Dieter Ameling

The Role of Steel in The New Silk Road

Prof. D.E.Sc. Dieter Ameling was formerly the president of the German Steel Federation and the chairman of the Steel Institute VDEh. His speech was translated from German.

Prof. Dieter Ameling: Germany's prosperity and social services depend on its remaining an industrial country.

Ladies and gentlemen, I would like, as this is my first time at the Schiller Institute, to thank you for the invitation to give a presentation this afternoon on "The Role of Steel in the New Silk Road Perspective."

I will begin with this picture (**Figure 1**), in order to present "the significance of steel as a construction material." Steel holds up the world, and steel moves the world. If you imagine just for a moment, that we did not have steel: We would then have no capability to travel, to sail, or to fly in an airplane. For all of these activities, you need that wonderful construction material, steel, which is, without a doubt, the Number 1 construction material in the world. Steel as a finished or semi-finished product, unformed, specialty, or processed—our companies produce it in all possible variations.

The auto industry is of course a very large customer. When you consider that in the Wolfsburger Volkswagen plant alone, 4,000 Golf autos are produced every day, this also requires then at least 4,000 tons of steel. There is certainly some amount of scrap that accumulates during production—trimmings, etc.—and that naturally has to be coordinated logistically.

Thus there is no doubt about it: Without steel, nothing in the world would move.

If we compare the importance of steel as a building material, with other construction materials, then we come very quickly to this picture (**Figure 2**): You see here that 1,607 billion tons of steel were produced in 2013. By comparison, aluminum plays a relatively small role, with 107 million metric tons [MMT]; magnesium, virtually nothing. Plastic, admittedly, has a very notable share at 288 million metric tons, but no automobiles can be built exclusively with plastic; one always has to rely on steel as the structural material. And carbon fiber-reinforced plastic is now just in the development phase, but will account for a large share in the future.

If we look at the development of world steel production since 1900 (**Figure 3**), I would say the following: Until 1950, there was very, very small growth in production. Only after 1950 was there a steeper increase, which through the '70s, '80s, and part of the '90s achieved saturation, leveling off. And only in 2000 did an explo-

FIGURE 1
Steel Holds Up the World

FIGURE 2
World Production 1970-2013
(MMT/Year)

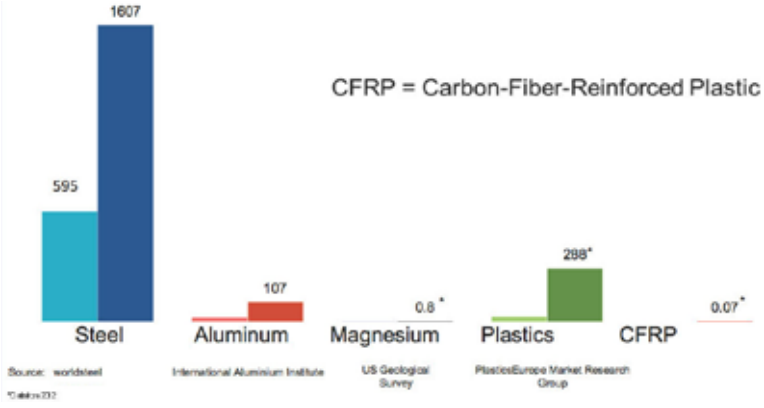
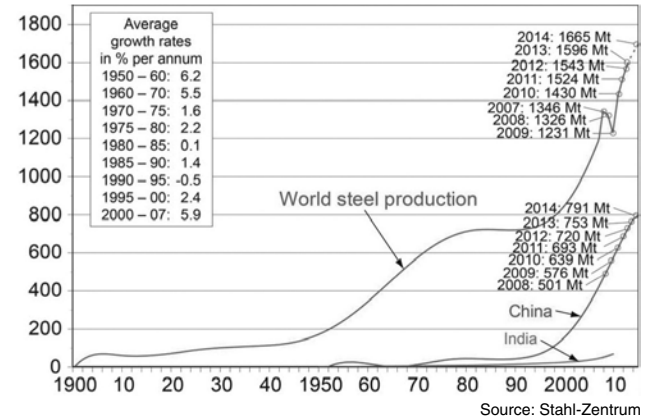
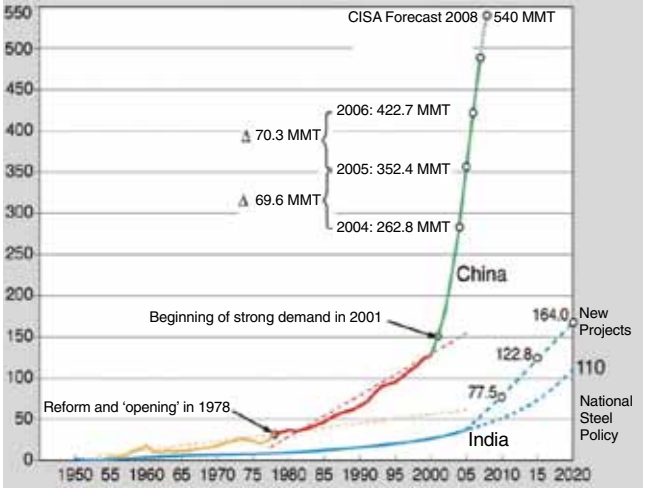


