

VOLKSWAGEN

AKTIENGESELLSCHAFT

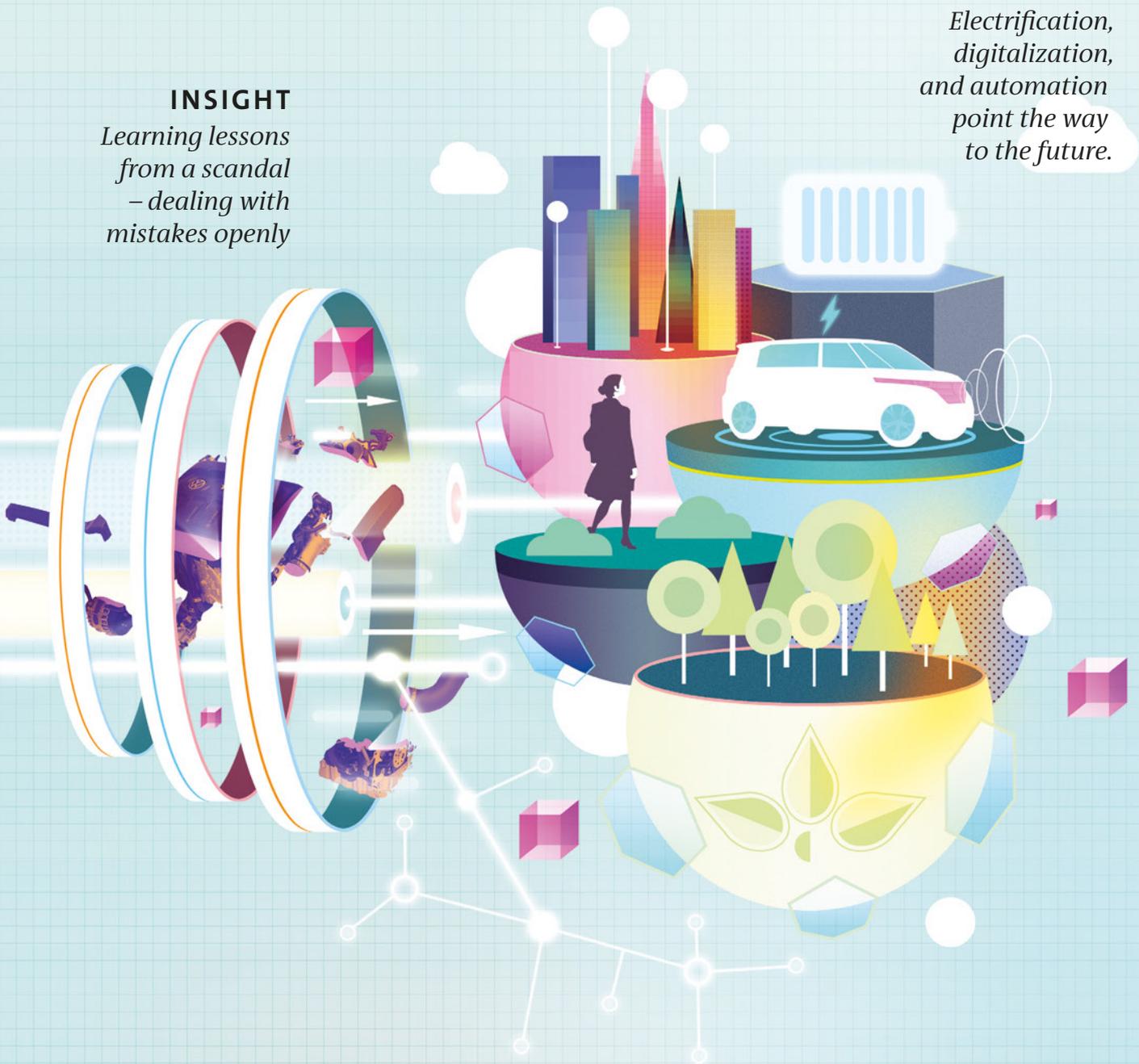
Shift

INSIGHT

*Learning lessons
from a scandal
– dealing with
mistakes openly*

OUTLOOK

*Electrification,
digitalization,
and automation
point the way
to the future.*





Shift

Shift means to move, change, or change gear – making it a fitting motto for a company that needs to reinvent itself to stake its claim to the future. As a fixture on the computer keyboard, this word is also familiar to virtually everyone in our global IT culture. “Shift. The Volkswagen Sustainability Magazine” has a sound of permanence about it. This is intentional. Shift isn’t a flash in the pan; it’s the expression of an attitude that will continue to shape our dialogue in the future. We are self-critical and argumentative – and we mean to remain so.

On that note: let us hear your opinion at
shift@volkswagen.de

Editorial

Dear Readers,

September 18, 2015, was the day a violation notice from the US Environmental Protection Agency (EPA) triggered the crisis that led to a serious loss of trust in the world's largest car manufacturer and great damage to its reputation.

How can a company that has so flagrantly broken its promise to society talk about sustainability again without fear of derision and ridicule? That was the question. This magazine, which complements our traditional Sustainability Report, is an initial answer.

Even this magazine doesn't deliver the promised no-holds-barred explanation of the emissions affair. We (still) can't say exactly how these things came about – the law firm appointed to look into the matter has yet to complete its investigation.

In this situation, we have given the floor to our stakeholders – a customer, an employee, a car dealer, an investor, a Wolfsburg-based businessman, and even the Managing Director of the International Council on Clean Transport (ICCT) and the former head of the EPA. Klaus Töpfer, the former Executive Director of the United Nations Environment Programme, has also contributed an incisive commentary on "Dieselgate."

Dr. Christine Hohmann-Dennhardt is to play a central role in ensuring that Volkswagen never again commits such a violation of the rule of law and decent behavior. In an interview, the new – and first ever! – woman on the Management Board freely admits that her job isn't "a walk in the park." And surprising insights are afforded by Dr. Francisco J.

Garcia Sanz, who is supervising the processing of the diesel issue, as he recalls difficult negotiations in the US.

The further essays, reports, and infographics in this issue provide information about how Volkswagen aspires to help shape the transformation of manufacturing and mobility in the future. In these articles, sustainability is understood as the sometimes difficult task of managing conflicting aims – in the conviction that trust can be regained only if such conflicts are laid bare.

Also read the debate between Dr. Ulrich Eichhorn, Head of Group Research and Development at Volkswagen, and Dr. Axel Friedrich, cofounder of the ICCT, who helped blow the whistle on the scandal. In a pro-and-con exchange on the emotional issue of SUVs, Dietmar Oeliger, transportation expert at the German environmental group NABU, crosses swords with Volkswagen strategy head Dr. Thomas Sedran.

It is worth noting that even those who feel especially disappointed by Volkswagen were prepared to participate in this project. We thank them for their willingness to do so. And of course we also wish to thank our many colleagues from the Group divisions for their support. This shift in sustainability communications wouldn't have been possible without them.

Kind regards,




Michael Scholing-Darby, 62, works in Public Affairs and Sustainability at Volkswagen AG. As Head of Political Communication, he engages in dialogue with critical stakeholders even in turbulent times.

“The question is: How can we talk about sustainability without drawing ridicule?”

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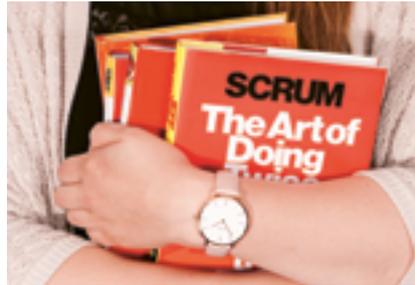
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PUBLISHING INFORMATION

**PUBLISHER
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Volkswagen AG
Michael Scholing-Darby
Public Affairs and Sustainability
Letter box 1882
38436 Wolfsburg

PROJECT MANAGEMENT
Dr. Thomas Steg
Head of Public Affairs and Sustainability

CONCEPT AND REALIZATION
Rat für Ruhm und Ehre GmbH,
Düsseldorf/Berlin

Chief Editor
Sepideh Honarbacht

DEVELOPMENT AND CREATIVE DIRECTION
Angela Ziegler (ZIEGLER, Berlin)

Image Editor
Anne Grobler

Layout
Jochen Starz, Angela Ziegler

STAFF FOR THIS ISSUE
Project Management
Daniela Blaschke
(Volkswagen AG), Tanja Iwas
(Rat für Ruhm und Ehre)

Text
Daniela Blaschke, Anette Frisch,
Sepideh Honarbacht, Jens Karbe,
Sascha Kummle, Gerhard Prätorius,
Klaus Richter, Michael Scholing-Darby,
Sibel Şen, Valdis Wish

Images
Ériver Hijano, Uli Knörzer, Ole
Häntzschel, Daniel Hofer, Roland Nie-
paul, Mathis Rekowski / 2 agenten,
Twinset

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A year marked by crisis

A notice of violation issued to Volkswagen by the US in September 2015 launched the toughest endurance test in the company's history.

TEXT — Sibel Şen



Rude awakening

The US Environmental Protection Agency (EPA) announces that Volkswagen has used a “defeat device” to manipulate measurements of nitrogen oxide (NO_x) emissions in diesel cars in the US. This software has been installed in eleven million vehicles worldwide, over five million belonging to the VW brand. The decision to enter the US diesel market lies a decade back. A profit warning four days later causes the share price to collapse.

9/18/2015

9/23/2015

Change at the top

Dr. Martin Winterkorn resigns as Volkswagen Group Chairman. Matthias Müller replaces him two days later. From October onward, customers can check online whether their vehicle is affected. In November, Volkswagen presents Germany's Federal Motor Transport Authority (KBA) with solutions for technical modification of EA189 engines.



12/9/2015



CO₂ values

There are indications of potential irregularities in the CO₂ values. The company informs authorities and the public. However, tests supervised by the KBA dispel suspicions of incorrect fuel consumption measurements.

1/4/2016



US lawsuit

The US Justice Department files suit against Volkswagen for violating environmental laws.

US visit

The first meeting between EPA representatives and the new Chairman is constructive and paves the way for technical solutions. In the media, this success, which is so important for future developments, is overshadowed by reports about a radio interview.

1/11/2016

Recall begins in Germany

The KBA orders the start of the recall of 2.0-liter engines. Around 2.4 million vehicles are recalled in Germany alone.



Steps toward agreement in US

After Volkswagen and the US authorities agree on a settlement in April, details are announced: the Group will pay \$4.7 billion for environmental compensation measures and the development of zero-emissions vehicles in the US, and will set up a compensation fund of over \$10 billion. Volkswagen is additionally negotiating a settlement with 44 states for over \$600 million to settle consumer protection lawsuits.

6/28/2016

1/27/2016

No summer break

Just under a year after the EPA notice, Volkswagen is in the process of implementing the German recall. By August, more than half of the vehicles have been approved by the KBA – including, most recently, the Polo. Civil suits are pending in around 30 countries.

8/12/2016

4/22/2016

6/22/2016



Ministry of Transport report

In retesting NO_x emissions, the KBA also finds differences between laboratory and road values in vehicles from other automakers. The ministry questions whether the “temperature window” in which exhaust filtering is reduced to protect the engine is justified in all cases.

Interim results

At the annual general meeting in Hanover, a majority of shareholders vote to discharge the former Management Board. The financial costs of dealing with the crisis amount to €17.8 billion by the end of June. The Group ends the 2015 financial year with the biggest loss in its history.





Motor of change

Crises can only be overcome if they are resolutely used as a lever for change. The greater the crisis, the greater the need to radically question the structure out of which it grew.

Illustration — Mathis Rekowski

As Einstein once said: "We cannot solve our problems with the same thinking we used when we created them." This means that the crisis must serve as a starting point for a whole new mindset without taboos. The company must ask how and why such a drastically misguided decision to manipulate the emissions system was conceived of, acted on, and covered up.

The diesel emissions scandal is the very definition of the term "worst-case scenario." It stems from a premeditated circumvention of legal requirements and consequent mass deception of customers. The company as well as diesel technology overall have suffered a loss in credibility and public trust, in Germany and around the world. Technical defects can be fixed by recalling cars to the shop, but repairing trust isn't so simple.

I. Tackling the causes

A fundamental change in the corporate culture must therefore be the first step in overcoming this crisis of confidence. The breeding ground that made wrongdoing on this scale even conceivable, and that created an atmosphere in which the deception was covered up to both outsiders and, in part, also insiders, must be credibly and transparently eliminated. It is time for a clean sweep. A way of thinking which not only enables, but obliges, every employee to openly address weaknesses or mistakes and entitles

them to a convincing, objective response must become second nature. There must be no fear of reprisal. The change in the corporate culture must span every level, especially the executive echelon. The ombudsman system must be vested with absolute confidentiality, and whistleblowers must be protected from stigmatization as traitors.

There is also an urgent need for review of the company's attitude toward civil society. Environmental organizations and institutions, especially, were persistent in their efforts to draw attention to the diesel issue. Instead of taking

their advice seriously and changing tack, the company took a hostile, defensive stance. Firms from other industries have long viewed critical voices as valuable partners for proactive trust-building measures, and use them in shaping long-term, transparent, verifiable sustainability strategies.

II. Establishing transparency

Changing the corporate culture also means appointing independent, critical experts to the Supervisory Board and advisory committees. A corporate culture of transparency without taboos benefits the company with respect not only to its customers, but also to its workforce – an asset which can't be valued highly enough in this time of technological upheavals that demand ever more of employees.

A longer-term view of sustainable forms of transport for the future is also needed. Technologically outdated products, even if still marketable, should no longer be pushed. Dead ends should be spotted early and avoided – especially when they can be quickly and elegantly driven into.

Full and unsparing transparency must finally also be established in the relationship between manufacturers and regulators. Clearly defined, verifiable areas of responsibility are key. A transparent factory might enhance the corporate



Prof. Dr. Klaus Töpfer, 78, was Germany's second Minister of the Environment and served for many years as Executive Director of the UN Environment Programme. He has received numerous awards for his contribution to environmental protection.

image, but a transparent corporate structure will do so immeasurably more. While legal limits no doubt apply, these have by no means been reached.

III. Developing solutions

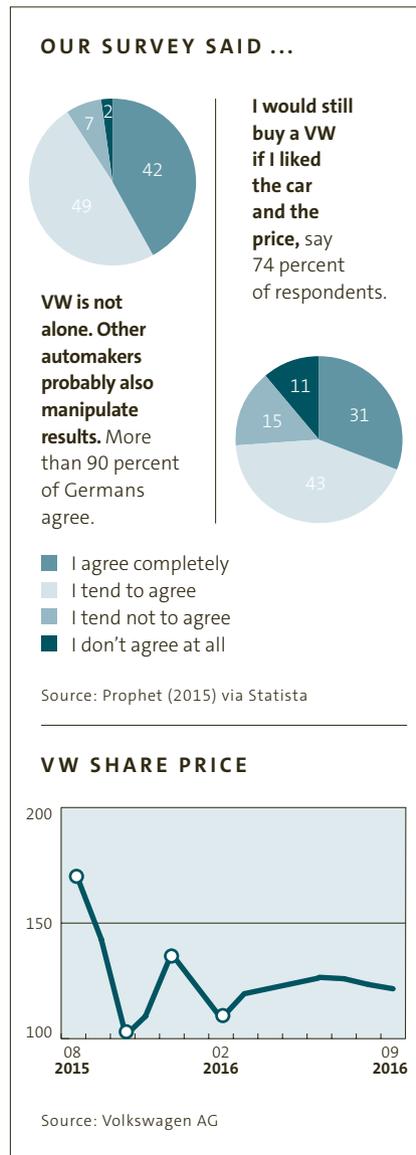
Germany's diesel subsidies incentivize the marketing of products which have largely fallen out of favor in important automotive markets. The air in Asia's urban centers – in China, India, and Indonesia alike – exceeds the limits established to protect people from particles and other traffic-related emissions. The populations of German cities like Stuttgart also face noticeably rising air pollution risks. Only massive lobbying has prevented countermeasures, such as nitrogen oxide windshield stickers, from being realized to date.

