldwide. Our strategy to get there is focused on three key principles:

Set the right targets.

We have set ourselves the most ambitious CO₂ reduction target in our industry: We want to reduce our CO₂ footprint by almost half by 2030 compared to 1990, to 400kg CO₂ per tonne of cementitious material. We are also committed to achieving Net Zero carbon emissions by 2050 at the latest. Making this happen means reinventing ourselves as a company. We are constantly working to optimize our processes and products, to push digital, and to apply a “circular mindset” in everything we do. Additionally, we are replacing fossil energy sources in our plants with non-fossil alternatives, and are increasing our use of electricity from renewable sources. When it comes to digitalisation, we set forth a clear ambition: to become the first industrial tech company in the sector and to leverage digital to support our sustainability efforts.

Choose the right approach.

Our strategy is consistently bottom-up: We have defined concrete carbon reduction roadmaps for every site and each country we operate in. Additionally, our global remuneration systems are linked to the reduction of CO₂ emissions. This logic must be at the heart of the green industrial transition: In dealing with the climate crisis, we cannot afford to only concentrate on certain regions of the world. We need to have solutions ready for all economies, whether they are mature frontrunners in climate protection or only at the start of this journey. The same goes for the scope of our own operations. We must consider the whole supply chain.

Pilot and scale cutting-edge technologies

To trial new technologies, we work with partners and carefully choose locations – as in the case of CCUS. CCUS is a prerequisite for achieving Net Zero in our industry. We will capture and store 10 million tonnes of CO₂ cumulatively until 2030 through our already launched CCUS projects. The most important factors in site selection for our pioneering CCUS projects are transportation and storage infrastructure, a mature regulatory and policy framework as well as societal acceptance of new technologies. Based on these criteria, we have chosen sites such as Brevik, Norway, and Edmonton, Canada, each with the best conditions in their respective region. And as soon as we can offer mature technologies at favorable conditions, we will roll them out to other countries.

On the top of our agenda: Closing the materials loop

At Heidelberg Materials, we have been contributing to progress for 150 years. Our materials have been used to build the homes, roads, and infrastructure that make the modern world. To make this progress climate compatible, we need to end linear business models and go circular.

By 2030, we want to offer circular alternatives for half of our concrete products. The recovery of building materials and concrete recycling make a decisive contribution in this regard. The processing of concrete demolition waste will allow us to increasingly prioritise recycled aggregates over primary raw materials, and to offer ready-mixed concrete with a high recycling share. Today, concrete demolition waste is often disposed of in landfills or used in road construction, which does not match the potential of the material and its costly, energy-intensive production. Heidelberg Materials is therefore focused on driving innovative technologies to process concrete demolition waste and upgrade it for use in the construction cycle as a valuable material.

But strengthening circular materials offering not only caters to the growing demand for sustainable building materials. The increasing substitution of primary raw materials also contributes to another goal that has been close to our hearts for a long time: the protection of global species diversity. Businesses affect nature in many ways, their activities can require considerable amounts of land and transform landscapes and natural habitats. At Heidelberg Materials, we have been assessing our impacts and undertaking specific projects to increase the biodiversity at our sites for many years.

“By 2030, we want to offer circular alternatives for half of our concrete products.”



Spotlight on many local solutions for climate change – for mature and emerging markets

While there is still much to achieve, it is worth noting some exemplary initiatives that are already in place. As governments and businesses have been working hard towards ambitious net zero roadmaps, there are many success stories to tell.

Work on Heidelberg Materials’ flagship CCUS facility in Brevik, Norway, is today well underway, with the goal of starting CO₂ separation from the cement production process already by 2024. With 400,000 tonnes of CO₂ to be captured annually and transported for permanent storage, Brevik CCS will be the first large industrial-scale carbon capture and storage project at a cement production plant in the world. We are also rapidly progressing on a number of other large-scale CCUS initiatives around the globe. Between now and 2030, further projects will be launched in Edmonton in Canada and Padeswood in the UK, among others. The recently announced ANRAV project in Bulgaria aims to be the first full-chain CCUS project in Eastern Europe. It will link carbon capture facilities at the Bulgarian Devnya cement plant through a pipeline system with offshore permanent storage under the Black Sea.

In Morocco, we are using captured carbon from the cement production process to grow microalgae, which can then be used for a wide range of applications, like animal feed additive or fertilizer. In Ghana, the construction of the world’s largest flash calciner is currently underway: Since CO₂ emissions from clay calcination are significantly below emissions from clinker production, substituting clinker with calcined clays will significantly reduce our CO₂ footprint on this important West African market.

These examples show: If we ambitiously drive the roadmap, achieving Net Zero carbon emissions is possible. But many challenges remain to be met. Only in close collaboration with our global value chain, policymakers, and societal actors can we drive progress toward sustainable, low-carbon construction materials around the world.

Everything we do is geared toward driving that change. The change we drive is key to unlocking our company’s future, and it creates opportunity. Green concrete is possible. We are ambitiously on the right track!►

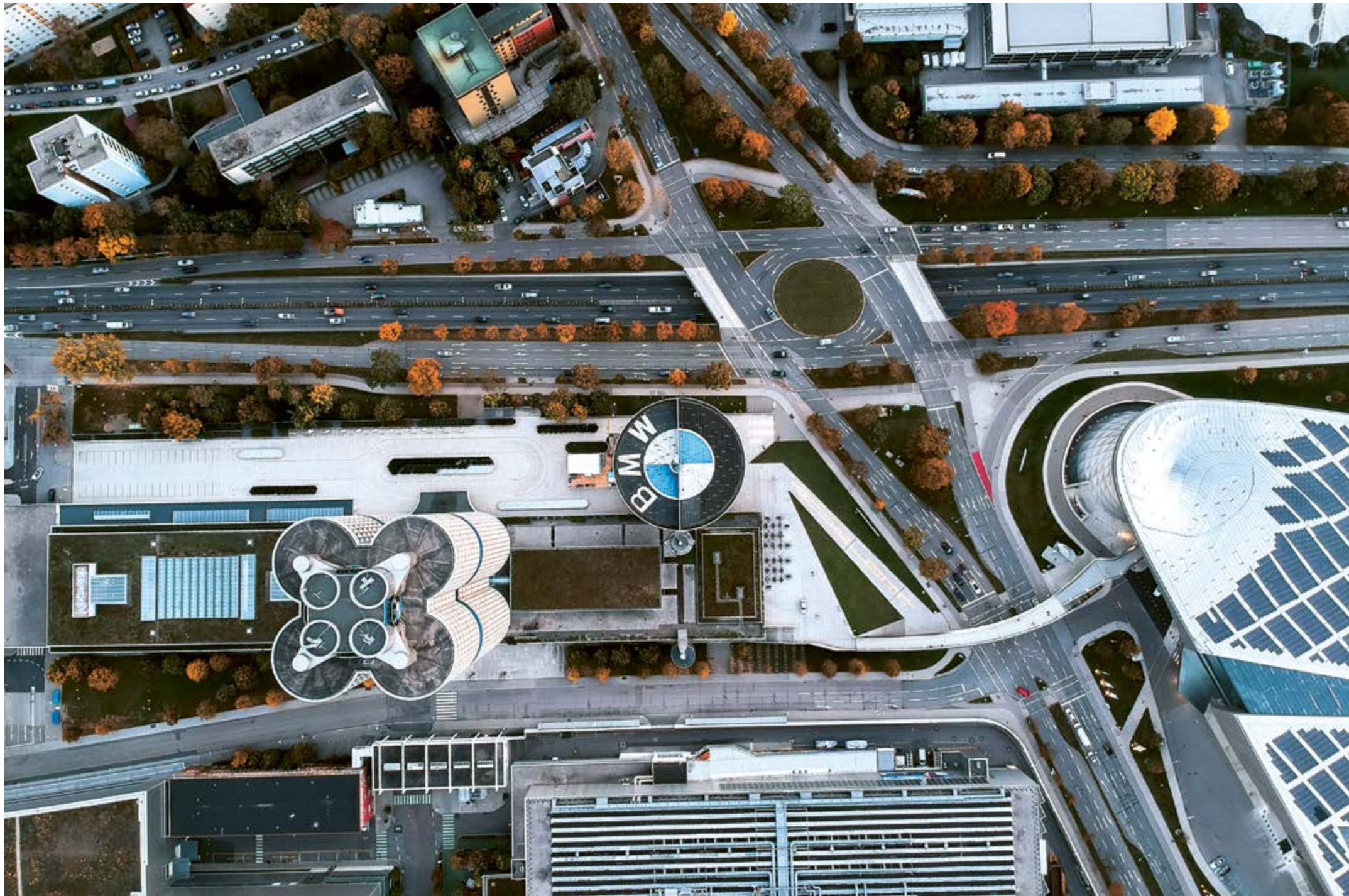
The BMW iFACTORY: Securing Production Excellence in a Changing World

Economic and technological flux is a constant in the world. However, current developments are quite different from anything that has gone before – in two main ways: first, in their dynamism, and second in the simultaneity and profundity of the changes they entail. What's more, these two aspects are inter-reacting, with a clear tendency to amplify each other.