FIGURE 3
World Crude Steel Production
(MMT/Year)



Source: Stahl-Zentrum

FIGURE 4
Raw Steel Production, China and India
(MMT/Year)



Source: Stahl-Zentrum

sive increase in steel production begin—in China.

China has become the absolute Number 1 in raw steel production in the world, as I will show you with the next figures. You can already approximately discern China's development from this curve: In the '60s and '70s and '80s only a very small amount was produced, less than 100 million metric tons; and only then came a slow increase, which then became explosively larger in 2000-01.

Underneath that you see the development in India.

And we will attempt to analyze the two together: What really distinguishes India from China?

Here this comes into view a little more clearly (**Figure 4**). You see, in China—the first, yellow section of this graph—roughly up until 1979, a very fluctuating and very low volume of production, under 50 million metric tons of raw steel production per year, and then in 1989 it continues to grow slowly, until 2000, when for the first time, some 120-130 million metric tons were produced in China. This then grows in an explosive fashion in the following years.

And now India, in comparison: In India, this structural material played a very subordinate role for a long time, no question; and then, only in about 2005, did the Indians begin to develop a new model, so that one can visualize future raw steel production in India. And if I tell you that India even today—in the year 2013—produced only 80 million metric tons of steel; then naturally, in comparison to China, that is a very, very low number, even though the size of the population in the two states is slowly moving toward equivalence.

I'm afraid that India's development is proceeding at such a depressed and slow pace, because whereas the way China makes decisions—"We shall now build a railroad from Beijing to Shanghai, which will be decided upon today and implemented tomorrow"—when India makes such decisions, such as to build a railroad across the Subcontinent, it is not begun the next day, but perhaps only 14 days later, and only finished after a number of years. The Chinese have the great advantage here, that they can implement such decisions very much faster and much more systematically.

Now let's look at the other regions of the world in comparison to the current situation in China (**Figure 5**).

FIGURE 5
World Crude Steel Production by Regions (%)

