

»» A boost in investment for the transformation – what exactly is needed?

2 November 2022

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Motivation

Russia's war of aggression against Ukraine and the COVID-19 pandemic have shaken the foundations of a rules-based world order and the German economic model. As an export-oriented economy, Germany has greatly benefited from international trade in the past. Businesses have reaped great cost benefits from being integrated into international supply chains. Germany purchased a large portion of its fossil fuel supplies from Russia at low prices. However, first the coronavirus pandemic and now the war in Ukraine and the energy crisis have laid bare how dependent the country is as a result of its integration into international value chain links and what vulnerabilities this creates on the supply and sales markets side. A possible greater regionalisation and fragmentation of international trade and international financial flows will require modifications to Germany's economic model.

Even amid the necessary short-term crisis management, long-term strategic decisions must now be made for a green and digital transformation as the key to successful adaptation to the changed environment. In the short term, Germany must deal with the rising prices and shortages and create supply security. But it must keep an eye on the medium to long term nonetheless, so that the German economy can hold its own in international competition even with changed relative prices. Against this backdrop, the already initiated green transformation in particular is even more urgent as it helps to reduce dependencies in the supply of fossil energy sources. In order to continue harnessing value creation potential in the future, it is imperative for the country to make progress in digitalisation and tap into digital and green growth markets. The time to make the necessary strategic decisions is now.

Investment is a key building block of the necessary restructuring. But without a joint effort by government, the business community and households, investment – and with it the transformation – will not happen. The lion's share of necessary investment will have to come from the private sector. However, private investment activity was already weak before the COVID-19 crisis and the war in Ukraine. The current burdens from high energy costs and uncertainties act as additional roadblocks. So it is all the more important to encourage and provide intelligent support for investment by businesses and – particularly with a view to the climate targets and the crucial role here of residential construction – households. Government therefore has a key role to play: first, by formulating targets and setting frameworks and incentives and second, by investing in infrastructure and human capital, both of which are required for the productive realisation of private-sector activity.

Against this backdrop, this paper aims to examine and systematically compile approaches for a boost in investment by government, business and households. The first section takes stock of investment already underway, the second section presents approaches for a boost in investment by the state, the third section sheds light on the role of the private sector and the fourth section describes the sticking points of investment finance.

1. Taking stock of investment: A lot needs to happen faster and will become more expensive

Investment activity in Germany has stalled even though investment needs are more urgent than ever.

Business investment has declined relative to economic activity in the past decades (2021: 12.0% of GDP, at the beginning of the 1990s: 15.8%), and public investment since the turn of the millennium has often been less than the amount tendered. According to the KfW Municipal Panel, the investment backlog in municipalities has now reached EUR 159 billion. At the same time, the green and digital transformation is generating urgent investment needs. The pandemic and the current geopolitical crisis have also revealed vulnerabilities that also need to be overcome through investment, for example in energy and resource security.

In order to be able to master the challenges of the green and digital transformation, a broad range of investments needs to be considered. The key to future prosperity lies in a strong willingness to innovate. As a resource-poor country with a high standard of living, Germany is completely dependent on innovation and the marketing of new technologies. The ability to innovate, to find answers to new challenges, is a key prerequisite for both the digital and green transformation and a resilient society. Besides traditional material investments in machinery, buildings and physical infrastructure, immaterial investments that are indispensable for innovation and digitalisation are therefore also moving into focus. Also closely linked to this is human capital, an important factor that can be preserved and strengthened only with investment in education.

The need for material investment alone is huge: Achieving climate neutrality in Germany by the middle of the century requires investment to the tune of around EUR 5 trillion alone. Much of this involves investments that are becoming necessary anyway and now need to move towards a sustainable path. However, additional investments amount to some EUR 1.9 trillion. If all the necessary climate action investment is spread out over the years remaining until 2045, the target year for climate neutrality, average annual investment will need to average EUR 190 billion, of which additional investment of a good EUR 70 billion, which is just under 2% of GDP of the year 2021. With a view to digitalisation, material IT investment by German businesses alone will need to double or triple to EUR 100 to 150 billion in order to keep up with comparable countries. Innovation expenditure and soft investments in digitalisation will be needed additionally.