In short, the next generation of diesel vehicles must – and will – be the electric car. With the diesel motor, we are committed to the wrong path. Its sales success is delaying a bold realignment, with disastrous consequences. The implications are wide-ranging and the commercial risk is huge – especially with regard to suppliers.

IV. Driving innovation

Heretofore essential automobile components – such as the clutch and gearshift – aren't needed in electric cars. However, there is a much greater need for electrochemical products. This change in paradigm calls for a smooth, carefully planned transition encompassing business management, the economy, and working conditions.

Every further delay in opening the market to electric vehicles, and to shared transportation involving multiple products, heightens the danger of structural breaks that could have incalculable consequences for the German economy, where



the automotive industry plays an exceptionally important role in employment and value creation. A firm of Volkswagen AG's size and structure also has a duty to society as a whole to work with the "hidden champions" in its supply sector.

Lastly, the globally accepted aims agreed at the Paris climate conference mean that the energy used for electric vehicles must come from renewable sources. It is therefore time that the auto-

motive industry used its lobbying power to actively support the expansion of renewable energies and the associated urban infrastructure. At present, the expansion of renewables is being financed by electricity consumers alone. It must be in the interest of automakers to extend this arrangement to transportation energy as well. The industry must make credible investments in renewables as a contribution toward this.

V. Securing the future

Dealing with the dramatic mistakes of the past will be expensive. It will tie up funds unproductively, making them unavailable for forward-looking projects. As a result, a future perspective for Volkswagen 4.0 can only be gained by doing without certain accustomed entitlements. In the interest of credibility, the Management Board must take the lead here as well.

The banking crisis showed that it was possible to make drastic cuts to bonuses which had been justified virtually as natural law. In a case like the diesel crisis, there should be no hesitation to go the next step and impose actual financial penalties. Given the level of future investment needed to bring about the transformation in mobility, some may view such fines as "peanuts" – a dangerous mistake. Within the company and among customers, their psychological impact will rapidly take on the figurative financial weight not of millions, but of billions.

The collateral damage from this crisis reaches far beyond a single company and industry. It contributes to a larger picture of growing distrust in state institutions in our democracy. This makes it all the more critical that Volkswagen tackle the unprecedented disaster of "Dieselgate" with unprecedented honesty, transparency, and rigor.

COMMENTARY

Lobbyism and sustainability: Two sides of the same coin

The renowned Nobel laureate Milton Friedman considered a company's social responsibility to consist solely in increasing profit. How fortunate that this misconception didn't prevail.

Once upon a time, charity and generous patronage arose from individual industrialists' sense of ethical or moral obligation. Today, a company's commitment has long since developed into a strategic approach in line with stakeholder expectations. Some refer to this as corporate (social) responsibility; others call it sustainability management.

At its core, however, this kind of commitment is not a concession to external expectations. Rather, it follows the reasoning that long-term business success is only possible in a stable context. Thus, companies are acting in their own interest if they make resources – knowledge and money – available for addressing issues that affect society as a whole. In this process, credibility comes from exercising the greatest possible transparency and public accountability.

There is no point in deliberating over whether the support of educational or environmental programs shouldn't actually be the task of government. Where there is a lack of collective goods, they simply must be produced through public-private partnership. And where government regulation fails, businesses and civil society must set standards. The real-world line between the government and business sectors was never as distinct as it is in theory anyway.

On the other hand, we needn't look far to find opportunities to boldly take on responsibility. The more a company succeeds in convincing the public that the business's particular interests lie in society's general welfare, the better its chances of finding a sympathetic ear for its concerns in the political sphere.

In other words, in and of themselves, sustainability and lobbyism are in no way incompatible. On the contrary, the two go hand in hand – assuming, of course, that dishonest methods and backroom deals are taboo. Companies need a culture of corporate citizenship, now more than ever. And every society is dependent on businesses that act responsibly.

“Business success is only possible in an intact context.”



Dr. Thomas Steg,
56, General Representative
of the Volkswagen Group,
Head of Public Affairs
and Sustainability

What others are saying

Volkswagen asked stakeholders what they think about the scandal. The Group will intensify its stakeholder dialogue in future, both in person and online.

Collected by — Sibel Şen



Wolf-Dietrich Warncke, 53, and his brother Peter run a car dealership in Tarmstedt in Lower Saxony that has been owned by their family for three generations. They have had a dealership contract with VW for over 60 years.

At the beginning, VW completely underestimated the scandal.

The management now knows how serious it is, but the lack of transparency remains a huge issue. The company is just at the start of a long process of coming to terms with the affair. It's not just the car industry that is suffering the consequences, but Germany as a business location overall. The "German engineering" seal of quality has been damaged. The main problem I see in the Group is one of governance – for which the old guard is responsible. VW should replace them, whether they're guilty or not, to win back the trust of investors. Only with new faces at the top can the Group make a fresh start. In addition, the company is being torn apart by different stakeholder interests. The conflict can only be resolved if everyone pulls together. Despite all this, VW is strong. The scandal is a great opportunity for it to take radical action and finally tackle its own weaknesses.

“They need a fresh start.”



Ingo Speich, 39, is a portfolio manager at Union Investment, where he is responsible for sustainable investments and active shareholder engagement. There were no VW shares in Speich's sustainability funds even before the crisis, because the company lagged behind the competition in internal ratings.

“VW needs a new culture.”

When I first heard about the accusations, I thought: that can't be true. We knew VW as a reliable company with a conscience. Today we know that others were also cheating and that it was easy for them all to do it, at least in Germany. The authorities allowed manufacturers to carry out their own testing and approval processes. The ministry has done little so far to shed light on the scandal. For me, one thing is clear: VW broke the law and that shook my trust in them. As a dealer, I have to explain the affair to customers. In our case, these are mainly private customers who are now choosing to wait before buying a new car. The fact that board members are approving bonus payments for themselves in this situation angered us as much as it did our customers. Going forward, I expect VW to take the scandal as an opportunity to rethink what it's doing – and to fully commit itself to a new culture, to researching alternative drive-train technologies and mobility concepts, instead of just waiting until the public storm blows over.



William K. Reilly, 76, led the United States Environmental Protection Agency (EPA) between 1989 and 1993. In 2010 President Barack Obama appointed him co-chair of the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling.

Nearly all my customers work for VW and come in for a beer or a coffee after their shift. I have close ties to the company, so I'm affected by the scandal. I can't understand what was driving those responsible. Probably greed. Whether we'll ever really learn who was to blame, I don't know, but of course I'd like to find out. I was worried that my business would suffer. After all, a lot of my customers are unsettled. I see it every day. The young people, in particular, are worried about their future. At first, they were all deeply disappointed – especially in the management. Now most of them have calmed down. Almost no one talks about the emissions scandal in here anymore. Their morale has improved since the company started moving. Maybe it was a lesson to everyone. When I first started here in the 1970s, there was a period of depression. Back then it was new models like the Scirocco and Polo that brought a change in the mood. Now I can feel the momentum building again for good times. Dr. Hahn used to walk through the production halls and shake hands with the people working on the line. VW needs to become VW again. That's what I'd like to see.

“VW needs to become VW again.”



Bruno Corigliano, 64, has been running the Tunnelschänke pub in Wolfsburg, near the “Tor 17” factory entrance, for 20 years. He himself worked for Volkswagen from 1973 to 1983.

“If you do not change, you need to leave”

The most critical thing for VW now is to demonstrate a change in culture – the culture that has led to the crisis in the first place. It has to begin at the top and permeate throughout the organization. Not only have these changes to be implemented, but also to be communicated externally in a credible fashion. Real changes are the crucial element in a crisis of this scope. It will not work without the will to change in every single position or department. The clear message has to be: If you are unwilling to change, you need to leave. As an observer I expect the executives responsible to be dismissed. Companies in post crisis situations often hire prominent consulting firms to lead the initiative of culture change. It never works. The job has to be done within the management, internally integrated with day to day operations by the managers of those operations. Furthermore, VW has to implement the agreed compensations for the environmental damage done. In any case, I recommend to focus on what VW knows to do best – that is, engineering.

Peter Mock, 35, is Europe Managing Director of the International Council on Clean Transportation (ICCT) in Berlin, a non-profit, independent research organization. When he and his team in the US investigated the emissions of German vehicles, they discovered Volkswagen's illegal defeat device.



Everyone in Wolfsburg is connected to VW – whether they work here or not. We were all shocked when we heard about the deception. Right away, I thought: didn't anyone see what this was going to cost us? And how much it would damage the company's image? VW has overcome crises before, but this one is bigger. Lots of my colleagues are still angry, but they identify strongly with the company. They know what they've got here – for example, a say in decision-making and good career prospects. Things have to keep going for all our sakes. The vast majority of the workforce had nothing to do with the rigging. I expect those who were to blame to take responsibility. That's the only way we can win back public trust. To make sure that nothing like this happens again, we need a new corporate and leadership culture. Everyone should be able to think about their work and ask questions – in a climate that's open to constructive criticism.

“We have to regain our credibility.”

“VW can make a big difference now.”

The test results in the US came as a real surprise to us. Today it's no longer just a VW scandal – the emissions and fuel-consumption crisis has spread to the entire industry. The biggest problem is that the industry has lost a great deal of public and government trust over the past few months. Yet the environmental and health problems had been known for a long time and hadn't caused much of a stir. It was only when there was talk of penalties for the automakers that the public became interested. It's still too early to assess what the consequences will be for VW. I see the company's announcement that it intends to significantly expand e-mobility and invest in this area as a positive step. VW can make a big difference in this area. Of course, I expect the company to push ahead in clearing up the scandal as well. VW has great engineers, but they often get involved in questionable lobbying activities in Brussels. It would be better to put their expertise toward new solutions and to actively support the legislative bodies in putting the necessary safeguards in place.



Klaus-Dieter Weiß, 63, has worked for VW since 1985. As a local native, Volkswagen is a part of what makes Wolfsburg home to him. As a union representative for IG Metall, he knows the concerns of many of his colleagues.

FIVE QUESTIONS

*Uncovering the truth
or just tactics?***Scrutinizing communications during a crisis.****Volkswagen always refers to the “diesel issue” –
but isn’t that just whitewashing?**

The misconduct of certain individuals in this context is not compatible with our understanding of ourselves as a company. Everyone at Volkswagen is aware of this. However, the constant repetition of words like “scandal” would sweepingly discredit the hundreds of thousands of our employees who have nothing to do with this misconduct, and who are giving their best every day for Volkswagen and our customers.

**Why won’t Volkswagen admit
that the company acted fraudulently?**

“Fraud” implies that the company willfully deceived customers and other stakeholders. So far there is nothing to suggest that this is the case. The fact is that we have disappointed our customers and the general public. And this is something we deeply regret.

**Why, in spite of the strong interest, have there been
so few press conferences since the disclosure?**

The management has repeatedly faced the public. And the company’s press office staff answers every query as quickly and individually as possible. Press conferences are a format we choose for news that we consider worthwhile for journalists to travel to hear.

**Why does Volkswagen regularly withhold
information, citing ongoing investigation?**

Statements not based on substantiated fact can’t restore lost trust. Providing legitimate, reliable information will only be possible after the ongoing, very costly, and complex investigations have been completed. This is something we have to take into account when communicating with the public.

Why were the affected customers informed so late?

Just a few days after September 18, 2015, customers could check online whether their vehicle was affected. Contacting them directly required us to have the current car ownership details from the registration or regulatory authorities. Thus only after measures were coordinated with the relevant agencies were we able to notify our customers personally.

At first I simply couldn’t believe the reports.

When the extent of the scandal was revealed, I was horrified that VW could cheat more or less legally and the legislator wasn’t doing anything about it. Our company could never allow such a thing. We keep our promises. I’m furious about this disparity. At the end of the day, their customers have been fooled because it doesn’t seem to matter whether or not they chose their vehicle based on emissions criteria. Our two “workhorses” are allegedly not affected by the scandal. Or at least I haven’t had mail from VW yet. But I can no longer truly trust the company. I also don’t understand why VW weren’t upfront about it and why they didn’t admit to it from the beginning. To proceed by awarding bonuses to board members does not look good to the general public. If VW had been honest straightaway and acknowledged the issues, they could have limited the damage. Ultimately many companies can build cars, and “made in Germany” used to be a quality seal. But people are forgetful. Maybe VW will be lucky.

*“They could have
limited the damage.”*

Inez Krüger, 51, founded Inez Krüger Haustechnik, a company near Hanover which operates in the building services, sanitary facilities, and heating sector, in 1992. The business has always relied on Multivans with diesel engines. After the scandal, Krüger no longer trusts the manufacturer.



Unsparring scrutiny

The public is waiting impatiently to learn what made such grave misconduct possible. Comments on the ongoing investigation.

Text — Sascha Kummle Illustration — Mathis Rekowski

A year has passed since the notice of violation from the EPA, and it still isn't clear how the deception transpired in detail, or who was responsible for the development and use of the software.

Did Volkswagen thwart the quest for the truth? Is the company betting that customers will forget and the public will lose interest?

Such assertions are popular, but wrong.

Braunschweig public prosecutor

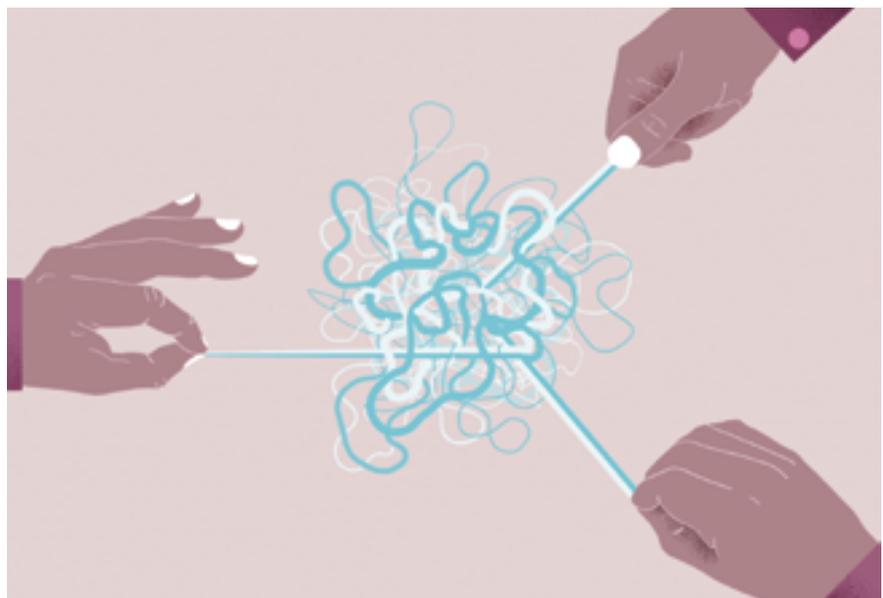
The public prosecutor's office in Braunschweig, Lower Saxony, is independently investigating the matter, including allegations of fraud. In September 2015, Volkswagen itself filed charges with the public prosecutor.