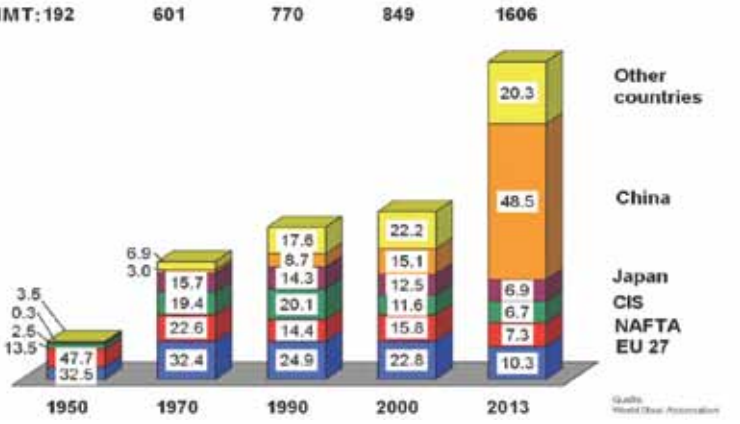
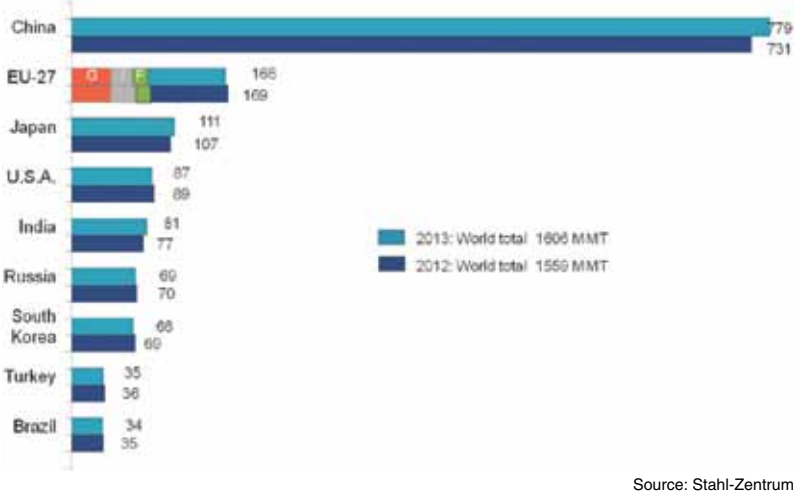
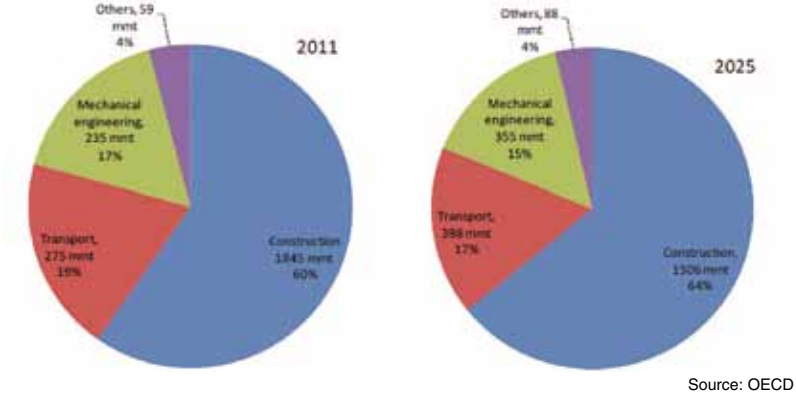


FIGURE 6
World Crude Steel Production 2012 and 2013
(MMT)



Source: Stahl-Zentrum

FIGURE 7
Global Steel Demand by Sector in 2011 and 2025
(MMT and % of Total)



Source: OECD

In 2013, you see again the 1.6 billion metric tons that you saw already in the first figure, and China has meanwhile achieved a share of almost 50% in the raw steel production of the world—within ten years!

That is a dramatic development, and today we can certainly say that the center of world steel production is in Asia. It was once in the United States; in the 1950s, the center of steel production was in the U.S.A.; in the '70s and '90s it grew rather more across Europe, and then just since 2000, in China and elsewhere in Asia.

Figure 6 shows the other countries that also produce steel. After China come the 27 EU countries (in 2013), in the Number 2 spot, although with a considerable gap compared to China, which in 2013 also exceeded its 2012 production. And the small red portion [labeled "G"], that is the share of Germany in the production of the European Union, and this share is about 45 million metric tons. That is the amount the Chinese produce in half a month, but for us it takes an entire year.

Then come Japan, the U.S.A., and India—there is the same 81 million metric tons I mentioned before. And then Russia, South Korea, Turkey, and Brazil, to list only the leading world steel producers.

If you were to ask me, how will the steel industry develop in the future, I would refer you to an investigation by the OECD in December 2012 (**Figure 7**). You would come to the conclusion that in 2025 we will reach 2.5 billion metric tons of steel. But that is a number which, in my view, is rather badly overestimated. Especially given current developments on our planet, I think the number is somewhat too high. But even if it were only 2.2 billion metric tons of steel, that would already be an exorbitantly high number—steel that will be needed for all kinds of purposes.

Raw materials are, of course, very important components in the capacity to produce a construction material of this nature. You see in **Figure 8** the worldwide production of beneficiated iron ore. Many ores that

come out of the mine—we call them mine run-off ores—can be immediately and directly used for production of steel. But there are also ores that do not contain such a high iron content, so that an enrichment process is carried out in advance of steel production, so that more iron is contained in the ore, in the prepared compound, and that is called iron ore beneficiation.

Here is what is involved in this total amount: Each year we use 2.3 billion metric tons of iron ore to supply the world's production of raw steel. China is without doubt Number 1 here as well. It produces a relatively large quantity of iron ore itself, but it also imports iron ore from Australia, and today, even from Brazil, to be able to cover the demand in China.

I must mention in this case another important energy source, coke, which is produced from anthracite coal (**Figure 9**). We need to extract the oxygen from iron ore; this is not particularly a use of coal to provide energy, but rather to allow the reaction between iron oxide and carbon to proceed in such a way that [purified] metallic iron remains. This is thus a material use of this raw material, no doubt. But carbon dioxide is also released from the use of this raw material.