Milan Nedeljković
Member of the Management Board
BMW





This is especially true of climate and environmental change, geopolitical conflicts and innovation breakthroughs in key fields of technology. Together, these define our era and pose entirely new challenges. Often, the effects of these global shifts extend far beyond their origins, encompassing further processes and interrelationships which, in many cases, reinforce each other in turn.

The race for resources

A good example of the interdependency of developments is the availability of raw materials for manufacturing high-tech products. Natural resources are finite, and those that remain are complex to extract. So, as demand rises and supplies continue to dwindle, the global race is on to win control of the last remaining deposits of essential raw materials. Without doubt, technological developments take a lot of these resources, but at the same time innovative methods and technologies are paving the way to develop substitutes and process raw materials from products that have reached the end of their useful lives for recycling.

Faced with these global shifts, we must all revisit our current activities – especially companies that have long been successful in their industry in the past and intend to remain so in the future. To maintain their licence to operate, they must review their business models and, if need be, adapt them to suit new conditions.

“So, as demand rises and supplies continue to dwindle, the global race is on to win control of the last remaining deposits of essential raw materials.”

These dynamic, multi-dimensional shifts are having a direct impact on the automotive industry. As economic conditions and cross-industry processes transform on a global scale, we find ourselves facing the task of ensuring electric cars are just as seamless and easy to use as conventional ones. This can only be achieved if the development of the charging infrastructure keeps pace with the burgeoning number of electric cars. And with demand for electricity set to increase exponentially, we must take the necessary steps now to ensure that stable supplies of energy can be fed into resilient networks. Multi-dimensional transformation processes such as these require long-term strategic but also short-term operative solutions, not just from the automotive industry alone but also together with its partners in related sectors and politics.

Re-use and recycle

In addition, the shift to electric mobility requires rapid and significant changes to products. As the shift from traditional combustion engines to electric motors continues, digital technologies are making their way into almost every section of the car.

Another priority is the recycling of raw materials. This entails not just integrating more recyclates into vehicles but also designing them specifically with recycling in mind. In other words, as a new car is developed, its various modules and parts are created with a view to being re-used at the end of the vehicle lifecycle.

However, it is not just the vehicle itself that is changing at an ever-increasing speed: the way cars are manufactured is undergoing a radical transformation too. New vehicle concepts require modified production methods and technologies. Here, new digital methods and tools especially are constantly pushing the boundaries of what's technologically possible. In a volatile political and economic environment, efficient, flexible production systems are the key to a competitive and viable future.

“It is not just the vehicle itself that is changing at an ever-increasing speed: the way cars are manufactured is undergoing a radical transformation too.”



Lean. Green. Digital.

It is these fundamental considerations that are at the heart of the new strategic vision for the BMW Group's global production system: the BMW iFACTORY. This approach is based on three key strands: **LEAN. GREEN. DIGITAL.**

LEAN is about achieving the ultimate in competitiveness. It encompasses not only the efficiency and effectiveness of all processes and workflows but also the optimisation of one-off expenditures and investments as well as maximum flexibility and adaptability.

A key focal point here is the effective optimisation of the production process. Cutting-edge methods and technologies are employed early on, as far back as the planning stages, to verify and optimise current processes and value streams in ongoing production. At the same time, a clear priority is to keep the production system as flexible as possible so that production planners can deliver agile responses to the various factors influencing our output, be it changing market conditions or customers' needs, or disruptions to the supply chain. The **LEAN** approach also offers advantages for our employees, as the systemic flexibility of production enables variable operating times and working time models.

GREEN is about sustainable and circular production of the future and centres on the stringent and consistent alignment of our global production system with green principles. This includes using green energy and heat, and systematically integrating the circular economy into everything we do – consistently and without compromise. From bio-methane at Plant Spartanburg to wind and hydrogen at Plant Leipzig, solar power in Oxford, Mexico and Shenyang, and hydro-power in Dingolfing, we make the best possible use of the potential available at the various sites to generate energy from alternative sources.

The BMW Group was quick to appreciate the importance of sustainably generated electricity and started long ago to switch to green energy at its plants and facilities worldwide. Since 2020 all the electricity it sources from providers has been generated from renewables.

The plans for our future plant in Debrecen, Hungary, have been **GREEN** since the start. When it starts production in 2025, Debrecen will operate entirely without fossil fuels, making this the first full vehicle plant in the automotive industry to run purely on CO₂-free fuels. This is a real quantum leap, with much of the energy used being generated directly on-site and from sustainable sources. All in all, only small amounts of process-related CO₂ emissions remain – less than the associate's breathing on the factory premises. All the while, the BMW Group continues to strive relentlessly for the next technological breakthrough to eliminate the remaining emissions as well.

From data science and artificial intelligence to virtualisation, **DIGITAL** is all about integrating digital intelligence into every production process. Artificial intelligence and machine learning, for example, have already made their way into quality management in ongoing production, where they allow us to ensure with greater speed and precision that every car is defect-free. These are just two memorable examples from a whole host of digital tools and technologies being used in manufacturing operations.

Achieving the perfect production process, however, always entails comprehensive planning. Here, too, digital technologies are proving invaluable, enabling the real production environment to be replicated within the virtual space – sometimes before it even exists. To do this, a 'digital twin' of every BMW Group plant is being created, which can then be used to develop and model comprehensive plannings – with zero impact on ongoing production operations. In addition, virtual planning allows the team at the BMW Group to collaborate with partners around the world in real-time, saving time and resources during the planning process and delivering on the **LEAN** and **GREEN** approaches as well.

The digital twins also support employee training, allowing production workers to learn and practise every move in the 'virtual duplicate' environment before the first production systems are even installed.

Focus on training

But the key formative influence on all these innovations is – and always will be – people.

Because as comprehensive as automation and digitalisation may be today and in the future, the primary influence on shaping car production will always be a company's managers and employees. This means not only training them but also inspiring them to participate in using the new technologies and stoking their desire to be an active participator and collaborator in the future. Crucially, for this to succeed, they must be invited to explore innovations and new ways of working early on.

At the BMW Group, over 25,000 employees have already trained for new jobs in electric vehicle production, and more than 40,000 training courses around digitalisation have been delivered. What's more, the BMW Group's attractiveness in the employment market has continued to increase significantly, thanks to the BMW iFACTORY and its clear focus on the future.

We believe this provides a crucial foundation for the future of our company. Highly trained people with a positive attitude to new tasks will ensure the BMW iFACTORY is a success – and with it the BMW Group. ▀



“But the key formative influence on all these innovations is – and always will be – people.”



Martin Daum
CEO
Daimler Truck



The Case for Hydrogen

Why Critics
Get it
Very Wrong

The goal is clear: Europe's economy is to become CO₂-neutral by 2050. But the way to get there is still less clear. One decisive and controversial topic is hydrogen. This article looks at popular arguments against hydrogen and unmask them as mere myths.



“That hydrogen is the champagne of the energy transition and an unnecessary luxury – a statement which critics like to spread – therefore turns out to be a myth. Hydrogen is much more like water: absolutely necessary to enable an era of renewable energies.”

The facts are clearly in favor of hydrogen: It is key for sustainable transportation. That’s why we at Daimler Truck are pursuing a dual strategy based not only on batteries, but also on fuel cells.

Myth #1: Hydrogen is the champagne of energy transformation

Fact: Hydrogen is like water – absolutely essential

Today, the world meets a large part of its energy needs from fossil fuels. And the regions where oil, gas and coal are mainly produced are often many thousands of kilometers away from North America, Europe or Asian countries like China and Japan where they are mainly consumed. Europe, for example, is a net importer of energy.

In the future, the world will increasingly meet its energy needs via renewable energies. Especially via solar energy. So that’s changing. But one thing remains unchanged: Also in the future origin and consumption of energy will often be far apart. Solar energy is best harvested in sunny regions such as North Africa, the Middle East and Australia. However, it will continue to be used primarily in regions that already account for the majority of energy consumption today.