Searches were then carried out in Wolfsburg and elsewhere with the involvement of special agents from the State Office of Criminal Investigation.

Lawyers from Jones Day

The matter is also being investigated by the US law firm Jones Day. The Supervisory Board of Volkswagen AG commissioned the firm to conduct an external investigation – an independent and comprehensive probe. Jones Day is informing the company and the US Department of Justice of their findings as they emerge.

In other words, the course of action in clearing up the situation is determined largely by the investigative authorities.



“There is no alternative but to fully clear up the situation.”

Matthias Müller,
Chairman of
Volkswagen AG

Further efforts

With the help of an internal audit, Volkswagen is working intensively to shed more light on the situation. The company is focusing in particular on the processes of software development for the engine control unit. It is examining the legality of these processes in order

to expose any ineffectiveness, irregularities, or tampering.

The Supervisory Board and Management Board currently expect that a comprehensive statement of the facts uncovered by the investigation will be made public if and when a full settlement can be reached with the US Justice Department. Such a statement of facts customarily accompanies the settlement of a criminal investigation. The statement will present the facts of the case from the perspective of the US authorities, taking into account the findings of the Jones Day investigation.

An assessment of the results of all efforts to clarify the matter will be possible as soon as the investigations are complete. ◀

INTERVIEW

Tough, but fair

Over the past months, it has seemed that the fate of the company would be decided in the United States. Dr. Francisco J. Garcia Sanz is leading the negotiations.

Dr. Garcia, how would you describe the atmosphere during your negotiations with the US authorities?

Our first meetings with the EPA and CARB were tough, but constructive. I can't and don't want to go into the details. This much I can say, though: it became evident to us that the Americans viewed our misconduct as especially serious. We apologized on behalf of the Volkswagen Group and signaled our desire to make up for what happened. But it will surely take some time before we're seen as an altogether trustworthy partner again in the United States.

Did you ever doubt that the intended settlement would be reached?

To be honest, I wasn't always certain a settlement with so many parties would be possible. In the final phase, negotiations lasted into the early morning hours. We had two months of hard work behind us, with an excellent team that included external consultants and lawyers. It was important to me to be available to everyone at all times. You can't resolve this kind of problem alone.

Did the Management Board weigh the possibility of a complete withdrawal from the US market?

We discussed many different scenarios, but this one was quickly shelved. The Americans have made clear to us that they don't want to chase us off. On the contrary, they want us to play a major future role as an engine of electromobility in the US. Besides, they really admire our factory in Chattanooga, which

serves as a model of resource efficiency and the dual training system.

Consumer advocacy organizations in the EU are pointing to the US deal and demanding equal treatment for European customers ...

We've been in dialogue with consumer advocates for months now. I went to Brussels myself to inform Consumer Commissioner Jourová about our technical measures, the vehicle-servicing process and the benefits to our customers. The cars are being modified so that they meet exhaust emissions and all other legal requirements without compromising standards in fuel consumption, CO₂ emissions, acoustics, or driving quality. Our customers rightfully expect these technical improvements. But there is no basis for further claims.

The diesel affair is going to be expensive enough as it is. Will the company be able to handle the costs?

The financial burden is indeed high, and we've made provisions for it. Of course, it's painful to have to use money for this that we'd much rather invest in future technologies and new business models. But Volkswagen is a strong and resilient company. With strict spending discipline,

we will meet the challenge.

When will you and the diesel task force be able to conclude your work?

The end isn't yet in sight, but we're fighting on. The company, our employees, their families and everyone who's counting on us are worth it.

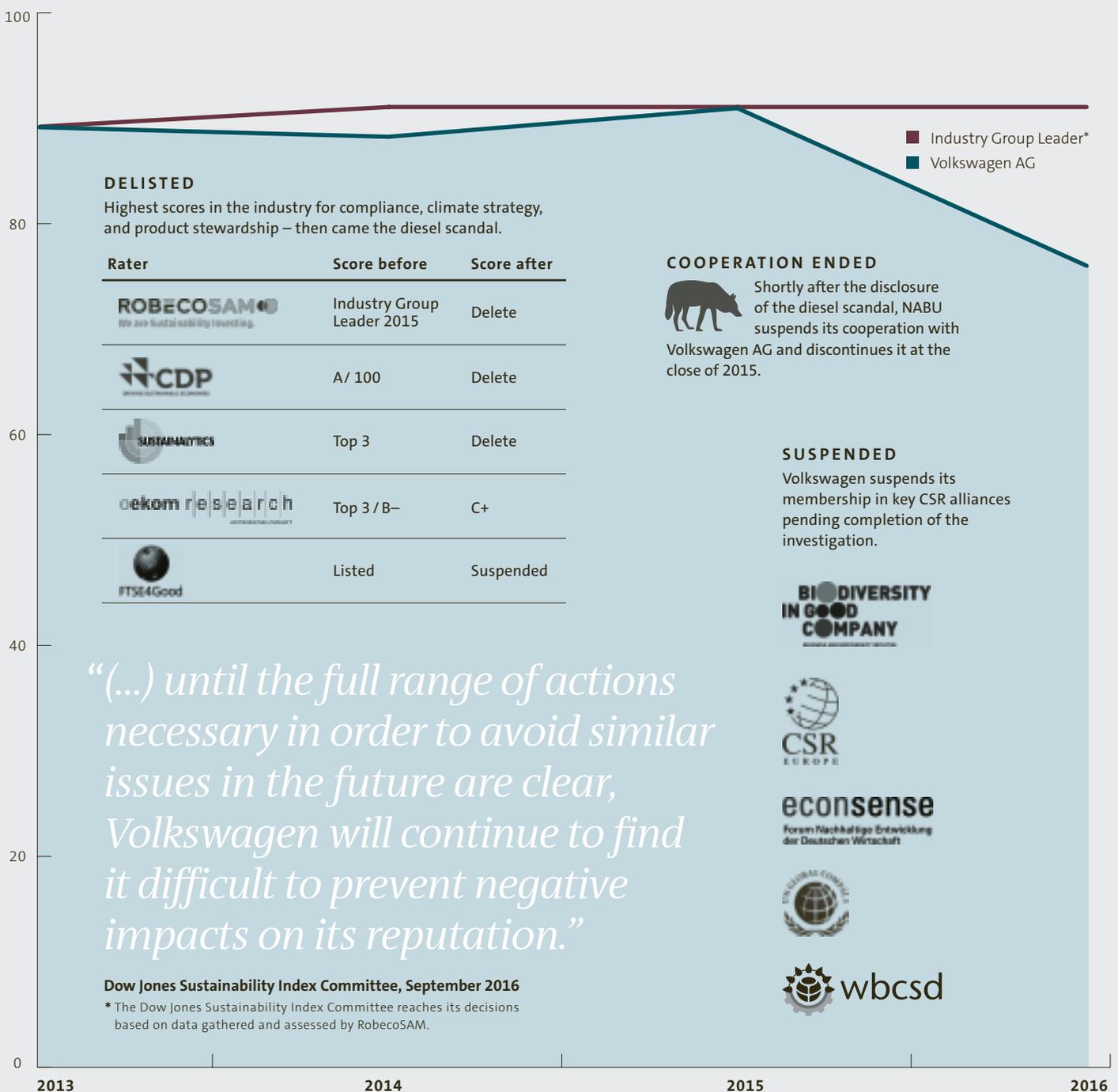


Dr. Francisco J. Garcia Sanz, 59, Member of the Board of Management with responsibility for Procurement since 2001. The Spanish-born executive has headed the diesel task force since December 2015 and is leading negotiations for Volkswagen in the United States.

Descent and delisting: Volkswagen falls hard

Autumn 2015 brought not only a drop in the Volkswagen AG share price, but also serious damage to its reputation. And the company had only just become the proud auto industry leader on the Dow Jones Sustainability Index.

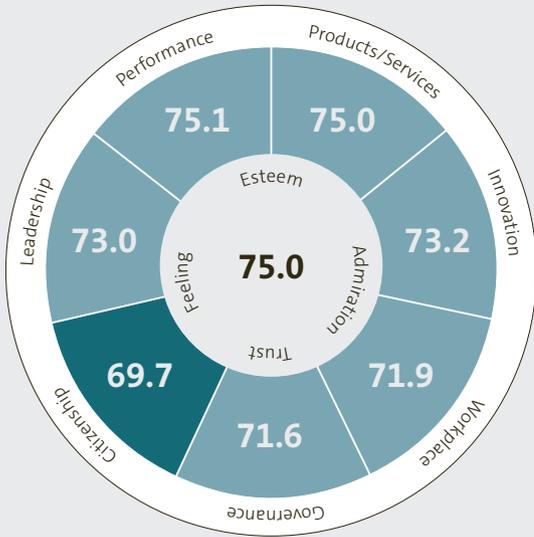
Text — Klaus Richter



DOWNWARD SLIDE

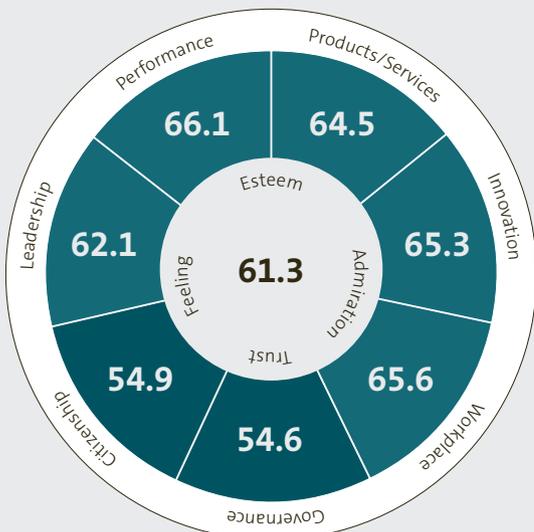
In the leading global reputation study, Global RepTrak 100, Volkswagen loses 13.7 points and slips to position 123 in 2016. The previous year, the company placed 14th in the rankings.

**VOLKSWAGEN 2015
GLOBAL REPTRAK®
Rank #14**



-13.7

**VOLKSWAGEN 2016
GLOBAL REPTRAK®
Rank #123**



INTERVIEW

“You can’t demand trust.”

Advice from an internationally recognized brand expert.

Which is worse, the financial consequences of Dieselgate or the loss of customer trust?

The fines and other charges are serious, but the reputation damage is much worse – and will also bring a heavy financial cost for the company. Trust is a valuable asset for a brand. Volkswagen always stood for reliability and quality, but now it looks as if they’ve been deliberately cheating their customers for years.

But Volkswagen wants to restore that trust.

Trust develops when companies keep their promises and act with integrity. It’s not something you can demand.

How can Volkswagen make amends?

The bonus debate certainly didn’t help. It’s still unclear what the active executives knew about Dieselgate. And letters to customers that read more like mobilization orders do more harm than good. Generous compensation payments, like those agreed in the US, make a better impression. VW should accommodate its German customers as well.

But they don’t have comparable losses. Unlike in the US, their cars are already being converted and made legal in a government-ordered recall.

It isn’t just a question of complying with the law, but of showing appreciation. The responsible executives don’t appear to have accepted this yet.

Volkswagen is certifying to its customers that the update won’t compromise their vehicles’ performance.

That’s not enough. VW simply has to do more than before if it wants to be seen as a company of integrity again. It needs on-road testing by independent inspectors, and it needs to install the best environmental technology and genuinely focus on its customers.



Jürgen Gietl, 46, is a father and lecturer and lives in a timber-framed house. He is a Managing Partner at Brand Trust in Nuremberg. He says: “To me, sustainability means appreciation.”

“I knew this job wouldn’t be a walk in the park.”

Dr. Christine Hohmann-Dennhardt set out at the beginning of 2016 to reorganize the areas of legal affairs and compliance. Her primary responsibility is to ensure that in the future the company not only adheres to the letter of the law, but also does the right thing. She is leaving no stone unturned, but can’t yet make a final judgement.

Interview — *Sepideh Honarbacht* Photos — *Ériver Hijano*

Dr. Hohmann-Dennhardt, you assumed the Integrity and Legal Affairs board function at a turbulent time. How did the company convince you to take the job?

I was certainly surprised when they asked me. And I didn’t accept the position right away. But then I thought, if they trust me to help get a company back on track that’s so important for the automotive industry and job security in Germany, then I want to do it. What ultimately convinced me was a long talk with Matthias Müller. I had the feeling that he was really serious about getting to the bottom of things and changing the company.

Do you remember his words?

Something he said that I really liked was: “I can only do this in a team with people I trust, people who support me and will join me on this road.”

Did you ever suspect that by hiring a woman with your resume and reputation, Volkswagen was simply seeking to look good?

That isn’t so important to me. It’s much more important that I stay true to myself. And I had the impression I could do that at this company.

Compliance and integrity – how do they relate to each other?

They complement each other. Compliance means following the rules, and is the basis for the safe, stable business that brings a company long-term success. But as former Federal President Christian Wulff once said, “Not everything that is legal is also right.” Integrity means doing what’s right. It means acting according to standards, guided not just by my own interests or those of the company, but also by a sense of responsibility to the people I’ve been put in charge of and to the common good.

According to your definition, does the team that you work with today have integrity?

I would answer in the affirmative, and not just for my board colleagues. It’s something that I assume of everyone in

The specialist for missions impossible

On January 1, 2016, the Supervisory Board of Volkswagen AG appointed Dr. Christine Hohmann-Dennhardt, 66, to the Board of Management. The first woman on the board, she is responsible for the newly created function of Integrity and Legal Affairs. She held the same position on the board of Daimler AG from 2011 through 2015. Among other positions, Hohmann-Dennhardt, who has a PhD in law, previously served as Minister of Justice of the State of Hesse and as a judge on the Federal Constitutional Court of Germany.

the company unless proven otherwise. But integrity in a company requires a shared canon of values that’s known to all. Otherwise, people become unsure and don’t know what’s expected of them. If business success is set above all else, we lose sight of other goals. But decency and integrity are prerequisites for sustained business success. If that isn’t clear, people can lose their orientation and go in the wrong direction. But that doesn’t mean everything is bad.

What were the underlying conditions that made the manipulation possible?

I can’t presume to give a final judgment yet. In the audit, we took a very close look at the company departments and processes, especially product safety. Compliance and Legal Affairs are examining whether procedures were transparent and clearly understandable. It may be that we need triple checks instead of double checks. There are also factors that favored improper behavior or at least made it harder to expose. The hierarchical structures in the company are part of that. And there obviously weren’t sufficiently clear signals that the Group doesn’t tolerate violations of the law.

What have you done to prevent things like this from happening in the future?

We’ve developed new guidelines, made changes to our organization in Compli-



ance, and improved communication and training. In particular, we want to offer employees more support in difficult situations down the road. We've intensified our monitoring, and in our risk management system we've changed from annual to quarterly reports. The entire board is in close dialogue with employees. In addition to these things, we've reordered our whistleblower system. That isn't a full list, but there's plenty that remains to be done.

Employees are reluctant to denounce their colleagues or superiors.

“But it's not about denouncing anyone.”