China's hunger for raw materials affects the whole world. China recognized this very early, and looked for contacts with South American countries, especially with Argentina and Brazil (**Figure 10**). Brazil supplies metallic raw materials, essentially iron ore; Argentina is shown on the map because of its production of soy; and in southern Africa, various countries supply oil to China.

FIGURE 8
World Production of Beneficiated Iron Ore
(MMT)

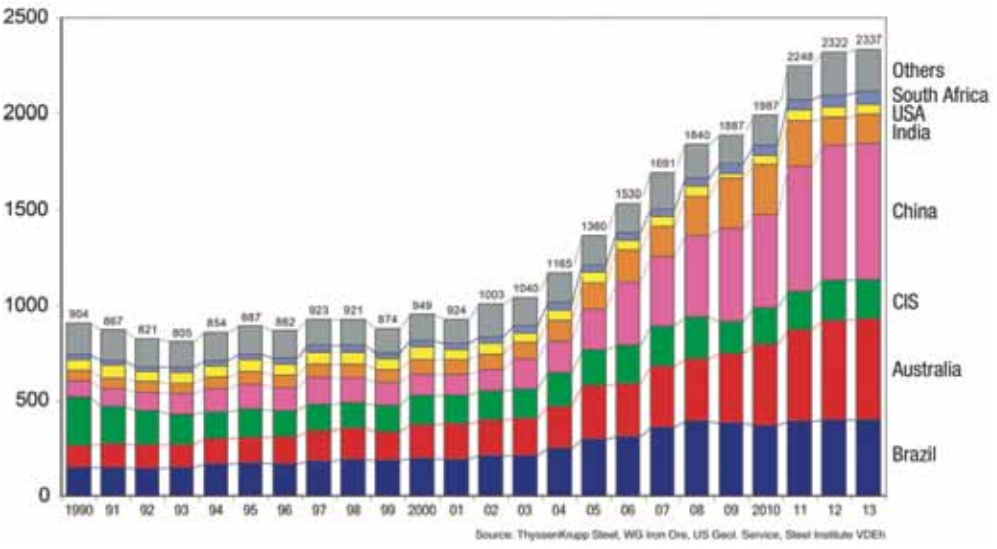


FIGURE 9
World Coke Production by Region 2013
(MMT, Dry Basis)

