Alexander Jung, Ann-Katrin Müller, Michael Sauga, Cornelia Schmergal, Gerald Traufetter and Kathrin Witsch write:

Despite its shiny façade, the German economy is crumbling at its core. That, at least, is how Marcel Fratzscher sees it. With the country's infrastructure becoming obsolete and companies preferring to invest abroad, the government advisor argues that German prosperity is faltering.

When Fratzscher, the head of the German Institute for Economic Research, gives a talk these days, he likes to pose a question to his audience: "Which country is this?" He then describes a place that has seen less growth than the average among euro-zone countries since the turn of the millenium, where productivity has only increased slightly and where two out of three employees earn less today than they did in 2000.

Fratzscher usually doesn't have to wait long before people begin raising their hands. "Portugal," one person offers; "Italy," says another; "France," exclaims a third. The economist allows his audience to continue searching for the right answer, until, with a triumphant smile, he announces the answer. The country he is looking for, the one with the weak economic results, is Germany.

Perhaps it takes someone with Fratzscher's background to be so scathingly critical of own country. The Bonn economist worked as a government adviser in Jakarta in the mid-1990s during the Asian financial crisis. He conducted research at the renowned Peterson Institute in Washington when the dot-com bubble burst and wrote analyses for the European Central Bank in the darkest hours of the euro crisis. He has always observed developments in Germany "with a certain amount of distance," he says.

Fratzscher has headed the German Institute for Economic Research (DIW) for more than a year now, and it is clear that this newfound proximity has sharpened his view of the contradictions in the world's fourth-largest economy. German industry sells high-quality automobiles and machines around the world, but when the plaster begins to crumble in an elementary school, parents have to raise money to hire a painter. Companies and private households are sitting on trillions in assets, but half of all autobahn bridges are urgently in need of repair. Germany derives more benefits from Europe than most other countries, and yet its citizens feel taken advantage of by Brussels.

Grand Delusion

Fratzscher calls it "Die Deutschland Illusion" ("The Germany Illusion"), the title of his new book which German Economics Minister Sigmar Gabriel will introduce on Friday. Last year, he asked his staff at DIW, one of the most important think tanks in the country, to address the underpinnings of the German economy. Fratzscher has condensed the results into an unvarnished reckoning with the country's economic grand delusions.

Germans see their country as an engine of employment and model of reform for all of Europe, Fratzscher claims, and yet Germany has barely made up for its own economic slump triggered by the financial crisis. Fratzscher's Germany looks like a giant from a distance but gets smaller and smaller the closer you get. The country is "on a downward path," writes the DIW president, and it's living "from its reserves."

Strong labor market figures still conceal Germany's most dangerous weakness: Hardly any other industrialized nation is so negligent and tight-fisted about its future. While the government and the economy were investing 25 percent of total economic output in new roads, telephone lines, university buildings and factories in the early 1990s, the number declined to only 19.7 percent in 2013, according to recent figures from the Federal Statistical Office.

That is more than just a statistical triviality. The future of the country and the everyday lives of its citizens depend on how each euro is used today. If a euro is spent immediately, it has no use for the future. It can

also be saved for future consumption. Or it can be invested in companies, education and infrastructure, so that it becomes the basis for future prosperity, technical progress and additional jobs.

The problem in Germany is that money is currently being used primarily for the first two purposes. According to DIW calculations, the investment shortfall between 1999 and 2012 amounted to about 3 percent of gross domestic product, the largest "investment gap" of any European country. If one looks only at the years from 2010 to 2012, the gap, at 3.7 percent, is even bigger. Just to maintain the status quo and achieve reasonable growth, the government and business world would have to spend €103 billion ($133 billion) more each year than they do today.

Growing Concern

This is Fratzscher's key diagnosis -- and now the onus is on him to find the treatment. Since Economics Minister Gabriel appointed him as his investment commissioner at the end of last month, he has been at the center of a spending reform debate potentially as important as the one over the Agenda 2010 reforms to the labor market and social welfare system.