This means that even in the age of renewable energies, Europe will remain an energy importer. And above all: renewable energies will also be traded and transported internationally.

The question now is: How can this trade and transport become possible? The answer: Not via power lines and electrons, but only via a molecule-bound, non-carbon energy carrier – namely hydrogen.

Hydrogen is therefore urgently needed for a sustainable, international energy market. That hydrogen is the champagne of the energy transition and an unnecessary luxury – a statement which critics like to spread – therefore turns out to be a myth. Hydrogen is much more like water: absolutely necessary to enable an era of renewable energies.

**Myth #2:
Hydrogen is
energy
inefficient**

**Fact: Hydrogen is
“sun-to-wheel”-efficient**

It is said that hydrogen is too energy inefficient – especially compared to batteries. If a hydrogen-based fuel cell powers a truck, the argument goes, a much smaller portion of the solar energy that was originally put in is used for propulsion than with a battery. The ratio is about 30 percent vs 70 percent. The so-called “well-to-wheel” efficiency of fuel cells is therefore lower than that of batteries by a factor of two to two and a half. The reason for this is that a significant portion of the usable energy is lost when hydrogen is generated in the electrolyzer and later converted into electricity in the fuel cell.

This ratio seems to speak a clear language – for batteries and against hydrogen. Yet it is not that simple. Because we need to consider the following: The solar energy used to charge a battery truck in Europe must also be harvested in Europe. The solar energy used to generate hydrogen for a fuel cell truck, on the other hand, can be harvested in much sunnier regions. There, each solar panel square meter delivers two to two and a half times as much electricity as in Europe.

If we now combine both facts – the lower energy efficiency of fuel cells and the higher efficiency in harvesting solar power – it comes down to this: With a solar installation in the sunny south, it is possible to move a fuel cell truck the same distance as a battery truck for which the energy is generated with a solar installation of the same size in Europe. Experts therefore speak of a balanced “sun-to-wheel” efficiency for fuel cells and batteries.

Moreover, energy efficiency is not a decisive criterion. That would only be the case if renewable energies were in short supply. But they are not. Every day, 15 times as much energy hits the earth’s land surface as we currently consume worldwide in an entire year. So there is plenty of energy available. We just need to capture it and make it available in the right place.

“With a solar installation in the sunny south, it is possible to move a fuel cell truck the same distance as a battery truck for which the energy is generated with a solar installation of the same size in Europe.”

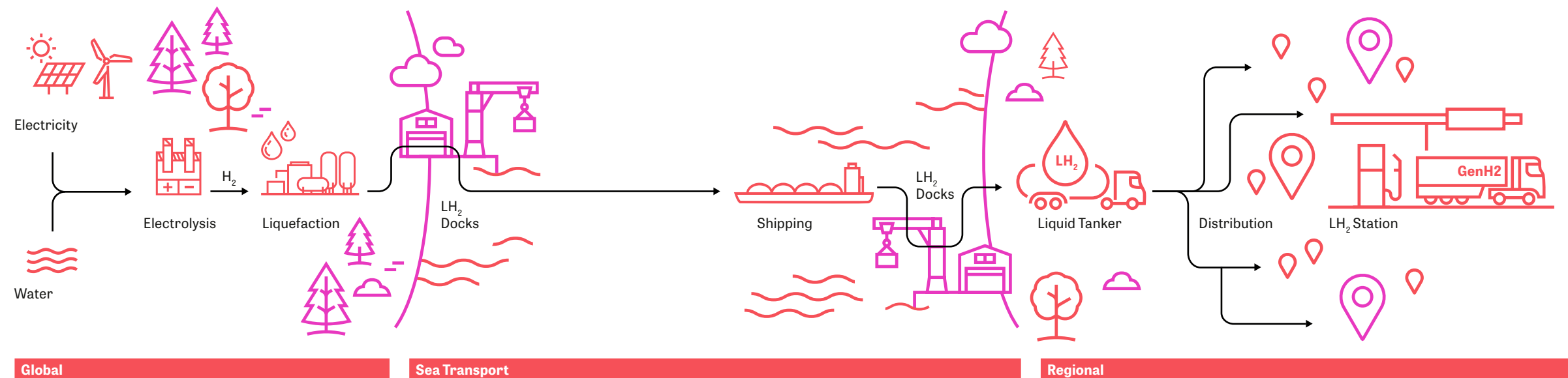
Myth #3: Hydrogen is too expensive

Fact: Cheap solar power makes hydrogen competitive

Critics like to point out that hydrogen currently costs more than ten euros per kilogram and is therefore not competitive. And at first glance, they are right.

Yet a high price today does not mean the price will also be high tomorrow – for two reasons. First, the electrolyzers still have a very low capacity, so we do not yet see any economies of scale.

And second, the energy used in electrolyzers is very expensive in Europe. The calculation looks very different if – see Myth #2 – the solar energy is harvested in sunny regions. There, solar energy is cheaper by a factor of two to two and a half – and because the energy used in electrolyzers is the largest cost block at about two-thirds, this immediately makes hydrogen competitive.



Fact: Two infrastructures are cheaper than one

An electricity grid is already in place, so it requires relatively little investment to charge the first battery-powered cars and trucks with it.

It's a different story with hydrogen. There is almost no infrastructure yet, and so considerable initial investment is needed to build up an initial supply.

Yet it would be fundamentally wrong to conclude from this that the costs for a hydrogen infrastructure are too high and that hydrogen therefore is out of the question.

Because after this first phase with an initial small number of zero-emission vehicles comes the decisive next phase: the ramp-up with a rapidly increasing number of vehicles.

If we then continue to rely exclusively on batteries, it will be very expensive to scale up the power grid further and further. Just one example: Once battery-electric trucks hit the road in large scale, a highway charging station will require 20 to 50 charging bays on average. Each of which should be equipped with megawatt charging – an energy load comparable to a city of 15,000 inhabitants.

In a study, the consulting firm McKinsey examined how infrastructure costs would develop if zero-emission vehicles were powered a) exclusively by batteries or b) exclusively by hydrogen-based fuel cells. Or if c) both technologies are used. The result was clear: c) is the most advantageous scenario. Building two infrastructures is cheaper than one.

Intuitively, one might have expected a different outcome. But: scaling the infrastructure for one technology to an extreme volume is more expensive than scaling two infrastructures to a medium volume.

Myth #4: Hydrogen infrastructure is too expensive

“If we then continue to rely exclusively on batteries, it will be very expensive to scale up the power grid further and further.”

Myth #5: Hydrogen is just a pet project of the big industry

Fact: We invest in a big way

We as Daimler Truck have committed ourselves to invest in hydrogen technology on a grand scale. By 2026, our joint venture with Volvo Group called cell-centric will put in operation one of Europe's largest production facilities for fuel cells.

Moreover, in the second half of this decade our Mercedes-Benz GenH2 Truck will hit the road, undergoing rigorous testing already. All of this clearly shows: We are very serious about hydrogen and make it an integral part of sustainable transportation. ▶