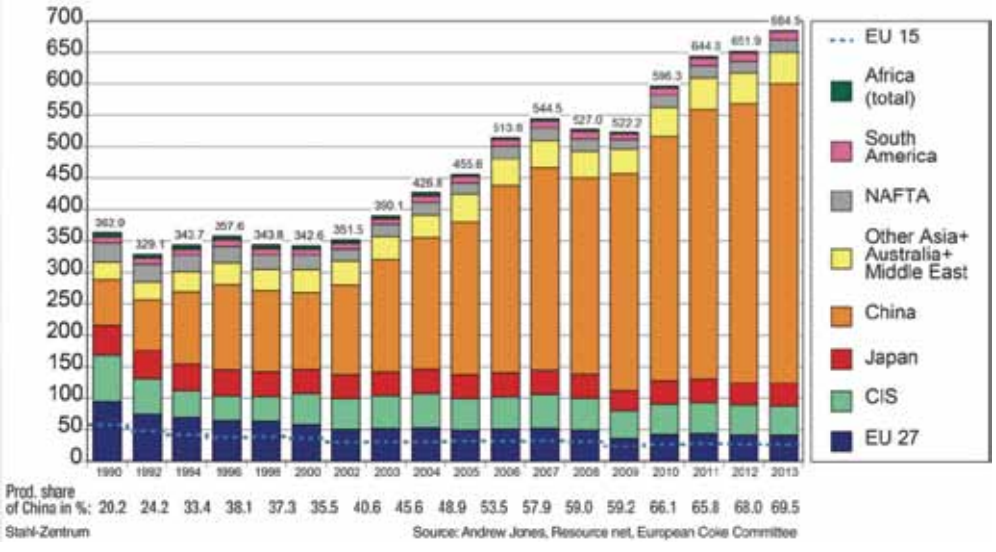


FIGURE 10
China's Hunger for Raw Materials

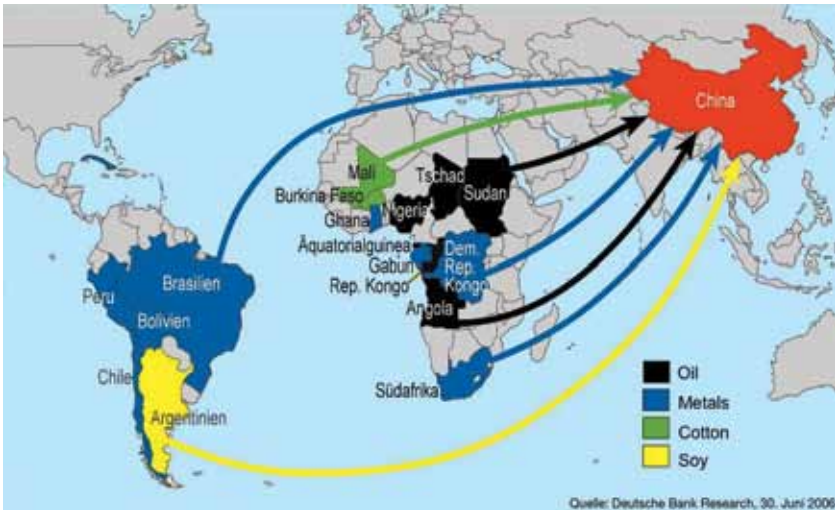
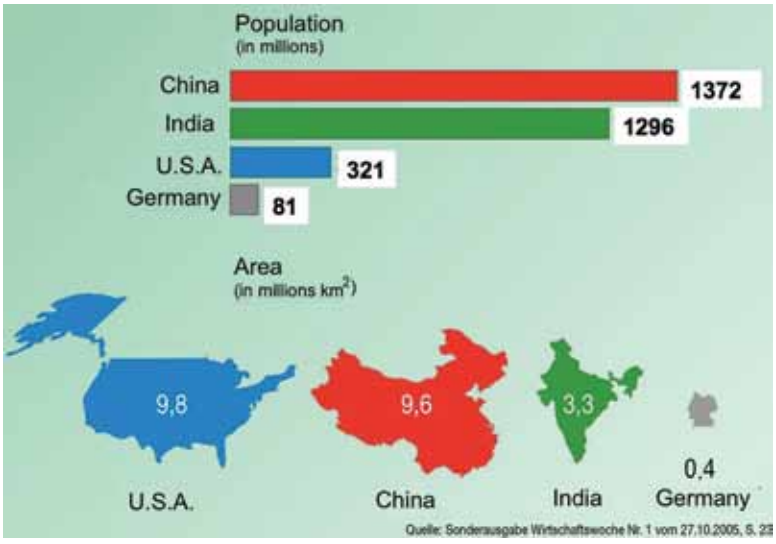


FIGURE 11
Country Comparisons, China, India, USA, and Germany



What is missing on the map is China's supply of iron ore from India. In the past, the Indians delivered significantly higher amounts of iron ore to China than is the case today: If they delivered 100 million metric tons before, today only 3 million metric tons are delivered from India to China as raw materials for domestic steel production.

Figure 11 compares [steel-producing] countries from the standpoint of population and landmass. China has now grown to 1.372 billion people; whereas India was at 1.1 billion in 2006, the latest figure is 1.296 billion. The next-largest region is the United States, with 321 million people. And then comes Germany, with the relatively negligible population of 81 million.

Below that you will find the geographical area comparison for the major countries: the United States with 9.8 million km^2 and China with 9.6 million km^2, compared to India with 3.3 million km^2—only a third of China and the USA—and quite Germany's quite small share of the surface of the world, with almost 400,000 km^2.

I have brought you a few images to show how the Chinese government implemented its penultimate Five-Year Plan (**Figure 12**), from 2000 to 2005, I unfortunately did not find a more recent plan. But you see here very substantial increases, especially for steel: You can see that by 2005, production was almost 400 million metric tons. Car production has increased explosively, a 361% rise from 600,000 to 2,770,000; cement also increased significantly; air conditioners: a dramatic increase under the five-year plan; and with personal computers, also a dramatic increase.

Figure 13 shows the major objectives of China's policy—keeping in mind your conference theme, "The Silk Road." You see here in the Five Year Plan 2005-10, first the gross domestic product, which increased significantly; and per-capita GDP also rose significantly. And if you believe that in the urbanization of 2005-10 "only" 4% was added, then you must realize that 4% of the Chinese population equals about 100 million. And to place them in new homes means building entire cities from the ground up, and this of course also requires a big part of the aforementioned production of steel. And even the objective of increasing the forest cover from 2005 to 2010 by only 2%, is also a relatively high proportion, given the vast size of the country.