At the same time, the nature of investment has changed. The share of immaterial investments such as R&D expenditure, software and copyrights is becoming increasingly important. Already between 2005 and 2019, the annual growth rate of real R&D expenditure in Germany averaged 3.4%, while business investment overall expanded by a mere 2.3%. Compared with material investments, immaterial investments are made up to a large extent of personnel expenditure and related expertise. But new technologies also involve changing demands on qualifications and skills. Specialist knowledge and experts who develop ideas, plan and implement new approaches in an interdisciplinary effort are crucial in driving the transformation forward.

Human capital continues to gain in importance – particularly in the context of innovation and digitalisation. The skilled labour shortage, which has reached an unprecedented level, is threatening to worsen drastically as baby boomers start to retire from the middle of the century. In order to prevent shortages of human capital and secure a labour supply that can respond to today's challenges, the people in Germany need to be mobilised on a broad scale. This includes further increasing female workforce participation, for example by eliminating disincentives of income tax splitting for married couples and expanding high-quality child daycare and nursing care offerings and by making the retirement age more flexible. Furthermore, a higher intake of well-qualified skilled migrants is necessary, specifically for the nursing sector, but also for many other occupational fields. In addition to costs of integration and continuing education, this will generate a need for investment in housing construction. In order to fully harness the potential of the people in Germany, increased investment in lifelong learning will also be important. In particular, efforts to provide initial vocational training and continuing professional development must be expanded.

The current transition is shifting the focus to resilience and involves cost increases as well as more difficult conditions for meeting all these investment needs. Russia's war of aggression against Ukraine and the resulting energy crisis have painfully illustrated what challenges emanate from strong international dependencies. In this respect, Germany is heavily dependent on imports of not just fossil energy sources but many mineral resources that are crucial for the energy transition. Since many countries have begun to transition towards climate neutrality, demand for and prices of basic materials required for the energy transition are rising. At the same time, there are concentration risks in critical countries, especially China. Ever since Russia's taboo violation, geopolitical risks to value chains and sales markets have generally come more to the fore. But all pathways towards greater resilience generate higher costs – from the (partial) withdrawal from globalisation, which would potentially be particularly costly for Germany, to friendshoring, diversification and stockpiling instead of just-in-time logistics. Given the very high inflation rates, the sea change also coincides with a global interest rate turnaround. As a result, financing conditions are tightening and investments with uncertain or rather long-term returns in particular are set to become notably more difficult.

In order to solve the acute problem of dependence on Russia while increasing energy security in the long term, it will be necessary to embark on already outlined transition pathways faster and develop new interim solutions at the same time. A greatly accelerated expansion of renewable energy is an important key to Germany's long-term energy security and acutely necessary to reduce the country's dependence on fossil energy sources from Russia. The infrastructure currently in place makes the dependence on Russian gas supplies particularly critical, which initially amounted to 55% of Germany's consumption and have now practically fallen to zero since September 2022 after Russia de facto stopped supplies using technical problems as a pretext and the sabotage of the Baltic Sea pipelines. Without a significant reduction in consumption and substitute supplies, substantial losses in value-added would result from rationing. In the short term it is therefore the right decision to pull out all the stops and save gas by increasing coal-based electricity generation and extending the operation of the last three remaining nuclear power plants until mid-April 2023. But because of its disastrous carbon footprint, it is important for coal-based electricity generation to be merely a stopgap for the short term. Besides, unplanned investment in fossil infrastructure is now needed once more to replace Russian pipeline gas with LNG supplies. But this, too, can only be an interim solution. In order to prevent investment write-downs in the post-fossil era, the best approach – where possible – is an infrastructure that can later accommodate hydrogen.

No stone must be left unturned in an effort to bring about the necessary boost in investment in this challenging environment. Public and private stakeholders are equally called upon to step up.