Ludovic Subran
Chief Economist
Allianz

The Good, the Bad and the Ugly of Sovereign Debt

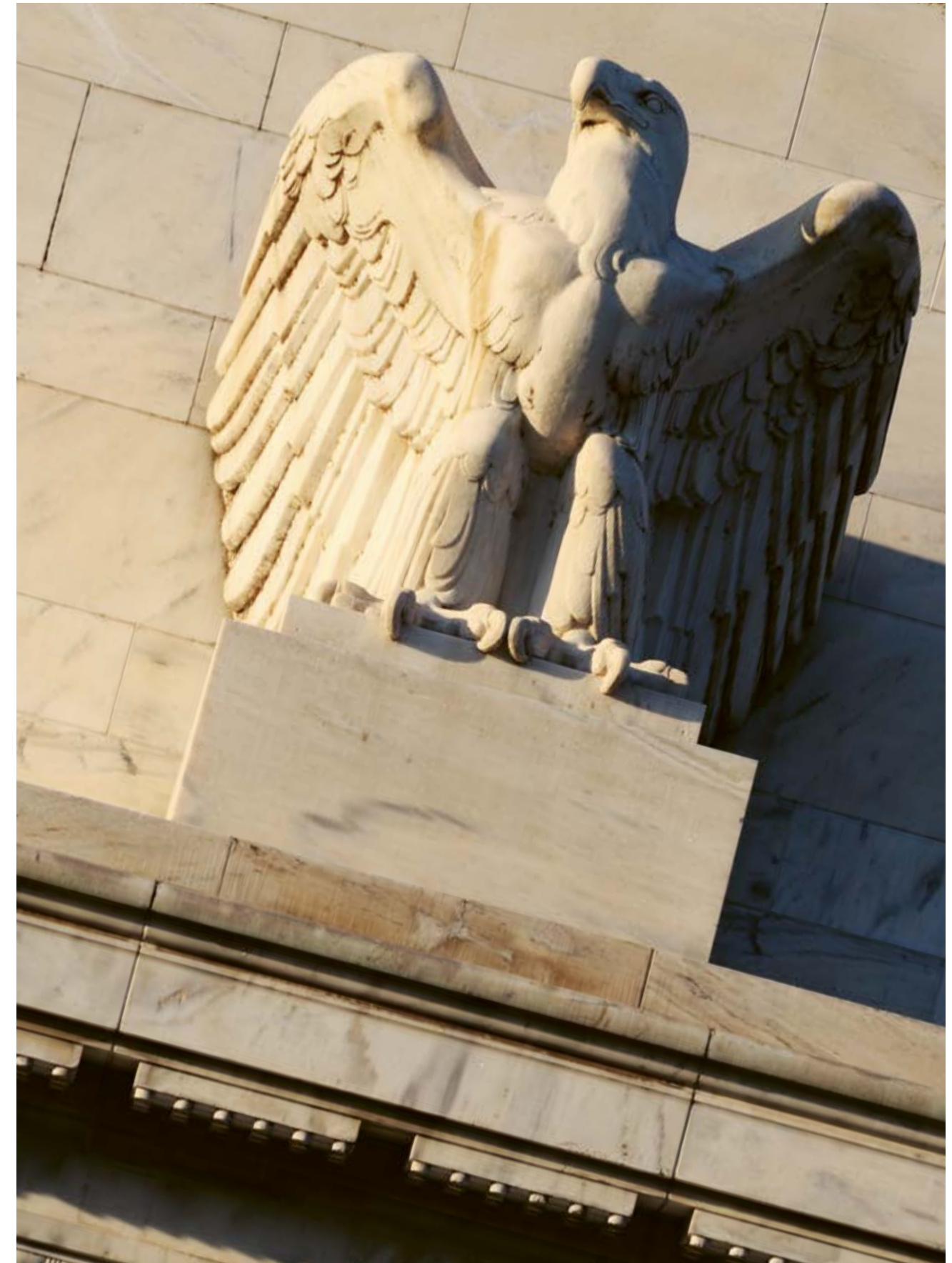
The Fed's Seismic Waves to Emerging Markets

Global debt is ringing alarm bells. Without urgent action, the policy-induced spasm of a plunging currency and skyrocketing bond yields seen in the UK could be a preview of what lies in store for many emerging market and developing economies in the next few months.

After all, increasingly restrictive US monetary policy is having an outsized tightening effect on the rest of the world – and hitting emerging markets the hardest. Central banks in emerging markets put an end to extraordinarily low interest rates induced by the Covid-19 crisis much earlier. However, as inflation in the US continues to break records, the Fed’s aggressive rate hikes over the last three months have amplified existing challenges for emerging markets, kick starting a “reverse currency war”.

“After all, increasingly restrictive US monetary policy is having an outsized tightening effect on the rest of the world – and hitting emerging markets the hardest.”

Uncertainty sparked by the war in Ukraine and rising US interest rates have driven up the dollar, squeezing emerging markets that borrow in foreign currencies. The stronger dollar is also intensifying inflation elsewhere by making commodities even more expensive. In this context, emerging market central banks are stuck between a rock and a hard place: High food and energy inflation makes it virtually impossible to let exchange rates adjust external imbalances, causing even more capital flowing out of emerging markets. At the same time, central banks also need to raise their own rates to contain imported inflation, which tightens domestic financing conditions even more. This reverse currency war leaves emerging markets with limited ammunition: more drastic policy measures such as intervening in foreign exchange markets, or even imposing capital controls.



Ludovic Subran The Good, the Bad and the Ugly of Sovereign Debt – The Fed’s Seismic Waves to Emerging Markets



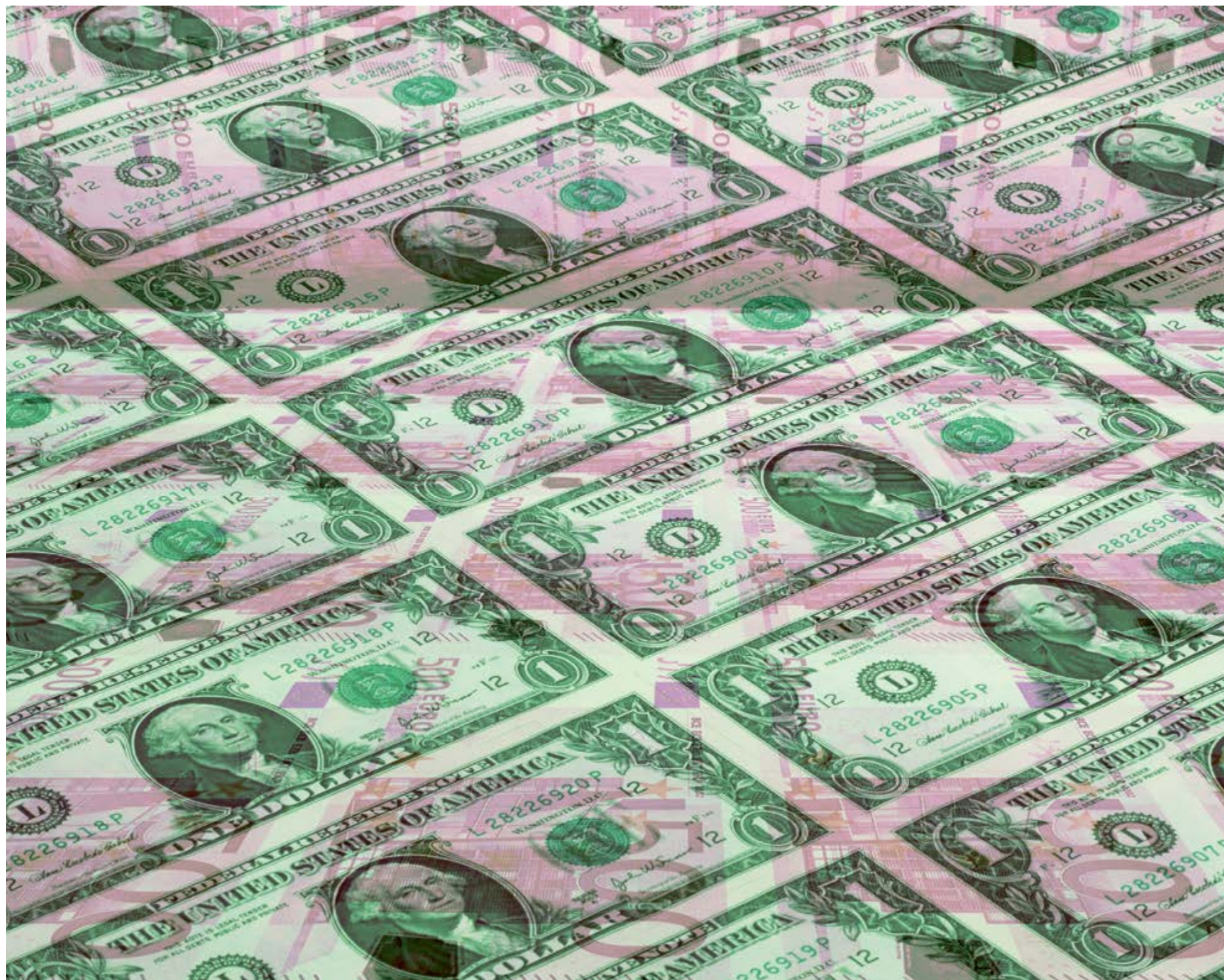
Which countries are most at risk?

Since the last taper tantrum in 2013, most emerging markets have gradually improved their external positions and built policy buffers over time. But net food and energy importers in particular have become very vulnerable. Of these, 11 countries could face balance-of-payments crises: Hungary, Romania and Turkey in Eastern Europe; Egypt, Ghana, Kenya and Tunisia in Africa; Pakistan in Asia and, to a lesser extent, Argentina, Colombia and Chile in Latin America. And if inflation remains high for longer than expected, keeping interest rates above 3.5% in the US and above 2.5% in the Eurozone, the risks could spread to a second set of countries, including Mexico, South Africa and Poland.