The current economic downturn makes the problem all the more urgent. Now that industry has seen a decline in order volume and scaled back production, the government must decide whether to offset the decline with an investment program.

What was recently nothing more than a theoretical possibility could soon become a central sticking point for Chancellor Angela Merkel's coalition government. While Merkel and Finance Wolfgang Schäuble remain determined to adhere to their plans to present a balanced federal budget next year, Fratzscher advocates preparing for a worst-case scenario. "If the crisis worsens once again," he said in a conversation with SPIEGEL, "more spending will be needed to bolster the economy."

If that happens, Fratzscher's book could offer a blueprint for how to proceed. In his study, the DIW president meticulously lists Germany's biggest investment problems from companies to the transportation network, and from education to the *Energiewende*, the federal government's shift away from nuclear power and toward green energy. Supporting evidence for his theories can be found all over the country.

A vanishing loyalty to Germany

Rainer Hundsdörfer is about to make what is perhaps the most difficult decision of his professional life. His company plans to invest €50 million soon, but he is unsure if it's still worth spending that money in his homeland.

Hundsdörfer is the chief executive of fan manufacturer Ebm-Pabst. The industrial fans the company produces in the southern German town of Mulfingen are installed in supermarket refrigeration systems, hotel air-conditioners and computer servers worldwide. Overseas markets already account for about 70 percent of the company's sales.

Ebm-Pabst has long been producing some of its products in India and China, but thus far its objective when investing in foreign countries was simply to be closer to new customers. The company remained fiercely loyal to its native Franconia region in Germany. But that loyalty could evaporate with the next investment decision. "It would be the first time we decide against the German site," says Hundsdörfer.

The company wants to expand a plant in Mulfingen and build a new logistics center. This could create hundreds of jobs, but what is missing is "a decent road infrastructure to make our investment worthwhile,"

says Hundsdörfer. His trucks are forced to use Hollenbacher Steige, a crumbling road urgently in need of repaving. Often, trucks coming from opposite directions can't pass each other on the narrow road.

The road construction project would cost €3.48 million, but state and local governments have been hesitant to move forward for years, citing costs. For Hundsdörfer, the numbers simply don't add up. "We pay more in commercial tax each year than the road would cost to build." Now Hundsdörfer is considering the previously unthinkable: Why not build the logistics center abroad? Hundsdörfer wouldn't be alone in making that choice.

Decreased Industrial Investment

The German economy has shied away from investment for years. Companies have almost €500 billion stashed in savings, according to the DIW president's estimates, and yet the investment ratio in the German private economy fell from just under 21 percent in 2000 to a little more than 17 percent in 2013.

Many economists conclude that companies are anxious because they are worried not just about crumbling roads, but about the lack of qualified workers, the state of the euro zone and rising energy costs. And this fear, in turn, is stymying the planning for Germany's future.

The consequences are dramatic. When adjusted for inflation, many businesses have actually decreased their spending on machinery and computers in the last decades, according to the figures from the Federal Statistical Office. This is especially true of the chemical industry, but industrial infrastructure is also crumbling in, for example, the mechanical engineering and electronics sectors.

But companies haven't stopped investing altogether -- they are simply no longer investing in Germany. Bavarian carmaker BMW is currently spending $1 billion on turning its Spartanburg, South Carolina plant into its largest worldwide. Daimler now assembles the new C class for the American market in the town of Tuscaloosa, Alabama. And painting equipment manufacturer Dürr expanded its factory building in Shanghai last year so that it matches the size of its headquarters in Bietigheim-Bissingen, near Stuttgart.

Since the fracking boom has lowered energy prices, the United States in particular has blossomed as a preferred site for German companies. In May, BASF CEO Kurt Bock announced a new €1 billion investment, the largest in company history, on the American Gulf Coast. In explaining the decision, the executive noted that natural gas in the United States costs only a third of what it does in Germany. Technology giant Siemens even went a step further, announcing that it will run its entire business from offices in the United States in the future.