2. Three fields of government action for shaping the transformation

In the social and ecological market economy, the market and the state must combine to get the best out of scarce resources for the good of society. The market generally provides the efficient allocation mechanism. The state creates a regulatory framework for efficient markets (competition policy, proprietary rights / regulation, mediation), ensures social cohesion and acceptance of the market result (equal opportunities / education, redistribution), produces public goods (infrastructure, security), provides incentives to improve the market result in the event of systematically distorted price signals (market failure particularly due to external effects and asymmetrical information) and specifies the relevant societal target visions in the democratic decision-making process (green and digital transformation, resilience). For complementary public goods and in overcoming market failure, the state itself in some cases is called upon as an investor. In critical socio-economic situations it also takes on the role of crisis manager. All actions of the state must be thought of in terms of efficiency.

Specifically, three key fields of government action for shaping the transformation can be identified:

a. Develop a target vision, create an environment that is conducive to investment, and shape regulations!

Formulating, refining and communicating a concrete target vision for a resilient, digital and green economy creates a long-term perspective for all market actors. The target vision provides orientation and the possibility to make progress measurable, to point out where enabling conditions need to be adjusted and to strengthen investment certainty for businesses.

- **An ambitious target vision exists for the transition to climate neutrality.** It may also need to be developed further with a view to impacts of crises and filled with actions to be implemented. Germany's 2030 climate target was increased in June 2021 and requires a massively accelerated expansion of renewables. In order to achieve 80% renewables in gross electricity supply, onshore wind energy capacity must be doubled from today's level and offshore wind and photovoltaic capacity nearly quadrupled – all within less than nine years.
- **A target vision for the digital transformation must be more multifaceted.** Possible target visions for digitalisation and innovation differ at sector and technological level. As it is impossible to formulate explicit targets for all fields of technology and sectors, it is useful to define overarching goals for inputs such as, for example, R&D expenditure of 3.5% in relation to GDP, or '100 additional university professorships for artificial intelligence'. The state also formulates target visions for selected key technologies as it guides the mission of innovation policy, such as 'establishing Germany as a lead market for electric mobility'. In an international comparison, Germany lags behind the strongest performers with an R&D expenditure share

of 3.14% of GDP. In order to achieve the 3.5% goal by 2025, further considerable efforts will have to be undertaken in the context of expansive research and innovation policy.

Openness towards technology is a major prerequisite for a successful transformation. To be sure, the target vision must be developed as a result of social debate and communicated by the state. However, which path to embark on to achieve that vision – for example through the development and choice of technological solutions – must regularly be left to the decision of market participants. It is only through the innovative strength of the private sector that efficient solutions for the transformation can emerge. An exception to this rule may become necessary when international markets have already pre-empted technological decisions. One example of this is battery-electric vehicles, which have largely asserted themselves against fuel cell vehicles in individual transport. In this case it may be expedient to focus on promoting battery-driven electric mobility to prevent the emergence of inefficient duplicate structures.

Protecting Germany's international competitiveness safeguards the acceptance of the transformation and creates investment incentives. A globally uniform carbon price will create fair competitive conditions with regard to the cost of greenhouse gas emissions. However, it will not be politically enforceable for the foreseeable future. So long as different levels of climate action ambition exist outside the EU, effective carbon leakage protection will be required, especially for energy-intensive companies and those that compete internationally. The planned European carbon border adjustment mechanism can achieve this. Establishing a climate club with major trading partners, as announced at the G7 summit in Elmau, Bavaria, would be even more effective.

Investment projects are often hampered by non-financial obstacles such as inadequate planning capacity or protracted approval processes. It is already clear that inadequate staff capacities are a key non-monetary obstacle to investment, particularly at municipal level, where the number of administrative positions in the area of construction and housing has fallen by 10% in the past decade. The key challenge for the further expansion of wind energy capacity, besides accelerating planning and approval procedures, is to make land available and gain the necessary public acceptance. The expansion of digital infrastructure in Germany has also been delayed in the past by lengthy approval processes for the construction of radio masts. In Germany, 42% of SMEs see laws and regulations as a major obstacle to innovation. Data privacy and security requirements in particular are a key bottleneck in the digitalisation of SMEs. Data privacy regulations in particular hamper the innovation activities of 35% of businesses.