“With the Fed likely to stay the course in fighting inflation, urgent policy action is needed to address the rising rollover risk in emerging markets.”

Potential balance-of-payments crises also make sovereign defaults more likely. While most of the countries at high risk are small developing economies (e.g. El Salvador, Ethiopia, Ghana, Kenya, Malawi, Mozambique and Tunisia), the defaults could hit larger and more systemic ones, such as Argentina, Egypt, Pakistan or Turkey, that currently are in a stressed situation as well.

With the Fed likely to stay the course in fighting inflation, urgent policy action is needed to address the rising rollover risk in emerging markets – more than USD75bn worth of hard currency bonds are maturing by the end of 2023 alone.



How to safe vulnerable economies?

2022, the IMF set a new record with over USD130bn in loans disbursed to vulnerable economies. The IMF's lending headroom has increased by USD650bn after the last Standard Drawing Rights allocation in August 2021. More support is possible – and probably necessary at a moment when the decades-old collective debt-resolution process (Paris Club) could lose its effectiveness. The World Bank and regional development banks have also scaled-up their lending to the most vulnerable countries. However, countries themselves must do their part, including by adopting more efficient financial-management practices, rebalancing expenditures towards growth-friendly policies and establishing transparency on all external creditors.

“2022, the IMF set a new record with over USD130bn in loans disbursed to vulnerable economies.”

Central banks can also help – both directly and indirectly. Cross-currency swap lines would offer a direct way to reduce liquidity risk from FX exposures in many emerging markets. Indirectly, they could also address the adverse impact of the current pace of monetary tightening on market functioning or “plumbing”. Rapidly deteriorating liquidity conditions matter a great deal for the valuation of emerging market debt, which relies heavily on intermediation. As high volatility puts a lot of pressure on market-makers subject to margin calls, they suffer disproportionately if liquidity dries up and access to central bank money is limited.

There are no quick fixes, but supporting the market plumbing should be top of the list. Safe collateral is crucial for market liquidity but much of it remains parked on central bank balance sheets. Making securities lending more widely accessible at lower cost could address current collateral scarcity. Finally, widening collateral eligibility for accessing central bank money could boost precious liquidity in the corners of the capital market that are most at risk of liquidity squeezes, which would especially help emerging market debts. ■



From Chief Financial Officer to Chief Transformation Officer

Why breakthrough innovations need a unifying force based on a scalable digital ecosystem.



Jens Holstein
Chief Financial Officer
BioNTech



The past years have been marked by dramatic changes: While companies are working to adapt their corporate structures at the speed of technological change driven by digitalization, automation and artificial intelligence, global health crises such as the COVID-19 pandemic, environmental requirements driven by climate change, increasing geopolitical tensions and high inflation, among other factors, pose additional challenges and significantly add complexity to corporate transformation processes.

In order to operate and remain competitive in this new ecosystem, it is, without question, necessary for companies to take up, deal with and translate these changes into actions for their organizations. The result is a wave of transformation that is particularly challenging not only because of its pace and agility requirements, but also because of its fundamental impact on all levels of the organization as well as the company's DNA – its culture. We strongly believe that transformation has the potential to be something very positive, as it can be the driver for innovation.

Organizational and financial performance are strongly related. Ideally, future developments are triggered by the company's innovative initiatives. In any case, the organization and its Chief Financial Officer (CFO) need to anticipate trends early to drive transformation. In the biopharmaceutical space, we believe there are four key drivers to bolster performance and drive profitability of a corporation developing disruptive innovations:

- 1** **An innovative pipeline that addresses an unmet need;**
- 2** **Agility in order to be able to react quickly;**
- 3** **A highly functioning corporate culture embracing change and thus enabling innovation;**
- 4** **An organization that allows and encourages entrepreneurial spirit at scale.**

With the wave of transformational challenges, the role of the CFO has changed as well. To ensure that companies remain competitive, today's CFOs must also master these key drivers as well as the adoption of new technologies and help their companies embrace transformation. These days, CFOs have to navigate an increasingly uncertain and unpredictable macroeconomic, social and legal landscape. Simply put: CFOs have become important drivers of transformational processes in their organizations.

The transformation of BioNTech

Over a decade ago, BioNTech was a small biopharmaceutical company driven by the vision of its co-founders, three scientists and physicians who became entrepreneurs out of desperation on their path to bring novel treatment options from bench to bedside. While they wanted to translate science into survival by developing novel immunotherapies to fight cancer, infectious diseases, and other serious diseases, they had to experience that what they defined as next-generation therapy others thought of as science fiction.

This view changed with the first mRNA-based medicine's approval. BioNTech's COVID-19 vaccine was the proof of concept of mRNA as a medical product as well as of its scientific and technological excellence. This historic achievement was a stepping-stone to potentially transform an entire industry. At the same time, it was the beginning of a new chapter in BioNTech's history. After establishing a diversified pipeline, a global profile and a growing employee base, we asked ourselves: How can we stay true to the company's vision and transform BioNTech into an organization that is prepared for future success on a global scale?

"Agility is the name of the game. However, the bigger a company, the more challenging this appears to become. An organizational structure needs to maintain enough flexibility to foster innovation."

A company is only as good as its people

BioNTech is a culture-driven company as we believe that a company is only as good as its people. We are driven by our vision to develop novel immunotherapies with scientific rigor to improve the lives of people worldwide. At BioNTech we put our vision first. It is truly the heart of our BioNTech culture, guiding our thoughts and actions. Being responsible for HR, I focus on transforming our organization to reflect the growth, while maintaining the culture as our DNA that has enabled us to come this far. Thus, agility and an environment that fosters innovation have been key to our success, and we strive to maintain this environment for the years to come.

We embrace diversity with team members from more than 80 countries, many women in leadership positions and a well-planned mix of experienced and young professionals. One of our focus projects in 2022 was the integration and digitalization of HR systems and processes to enable a standardized, global, and scalable HR landscape, something that was not previously needed given the size of BioNTech. We designed and rolled out a cloud-based single system while hiring more than 1,500 employees in 2022. This established ecosystem allows for current and future transformation at scale.

Structurally, we started to establish an object-oriented organizational structure to run our value creating business areas in a flexible, more project-oriented manner. Agility is the name of the game. However, the bigger a company, the more challenging this appears to become. An organizational structure needs to maintain enough flexibility to foster innovation. To achieve this, working structures need to reflect this agility, for example by setting up small teams with employees that work on various projects in parallel in different settings, based on their knowledge or attributes.

To safeguard our culture and maintain what made us successful in the first place, we have established an initiative called "Culture Campus". This initiative continuously aims to foster successful collaboration and encourages and enables employees to take an active role as ambassadors in shaping our culture. The Culture Campus drives a variety of initiatives to help employees, teams, departments, and the entire company forge a collective identity while empowering individual employees to bring in their best capabilities. This inter-divisional approach aims to create a unifying force to prioritize a crucial success factor in our transformational process: our people.

"Most of all, transformation is necessary as it is the driver for innovation. Addressing challenges with an open mind are a big motivator and value creator."

Embracing a Transformational Future

Transformation can be challenging, but it is also very exciting and motivating. Most of all, transformation is necessary as it is the driver for innovation. Addressing challenges with an open mind are a big motivator and value creator. When SARS-CoV-2 emerged, BioNTech decided to focus on the development of a vaccine to address the pandemic while not losing sight of its other projects. Thanks to that decision and the subsequent transformation, we are in a strong position to turn our vision into reality: improving people's health worldwide by developing breakthrough innovations.

To realize that mission, ongoing transformation will be required. While we can't accurately predict how the company will look in a few years from now, we can take comfort in, and draw confidence from, the fact that we're improving our chances of success by empowering our teams to drive scientific discovery and excellence. The CFO's role has massively changed, especially in innovative companies. From a Chief Financial Officer to a Chief Transformation Officer who masters the financial and the organizational capabilities of the company. ▀

THE STERN
STEWART
INSTITUTE

ANNUAL SUMMIT 2022



REVIEW

Another year has passed since our last Stern Stewart Institute Annual Summit. And while few of us might have assumed that the global pandemic and its consequences for business and people would no longer be on our minds today, probably even fewer expected that since February of this year, Putin's war in Ukraine has presented us with a whole new set of challenges that are no less difficult. Our annual Summit Review.