Infrastructure -- A Herculean Task

The Sauerland route between Dortmund and Giessen in western Germany, one of Germany's most beautiful highways, is deservedly nicknamed the "Queen of the Autobahns," traversing a picturesque landscape of hills and valleys. ut it is set to become one of Germany's most expensive autobahns in the coming years.

The stretch of the highway passing through the state of Hesse includes 22 large bridges that were built in the 1960s, and all but two of them will have to be refurbished in the next few years. The need has arisen "well ahead of the lifespan calculated at the time of construction," says Tarek Al-Wazir, transportation minister in Hesse.

Three weeks ago, he visited a major construction site at the Lützelbachtal bridge near Dillenburg. Wearing a helmet and a safety vest, he was suspended above the valley in a steel cage, which enabled him to see how the concrete is cracking, steel rods are rusting and seals are crumbling.

The bridge was not planned for current loads -- the maximum allowable weight of a truck used to be 24 tons, but today it's 44 tons. A single tractor-trailer now exerts as much stress on the material as 40,000 cars.

There is a lot to do in Hesse -- and much to pay for. The state and federal governments are spending €207 million to renovate bridges in 2014. The costs will continue to rise in the coming years, says Al-Wazir, who claims this will be nothing short of "a Herculean task" for his state.

Autobahn bridges are the most visible sign that a significant portion of Germany's infrastructure is ailing. Autobahns and federal highways, bridges and locks, railway networks and shipping routes -- much of this infrastructure has gotten old. In the last two decades, federal, state and local governments have neglected to properly maintain these kinds of structures, and their investments in maintenance and repairs have steadily declined since the early 1990s.

In 2008, Germany was ranked third on a list -- prepared annually by the Global Economic Forum in Davos -- of countries with the best infrastructure. But now Germany has slipped to seventh place. For decades, the world envied Germany for its network or roads and railways. Today this capital is crumbling.

The trend could be stopped, even reversed, but to do so, Germany would have to invest at least an additional €10 billion a year according to DIW calculations. That includes roughly €3.8 billion to preserve crumbling structures. Another €2.65 billion would be needed to undertake renovations that were neglected in the past. Some €3.5 billion is needed to expand the existing infrastructure. The federal government, however, only plans to spend €1.25 billion a year -- an eighth of what the economists believe is necessary.

Private-Sector Help?

But when public funds are insufficient, there is another way to pay for bridges and tunnels -- so-called public-private partnerships, known by the German acronym ÖPP. In these partnerships, an investor funds projects with private capital or borrowed money and, in return, receives a fee from users or from the government. A standard life-span of such deals is 30 years.

One example is that of the A1 autobahn extension between Bremen and Hamburg to a length of 73 kilometers (45 miles). A consortium including engineering and services group Bilfinger financed the construction and will receive a monthly payment from the government until 2038. Those payments come from truck tolls that have been collected since 2005 -- the exact amount the consortium receives depends on the volume of truck traffic along the stretch of highway.

It sounds logical enough. The argument in favor of ÖPP projects is that they make it faster and cheaper to preserve and improve infrastructure. Indeed, many such projects -- including the extension of the A1 autobahn, were finished ahead of schedule.

Few Other Options

But a study by the Federal Audit Office has found that costs may actually be higher for ÖPP project than they are for conventionally funded enterprises. The auditors examined seven large, privately financed road-construction projects. They found that five of them would have been cheaper had they been paid for in the usual manner -- that is, with taxpayer money. The total savings were estimated at €1.9 billion. In the A1 expansion project, the Transportation Ministry had assumed that the public-private partnership would be 40 percent cheaper than tax financing, but the final cost was a third higher.

ÖPP projects "did not achieve significant goals" and projects conducted to date have been "uneconomical," the auditors concluded.

The private consortiums are more expensive because they must pay an average of 6 percent interest on their loans, which is about four percentage points higher than the federal government pays in interest on long-term borrowing. In a sample calculation, Berlin infrastructure economist Thorsten Beckers concludes that the capital costs of such projects amount to almost 28 percent of construction costs. Therefore, Beckers argues, the supposed financial advantages of ÖPP autobahn expansion projects are "extremely implausible."