In designing specific regulatory measures, the conflicting aims between the intended protection of the legal asset and their impact on innovation and investment activity must be carefully weighed. Particularly for the development of digital business models, large markets with uniform regulation that enable upscaling would be helpful. Completing a single digital market in Europe would be an important step in this direction.

b. Harnessing the market mechanism – and strengthening it with complementary measures!

Efficient investment incentives can be created via the pricing mechanism. Strengthening the attractiveness of climate-neutral technologies and products through consistent cross-sectoral carbon pricing could eliminate the need for small-scale discretionary interventions in many areas and save costs. This applies to the many measures aimed at addressing the market ramp-up of electric vehicles, for example. Carbon prices could internalise not only the negative externalities of internal combustion engines but also those resulting from emissions from the generation of electricity needed to charge electric vehicles. It is therefore important for the national emissions trading system and the EU-ETS to take on an increasingly larger role so that they both become a guiding instrument for the transformation in the medium term. The EU negotiations on expanding the EU-ETS to further sectors (ETS2) mark an important strategic milestone for European climate action. Ideally, the two emissions trading systems could then be combined after 2030.

Already expectations on the future development of carbon prices can mobilise private capital and investments in the real economy. Many climate investments are worthwhile only if the carbon price remains high on a sustained basis in the future. To be sure, the current fossil fuel price rises driven by the war in Ukraine are increasing the pressure to switch to climate-friendly processes. At the same time, however, uncertainty over future price trends has grown further in the present environment, jeopardising necessary climate action investment.

Increased regulatory uncertainty about future carbon prices is evident not least from the most recent policy decision to let the national carbon price in the fuel emissions trading system for the transport and heating sectors stagnate for the coming year. A clear commitment to a minimum national carbon price within the EU-EHS is expedient despite the increased prices of fossil energy sources and will provide greater long-term planning certainty for market actors.

In some cases, carbon contracts for difference may also offer a solution to the existing trade-off between high uncertainty over future carbon prices and the need for making necessary investments climate-neutral already. This applies to basic industries in particular where fossil assets would otherwise risk becoming stranded for many decades because of the long lifetime of plant and equipment. There is obviously a risk that subsidising such assets would keep inefficient technologies in the market. But this risk can be reduced by designing the contracts appropriately.

Complementary policy measures can mitigate undesired distribution effects and achieve greater social acceptance of the transition. State revenue obtained from carbon pricing is used well to address the distribution effects of climate policy and ensure a social balance. The relief measures under discussion for the high energy prices can already be integrated into a long-term overarching strategy for the climate transformation. This will be possible if policymakers swiftly create the administrative prerequisites for direct payments to citizens. In the future, such a channel can then also enable the introduction of a climate allowance that can take the role of socially balanced compensation for rising fossil energy prices. In any case, variants that are compatible with incentives should be preferred when defining relief measures for the high energy prices. Thus, per-capita payments not tied to current energy consumption maintain the allocation effect of the price and, in this way, provide incentives to save energy and invest in climate-friendly alternatives.

c. Invest public funds in selected fields!

With a view to effective and efficient implementation in the relevant areas of investment, it should be examined whether the state itself should invest or set corresponding incentives for private stakeholders.

The state itself is called upon to act as an investor primarily in making available infrastructure such as transport routes and other networks with high externalities that constitute a necessary prerequisite for private economic activity. Where public investment creates the prerequisite for the broad distribution of substitution options with little fossil fuel content, they can have a major leverage effect on the mobilisation of private investment in their interplay with a consistent carbon price. In particular, coordinating and accelerating the expansion of infrastructure for energy transport (electricity, hydrogen) and climate-neutral mobility (charging stations, hydrogen filling stations) is a major prerequisite for businesses to develop corresponding applications. By contrast, for investments in production facilities such as battery factories, for example, from which businesses can earn income without causing high costs of economic exclusion, a useful approach would be for the state to merely set targeted promotional incentives and offer tax benefits for private investors. Direct, temporary government involvement, with due consideration of risk, may be helpful in a very early phase of such projects at best in order to kick-start corresponding markets.