There are also a number of weaknesses in China, which we do not want to overlook in this context. These are the problems in agriculture, left over from the sins of the previous governments, and these have of course

FIGURE 12

China: Rapid Growth of Major Industrial Products

(MMT or Million Units, 2000-05)

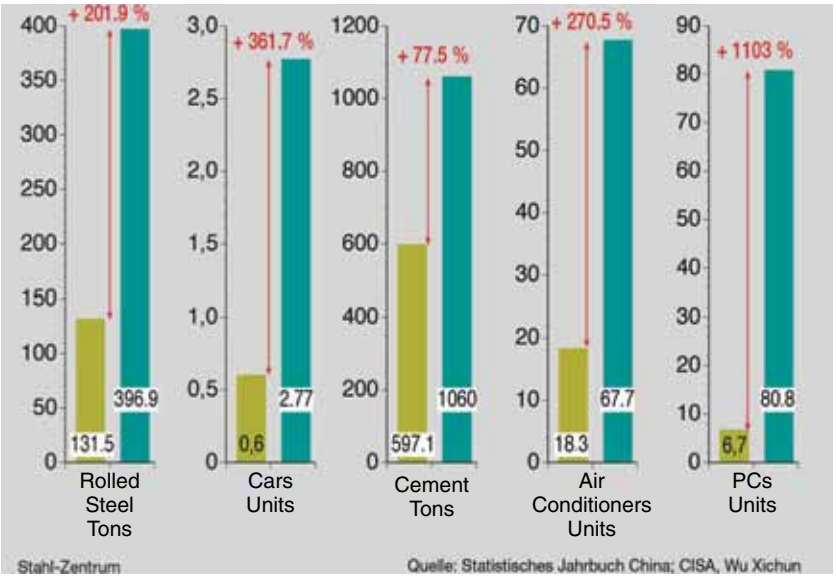
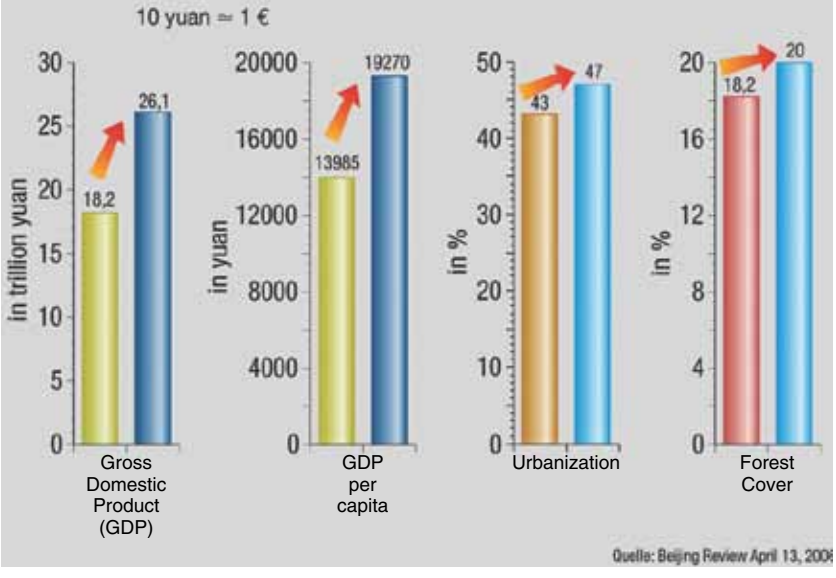


FIGURE 13

China: Major Development Goals to 2010



led to mass unemployment in China. There are social tensions and inadequate security systems; the problem of privatization of ailing state-owned enterprises; the insolvency of the Chinese banking system; rivalries among local, regional, and central authorities, which repeatedly afflict the regions; the increasing scarcity of resources—I've made it clear how much raw materials are used; and of course the problem of the still inadequate environmental protection. These are concerns that also engage the Chinese government.

We Need Innovation

There is no doubt that we need innovation. Our Chinese colleagues and our Indian colleagues need to innovate, and here in Europe, we need more innovation in order to survive in international competition.

Of course, these innovations lead then to greater resource efficiency, which is our common goal: to use natural resources such as iron ore, energy, as well as capital resources, human resources, carefully and sparingly, in order to be able to sustain the performance of our body politic.