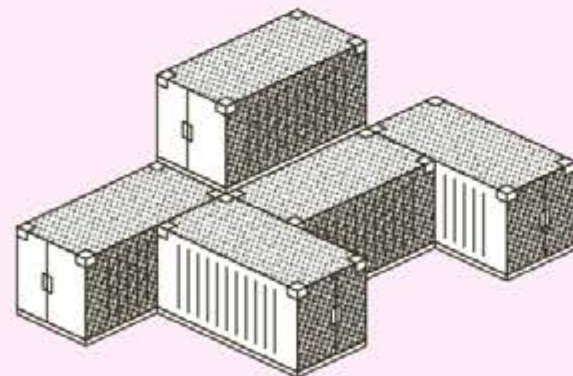
While many countries and companies are still struggling to learn their lessons from the pandemic and better equip themselves for coming crises, the war in Ukraine and the resulting sanctions are forcing us to take decisive action in a wide range of policy areas. For it is not only the international security architecture that is affected, but also the energy industry, global supply chains and, once again, the issue of new migration flows from the affected regions is also on the agenda. For many years, a nuclear scenario seemed to belong to a distant Cold War past, but suddenly this threat is again dominating our lives and political discussion.

As always, however, our Institute also dealt with other, less day-to-day political issues that invited less substantive and stimulating discussions. These included, for example, how to deal with the changing lifestyles of Generation Z, the future of office work versus the home office, which has gained enormous virulence not only because of the pandemic experience, and the expected reactions of central banks to ongoing inflation. All these and many other topics once again proved to be exciting starting points for lively debates, which were conducted with commitment and expertise by all our participants. And our annual survey produced illuminating results, two of which should be highlighted at the outset: When asked about the future of globalization, 64.52% of respondents said that supply chains will become local (see **figure 1**)...

1
Will globalization continue, or will supply chains become much more local?



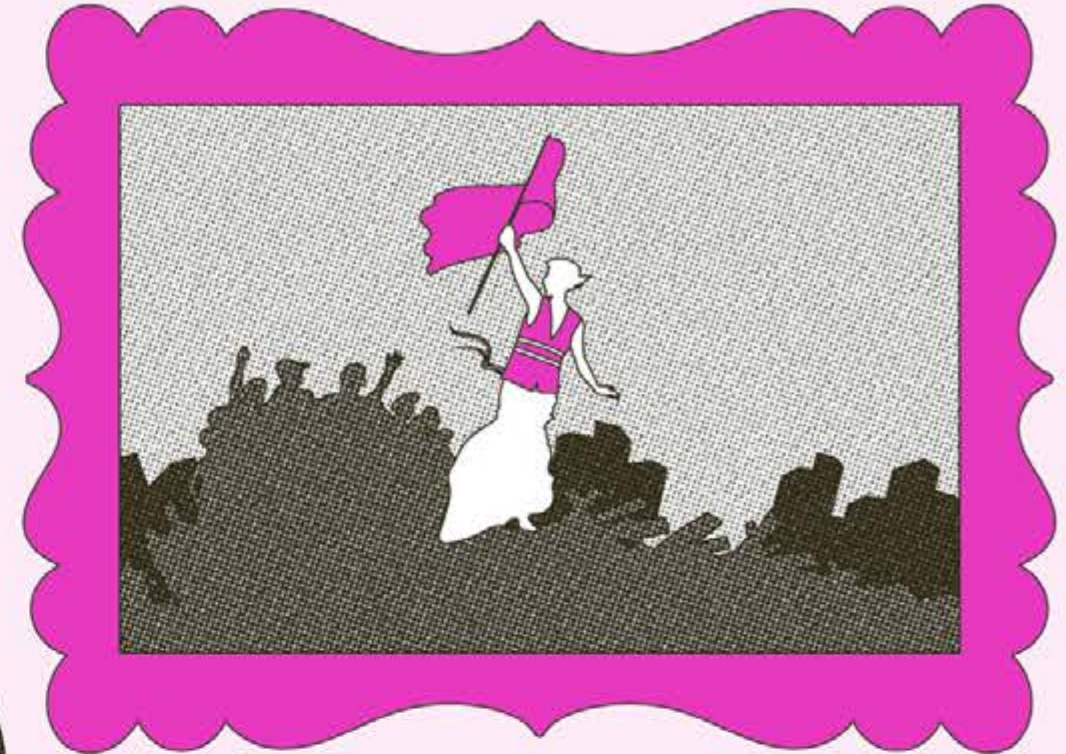
64.5%
Supply chains will be more local



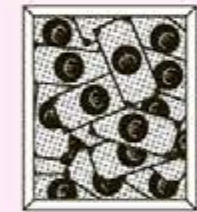
35.5%
Globalization will continue



28.7%
Stopping Climate Change



62.8%
Saving Freedom & Democracy



8.5%
Creating Prosperity

2
What is it that our generation should be remembered for?

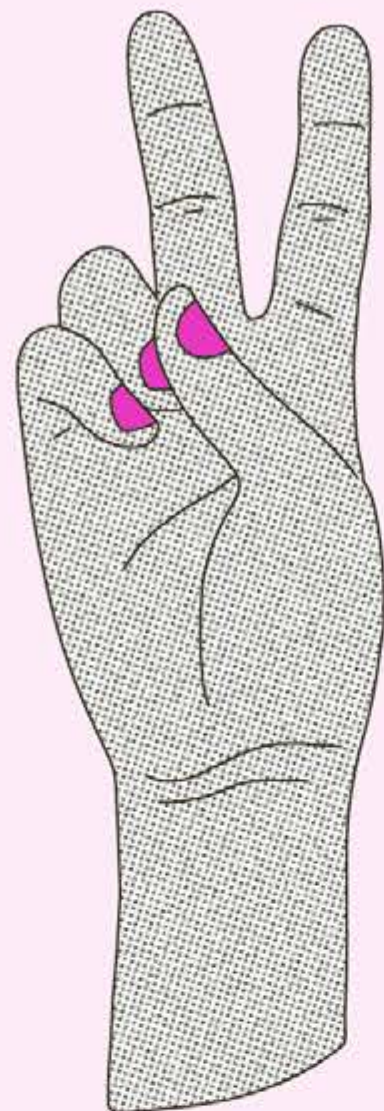
...and when asked more fundamentally what our generation should be remembered for, nearly two-thirds voted that saving freedom and democracy should be the top priority (62.77%, see **figure 2**).

INDIVIDUAL FREEDOM VS. GOOD OF SOCIETY – HOW MUCH AUTHORITY MUST DEMOCRACIES BEAR?

Many of the political challenges we face today touch on the contrast – or perhaps conflict – between individual freedom and society’s common good. Pandemics, environmental disasters, the climate crisis – more and more often, help is being demanded from the state, but more and more often, the state is also asking individuals to put their personal freedoms last for the benefit of society. How should Western democracies respond to this challenge?