By the middle of the century, public funds of around EUR 500 billion – some EUR 20 billion per year – will have to be invested to achieve climate neutrality. That is around 10% of the sum that needs to be invested to achieve this goal. The energy sector will take the highest volume of public funds that needs to be invested here, just under EUR 300 billion (particularly for renewable energy facilities), followed by the transport sector with EUR 138 billion (mainly infrastructure measures). Substantial public investment will also have to be made in the digital transformation, for example in the expansion of the broadband network.

Municipalities have the greatest need for action. This applies primarily to municipal functions such as transport, schools and buildings, which are of great importance for implementing the transformation. New transformation requirements will also emerge in the future, such as urban adaptation measures for climate change (e.g. 'sponge cities') and further digitalisation of the public sector (e-government).

The vulnerability of public finances to shocks is making it increasingly difficult to implement transformative investments. The current crises are creating uncertainty on the revenue side and a growing need for funds to

manage crises on the expenditure side, particularly at municipal level. In order to enable transformative investments at local level, municipalities will need to be equipped with sufficient financial planning certainty to invest in efficient administrative structures and sustainable projects.

When developing efficient physical and digital infrastructure, the use of public funds can speed up the transformation. In motorised individual transport, network effects can make it more difficult for households to reduce their emissions. The availability of public charging points has a positive influence on the uptake of electric mobility in Germany. Against this backdrop, it is problematic that the fleet of electric vehicles has grown nearly six-fold in the past two years while the number of charging points has not even doubled. Greater government support for the expansion may be useful but would primarily serve to mobilise private investment. Rapid electrification of individual transport is important but not sufficient. Energy efficiency must also be increased because the available quantity of electricity from renewables will remain a scarce good for the foreseeable future. Efficiency gains in transport can be achieved by moving to more efficient public transport or adopting related forms of ridesharing, for example. Around three quarters of households in Germany can envisage using public transport more frequently. Better connections in rural regions and improved convenience in urban areas are the greatest levers that can be addressed by targeted public investment. Expanding bicycle infrastructure provides similar potential for reducing car use both in cities and in the countryside.

Digital infrastructure deficiencies are already a major bottleneck for digitalisation efforts in the SME sector. Particularly in technologies with network effects such as information and communication technologies, the availability of complementary infrastructure is a necessary prerequisite for businesses to invest in the technologies that build on them. Poor internet connectivity is a high or medium barrier to digitalisation for 38% of SMEs in Germany. The provision of fast internet services must be further improved through targeted public investment. This is needed primarily in rural regions, where the cost of expansion cannot be recovered. However, given the constantly growing demands on transmission speeds, low quality of internet connectivity is also a barrier in metropolitan regions. In order to ensure the rapid expansion of a high-speed fibreglass network it will be necessary for the state to fund these infrastructure projects and not to make expansion dependent on the willingness to pay of households in the affected regions.

Investment in educational infrastructure can make the transformation much easier. Demands on workforce qualifications and skills change with new technologies. For example, in future the manufacture of batteries will make up a significant portion of value added in the production of vehicles. And currently there is a large shortage of skilled workers for the energy-efficient modernisation of buildings. A shortage of skilled labour – both in the workforce as a whole and in information technology – already constitutes a key barrier to the digitalisation of small and medium-sized enterprises. Building the necessary skills of the workforce is an essential precondition for employees to be able to use new technologies so that innovations can be diffused and a full potential of new technologies can be realised across the whole economy. Training and continuing education therefore must be intensified as a matter of urgency. In addition, more effective mobilisation of the local labour supply, for example by increasing female workforce participation, greater inclusion or raising the retirement age and increasing the intake of skilled migrants are also important for Germany.