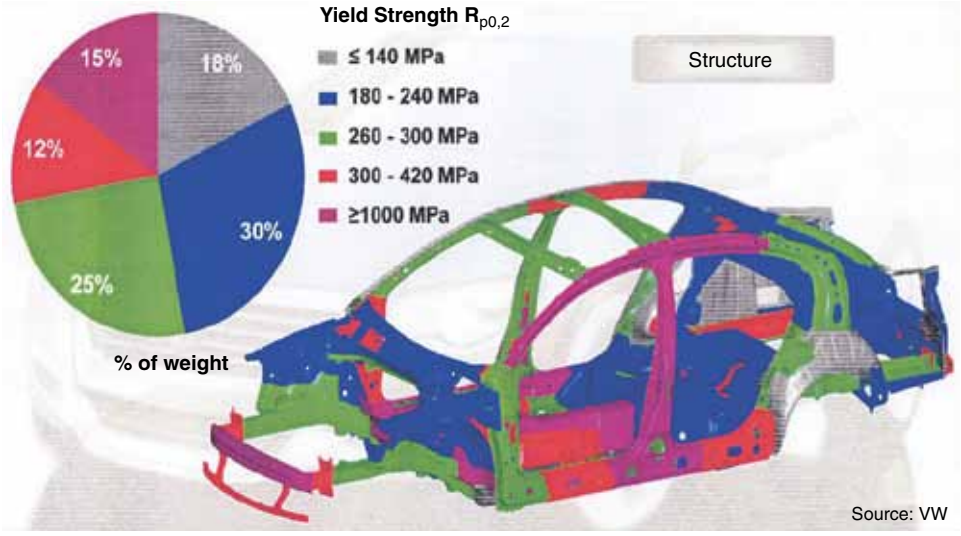
When I apply this concept to the steel industry, then it's just a matter of developing materials innovation, product innovation, applications innovation, organizational and process innovations. This is our driving engine, not only for Europe, but especially, of course, for China and in India. In the latter it is somewhat more problematic, because India, with its bureaucracy, most likely will not have the same steep growth rates in the future that we have seen in China.

Take a single example of materials innovation. **Figure 14**, from Volkswagen, shows the various materials for the VW Passat, and the colors show the strength classification of the types of steels that are used. I'll call attention here only to the so-called B Pillar—parts of the roof, the footwell, and the bumper. This is a high-strength, difficult to form material. But it has required the fire brigades in Europe, for example, to be equipped with new shears that can cut free people in the case of an accident. The steel used here is so hard that you can no longer cut it with conventional shears.

FIGURE 14

Steel Innovation in the Automobile: New Passat Takes the Lead

(Stress-Equalizing Use of Steel)



This is a classic product innovation that has benefitted the new Passat.

Industrialization is a very important chapter. Our prosperity here in Germany, and our social network, depend simply on the proportion of the gross industrial value added, to the total value added of the economy (**Figure 15**). We are currently still at around 25% of GDP, as the proportion of industrial value. South Korea, for comparison, is well above 30%.

But what I think is particularly critical, is that in the UK, the industrial component of GDP has dropped almost to 15%, and in France it has decreased to about 12.5-13%. In comparing these to Germany, this is the particular strength of this business location in the European Union: that here there is still sufficient value added from industrial production.

At the peripheries, poverty is growing. I'll cite from an article in the *Frankfurter Allgemeine Zeitung*, from June of this year: A controversial study from the UK shows that, despite rising economic power, material hardship is also increasing. Parents are cutting back on their own food to provide food for their children to eat; citizens lack clothes and families are freezing at home, because they need to save on heating costs.

These are very massive, critical weaknesses in this national economy, which are clearly due to the fact that the share of industrial value added in this country has become far too small.

We must do everything possible to convince especially our politicians and our economic policymakers that we can maintain our 25% share of gross value.

Another issue, which also concerns us, of course, is the question of energy supply (**Figure 16**). There is an energy boom in the United States: Oil production, from 2000 to 2013, has clearly increased, as can be seen here. Likewise in the European Union, gas production in billions of m^3.