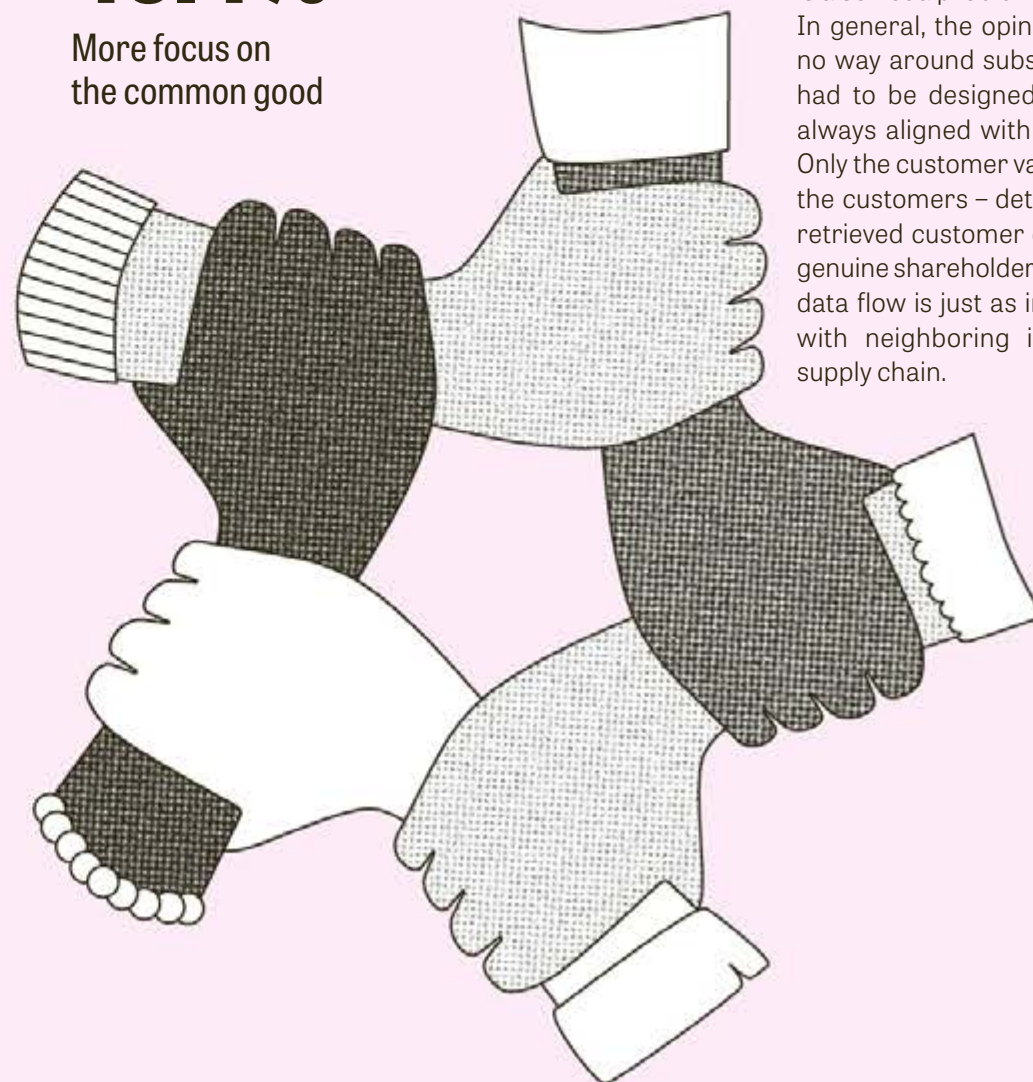
Despite differing emphases on detailed issues, there was agreement among the panelists that individual freedom must not be played off against society. Safeguarding personal freedoms does not have to be at the expense of social cohesion, rather the opposite. Instead, it is a matter of separating the different spheres in which one is more prominent than the other. Thus, it is still necessary to preserve individual freedom in the political sphere, at the level of voting rights and political participation, while at other levels individual freedom rights can no longer apply fully without being tied to regulations and resources. There was also agreement that there must be a broad, Europe-wide discussion about a future vision of freedom and social responsibility. In any case, the result of our survey this year is interesting in this context: When asked in which direction Europe should steer in view of the pandemic and the political dynamics in China, a narrow majority was in favor of more individual freedom (53,62% vs. 46,38%, see **figure 3**).

3
Learning from the pandemic and the dynamics in China, in which direction should Europe move?



53.6%
More individual freedom

46.4%
More focus on the common good



TRADING MULTIPLES LOVE RECURRING INCOME – HOW TO MAKE YOUR BUSINESS AS A SERVICE?

At the center of the current discussion about the future of services is the question of how precisely the customer focus can continue to be shaped and developed. The panel agreed that the customer must be at the center of every successful business model. In concrete terms, however, the question was, for example, what role the subscription models, which have been intensively expanded for some time, play. The idea was raised that these models had perhaps been overdone in recent years and that there was therefore a backlash. No, it was countered, not as long as the customer feels that his needs are the focus of the business; then the dependency associated with the subscription is also not a problem for him.

In general, the opinion prevailed that there was no way around subscription models, even if they had to be designed as flexibly as possible and always aligned with specific customer interests. Only the customer value arising from the loyalty of the customers – determined from the constantly retrieved customer experience – can also create genuine shareholder value. For this, a cutting-edge data flow is just as indispensable as cooperation with neighboring industries along the entire supply chain.

A THUG AFTER ALL – HOW TO STOP PUTIN’S CRUSADE AGAINST OUR SECURITY AND OUR VALUES?

Shortly before the second anniversary of the outbreak of the Covid19 epidemic, the Russian invasion of neighboring Ukraine created yet another global crisis, some of whose dramatic consequences are only now becoming apparent and whose end is not yet in sight. What is certain is that the war aims originally announced by Russian President Putin have not been achieved. Everything points to a prolonged conflict, with the worst consequences for the people and the economy in Ukraine, as well as unforeseeable effects on the global economy and each national economy. The West’s response to Putin’s attack has been to supply weapons to Ukraine and to impose multiple, increasingly harsh sanctions packages on Russia. And even if experts assume a major impact on Russia’s competitiveness and economic power, the question is increasingly urgent whether there are other ways to end this war.

Many aspects of the very complex situation were highlighted by the participants during the stimulating discussion: How dangerous is it to continue to corner Putin? Will it be possible to maintain the previous solidarity of the Western states in the long term? To what extent can a worsening of the situation be expected as a result of a more difficult supply situation in the winter and an ensuing danger of social unrest?

The outlook, the panel was fairly unanimous on, is bleak. A quick end to the war is not to be expected, and it was also pointed out that even an end to Putin’s presidency, however it came about, would not automatically mean an end to the war. It was agreed that both the pressure on him must continue and the attempts to inform the Russian population more accurately must be maintained at all costs. The need to send a warning signal to other autocrats was also pointed out.

DIRTY ELECTRICITY – HOW TO SUPPLY ENOUGH ENERGY WITHOUT USING NUCLEAR?

4
How important are nuclear, fracking, and coal as transition technologies?

Just as the pandemic and the war in Ukraine have combined to form a dangerous mix, with serious consequences for global supply chains, the West’s sanctions policy, combined with efforts to achieve an energy transition, is exacerbating the situation in the energy sector. This is especially true for countries like Germany, where the long-planned phase-out of nuclear power is imminent. The question that arises is: What role could a suspension of the phase-out, even if only temporary, play and would this be a viable or even necessary step to mitigate the consequences for the economy and households? At least in bare figures, the opinion of our participants can be well reflected, as almost 70% of them stated in our survey that they consider nuclear energy as well as gas fracking and coal as transition technologies to be very important, because the transition to renewable energies will still take time (see **figure 4**).

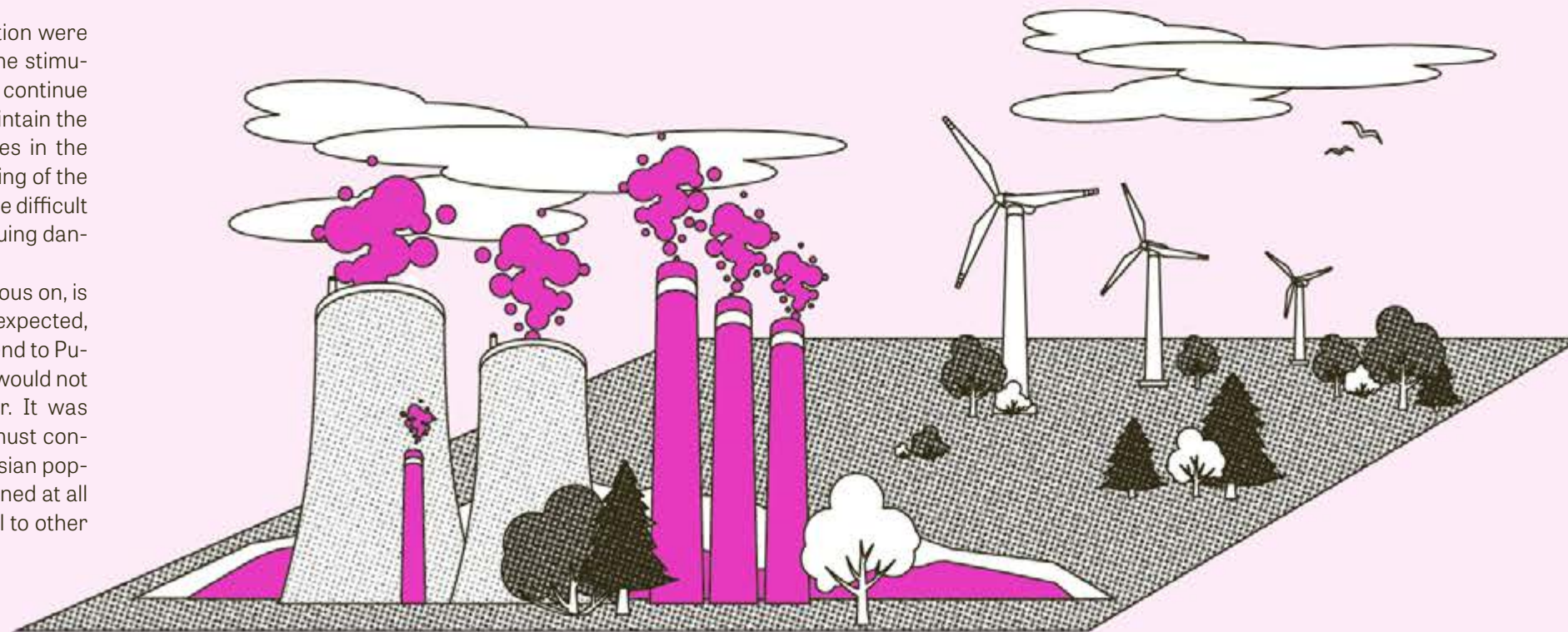
Arguments against the continued use of nuclear energy were put forward. For one thing, it is the only fossil energy technology whose potentially harmful effects cannot be reduced technologicaly. It was also pointed out that it does not make sense to start the same discussion every two years. On the other hand, participants pointed out that nuclear energy cannot be dispensed with, at least as a transitional technology, as long as the desired improvements in infrastructure and the expansion of wind and solar energy are delayed. However, it was generally noted that there were hopeful signs, such as the share of renewable energies in Germany, which has now reached 45%. The panel agreed that the next two or three decades will be a critical phase in the transition to a more climate-friendly energy policy and that bold decisions will have to be made.