Certainty has massively gained in importance with the coronavirus pandemic, increasing extreme weather events and, not least, the war in Ukraine. Building defence capacity is primarily a government responsibility. Public sector activities also have a role to play in civil defence and disaster control and in building up emergency fuel reserves and other essential goods provided as a general public service.

3. The private sector is the main driver of investments

3.1 Businesses play a key role for the boost in investment

The necessary boost in investment cannot succeed without businesses in Germany. In the long-term average, private sector stakeholders account for nearly 90% of total investment volume in Germany. Businesses provide around two thirds of this. They therefore play a critical role in the green and digital transformation. Confidence is a key prerequisite for businesses to undertake investments.

The coronavirus pandemic, the war in Ukraine and the energy crisis have created great uncertainty for businesses, which is hampering their investment activity. For many businesses, the war in Ukraine presents a

risk to development of their operations. The main reasons for this are the increased energy prices and economic consequences the conflict is having for Germany and Europe. Whereas assessments of the current business situation in September continued to be just under the long-term average, business expectations are nearing historic lows. This overall sentiment is sure to have a dampening effect on investment activity. Investment appetite, investment volumes and investment goals are crucially dependent on positive business expectations. It was not without reason that the coronavirus crisis has recently led to massive cuts to business investment activity. Signs of this are already becoming apparent for 2022 as investment activity is weakening due to the energy crisis.

Demographic change also requires increasing levels of investment. As owner-managers of small and medium-sized enterprises get older, they are less inclined to invest in their business. The amortisation period of investments then becomes too long for them, so they avoid the – often personal – financial obligation. Whereas 57% of younger entrepreneurs invest in their operations, that percentage drops to 36% among older entrepreneurs. The average age of SME owner-managers has increased by eight years since 2002 and currently stands at 53 years. Not enough junior entrepreneurs are filling the void by starting a business. Lack of clarity about succession arrangements also weighs on investment levels.

Businesses have learned from earlier crises and have become more cautious. Strengthening their financial resilience is becoming more important for them. The quest for financial independence of many SME entrepreneurs is also putting the brakes on investment activity. The experiences they gathered during the crisis years 2008/2009 may have contributed to this. Their desire for greater stability and to become more resistant to future shocks, that is, more resilient, is making them more reluctant to invest. That would not bode well for the productivity and competitiveness of German enterprises.

Investments needed to achieve the dual transformation are also being hampered by skills shortages, an inadequate digital infrastructure and funding difficulties. Skills shortages in particular are a major bottleneck for innovation and digitalisation projects. In addition, poor infrastructure is making digitalisation difficult in many places. This is compounded by funding difficulties that are due to the particular characteristics of innovation and digitalisation projects and ultimately cause market failure in the form of external effects (spillovers) and asymmetrical information distribution between businesses and potential external providers of capital. Instances of market failure also occur in climate action. As the cost of climate damage is not yet being fully internalised in the cost calculations of the parties who cause the damage (negative external effects), climate action technologies often have competitive disadvantages compared with conventional technologies.

Crises can also provide positive impetus for investment. But the associated incentives alone are not enough to manage the transformation. The recent massive increases in energy prices have already visibly increased incentives for businesses to lower their energy consumption and expand renewable energy use. In a supplementary survey conducted by KfW in early May 2022, 69% of SMEs reported having implemented energy-related measures in response to the war in Ukraine and current high energy prices. A lot more can be expected to happen here. Similarly, the coronavirus crisis has generated a change in awareness and led to a real digitalisation spurt in the SME sector. Thirty per cent of SMEs believe that their customers will embrace digital offerings (another 30% at least in part) and 35% of SMEs have expanded or (re-)started their digitalisation activities under the coronavirus pandemic. Visible manifestations of this included the fact that the massive expansion of digital sales channels in 2020 mitigated the turnover losses of many businesses.