A significant factor is that, particularly in the U.S.,

FIGURE 15

Industry as % of Gross Value Added

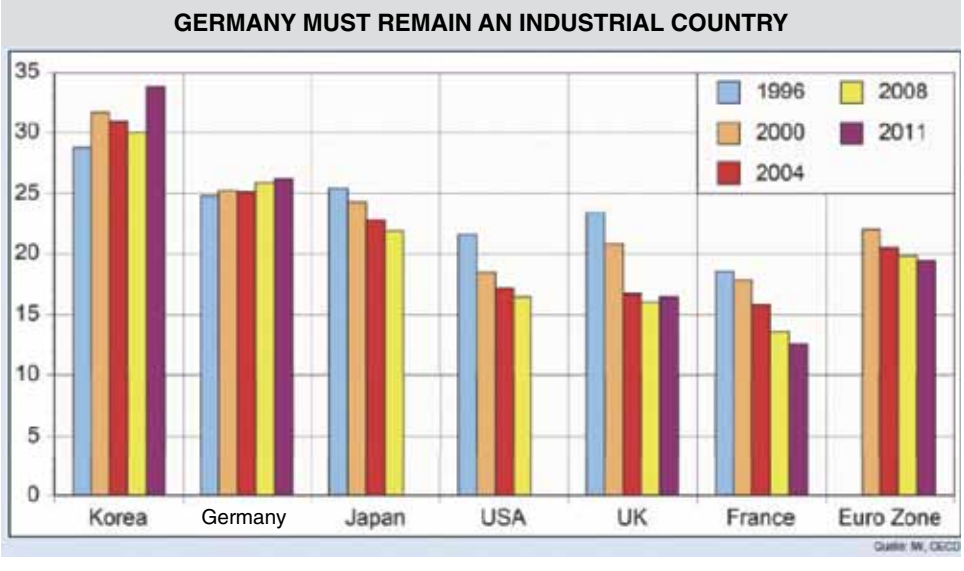


FIGURE 16
Energy Boom in the USA

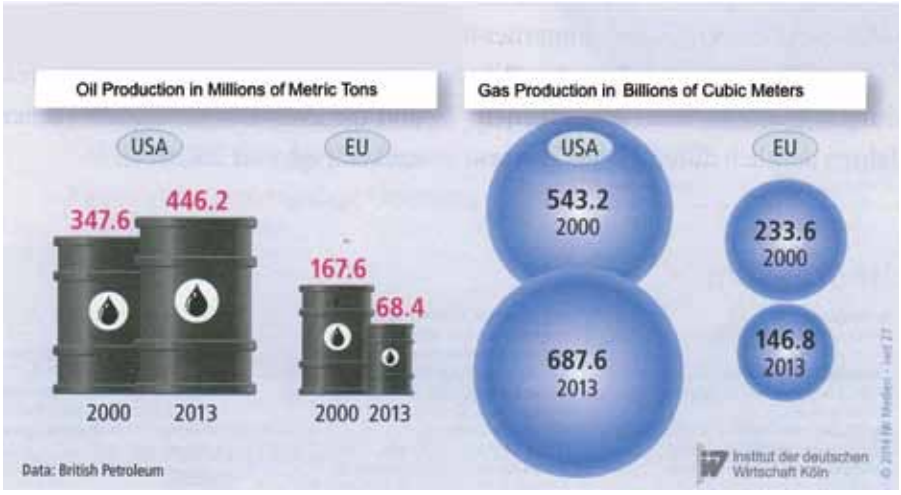


FIGURE 17
Natural Gas: Fracking Causes Prices To Tumble

a new technology for the extraction of shale gas and shale oil is being deployed, with the result being that energy prices have fallen sharply—they are one quarter to one third of the energy prices that we have here in Europe, and of course, that is explained by a special productive efficiency of the Americans. It could also cause a greater tendency for our industry to migrate to the United States, just to be able to take advantage of these favorable energy prices, and not have to bother with the problems of emissions trading and renewable energy in Europe.

Figure 17 shows the trend in gas prices, in dollars per unit of gas. You see the curve for Germany with 10.7 on the right, and 3.7 in the United States, so we can say that Americans pay a third of what we do in Europe, and are thus realizing quite substantial competitive advantages.

Summary

Now I'm coming to my summary.

- Steel is undoubtedly the world's Number 1 material.
- Crude steel production continues to increase, but at present, there are also problems with overcapacity—I must mention this here. The Chinese have greatly expanded their crude steel capacity—the experts today say that China has about 200 million metric tons of excess crude steel capacity; but also in Europe, the capacities are currently too high. In Europe, we have about 40 million metric tons of excess capacity, which of course makes prices too low.
- China is the Number 1 steel producer.
- China needs high growth rates for the economy.
- India will not become a second China, because of the bureaucracy, as I mentioned earlier.
- The raw material supply was tight, but that has eased off.
- Innovations safeguard the future.
- The prerequisite for prosperity is an industrial sector accounting for 25% of gross value added.
- The U.S. has the lowest energy costs.