69.2%

Very important...since the transition will take time

30.8%

Best avoided as they reduce the pressure to switch to renewables



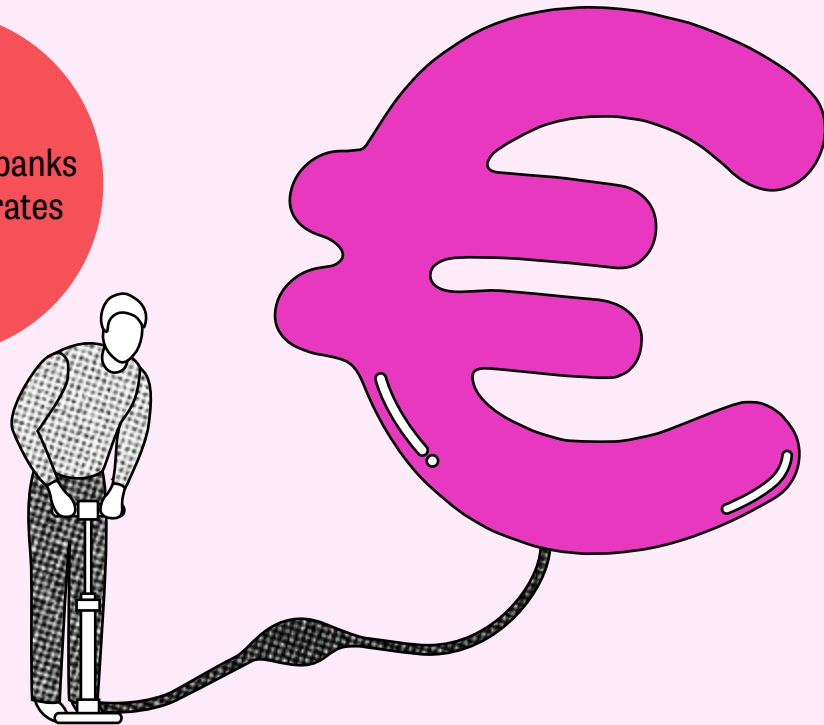
CENTRAL BANKS AT A CROSSROAD – HOW TO FIGHT INFLATION WITHOUT KILLING ECONOMIES?

Central bank directors are anything but to be envied at the moment: The squaring of the circle they have to find is to get a grip on the inflation experienced in all EU countries in terms of monetary policy without stifling the growth of the economies. And even though inflation varies widely from country to country (6.6% in France in August 2022, but between 20 and 25% in the three Baltic countries), none of them can avoid central bank intervention. Even in Germany, there is a real danger that parts of the lower middle class will become poorer. So how have central banks responded in recent months, and what should their response be in the months ahead? What is striking is the fact that central bankers have tacitly shifted from measuring the impact of their policies based on medium-term variables and expectations to measuring them on the basis of current and actual inflation outcomes, which could definitely lead to an overshooting of policy rates.

Our panelists also see this danger, pointing out that inflation will not only increase in the short to medium term, but will also hit those the hardest that have not enjoyed advantages of cheap money. In view of the risks also for the emerging markets, there is no way around decisive action, even if this will initially lead to a recession. The survey also showed this very clearly: for 81.4% of respondents, the fight against inflation is a priority (see **figure 5**).

At the same time, however, it will be crucial to address the structural deficit in the long term, because otherwise growth could not be stimulated. There was also agreement that coordinated action by central banks was even more important than before.

5
Should central banks raise interest rates further?



81.4%
Yes, fighting inflation has priority

18.6%
No – don't risk even more recession

ZOOM VS. IN-PERSON INTERACTION – ARE WE ABOUT TO ABOLISH CORPORATE CULTURE FOR GOOD?

One topic that has gained considerable relevance as a result of the pandemic is the question of what the future of corporate culture will look like in terms of the importance of the home office. Are the days of face-to-face interaction and one-on-one meetings over? Do we even need face-to-face meetings anymore, and if so, to what extent and on what occasions? And how does the issue of the home office relate to the no less virulent phenomenon of Generation Z and the lifestyles that have changed as a result? It is not easy for companies to position themselves here, since it affects the core of business: creativity, team spirit and flexibility. This is also shown by our survey, in which our participants were split: Only a slight majority of respondents were against forcing employees back into the office (52.14%, see **figure 6**).

6
Would you like to force your employees back to the office?

The opinion of the panel was quite unanimous on this issue: it can't be done entirely without personal interaction. Face time cannot be completely replaced by Zoom conferencing and remains an important element of corporate culture for any company, especially for team spirit and efficient business organization. At the same time, however, the home office, if it is used intelligently and, above all, in a targeted manner, can be an incentive in the future to attract capable young employees, including from Generation Z to companies and to retain important key employees in the long term. ▶



52.1%
No, virtual meetings are as effective

47.9%
Yes, the office is an integral part of company culture and performance

About this publication

The periodical of The Stern Stewart Institute

26th Edition, March 2023
Published half-yearly

Publisher and Chief Editor

Gerhard Nenning

Board of The Stern Stewart Institute

John Deferios
 Benedikt Franke
 Susanne Klatten
 Gerhard Nenning
 Markus Pertl
 Susanne Pertl
 Daniela Schwarzer

Managing Editor

Anja Deucker

Editorial Support

Charlotte Kotowski

Design Production and Artwork

KW NEUN Agentur für Visuelle Kommunikation GmbH

Printing

Industrie-Druck Haas

The opinions, beliefs and viewpoints expressed by the various authors in this publication do not necessarily reflect the opinions, beliefs and viewpoints of the editorial staff or of The Stern Stewart Institute. The publisher accepts no responsibility for errors, omissions or the consequences thereof.

The Stern Stewart Institute e.V.

Salvatorplatz 4
 80333 Munich
 Germany
 T +49 89 242071 0
 F +49 89 242071 11
 E info@sternstewartinstitute.com

sternstewartinstitute.com
tssi.org

Picture Credits

istockphoto / SensorSpot (Cover), dem10 (p. 6/7), Orientfootage (p. 8/9), TommL (p.10), da-kuk (p.12), Fabian Wolfram (p.14), gremlin (p.16), XH4D (p.24/25), SpiffyJ (p.27), aislan13 (p.28/29), aluxum (p.31), NatalyaBurova (p.34/35), duncan1890 (p.46/47), zhongguo (p.48), zhongguo (p.50/51), AscentXmedia (p.53), ilbusca (p.54), ziggy1 (p.56), agafapaperiapunta (p.59), imaginima (p.60), JasonDoiy (p.63), ewg3D (p.64/65), Tom Kelley Archive (p.73), taranchic (p.74), aislan13 (p.76), Luka Banda (p.88/89), Veni (p.91), Wicki58 (p.92), skodonnell, tampatra (p.94), ungorf (p.96), ktsimage (p.101), manfredxy (p.102/103), kadirkaba (p.104), Dacian G (p.104), tommy (p.105), bellanatella (p.105), Ekaterina Bedoeva (p.106), hakule (p.107), petovarga (p.108/109), Ace2020 (p.110), daz2d (p.111); Shutterstock / Bartłomiej K. Wroblewski (p.32); unsplash / Louis Droeger (p.18/19), Paul Fiedler (p.21), The New York Public Library (p.22/23), Austrian National Library (p.36/80), CDC (p.98). All other images are property of the authors or companies. Illustrations by KW NEUN.