The transformation towards climate neutrality and digitalisation requires much greater and, in particular, accelerated efforts on the part of businesses in Germany. Despite all uncertainty, businesses must keep an eye on their long-term competitiveness and invest in their operations. Developing digital strategies, safeguarding and expanding innovative capacity and increasing in-house training and continuing education are crucial to the sustained success of enterprises. This requires them to be optimistic about the future, for which they need reliable economic policy and regulatory frameworks over the long term. Even though times are tough, the necessary frameworks and incentives for enterprises must be put in place without delay in order to make this possible. Innovation has a key role to play here, not just for future competitiveness. Rather, a strong innovative capacity also has a positive effect on future crisis resilience, which includes, for example, making production processes and their output of goods and services, sales channels, ties to suppliers and service providers more adaptable.

3.2 Residential construction also needs high investment volumes – both by homeowners and by real estate companies

In residential housing the main focus lies on conversion to climate neutrality and elimination of regional housing shortages. The climate targets call for the housing stock to be climate neutral by the year 2045. This will require substantial investment to the tune of around EUR 640 billion, of which some EUR 250 billion in additional investment. Most of this affects existing buildings. In addition to improving the insulation of the building shell, it also means banning the use of fossil fuels. Almost three in ten households already use relevant energy transition technologies such as photovoltaic solar systems, solar thermal systems and heat pumps. According to the KfW Energy Transition Barometer, that share recently rose by around 3 percentage points annually. Although this is positive news for achieving the climate targets, it is still too little. The modernisation rate must also more than double from currently 0.85% to 1.9% per annum. There is also a shortage of housing in metropolitan regions. The German Federal Government therefore wants 400,000 new housing units to be completed each year. However, construction activity has currently stagnated at around 300,000 new homes per year.

Investment in residential construction is also being weighed down. Material bottlenecks and skilled labour shortages have led to delays, order cancellations and historically high price increases. Around one third of construction and civil engineering firms are affected by skills shortages. Occupations with skills shortages include, in particular, plumbers, heating and air conditioning installers and electricians. Material bottlenecks are also causing considerable delays to delivery times and building completions. Prices have also continued to rise steeply, with new dwellings costing 16.5% more year on year in the third quarter of 2022. Not least, inadequate pricing of carbon emissions is contributing to a lack of necessary investment. Households continue to mention cost-effectiveness concerns as a major barrier to the broader uptake of energy transition technologies in the housing sector.

4. Finance is an important prerequisite for investment

The war has brought about a profound change in the macroeconomic environment. Germany and Europe are experiencing the highest price increases in decades. This is primarily due to disruptions in energy supply and global supply chains. KfW Research expects an inflation rate of 8 to 9% for 2022. The task of monetary policymakers is now to firmly tie the inflation expectations of households and businesses to the ECB's 2% target. Otherwise, there is a risk that high inflation rates will continue. The central bank is therefore called upon to consistently implement the interest rate turnaround it has announced.

Much indicates that we are transitioning to a regime of higher long-term inflationary pressure and higher interest rates even beyond the acute situation. Cheap imports of fossil energy sources and commodities from Russia are a thing of the past. At the same time, the green and digital transformation is increasing the need for resources, especially of bulk metals such as copper, but also of special metals such as lithium, rare earths and cobalt. Demographic change is also producing an upheaval in the labour market that is driving prices and wages. Already the skilled labour shortage is increasingly shifting bargaining power toward workers.

Businesses and households will have to live with tighter financing conditions. Ensuring continued access to sufficient finance for investment projects is therefore all the more important. Monetary tightening makes bank loans as well as capital market finance more costly. For example, in August 2022, financial institutions charged 2.6% interest on corporate loans with a maturity of more than five years. That was a steep rise of 120 basis points in six months. In addition, it is becoming increasingly clear that banks are tightening their lending policy. More than one fourth of the small and medium-sized enterprises surveyed for the KfW-ifo Credit Constraint Indicator recently reported facing more restrictive criteria in their negotiations with banks. Thus, after a period of looser lending, accessing credit is becoming significantly more difficult as the coronavirus crisis subsides.

Financial institutions are reassessing default risks against the backdrop of the war. Rising interest rates, a steep surge in costs and a weakening economy are causing banks to act with greater caution. In addition, their own income situation is worsening. Losses in the financial markets, higher funding costs and rising costs of risks are contributing to this. Institutions are well capitalised, to be sure, but risks do exist for their lending propensity and capacity. In order to stabilise the credit channel for investments where needed, interest rate reductions and risk assumption by the state are suitable and proven instruments.