But it's not about denouncing anyone. If an employee learns that a colleague is doing something illegal, the first step is to talk to them. If that doesn't work, it should be taken to a superior. Reports can also be made anonymously. The

point is to prevent illegal actions and keep them from bringing the company ...

... into disrepute.

(Angered) Much more than that. At Volkswagen, it isn't a minor thing. The scandal was a serious blow to a strong and very successful company. Calling someone a traitor because they want to prevent that just reveals a lack of courage.

If you put yourself in the place of the people who were involved in the manipulation, can you understand them a little bit?

You can explain their motivation. But I can't understand that kind of behavior, and as a board member I can't accept it by any means. If customers don't trust you any longer, you're out of business. Which is to say, compliance and integrity are also economic factors.

In recent weeks, new details have come to light and new accusations have been made against management. Do you sometimes ask yourself “What have I gotten myself into?”

No. I'm not the kind of person who looks back and asks “What if?” That doesn't interest me. Once I've decided to take on a task, I dig into it. I make it my field, and my motivation and objectives are clear. Now I'm at Volkswagen. I knew this job wouldn't be a walk in the park.

When will you consider what you've started here to be a success?

When Volkswagen's good reputation has been restored, and our employees can look to the future with pride and optimism. ◀



Transforming our core business

We plan to hone the profile of the 12 Volkswagen Group brands and streamline our current 340-model range. Across our brands, we are embarking on an ambitious program of electrification, launching more than 30 new electric vehicles between now and 2025. Battery technology will play a key role. Autonomous vehicles and artificial intelligence will also be important focal points.

Developing mobility solutions



With our stake in the start-up Gett and our partnership with Hamburg as a pilot city for sustainable and integrated urban mobility, we have taken important initial steps in this field. By 2025, Volkswagen plans to be generating billions of euros of revenue from its interests in forward-looking mobility services. Our intention is thus to focus not just on the business of selling cars, but also on becoming a leading provider of intelligent transportation solutions. This new cross-brand business area will be based in Berlin.

A new, better Volkswagen Group

In light of the current crisis, our company is making a bold 180-degree turn. Our vision as we move forward is to become a leading global provider of sustainable mobility solutions, taking the “TOGETHER – Strategy 2025” as our road map. We want to continue to attract customers with captivating vehicles and smart mobility solutions. Our aim is to be a technological leader and a standard-bearer for environmental responsibility, safety, and integrity. We seek to retain competitive profitability and remain an attractive employer.



Enhancing our ability to innovate

The digital transformation of the company continues, both in manufacturing and sales. A new way of thinking and working will enable the most extensive transformation process in Volkswagen's history. Under the banner of “Organization 4.0,” the Group seeks to reform everyday structures and processes and create a climate that encourages open and collaborative working relationships at all levels and across all departments. In addition, we plan to hire around 1,000 new software specialists.



Securing funding

We anticipate investing tens of billions of euros in the implementation of “Strategy 2025”. This will require improvements at every stage of the value chain, in all of our brands and areas of business – as well as a rigorous commitment to delivering profitable growth.

Making way for good ideas

If we want to lead the market for mobility concepts, we need less hierarchy and more courage.

Illustration — Mathis Rekowski

Success makes people lazy. The Volkswagen Group has been very successful over the past decade – and has been resting on its laurels. This must change because the market, our customers, and our staff are all changing fast. Anyone who isn't alert will miss the boat. The wake-up call in September 2015 was a particularly painful and costly lesson. But the scandal was just a symptom, albeit a dramatic one. The changes to our company and management culture that we introduced in 2015 were unavoidable – in fact, they were vital for our survival.

To understand why, we need only look at our future competitors: the Apples, Googles, and Ubers of this world are uncomplicated, direct, and fast-moving. At Volkswagen, by contrast, processes are sluggish and hierarchies hold sway. Good ideas sometimes fall by the wayside because they have to be presented to too many management levels before being budgeted and implemented.

Today's competitive market is fueled by the spirit of Generation Y, the Millennials – the generation to which many of our employees, future colleagues, and customers belong. These young people have different values from the generations before them. They want to have a say, make decisions, and shape things. They are less interested in exercising power. They cultivate their real and digital networks and are used to sharing their thoughts, their experiences – and their cars.



“In the future, management must clear obstacles out of the way.”

If we want to survive in this environment, we must change the way we collaborate across brands. Up to now, there has been too little sharing of knowledge within the Group. We waste lots of money reinventing the wheel and competing among ourselves. To achieve an objective, we can use more cooperation and fewer resources, or less cooperation and more resources. At the moment, we are much closer to the latter.

These realizations led us to adopt a Code of Cooperation for the Group in June 2016. The code states that we deal with one another on an equal footing,

that we are sincere with one another, straightforward and reliable when working together on projects, and that we stand by one another. We are also aligning our management and staff development programs with these principles, using formats that strengthen, value, and nourish. In this way, we can promote a culture that learns from mistakes rather than sweeping them under the carpet.

We will have to say goodbye to many familiar rituals if we are to create a culture that deemphasizes power and hierarchy. Our vision of leadership is less about directing and steering. In the future, management must clear obstacles out of the way so that employees can do their jobs well. It should encourage the little experiments, even though they may fail. This is the only way we will unleash creative potential – and the only way Volkswagen can set the course and take the lead again in the field of disruptive technologies. ◀



Dr. Karlheinz Blessing, 59, has been a member of the Volkswagen AG Board of Management since January 1, 2016. He is responsible for Human Resources and Organization.

Sustainability – getting it right this time

The crisis revealed weaknesses in our processes and, in so doing, opened doors and cleared the way for change. Strengthening the Group's sustainability management is a key example.

Text — Prof. Dr. Gerhard Prätorius

September 18, 2015, was a black day for Volkswagen – and a bitter blow for the Group's sustainability management. The notice from the US Environmental Protection Agency revealed that Volkswagen had broken not only the law, but also a promise to society. Clean diesel wasn't clean. It had failed to deliver on its environmental claims.

The new Chairman, Matthias Müller, promised that Volkswagen would learn the right lessons from the absurd manipulation that had taken place. Less than a year on, some of these lessons have already been taken on board. Apart from the need to improve compliance standards, the most important lesson from the mistakes of the past is the need to strengthen the Group's sustainability management.

The Council

To tackle this task, the Group has appointed an international Sustainability Council that is vested with far-reaching rights of information, consultation, and initiative, and thus is able to initiate projects. The high-caliber council consists of four women and five men. They will establish their own working methods and areas of focus and will consult with the Management Board regularly to breathe life into the Group's sustainability strategy. The council's role is to cast a search-

ing, critical eye over developments within the company and in society.

In addition, it will provide fresh impetus by putting forward ideas and suggestions. The proven expertise of the council members guarantees a comprehensive approach. The topics are: (1) social responsibility and integrity, (2) sustainable mobility and climate protection and (3) the future of work and digitalization. This should enable external reflection on our internal view of problems and solution approaches in areas of future significance. A project budget and offices are being set up to facilitate the work of the council.

“We have to integrate sustainability more strongly into our management processes.”

Dr. Thomas Steg,
General Representative of the Volkswagen Group and Head of Public Affairs and Sustainability

Stakeholder management

A company that seeks to position itself for long-term success on the market and vis-à-vis the competition must have a close knowledge of its business environment and stakeholders, as well as the factors that influence them. And its strategy must take these into account. In the near future, Volkswagen will therefore redouble its efforts to resume its time-proven stakeholder dialogues and partnerships, and to regain its place in national and international sustainability alliances.

Along with our employees and customers, our stakeholder groups in science, business, politics, the media, and society all need to be integrated into a systematic stakeholder management strategy. The new “TOGETHER – Strategy 2025” has laid the foundation, placing stakeholders firmly at the center: we are taking responsibility for the environment, safety, and society.

In a process spanning our divisions and brands, we are also developing targets and indicators that the company will use to measure its progress in three key arenas: business, the environment, and social affairs.

The aim is to ensure that, as it moves forward, Volkswagen takes stakeholder expectations into account in a balanced way and keeps its promises to society. ◀

BRIGHT MINDS

**Prof. Ottmar Edenhofer,**

born in Germany, is Deputy Director and Chief Economist at the Potsdam Institute for Climate Impact Research (PIK) and Director of the Mercator Research Institute on Global Commons and Climate Change. From 2008 to 2015 he was one of the co-chairs of Working Group III of the Intergovernmental Panel on Climate Change (IPCC).

**Connie Hedegaard,**

born in Denmark, is a member of the board of Aarhus University and Chairwoman of the Kann Foundation, an international environmental foundation. From 2010 to 2014 she was European Commissioner for Climate Action. Prior to that she served as Denmark's Minister for the Environment and Minister for Climate and Energy, and hosted the UN Climate Change Conference in Copenhagen in 2009.

**Prof. Gesche Joost,**

born in Germany, is a professor of design research at Berlin University of the Arts, where she heads the Design Research Lab. Her research focuses on human-computer interaction. In March 2014 the German government appointed her Digital Champion for the European Commission.

**Georg Kell,**

born in Germany, is Vice-Chairman of Arabesque Partners, a company specializing in sustainable investment. He was the founding director of the United Nations Global Compact and its executive director until 2015. He is considered one of the most influential thinkers in the field of business ethics.

**Yves Leterme,**

born in Belgium, is Secretary-General of the International Institute for Democracy and Electoral Assistance (IDEA) and a former leader of the Christian Democratic and Flemish Party (CD&V). He was the Belgian Minister of Foreign Affairs until 2009 and Prime Minister until 2011, when he became Deputy Secretary-General of the OECD.

**Prof. Gertrude Lübke-Wolff,**

born in Austria, is a professor of law at Bielefeld University. She served as a judge on Germany's Federal Constitutional Court from 2002 to 2014. She received the Gottfried Wilhelm Leibniz Prize from the German Research Foundation for her research in the field of public law.

**Margo T. Oge,**

born in Greece, has lived in the USA since 1968. She is a Distinguished Fellow of the ClimateWorks Foundation and a member of the International Council on Clean Transportation (ICCT). For more than 30 years, she held high offices at the Environmental Protection Agency (EPA), including as Director of the Office of Transportation and Air Quality.

**Michael Sommer,**

born in Germany, is Vice-Chairman of the Friedrich Ebert Foundation and a member of the Board of Trustees of the Volkswagen Foundation. A member of Germany's Social Democratic Party (SPD), he was Chairman of the German Trade Union Confederation (DGB) from 2002 to 2014 and, during his last few years in office, also President of the International Trade Union Confederation.

**Elhadj As Sy,**

born in Senegal, is Secretary-General of the International Federation of Red Cross and Red Crescent Societies. He is a member of the Independent Oversight and Advisory Committee for the WHO Health Emergencies Programme. In June 2016 UN Secretary-General Ban Ki-moon appointed him to the Global Health Crises Task Force.

Electric, connected, shared – the future of mobility

As painful as our company's crisis has been, it has galvanized us and sharpened our vision of what the future demands and what our customers want. Our transformation from automaker to provider of sustainable mobility solutions has begun.

Illustration — Mathis Rekowski

In big cities, more and more young people are choosing not to own a car. They neither truly need a car to get from point A to point B, nor do they value it as a status symbol. A smartphone, on the other hand, is something they can't imagine going without. It helps them communicate with friends, optimize their lives, and get where they want to go – by means of bus, train, or carsharing. The smartphone seems to be an essential these days, while the car does not. The avid driver in me finds that hard to take. But as an executive for a large automaker, I have to embrace it as a challenge.

For Volkswagen, this means, first and foremost, that we have to think differently – and try to view the world more the way the coming generations will. This was clear to many people even before the present crisis, but our situation has opened new doors and the willingness to embrace reform has grown. Our “TOGETHER – Strategy 2025” road map has begun to change the paradigm. In the coming years, we will focus on four key priorities. We will transform our tradi-

tional core business; develop a new business area devoted to mobility solutions; strengthen our innovative capacity – primarily but not exclusively in new technologies; and improve efficiency throughout the company so that we can afford the massive investment our future requires.

A global leader in sustainable mobility – that is what the Volkswagen Group wants to become. We want to enable the resource-efficient movement of people and freight all over the world. At the Paris climate summit, the international community made a commitment to limiting global warming to under two degrees, setting the signal for a global energy transformation that can only be achieved jointly. The auto industry is obliged to steadily reduce the CO₂ emissions of its fleets toward zero by 2050.

Volkswagen will exploit the internal combustion engine's potential for improvement and make it as clean as possible – using particulate filters in the gasoline engines and the latest and best SCR catalytic converters in the diesels. Parallel to this, the Group will launch more than 30 new all-electric models by 2025 that boast significantly improved range and shorter charging times. At that point, we anticipate sales of two to three million all-electric vehicles per year – around a quarter of our total turnover. To achieve this, we are starting a multibillion-euro investment program.

Such a breakthrough in electromobility calls for a massive joint effort on the part of industry and govern-



Matthias Müller, 63, has been Chairman of the Management Board of Volkswagen AG since September 25, 2015. He is also a member of the Management Board of Porsche Automobil Holding SE and Chairman of the Supervisory Board of AUDI AG.



ment. The state must provide a comprehensive network of rapid charging points, while the auto industry has to do all it can to further reduce the cost and extend the driving range of electric vehicles. We see battery technology as key, and plan to establish it as one of the Group's core competencies.

“Our proposition is mobility.”

With a view to the customers of tomorrow, our proposition is not simply to make efficient, attractive, and reliable cars that are fun to drive. Our proposition is mobility. We want to get people and goods to their destination quickly and safely. Along with the electrification of our fleet, we are therefore also developing mobility services as a new area of business. By acquiring a stake in Gett, a start-up that already serves over 50 million customers, we have taken an important first step. With a tap on the app, your driver appears, opens his door, and takes you to your destination. Billing is automatic and cashless. In years to come, this will form the nucleus around

which we develop further services, such as robo-taxis, carsharing, and transport on demand.

Even if future generations don't necessarily feel the need to own cars, they will still use and appreciate them – if they are electrically powered from renewable sources, if they serve the many and not just the individual, and if they are networked to reduce the strain on our transportation infrastructure. Yet we also recognize the risks of digitalization. Where people's lives are at stake, there must be no doubt whatsoever about the safety of new systems. Far-reaching ethical issues must also be resolved – particularly around data protection and data security. Technical feasibility must not be equated with inevitability; new technological developments should be implemented only if people want them to be. This, too, is part of our vision of sustainable mobility.

Take a closer look and you will see: Volkswagen is more than this crisis. Through electrification, autonomous vehicles, and new services, the Group will undergo fundamental change – in order to remain what it is and always has been: a company that offers mobility for the many. ◀

The car of the future is not a car



Text ___ *Valdis Wish* Photos ___ *Jens Oellermann und Daniel Hofer*

Electrification, automation and digitalization are about to change pretty much everything about how we get from A to B. But is this good news for people and the planet?

Imagine your city with only a seventh of the vehicles it has today. Parks replace parking lots. The young, sightless, elderly and disabled have access to individual mobility. Nobody dies in traffic accidents anymore due to human error. The vehicle you travel to work in does not look like a car at all; it's more like a comfortable private lounge.

As Johann Jungwirth shares this future vision for automated and digitized mobility at the Digital Future Conference in Berlin in May 2016, the audience is all ears. But when he says that his company wants to be a leader in sustainable mobility by 2025, muffled laughter can be heard. Why? Because Jungwirth works for Volkswagen, and this is just months after Dieselgate. With VW's reputation at an all-time low, it's a stretch for some to imagine the company's quick rebound as a sustainable leader.