But lawmakers are not passing on the funding of public projects to private investors for business reasons, but because of a sheer lack of funds. As the German *Schuldenbremse* -- or "debt brake," a 2009 provision that limits the ability of German governments to run a deficit -- comes fully into effect in the next few years, it will prohibit unlimited borrowing.

The Federal Audit Office warns that this could provide additional incentive to turn over the construction of roads and building to private investors, even though the conventional approach would be more affordable. And given that investors are naturally most interested in projects that promise the greatest return -- which hardly includes bridge renovation in rural areas -- private financing collides with the government's mission to offer adequate public services to all citizens.

The Botched Energiewende

The new bituminous coal unit of the Rheinhafen power plant in the southwestern city of Karlsruhe is the most modern coal-fired power plant in Germany. It operates at a record efficiency level of more than 46 percent. The smokestack juts more than 200 meters (656 feet) into the sky and, on clear days, the 80-meter cooling tower next to it offers a view of the Vosges Mountains from its rim. The plant was built to fulfill an important task for the *Energiewende:* It's designed to operate whenever there is too little wind or not enough sun to offer a reliable supply of renewable energies..

The plant cost €1.3 billion to build, but it will probably never make any money. It was generating losses for its operator, EnBW, even before it was put into service this summer. The reason can be found in another, much larger investment. German electricity customers are paying more than €23 billion this year via an allocation charge for renewable energy.

There are consequences. Wholesale electricity prices are so low that the latest generation of conventional power plants is no longer economically viable. The Rheinhafen power plant, as modern as it is, has thus become a symbol of the botched *Energiewende*.

Fratzscher sees Germany's shift to renewables as "one of the biggest challenges of our generation" -- and also sees it as a hurdle for investment. If the *Energiewende* succeeds, it will create a new, nuclear-free infrastructure worth hundreds of billions of euros. But if the project ends in chaos, it could lead to losses on a similar scale.

Differing Approaches to Energy

The problem is aggravated by the fact that there is no consensus on the right approach to the *Energiewende*. Fratzscher, for example, advocates a radical departure from traditional fossil fuels. He wants the country to enter the wind and solar age as quickly as possible, as well as impose substantial energy conservation goals on companies and real estate owners.

Other experts recommend a softer transition to avoid putting too much strain on the economy. But as long as the direction of the *Energiewende* is unclear, it is difficult for investors to determine whether they have invested their money wisely.

Many investors already view the *Energiewende* as an example of waste and bad planning. Solar and wind farms were built at a cost of billions even though the necessary electricity grids are not available yet. New high-voltage lines are planned, but no one knows whether builders will prevail over citizens' objections. Conventional power plants are needed, but because of the *Energiewende* they are no longer profitable.

The phase-out of nuclear energy offers enormous opportunities and risks. If politicians do not manage the investment project properly, it could turn into a huge debacle. As Fratzscher concedes, the *Energiewende* is "an experiment," for which there are "no economic policy experiences."

Education: Outsmarting demographics

Meanwhile, a demographic crisis is rearing its head across Germany -- and it has attracted the attention of the world's largest chemical company, BASF. If the company had its way, it would see children go from daycare to school to the laboratory. As one of its slogans -- "From Little Ones to Einsteins" -- reflects, the company wants to children to interact with scientific phenomena at a very early age in order to increase their future interest in working in the industry.

As part of this aim, BASF and other companies established the "Knowledge Factory." Some 122 companies and foundations are now members of the association, which seeks to combat the shortage of skilled professionals with education in early childhood, thus outsmarting demographic changes and solving its own recruitment problems.

The industry is unwilling to rely on the government, which it argues lacks both the necessary funding and the political will. Germany spends only 5.3 percent of its economic output on daycare centers, schools and universities, compared with the OECD (Organization for Economic Co-operation and Development) average of 6.3 percent.