Innovation and digitalisation projects – including climate action innovations – require a range of funding instruments that are aligned with the maturity level of the relevant technologies. Innovation and digitalisation projects – including green innovations – have specific features that are at odds with the provision of finance. Thus, instances of market failure such as external effects and asymmetric distribution of information between the potential provider of capital and the business implementing a project cause the criteria for – particularly external – finance to vary with the level of maturity of the technologies. The high share of human resources expenditure limits the options for providing collateral from the projects, so that technologies in early stages of maturity are not bankable.

In early stages of technological maturity, which can typically be referred to as the research and development (R&D) phase, uncertainty about success is especially high and the share of material investment very low. Private external funds are unobtainable and state subsidies and allowances, as well as tax incentives for R&D, are major funding instruments in this phase. At medium levels of maturity, at which technologies typically enter the market, uncertainties are already reduced and the proportion of material investment is higher. Financing arrangements that are close to market conditions with a high risk-bearing capacity and, where appropriate, a component of government funding, risk assumption or interest rate reduction are possible: VC, venture debt, special financing instruments for demonstration projects, especially for green innovations, and special promotional loans for innovation and digitalisation are typical financing instruments in this phase. Technological uncertainty practically no longer exists in later stages of maturity. Such technologies are in the phase of diffusion. The relevant technologies can be acquired by businesses as material investments. ‘Traditional investment finance’ instruments such as bank loans and investment promotion loans are suitable financing instruments in this phase.

When designing public financial support schemes, it is important that they lead to a ‘crowding-in’ of private investors, in other words, the mobilisation of private capital and not simply its replacement. Incentivising additional private investment is a major goal of state support schemes. ‘Crowding-in’ can be observed in the general promotion of R&D in Germany, for example. For decades, increases in public expenditure on R&D have regularly accompanied increases in private sector R&D expenditure. Officially supported VC, too, mobilises the provision of additional private sector VC. In order to mobilise sufficient capital for the transformation, capital markets must be tapped more intensively than before. To bring this about, the VC market must be further strengthened and instruments such as green bonds and securitisations must be utilised.

The high public sector funding requirements require a ‘cash count’ of the public budget. An urgent question here is how, in a federal state, funds can be directed where they are actually needed. This applies in particular to municipalities, communities and rural districts, which will have a greater share in the transformation because they are responsible for more than 50% of public construction measures as part of their provision of public services and local infrastructure. At the same time, municipal finances are characterised by major regional disparities (18% of municipalities did not have a balanced budget in 2021), so that public administrations do not have the same financial scope across the country. There is little scope for further increasing the financing of existing and additionally emerging investment needs through municipal loans or promotional funds because of existing budgetary and capacity limits. In order to increase public and municipal investment on a sustained basis, town halls require more planning certainty in terms of funding, staffing and timing. This requires, above all, strengthening municipalities’ own resources at structural level on a permanent basis, for example by increasing the share of municipalities in income from value added tax and income tax revenues.

As the low-interest environment comes to an end, the state faces rising financing costs as well. In order for sufficient funds to be available for public investment in the future without additional burdens for individuals and private businesses despite tight budgets it is necessary, more than anything, to recommend a careful prioritisation of public expenditures and to make greater efforts at ensuring an efficient use of funds. The financing mix can be supplemented by government borrowing for investment purposes if it is ensured that the resulting costs and benefits are fairly distributed across present and future generations.

Appendix: Further reading

Taking stock of investment: A lot needs to happen faster and will become more expensive

- Brand, S., Römer, D. and Schwartz, M. (2021): Investing EUR 5 trillion to save the climate – a surmountable challenge, Focus on Economics No 350, KfW Research.
- Raffer, C. and Scheller, H. (2022): KfW Municipal Panel 2022, KfW Research.
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Three fields of government action for shaping the transformation

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