"We will democratize mobility and increase social mobility"

Johann Jungwirth

The skeptical laughter also reflects something else: the connection between sustainability and the trends reshaping the auto industry is not always clear. While it might be a smart business strategy to offer fully automated, electric cars and a wide range of digital services, how do society and the environment profit? In the case of electrification, the transition away from combustion engines will have clear benefits for urban air quality, noise reduction, and lowering CO₂ emissions – particularly if the electricity used to recharge batteries comes from renewable sources.

For Johann Jungwirth, Volkswagen's Chief Digital Officer, the sustainability impacts of digitalization and autonomous driving are also clear. By eliminating the root cause of over 90 percent of traffic accidents – human error – autonomous driving could dramatically reduce the 1.25 million lives lost on the world's roads each



Johann Jungwirth, Chief Digital Officer at Volkswagen: "The car may not even have a steering wheel."

year. After all, Jungwirth says the car of the future may not even have steering wheels or pedals. Without drivers, designers can also rethink standard features like driver-side doors and large windows. It will be more pod than car.

"Self-driving vehicles will also make a huge contribution to sustainability in the sense that we offer individual mobility to everyone," says Jungwirth. "I am thinking here about the blind, the sick, children – people who have no or just very limited access to individual mobility today. We will democratize mobility and increase social mobility."

For Volkswagen to play a leading role in this sustainable future, Jungwirth believes there is no time to lose. For the last seven years, he has worked in California's Silicon Valley – most recently at Apple – where he had an insider's view of the powerful new players and trends that are rapidly shaping the future of mobility. Since returning to his native Germany in November 2015, Jungwirth now finds himself on the front lines, not only of the reinvention of the car, but also the reinvention of Volkswagen.

Volkswagen announced in June 2016 that autonomous, digitalized, and electrified mobility will be cornerstones of its Strategy 2025. According to Jungwirth, this strategy should hasten the transformation of Volkswagen from a traditional carmaker to a mobility provider that also offers software and services. With its first automated cars expected to be available in three to five years, Volkswagen also plans to develop or acquire a range of mobility services. The group's recent invest-

ments in on-demand mobility company Gett and mobile payment company sunhill technologies are early milestones on this path. “We are a hardware company that has focused on safety, reliability, quality, design, and great brands,” says Jungwirth. “Now let’s take software and services to the same level to become an integrated hardware, software and services company. This is extremely important for a successful digital transformation and long-term success.”

A peek in the kitchen

This will be no small feat. To get there, Volkswagen needs to quickly attract talent and expertise in key areas, such as user experience and software development, and embrace the working cultures that digital companies use to speed up innovation, such as flatter hierarchies and more collaboration across different parts of the company. These changes are already underway at the Future Center Europe in Potsdam, Germany, where exterior and interior designers, as well as user experience designers and engineers are designing and developing new concepts around the digitalization, automation, and electrification of mobility.

“We are breaking down the old boundaries between departments,” says Peter Wouda, as he gazes out his office window overlooking Potsdam’s picturesque Tiefer Lake. Wouda has designed cars for the Volkswagen Group for twenty years, and now leads exterior and interior design at the Future Center Europe. Today, the teams



The Future Center in Potsdam: flat hierarchies

working at the center are more interdisciplinary, uniting talent from different areas of expertise. “It’s not so important who in the team is the exterior designer, interior designer, engineer, or user experience designer,” says Wouda. “What is important is that the team works together to achieve the best possible result for the customer.”

Along with Wouda, Ulrike Müller leads the Future Center Europe. As the head of user experience design, Müller says her work is now more focused on solving custom-

E-MOBILITY AT A GLANCE

Four Levels of Electrification



01. Mild hybrid

A **mild hybrid electric vehicle (mHEV)** does not actually drive in full electric mode. It shuts off the combustion engine and disengages it from the drivetrain in coasting phases. Also, it recovers energy by regenerative braking for its electrical system or a “mini boost”.



02. Full hybrid

When people use the term “hybrid”, they usually mean a **full-hybrid electric vehicle (HEV)**. These can be driven with either of the two different drives – electric or internal combustion – or with a combination of both. The full hybrid can drive a few kilometers in pure electric mode.



03. Plug-in hybrid

The **plug-in hybrid electric vehicle (PHEV)** is a full-hybrid that can be charged by plugging it into an external power source. Their batteries have larger capacities, allowing for them to be driven in all-electric mode for longer. The purely electric driving range covers up to 100 kilometers.



04. All-electric

The **battery electric vehicle (BEV)** represents the ultimate step for e-mobility, because an internal combustion engine is no longer needed. Improvements in battery technology and investments in charging infrastructure will make BEVs a viable option for longer journeys.



Peter Wouda, Head of Exterior and Interior Design at the Future Center Europe: “We are breaking down the old boundaries between departments.”

ers’ problems than responding to top-down demands from management. “We don’t ask for a commission; we ask for a problem,” says Müller. “Once I know the problem, I can come up with an idea to solve it, and then work to confirm that idea. That’s different thinking.”

This user-centric approach can unlock innovation, but Müller also believes it can lead to more transparency. Well-designed interfaces are an opportunity for brands to build trust with the customer by giving them more feedback and control – for example, over how their data is collected and used. Müller says giving customers the “right feeling” when using the product will become increasingly important as vehicles become more connected and automated.

Planning for third place?

The Future Center Europe is one of three Future Centers that Volkswagen is setting up globally. At the Future Center California, the focus will be on absorbing the influences from the Silicon Valley, while Future Center Asia in Beijing will conduct research and develop design concepts specific to the Asian markets that are key to Volkswagen’s success and growth. This is vital because there are significant regional differences, not

only in language, culture, and taste, but also different attitudes towards new touchstones of sustainability like data protection. Particularly in China, Volkswagen’s single-largest national market, the breakneck speed at which digitalization and electrification are being embraced should be reflected in designs and services. According to Simon Loasby, Design Director at Volkswagen Group China and head of the Future Center Asia, Chinese consumers are generally more open to data sharing and more accustomed to electric mobility than, for example, consumers in Germany.

Past design study: Scirocco model





Ulrike Müller, Head of User Experience (UX) Design at the Future Center Europe, firmly believes well-designed interfaces that give customers the “right feeling” are a way to build trust

Loasby says China is arguably the most advanced market when it comes to combining data freedom and e-mobility worldwide, with the United States second and Europe third. “If we designed everything technically and aesthetically, the user experience, and the user interface from a European perspective,” says Loasby, “we’d be planning to be in third place.”

Christian Senger, head of the Volkswagen's e-Mobility line, also sees China as an ideal market for electric vehicles due to government support, shorter average commutes, ubiquitous charging stations, and an urgent need to reduce urban pollution. “I predict that during the 2020s, combustion vehicles will seem old-fashioned,” says Senger. “That is happening faster in China than in the rest of the world.” But Senger also suggests the rest of the world might not be too far behind. Swift progress towards less expensive batteries with longer ranges, investment in charging infrastructure, and the development of an ecosystem of digital services should make e-mobility more attractive in other markets.

“We don't ask for a commission; we ask for a problem”

Ulrike Müller

“At the end of the day, people don't want just a car without emissions,” says Senger. “The e-vehicle of the future is actually a smartphone on wheels.” However one chooses to visualize the future of mobility, it represents an opportunity for Volkswagen to improve its “triple bottom line.” Going beyond incremental improvements in efficiency or waste reduction (the usual domain of ecological corporate sustainability initiatives), the convergence of digitalization, automation and electrification could make Volkswagen's products and services radically more accessible, safe, and convenient for the millions of people who use them, and more sustainable for the planet they inhabit. <

Under glass: automotive visions from Potsdam



SHOWCASE



VW e-up! (2013)
Ideal for city driving and short commutes, Volkswagen's first all-electric vehicle can recharge faster than a smartphone, and boasts a range of 150 kilometers per charge.

VW e-Golf (2014)
The all-electric version of the Golf can reach up to 190 km on a single charge without producing any local CO₂ emissions.



VW BUDD-e (2016)
The all-electric BUDD-e van concept is Volkswagen's first application based on the platform of the Modular Electric Drive Kit (MEB).

One plug for all

In 2013, the European Commission voted to implement a single standard connector system throughout Europe for charging electric vehicles – Volkswagen played the most prominent role in promoting the Type 2 charging plug developed by Mennekes.



Modular Electrification Toolkit

The Volkswagen brand is developing an architecture especially for e-vehicles. It enables entirely new vehicle concepts as well as ranges in excess of 500 kilometers.



e-Mobility-Station

In 2015, Volkswagen and the city of Wolfsburg transformed a landmarked 1950's petrol station into the "filling station of the future." The site now features charging terminals for electric vehicles, an exhibition about e-mobility, as well as its own wind, solar and geothermal energy installations.



April 2016: New exhibition showcases e-mobility at Volkswagen Visitors to the interactive exhibition about electromobility and digitalization at Volkswagen's Gläserne Manufaktur (Transparent Factory) in Dresden can test out driving simulators, view e-mobility concept vehicles up close, and test-drive all-electric and plug-in hybrid vehicles.



Charge&Fuel Card

Introduced in January 2015, this payment card (and accompanying app) from Volkswagen Leasing GmbH gives drivers of all-electric and plug-in-hybrid vehicles more convenient access to over 3,000 charging stations across Germany.

June 2016: E-mobility made a cornerstone of Volkswagen's Strategy 2025

As part of its "Together – Strategy 2025", Volkswagen Group announced in June 2016 that it plans to launch 30 purely battery-powered electric cars within the next decade. It forecasts sales of between two and three million units by 2025, or around 20-25% of total unit sales expected at that time.

up to 3 million
fully electric cars
sold annually

30+
fully electric car models

“Drive me home, Jack!”

Text — Jens Karbe Layout — Twinset

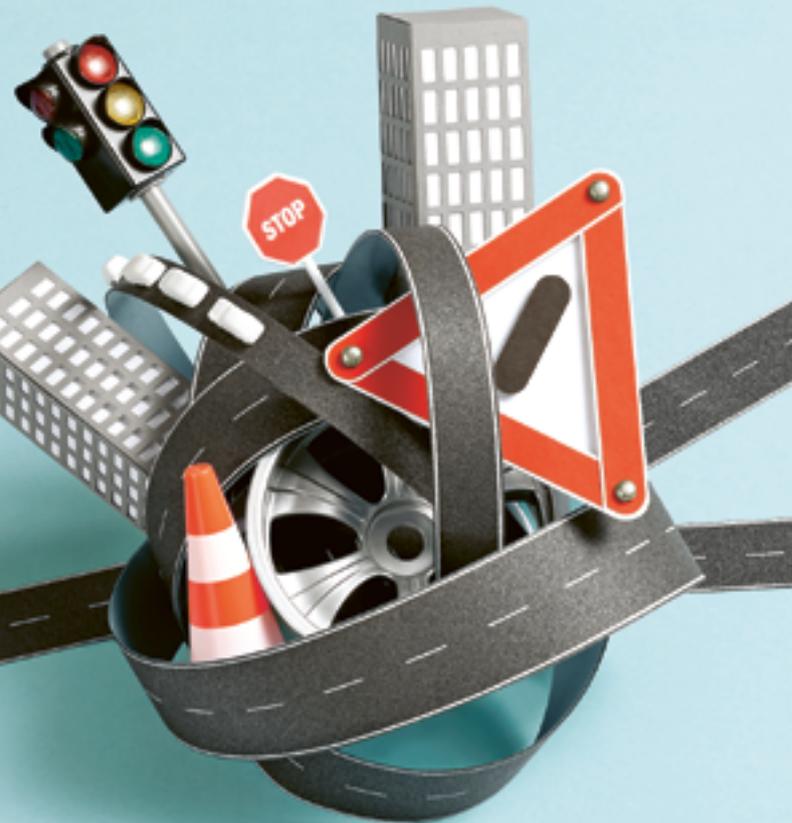
In 2030, “robot taxis” will be driving people around town – networked, intelligent, and fully automated. Developers have launched the “turbo boost” on the way toward the autonomous car. But there are still data security and liability issues to be clarified.

A utopia becomes reality

A sports car that can be summoned via a wristwatch and talks to the driver – the cult series “Knight Rider” rendered this vision back in the 1980s. And for some time now, engineers have been working on actual test vehicles; like “Stanley,” the VW Touareg that won a desert rally for autonomous vehicles near Las Vegas in 2005.

Little helpers make life easier

Today, our cars already contain a number of assistance systems that we take for granted. These are the first “evolutionary” precursors of autonomous driving.



New concepts are needed

Urbanization, ever more vehicles and massive congestion – our traffic system is on the verge of collapse: by 2035 the number of passenger cars worldwide will nearly double, to 1.7 billion. Even today, drivers spend an average of 38 hours a year stuck in traffic. In London and Beijing, they are moving as fast as people once did by horse-drawn coach – 16 km/h on average. Automated and autonomous driving means fewer traffic jams, less fuel consumption, and fewer accidents.

Drive or be driven

Everyone will be able to choose whether to drive themselves or not – and thus have full freedom in the use of their time. Experts predict that by 2030 only 45 percent of the driving distance we cover will be traveled in our own car. Car sharing and automated “robot taxis” will become increasingly popular.



Getting there faster with swarm intelligence

Cars of the future will be digitally connected with other vehicles (Car2Car) or traffic control systems: they will communicate with intelligent traffic lights and adjust their speed to ride a “green wave.” In parking garages, networked cars will automatically drive to free spaces.



Freight transport – fully networked

In “platooning,” multiple trucks drive in close single file. The driver of the lead truck sets the speed and direction, and the others follow automatically – with significant reductions in diesel consumption and CO₂ emissions.



Car with a super-brain

On a designated section of the A9 autobahn, Volkswagen is already testing a range of piloted-driving technologies. The Audi research car “Jack” autonomously handles all maneuvers on the highway and takes other vehicles into account when passing. A “traffic jam pilot” takes over in slow-moving traffic, independently braking and accelerating.

Green light for innovation

Almost nowhere in the world has driverless motoring yet been allowed. Germany and Europe have initiated legislation to allow drivers to leave more driving tasks to the car – even at higher speeds. The use of programmed algorithms to guide cars in the future will bring up certain ethical issues. Volkswagen supports the German Government’s plans to set up an ethics commission and open a dialogue with society.



Fully connected, but transparent

WHAT THE EXPERTS FEAR ...



Andrea Voßhoff, 58, is Germany's Federal Commissioner for Data Protection and Freedom of Information. It is particularly important to her that people be able to decide for themselves what is done with their data. Andrea Voßhoff holds a law degree and was a member of German Parliament from 1998 to 2013, where she was active on the judiciary committee.

For many of us, our car is an important symbol of our individual mobility and personal freedom. Accordingly, we have high expectations regarding the management of the data generated in connection with our cars. People don't want others to observe their driving style or the routes they take. There is no question that such data – which could be brought together via the car's registration number, for instance, and used to construct a detailed personality profile – falls into the category of personal information. Auto-makers, who are responsible for the IT systems in their vehicles, therefore have a duty to provide technical and organizational measures for data protection.