For Fratzscher, it is clear that Germany "lags significantly behind other countries." He believes that ensuring Germans' legal right to daycare services for all children one year or older -- which was enshrined by the German government in 2013 -- is a first step at best. The next step is to address quality and provide special, targeted training for skilled workers.

Everybody Loves Children

Even trade associations, traditionally dominated by gray-haired men, have now developed a concern for the welfare of young children. The Federal Society of German Employer Associations (BDA) recommends expanding all daycare centers into educational facilities and implementing nationwide quality standards. This is not entirely altruistic, because the more satisfied mothers are with their child's daycare, the more likely they are to work longer hours. In this sense, the billions being spent on daycare centers already pay off in the short term, because they bring many mothers back into the working world.

The research community is already convinced of the long-term benefits. According to Nobel laureate James Heckman, the earlier a society invests money in educating its young people, the more profitable it is. Children who are nurtured at an early age are less likely to drop out of school or university, and have a lower risk of poverty. If they are from immigrant families, they learn German more quickly and come into contact with knowledge at an earlier age and in a more playful manner.

Still, the level of early-childhood education in Germany is "in the poor-to-moderate range," says Yvonne Anders, a professor of early childhood education at the Free University of Berlin. But a daycare quality law that would establish minimum nationwide standards will not materialize in this legislative period -- Family Minister Manuela Schwesig was unable to prevail against the center-right Christian Democratic Union and

the German state governments, which fear high costs. The economy is now looking to the EU for solutions. Brussels is developing a quality guideline that could also apply to kindergartens.

Searching for Solutions

When Sigmar Gabriel's investment advisory council met for the first time late last month, he told them there should be "no restrictions on free thought." That's something politicians like to say when they ask experts for advice.

But Gabriel's appeal was justified, and perhaps it was also directed at his chief adviser, Fratzscher. With his book, the DIW president offers a detailed picture of the plight of German investment, and illustrates the sectors with the most serious problems, but he provides very few solutions.

The government, for example, has hardly any room to make additional investments because most of its spending is earmarked for the long term. Companies are also difficult to mobilize -- their willingness to invest depends on hard-to-influence factors, like the overall economic situation, expected profits and interest rates.

Not surprisingly, Fratzscher's committee wants to place its emphasis elsewhere and is now searching for ways to convince Germans to invest their enormous combined personal assets in domestic infrastructure. Insurance giant Allianz, for example -- which is also a member of the advisory council -- prefers to invest its customers' money in the expansion of Belgian highways. As a result, the council is considering whether an agency, funded with private investment and managed by the government, should be established to address traffic infrastructure.

The country's capital streams are also to be guided into other segments of the infrastructure, such as energy grids and wind farms. But financial market rules prevent pension funds, for example, from investing unconditionally in these sectors.

Most of all, Gabriel hopes to convince major investors to invest private money in the construction of public roads, bridges and buildings in Germany. The funds are to be raised in the capital markets, from pension funds or insurance companies.

UK and Canada as Examples

The minister is preaching to the choir in one respect. Alexander Erdland, president of the German Insurance Association, recently said that his industry is ready. So far, the insurance sector has invested less than 1 percent of its total capital investments of close to €1.4 trillion in infrastructure and renewable energy. Companies would be only too pleased to become more involved, especially in an era of low interest rates and few alternatives.

In Great Britain and Canada, so-called project bonds are issued to finance infrastructure projects that are, to some extent, traded in capital markets. The European Commission also advocates this approach and has established the "Europe 2020 Project Bond" initiative.

Whatever the Commission ultimately proposes, it is already clear that its work is of critical importance to the country's economic future. Germany will only be able to maintain its position in the global economic competition if it once again focuses on its future. To do so, it needs to renovate its factories, transportation arteries and data networks, educate its young people more effectively and devise new ways to use the vast savings capital of its citizens in economically meaningful ways. As the DIW president puts it, "the key to Europe's long-term economic success lies in the strength of the German economy."