These days, however, this data doesn't stay in the car, to be accessed only in the repair shop. The increasing connectivity of vehicles poses the greatest challenge today. Two developments, especially, cause me concern. One is the penetration of the data-hungry world of the smartphone and all its apps into vehicles via cars' technical interfaces. The other is the standard which is currently being developed for communication between vehicles and with the transportation infrastructure, and which must conform with data protection principles. In both cases, we must intrude as little as possible into the privacy of vehicle users.

... AND WHERE THE GROUP STANDS TODAY

Data protection

At Volkswagen, the protection of personal information is a key part of the foundation upon which we shape our relations with our employees and customers. We want to fulfill our customers' expectations in terms of the advantages of connected driving. This will require us to process larger data volumes than before – while continuing to uphold our values of transparency, self-determination, and data security. In principle, anyone who gets

into one of our vehicles should be able to determine how their personal information is shared and used. But not all data collected by vehicles is personal information, and customers can't decide on all services themselves. For instance, European law stipulates that the eCall emergency call system be installed in all new vehicles from 2018 onward. In an emergency, the system has to be able to send location data to rescue services.

and vulnerable to attack?

Cars have become rolling computers, from entertainment electronics to piloted driving systems. As with any digital product, the question is: how secure is it? With computers, security is always just a present state that can change at any time. With cars, on the other hand, people's lives are at stake, so the demands in terms of IT security are considerably higher than for household appliances in the Internet of things.

We've got used to cars lasting for 20 or more years through several generations of users. Will there be security updates for the entire lifetime of the vehicle? Or will a manufacturer be able to say after ten years that, from now on, a car will be driven at the driver's own risk? Who will be liable if a piloted driving system causes an accident? And, above all, who will assess this independently of the manufacturers? So far, it does not look as if independent assessments are being carried out to establish whether computers might be partly to blame in the case of accidents. Nor are there any independent investigations into how frequently autonomous systems help cause accidents. This means that any liability is shifted onto the drivers, even if they were the innocent victims of computers. The only explanation for this state of affairs is incompetence or a collective decision to look the other way. The government needs to issue clear rules and to introduce compulsory notification requirements. We also need clear recall rules for software.



Markus Bechedahl, 40, is the founder and editor in chief of netzpolitik.org and has been studying the impacts of digitalization on society and policies for 20 years. He is a cofounder of the Re:publica conferences and was a member of the German Federal Parliament's cross-party working group on internet and digital society.

Data security

In our increasingly interconnected cars, assistance systems are already being used to defuse dangerous traffic situations, helping drivers recognize them sooner or avoid them altogether. As automation advances, the car will take on more and more of these tasks, first intermittently and later perhaps completely. This will call for a high level of security in the corresponding systems, possibly necessitating regular security updates.

We strictly separate the systems designed for comfort and entertainment from those that concern road safety, making for significantly better protection of safety-relevant systems in the event of a hacker attack on information and entertainment functions. We are additionally working on technical mechanisms to identify attempted attacks in and on internal vehicle networks.



“What comes out the back is all that matters.”

Following the climate summit in Paris, decarbonization is the new global goal – including for the automotive industry. But how can the industry achieve emission-free transportation? A debate between Dr. Ulrich Eichhorn, Head of Research and Development at the Volkswagen Group, and Dr. Axel Friedrich, cofounder of the International Council on Clean Transportation (ICCT) and one of the whistleblowers in the Volkswagen exhaust gas scandal.

Dr. Elmer Lenzen: Dr. Friedrich, Dr. Eichhorn, it seems that even the darkest cloud has a silver lining. Since the emissions scandal, the industry has been calling for a change of direction – toward electromobility.

Dr. Axel Friedrich: What counts is action. So far, the auto industry has only tried to put the brakes on Brussels.

Dr. Eichhorn, how serious is your commitment to decarbonization?

Dr. Ulrich Eichhorn: Very serious. And not just since yesterday. We’ve had electric vehicles at Volkswagen for more than ten years already. But now, as then, the prerequisites for their market success are lacking. **Would the market breakthrough of e-cars be a dream**

come true for you, Dr. Friedrich?

Friedrich: No, because it’s not the drive technology, but the well-to-wheel balance that matters. The CO₂ emitted by power plants can ruin an e-car’s life cycle assessment. In the interest of the environment, the main priority is to rapidly reduce overall emissions. So we need to define clear intermediate targets for 2025, 2030, and 2040. In the process, the industry still has to earn enough to shoulder the necessary investments for research and development.

You’re forgetting the customer. Fuel is cheap and SUVs are comfortable. Why change?

Friedrich: What the German auto industry spends on advertising in a single day is the equivalent of the annual budget of the German Environment Agency

(UBA). The two sides just don't have equal fire power. And the policy framework needed to create the product range is missing – thanks to an exceedingly influential auto lobby.

Eichhorn (laughs): That's balanced out when a department head from the UBA switches to the side of the environmental groups.

Friedrich (smiles): Well, sure, I've done my part – both here and there.

Eichhorn: Hardly anyone needs an SUV, but more and more people want one. We live in a market economy and we don't want to and can't reeducate our customers. The most environmentally friendly car is no good if no one buys it – just think of our Lupo that goes one hundred kilometers on three liters, or our natural gas vehicles.

The EU wants to take the decision for or against an e-car out of the hands of customers and is talking about a fleet limit of 75 grams of CO₂ per km for 2025. Are there still conventional internal combustion engines in your portfolio?

Eichhorn: Just to get to 95 grams by 2020, we're going to need electrified or CO₂-neutral fuel-powered vehicles.

Fleet limits or rewards – what is the right way to achieve transportation reform?

Friedrich: We need a technology-independent efficiency standard that emphasizes energy consumption over the vehicle's entire operational life. At 37 kilowatt-hours per 100 kilometers, a Tesla isn't eco-friendly – it's a power hog. Customers need clarity to be able to decide between technologies.

Vehicle weight is decisive when it comes to efficiency.

Eichhorn: We're struggling constantly to reduce weight, testing alternative materials and putting a lot of money into lightweight design.

“Very few customers opt for the most economical model.”

Dr. Ulrich Eichhorn

Friedrich: While engines and tires keep getting bigger and heavier.

Eichhorn: This weight spiral is also being driven by legislators, to make vehicles safer. And, of course, by customers' wishes.

Friedrich: But the customer can't freely configure his car. If you want to have air conditioning, you need a big engine.

Eichhorn: The truth is that very few customers actually opt for the lightest and most efficient version of a series.

Is the diesel still necessary for climate protection?

Friedrich: No. A gasoline-fueled vehicle in the same price range can have even better fuel economy than a diesel. In the 1.7- to 1.8-ton weight class, diesel hasn't made any sense for years.

Eichhorn: For long-haul drivers, it still pays to drive a diesel.

Friedrich: Wrong. The preference for diesels is irrational. People are subsidized for driving a lot, and that isn't a reasonable solution in the long term. We need fair conditions for everyone – whether they drive on gasoline, diesel or natural gas. I'm also only interested in what comes out the back.

Eichhorn: But the diesel driver pays a higher automo-

Dr. Ulrich Eichhorn, 54, studied at the Technical University of Darmstadt before beginning his career in the automotive industry, which has included positions in Germany, the United States, and Britain. In 2012 Eichhorn became a Managing Director at the German Association of the Automotive Industry (VDA). This year he assumed responsibility for Volkswagen Group Research and Development.





Dr. Axel Friedrich,

69, studied chemistry at the Technical University of Berlin and worked for the German Environment Agency for 28 years. He is a cofounder of the International Council on Clean Transportation (ICCT) and today serves as a consultant to governments, international organizations, and environmental groups around the world. He recently received the German CSR Award as the “whistleblower of the Dieselgate affair.”

bile tax. For a long time now, the fuel has been taxed less heavily so that companies aren't put at a competitive disadvantage.

However, diesel has a nitrogen oxide problem. Cities are raising the alarm and the so-called blue badge is being discussed at the federal level, but no time frame has been set. What do you think of this idea, Dr. Eichhorn?

Eichhorn: A sticker for Euro 5 and 6 makes a lot of sense. But I think nitrogen oxide values will sink anyway as fleets are renewed. Often, intelligent traffic control would be enough.

Friedrich: That's just not true. The “green wave” won't help much at all. Cities can't wait for eco-friendly models to come out. I don't understand why the auto industry so reflexively rejects the blue badge system. It's a stimulus program: owners have to upgrade their present car or buy a newer, cleaner model.

Eichhorn: The Audi A3 is already under the NO_x limit, even in actual on-road driving ...

Friedrich: ... as is the Passat. Which goes to show that modern diesel vehicles can comply with the limits. And if a software update gets you an 80% NO_x reduction, it's hard to justify not doing it. Then, a slight increase in the CO₂ levels would also be tolerable. Unfortunately, the policymakers don't understand the trade-off between exhaust gas reduction and increased consumption – we should explain that to them together.

Eichhorn: There used to be an upgrade incentive for Euro 2 vehicles ...

Friedrich (smiling): I came up with that.

Eichhorn: I know. Now, anyone who upgrades their Euro 5 diesel with an appropriate exhaust after-treatment system should receive the blue sticker and be allowed to drive in the city center.

Environmental groups have proposed doing without

laboratory tests during type approval and taking measurements on the road only.

Friedrich: New methods have been invented repeatedly over the years without abandoning the old ones. That costs money and creates unnecessary emissions. In the near future, the RDE test will dictate the design of the vehicle. I'm still waiting for the first manufacturer to support our proposal.

Why not Volkswagen, Dr. Eichhorn?

Eichhorn: In fact, the NEDC reflects the state of the art of 25 years ago. The WLTP is better, but doesn't change the fact that the driver, not the vehicle, is the biggest factor affecting consumption. RDE is a big challenge for us because of the difficulty in reproducing PEMS measurements – you'd have to drive the route ten times and take the average, but we aren't allowed to do that. The worst value is the one that counts.

Friedrich: Absurd rules have been created here. If anything good has come of Dieselgate, it's the fact that we can talk about such regulations now.

Let's get back to the innovation barriers: how do we get our act together on e-mobility, Dr. Eichhorn?

Eichhorn: Customers are hesitant because of the poor range of battery-powered vehicles, the lack of charging infrastructure and the high prices.

“What good is a plug-in hybrid when it's constantly driven in gasoline mode?”

Dr. Axel Friedrich

The first two points will improve soon. The high cost of batteries will, however, make BEVs more expensive than conventional cars for maybe the next ten years. And today's list prices don't even reflect the additional costs.

Friedrich: No one earns money with electric vehicles. The Netherlands, Austria, and even India plan to discontinue approval of internal combustion vehicles in the near future. Is that a solution?

Friedrich: How will an Indian, who can spend 3,000 euros on a car today, be able to afford a BEV for 35,000 euros tomorrow? And as an environmentalist, I can't condone subsidizing car purchases with up to 12,000 euros – as is being suggested in Norway. Why not offer people a rail card? That would certainly be more efficient. It may be justifiable for industrial policy reasons to promote a technology to prevent being left behind. But permanent subsidies are rarely good – we need solutions that are ecologically appropriate, economically reasonable, and socially accepted.

Eichhorn: The plug-in hybrid is a step forward ...

Friedrich: ... if it were highly efficient in internal combustion operation. But not if the car consumes seven liters [per hundred kilometers] and almost always drives on gasoline. With regard to the limited life of the batteries, too, maybe electrification using smaller batteries should initially be encouraged. That would allow you to get ten, fifteen kilometers of emission-free driving and the costs would remain reasonable.

Eichhorn: The hybrid only makes sense if it's also driven electrically. The Federal Government's incentive program can help us reach a volume great enough to give rise to a used car market.

Friedrich: Instead of promoting a technology, it would have been far more useful to have a promotion based on efficiency, that is, on CO₂.

Eichhorn: Of course, a modern gasoline or diesel automobile can be just as efficient as an electric car. So we'll continue our research and development in that area, too. What market share will electric cars have by 2030, and which country will have created the best conditions for this?

Eichhorn: Worldwide, we could be at ten to fifteen percent. In Germany, Europe, and China, significantly higher.

Friedrich: No more than ten percent. Although in China the state is driving things, Europe has the best conditions technologically and socially.

That sounds hopeful. Thank you both.

GLOSSARY

BEV: battery electric vehicle

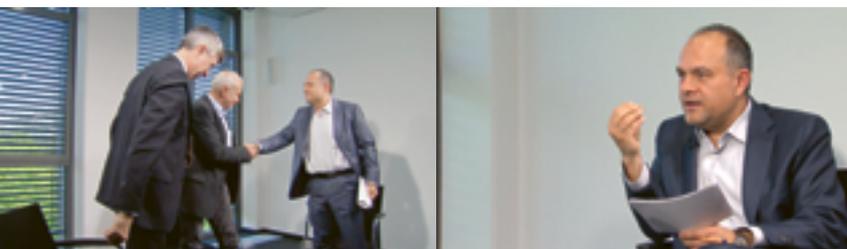
Blue badge: a sticker to identify particularly low-emission cars. To apply to electric cars, many diesel vehicles of the emission standard 6 (introduced in 2015), and gasoline-powered vehicles of standard 3. Diesel vehicles without the blue badge could be prohibited from driving in city centers. No date has been set for the introduction of the new standard.

NEDC: New European Driving Cycle. Used since the 1990s to determine exhaust gas values on a chassis dynamometer. It has been criticized for not reflecting today's driving behavior.

PEMS: portable emission measurement system. Records whether vehicles meet emissions standards in on-road driving.

RDE test: real driving emissions test. A method for testing emissions prior to type approval by taking measurements directly from the exhaust pipe under actual driving conditions.

WLTP: Worldwide Harmonized Light Vehicles Test Procedure. Set to be progressively introduced from 2017 as a new standard to replace the NEDC.



Dr. Elmer Lenzen, 48, journalist since 1998. He founded the media group macondo, which also owns the online news service UmweltDialog. His areas of focus are development policy and sustainability.

Climate killer

Sport utility vehicles, or SUVs, divide opinion. They are taller, wider, and heavier than other cars and consume more fuel. Is that in line with today's thinking? Two opinions.

Collected by — Sibel Şen

Dietmar Oeliger, 44, Head of Transport Policy at the Nature And Biodiversity Conservation Union (NABU) in Berlin, usually travels by train and bicycle. But he can be inspired by attractive car design, like that of the Porsche 911 – whether it is from 1963 or 2016. However, he finds the Cayenne unacceptable, even aesthetically.



Admittedly, SUVs are enjoying growing popularity. And generating huge profits for the automotive industry. In 2015, every fifth new car was an oversized model, and the trend is rising. The fact that these heavyweights consume up to 30 percent more fuel seems to bother neither company car drivers nor well-off urbanites. No one can avoid the laws of physics: large vehicles mean higher emissions. That should worry the company with regard to the future. The EU has dictated that by 2021 car fleets will be limited to emissions of 95 grams of CO₂ per kilometer, or consumption of 3.6 liters of diesel or 4.1 liters of gasoline per 100 kilometers. The industry is a long way off this target – less so on paper, but especially in terms of actual consumption.

Even electric SUVs are very resource-intensive, and need larger batteries and more power than other mod-

els. Unlike with innovative safety technologies, such as ABS and ESP, the SUV is not a catalyst for the market introduction of new drive technologies. Manufacturers casually count SUVs with plug-in technology as green, but on the road, hardly anyone uses the electric mode. Certainly not when subsidized diesel is so cheap. While the purely internal combustion engine will disappear from our roads sooner or later, this doesn't spell the end for premium manufacturers. They are already offering models in each vehicle class that comply with the limit values. But they prefer selling the less ecological versions because the margin is more attractive.

Manufacturers are fully aware of the dramatic increases in efficiency they will have to achieve in the coming years and decades. Instead of acting on this, though, they are blithely planning the next generation of SUVs and developing costly advertising campaigns to persuade customers to buy more oversized cars. This is neither future-oriented nor sustainable. And climate protection isn't possible with the current vehicle portfolio. The industry has a simple choice: either force the technology shift through advances in efficiency or do away with whole market segments. Like the SUV, for starters. <



*“An anachronism
on wheels”*

or driver of progress?



“The SUV business enables jumps in innovation.”



Dr. Thomas Sedran, 51, Head of Group Strategy at Volkswagen, drives a Porsche Cayenne hybrid. In this perfect combination of sports car and robust family vehicle, he often drives his family, friends and dog to the mountains on weekends – to go trail-running in the summer and skiing in the winter.

No question, SUVs are in vogue. Our sales of these practical all-purpose vehicles have risen 20 percent annually since 2010. What attracts many customers is that an SUV offers extra safety and comfort and, on top of that, lots of luggage space. The driver's seat provides an excellent view of the road as well as more convenient entry and exit. The older drivers among us appreciate this – and, after all, we live in an aging society. The social prestige that one often still enjoys as an SUV driver also shouldn't be underestimated.

Ecologically minded customers, on the other hand, consider the SUV ostentatious and wasteful. But they are mistaken. It is true, SUVs don't make achieving our climate targets any easier. They are less aerodynamic, heavier, and often more powerful, making for in-

creased fuel or electricity consumption. However, electrifying the motor and putting ever more plug-in hybrids and all-electric vehicles on the road will allow us to reduce total CO₂ emissions. Especially if we offer our customers power from renewable sources. Electric motors have another advantage: they encourage customers to be more energy-conscious in their driving behavior.

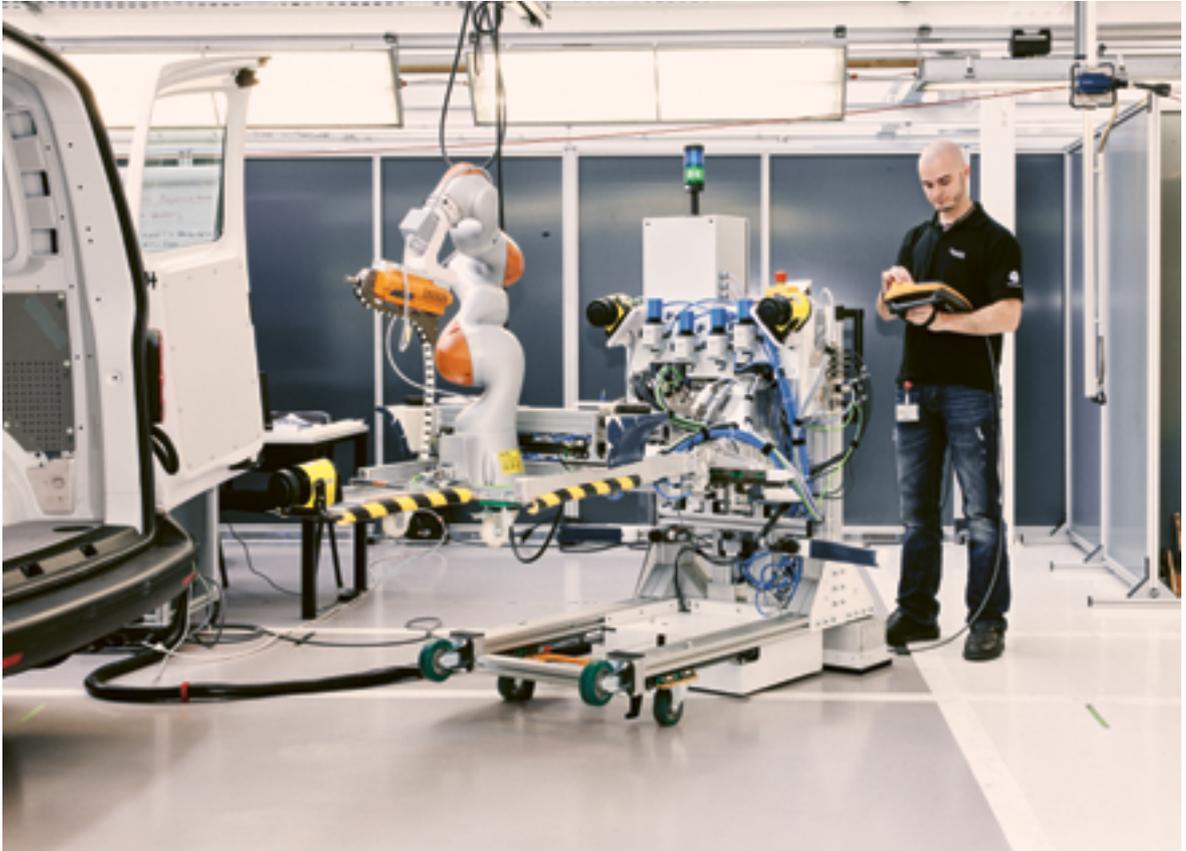
All the technological innovations that are needed to keep SUVs in step with stricter future regulations will also benefit the many other models of the Volkswagen Group. In this respect, the willingness of SUV customers to pay higher prices funds necessary leaps in automotive innovation – in turn securing the jobs of over two million high-wage earners in Germany. ◀

Room to move in the digital workplace



Text — Anette Frisch Photos — Ériver Hijano

Technological trends are reshaping the workplace. What this will look like in the future isn't yet clear, but at Volkswagen the transformation has already begun. A snapshot.



Jump-start for stalled robots: humans are much more flexible than machines

As so often happens, the future begins with a problem. Andres Davila and his team are standing around a lightweight construction robot. It doesn't look at all like a robot, but more like a giant silver arm with bulky orange joints. The special feature of this steel limb is that it

yields if a human touches it. If someone pushes it hard, which can happen during work on the line, the robot switches off completely – a safety feature designed to prevent injury.

Experts talk about the machine's "sensitivity." By contrast, its heavy steel colleagues, towering behind giant protective screens, go doggedly about their work. They aren't as considerate when someone gets in their way.

Andres Davila, production planner at the Hanover plant: "You can't use a sledgehammer."

Davila is a production planner at Volkswagen's commercial vehicle plant in Hanover. His job is to ensure that production runs efficiently and that staff are able to work in ergonomically ideal conditions. This morning he and his team are testing how fast and accurately the new lightweight construction robot can attach plastic clips to the interior paneling of a VW Transporter. When the software crashes and the machine freezes. A technician goes to the laptop and restarts the program.

Normally, a person attaches the several hundred plastic clips. If the robot could take over this job, it would relieve the employee of the monotonous task of clambering around inside the vehicle to align the paneling and push the clips into the walls – a job that strains the thumb and wrist.

It isn't yet clear whether this type of robot will become a standard part of the assembly line. It isn't just a question of demonstrating that the technology works – but





Dr. Nari Kahle, economics specialist on the General and Group Works Council: “We need to get people on board.”

also of the willingness of employees to work so closely with the robot. “You can’t use a sledgehammer to get humans to collaborate with robots,” says Davila. “Ultimately, it’s our colleagues on the assembly line who are going to have to work with the robot in three shifts every day.”

People are choosy

Robots like the one in Hanover belong to a new generation. So far, there are only around 40 of them being used or tested throughout the Group. By contrast, VW has 40,000 conventional robots. The little lightweight construction robots are symbolic of the developments referred to by the term Industry 4.0. But this generation of robots is really just one possibility in a future when humans, machines and processes network and communicate in real time and, at the end of this virtual orchestration, turn out the exact product specified by the customer.

The usual reduction of the term Industry 4.0 to technological aspects is a problem because technology cannot exist without people. Unless people accept, appreciate and use it, any innovation will end up on the scrap heap.

So, despite increasing automation and digitalization, there will never be a production hall without people. This has been shown by research conducted in the area of workplace sociology. The way that companies embed and use technology in their organizations has nothing to do with whether they can, and everything to do with

whether they want to do it. Innovations have to match the business strategy and satisfy internal concepts, staff job requirements and working conditions. Because there are so many variables, Industry 4.0 will change companies in very different ways.

Shaping the unpredictable

Dr. Nari Kahle agrees: “Buying and planning technology is the least of the tasks facing us. Getting people on board is a much bigger one.” Kahle (30) is an economist working for the General and Group Works Council. When she thinks of the future world of work, she can name lots of successful Works Council initiatives. These include pilot projects like the digital labs and campaigns to prepare the workforce for technological change. Recently, the Works Council and Volkswagen signed an agreement on mobile working. “It’s important for us to address the various needs of the workforce,” says Kahle. Knowledge work, in particular, will change dramatically over the coming years, she believes.

Artificial intelligence and automation will make everyday work much easier, and will also replace routine activities. Numerous new fields of activity will emerge in

Reserved for a potted plant: relic of a bygone workplace era?



Strong team: employee and lightweight construction robot work together on an engine block on Assembly Line II in Wolfsburg



their place,” says Kahle. Despite diligent preparation and prudent foresight, the future of work will therefore look very different for different occupations. The economist does see one common aspect, however: “We will only be able to manage the change and all the disruptions to our core business if we get the employees on board. And the Works Council is in a good position to help shape this transformation.”

Time for change

“Klaus” is positioned at Assembly Line II in Wolfsburg. He carefully feels his way to the bolt for the pendulum support beneath the engine block. Klaus cannot see. Sensors help him find his way, locate the bolt and tighten it. Klaus is another lightweight construction robot – and another experiment. But unlike his counterpart in Hanover, he has already left the laboratory. Klaus, currently being tested for series production, now awaits the verdict of his flesh-and-blood colleague.

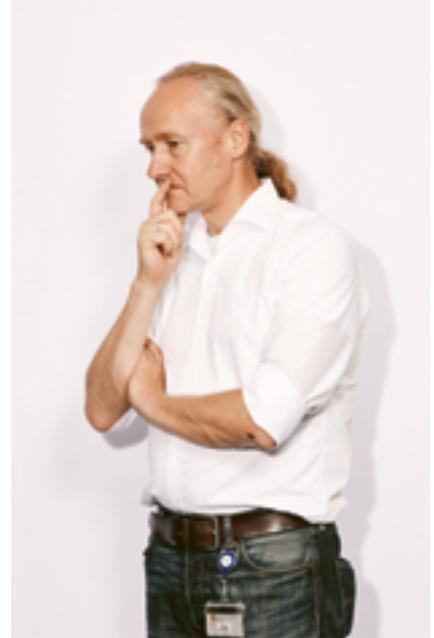
To Ralph Linde, Industry 4.0 sounds “heavier” than it really is. “The term is a vehicle to express the upheaval that the world is going through,” he says. Linde is Head of the Volkswagen Group Academy, the umbrella organization for training and staff development within the Group. The Industry 4.0 transformation requires new skills. For instance, industrial electronic engineers will need a greater knowledge of computer science to be able to resolve glitches in Klaus and consorts and to program workflows. The capacity for abstract thought and the ability to solve problems quickly and independently are also becoming more important. However, Linde doesn’t believe in limiting Industry 4.0 to objec-

tive and logical or scientific skills: “The growing complexity increasingly calls for social skills.” These, of course, include the skills necessary for productive collaboration.

The agile ideas factory on the edge of town

The Wolfsburg industrial park, which feels a long way from the Volkswagen headquarters, is home to the Agile Center of Excellence (ACE). Agile project methods like Scrum and Kanban are seen in many places as an alternative new form of collaboration. The idea is to do things nimbly, quickly and with a high degree of self-organization – with the aim of achieving fast results through repetitive (iterative) processes and learning as much as possible along the way.

The agile team meetings take place here in the project room of the ACE at the Heinenkamp industrial park. Some participants have made themselves comfortable in beanbags or on upholstered stools, while others stand at bistro tables. The walls are covered with big



**Jörn Schrader (left)
and Stefan Waschk:**
“Agility is an attitude,
not a method.”

black display boards on which countless colorful Post-its have been stuck. This morning, Scrum Master Mirko Drobiez is going to make a “sprint change.” This means that the results of the two-week project phase (sprint) will be presented, and the objective of the next sprint decided on. The atmosphere is one of collaborative, relaxed concentration. When his colleagues get stuck on a

tangential matter for too long, Scrum Master Drobiez shouts, “Focus!” and they quickly get back to the core issue. Once a topic has been successfully completed, everyone applauds and the team moves on to the next one.



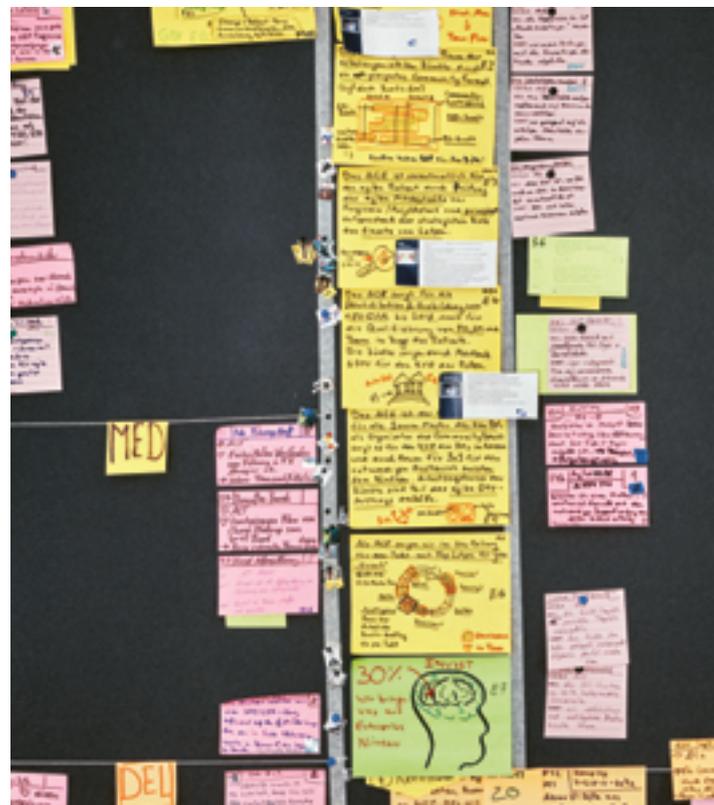
Stefan Waschk and Jörn Schrader are driving the formation of agile high-performance teams in the Group. There may be a 20-year age difference between

them, but they share the same perspective: agility, they say, is an attitude, not a method. It is a mindset to which certain values are attached, including mutual respect, open and equal communication, and the courage to try things out and learn from mistakes. Schrader: “It’s a culture. You move closer together. There isn’t just one individual up there making the decisions and believing he alone holds the key to all knowledge.” Waschk sees the diesel affair as a “huge opportunity” to focus on agile values. “Too often, we’re stuck in processes that are much too rigid, but trust that we have the perfect plan,” he says. “But customer requirements are changing at an ever faster rate. Only if we manage to quickly integrate these demands into our processes can we develop products that attract the customer.”

The limits of technology

In Hanover, the VW employees have amassed plenty of experience with their clip-fastening robot – and long since overcome the first setbacks. The robot still takes far too long to install the interior paneling. Further development will be necessary before it can be integrated in timed production-line work.

Davila recalls an international competition where robots had to open a door. Most of them fell over – the task was just too complex for them. Davila says: “Technology is meant to support humans, not replace them. Ultimately, every story is about humans.”



INTERVIEW

“We need to learn to understand the richness of diversity even better.”

Mr. Bussemer, what will the value of human work be in the future?

Probably much higher than today. While simple tasks are likely to be automated further, the share of creative knowledge work is increasing, even on the factory floor. Automation has limits. It's capital-intensive and susceptible to faults. In addition, humans are much more flexible than machines. At Volkswagen we strive to keep a sense of balance when it comes to introducing technology. In areas where we can automate unergonomic workplaces, we're pushing ahead with robots. But we aren't going for automation in places where skilled workers are better suited to the task.

What are you currently working on?

At the moment, we're thinking a lot about the attractiveness of manufacturing work in the future. Skilled production workers are still bound to strictly timed systems and shifts. A part-time shift-work model for working hours could make things much easier. We're additionally designing a shift-planning app that employees can use to swap shifts with one another directly. We also need to create more opportunities for skilled workers to discuss issues in their peer communities. In general, we're trying to improve our communications and connectivity within the company. Our internal Group Connect social media network is a good platform for this.

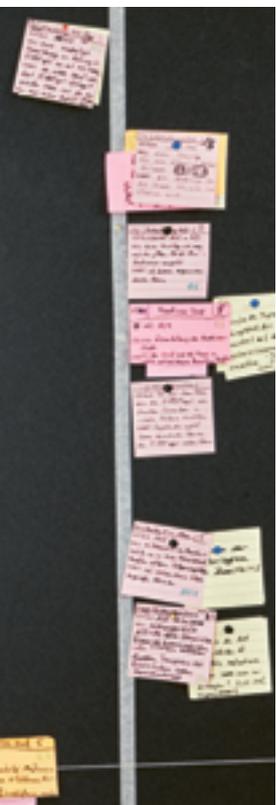
What cultural changes are needed at Volkswagen?

We have to break out of our divisional mindset, get in step with the customer, and focus hard on the value-creation process. And in many areas of the business we need to establish new, agile work cultures that facilitate faster innovation. This is particularly important in the new business segments. To do this, we need to gain an even better understanding of the richness of diversity.

The interviewer was Anette Frisch.



Dr. Thymian Bussemer
is Head of HR Strategy &
Social Sustainability
at Volkswagen AG



Important ILO norms



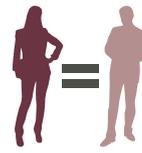
Prohibition of forced labor



Freedom of association



Right of collective bargaining



Equal pay



Prohibition of discrimination



Prohibition of child labor

Focus on human rights

Not only governments, but also industries and companies are responsible for protecting human rights. This is easier to demand than achieve. A look at a wide field of action.

Text — Daniela Blaschke **Illustration** — Ole Häntzschel

Respect for and protection of human rights is a top priority at Volkswagen. But it cannot be denied that for a company with a deeply tiered supply chain, numerous production facilities, and sales activities in over 150 countries, due diligence remains a major challenge.

Various specialist departments at Volkswagen, as well as the General and Group Works Councils, participate in initiatives to strengthen human rights. The company also conducts specialized training and monitoring in this area. The establishment of a Management Board

department for Risk Management, Law, and Compliance is an important step toward synchronizing these efforts. Without uninterrupted processes and coordination, it is difficult to ensure human rights protection for those affected as well as for the company, which has no tolerance for violations in this complex area. There is a standardized process in Procurement (see below) intended to help resolve conflicts with suppliers in a spirit of partnership. However, if suppliers don't show a willingness to improve the situation, business relationships can be terminated. ◀

Supply chain: What happens in a suspected case



Reporting of violations



Ad-hoc expert team



Individual qualification



Checking off the tasks

Volkswagen initiatives



2016 Realignment of the ombudsman system within the purview of the Management Board functional responsibility 'Integrity and Legal Affairs'



50,000 visitors to the forced labor memorial at the Wolfsburg plant in 16 years

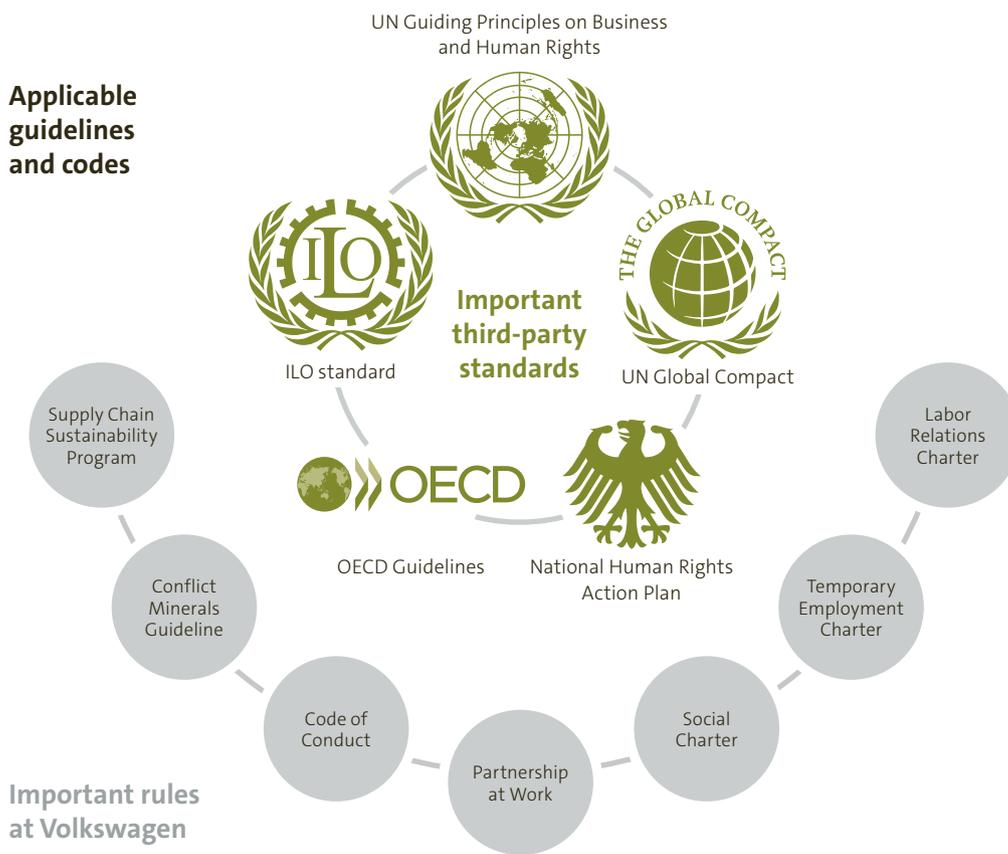


1980 First company in South Africa to recognize a black works council during apartheid



Investigation of possible human rights violations at VW do Brasil during the military dictatorship (1964–1985)

Applicable guidelines and codes



Important rules at Volkswagen



Goal: dialogue as partners



If the supplier is unwilling to improve...



42 cases were investigated in 2015



21 supplier relationships were terminated

Long march to sustainability

The People's Republic has quickly transformed from economic dwarf into the world's second-largest economy. Up to now, this rapid growth was at the expense of the environment. But there is a change in thinking afoot, in government and among the people.

For over three decades, China prioritized growth at any cost. But the country seems to be reaching the limits of this model. The air in well over 90 percent of the cities in China exceeds the fine particulate limits set by the World Health Organization. About half of the country's river and ground water is heavily polluted, as is a sixth of the soil, resulting in high contamination levels in foodstuffs. While industries and people demand ever increasing amounts of water, the deserts are growing. At the same time, farmland is disappearing under concrete.

But consumer hunger remains unassuaged. Indeed, while living standards in parts of some Chinese cities are up to the Western level, there is still huge potential for development in rural areas. Chinese car density is significantly under a fifth of that in Germany, and the amount of waste produced per capita by the two countries stands at a similar ratio.

Today, much of the populace, especially the more educated classes, have an awareness of environmental issues, and the mood is turning ever more clearly against an economic policy of "business as usual." The Chinese government is concerned about its position in the face of dissatisfied citizens, and so is not even attempting to deny the sulfur damage in cities or the oil film on the rivers. Premier Li Keqiang has spoken openly of an "inefficient growth model" and Party General Secretary Xi Jinping has promised to punish polluters "with an iron hand."

Sustainability has also started to factor into the five-year plans which set the overall focus of the economy. The legal and regulatory framework is becoming ever denser, to the benefit of the environment. Implementation is quite slow, but the first successes are evident. For example, the government is pushing the expansion of alternative energy, from photovoltaics and wind to electric cars. In China's fast-growing cities, traffic infrastructure is often stressed to its limits. Here, too, the government is intervening, while also searching for new ways to address the problems.

But all this isn't done solely with a view to a healthy environment and the social peace that goes with that. Economic policy factors also play a role. After all, the production of alternative energy would greatly reduce China's dependency on the world's complicated oil markets. Above all, the country hopes that ecological business sectors will have great potential for Chinese companies, both at home and abroad. ◀



Prof. Dr. Dominic Sachsenmaier, 46, teaches Modern China with a focus on global historical perspectives at the University of Göttingen.

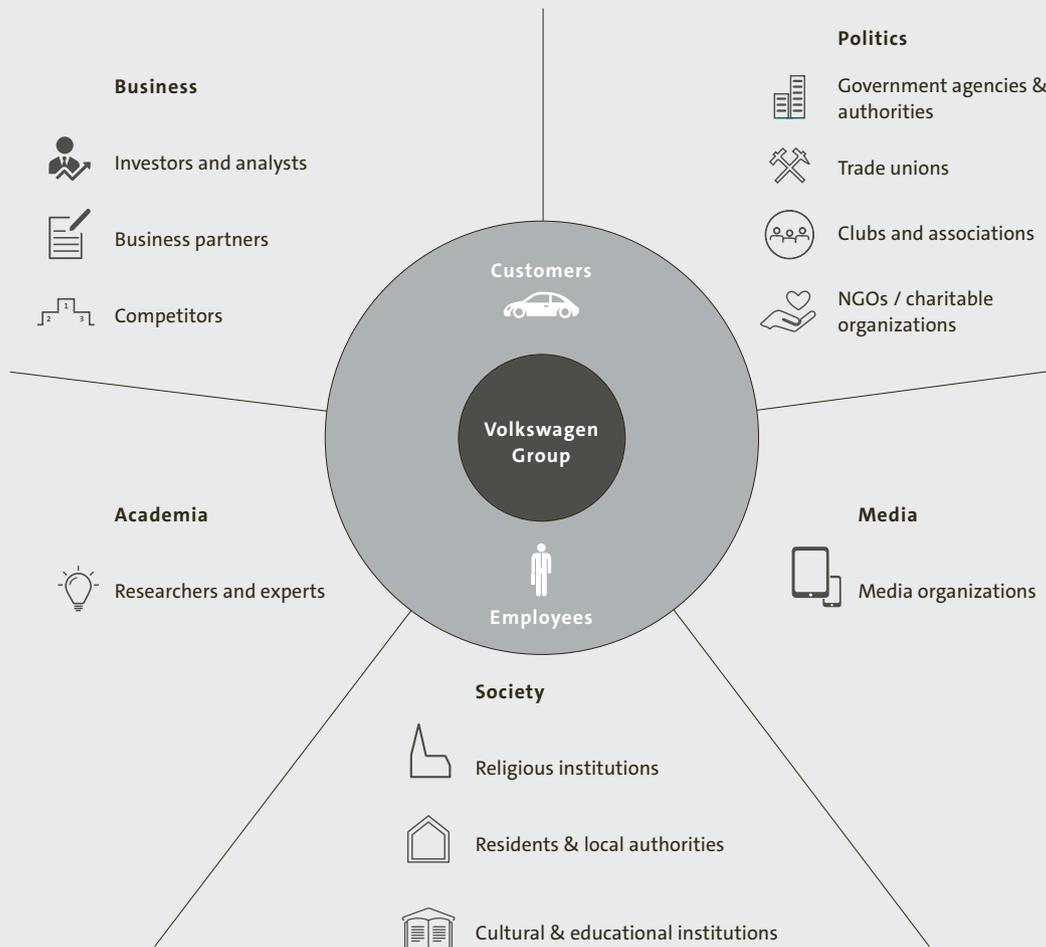


Solar array at Qinhuangdao in the northern province Hebei

Facts, figures, and data

STAKEHOLDER MANAGEMENT

Volkswagen places importance on intensively communicating and maintaining good relationships with all of its stakeholder groups. To this end, the Group pools its various brands' dialogue activities. Our holistic approach to stakeholder management means understanding different interests, solving problems together, and sharing knowledge. Eye-level dialogue gives all parties a chance to identify and defuse potential conflicts and to communicate decisions transparently and openly.



COOPERATION WITH NON-GOVERNMENTAL ORGANIZATIONS



The Nature And Biodiversity Conservation Union (NABU) was a strategic cooperation partner of Volkswagen in critical dialogue until December 31, 2015. For 15 years, this partnership encompassed consultation, joint initiatives, and specific conservation projects.

Under the motto "Responsibility for people," the German Red Cross (DRK) and Volkswagen AG have been working since 2014 as strategic partners to support rescue services in Germany and first-aid training.



“Sustainability is an elementary building block for our future.”

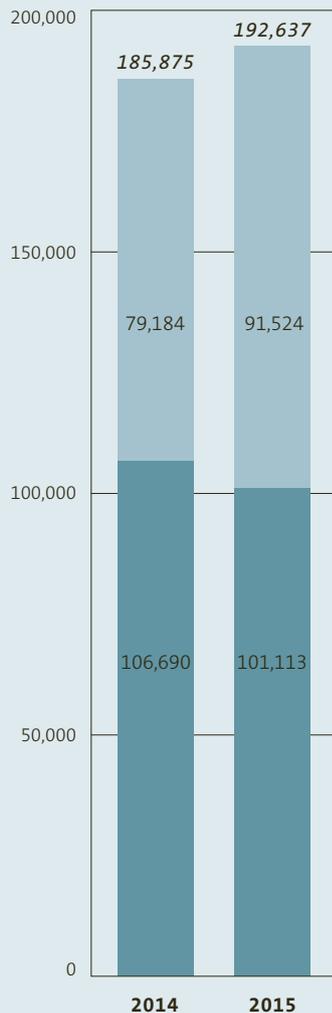
Matthias Müller,
Chairman of Volkswagen
Aktiengesellschaft

ECONOMY

COMPLIANCE TRAINING

The Volkswagen Group provides in-person and online training for its staff on the subject of compliance.

- Participants, in-person training
- Participants, online training



REVENUE IN 2015

€213.3 billion

Up €11 billion from 2014

FINANCIAL IMPACT OF THE DIESEL AFFAIR IN 2015

€16.2 billion

KEY SALES FIGURES

The Group's brands sold more than ten million vehicles worldwide in 2015.

In thousands of vehicles

- Asia-Pacific
- North America
- South America
- Europe/other markets



GLOBAL PRODUCTION

The Volkswagen Group operates

119 production facilities

on four continents – in 20 European countries and 11 countries in Africa, Asia and America.

Globally, **nearly 42,000 vehicles**

are made each workday.

VEHICLE AND TRAFFIC SAFETY:

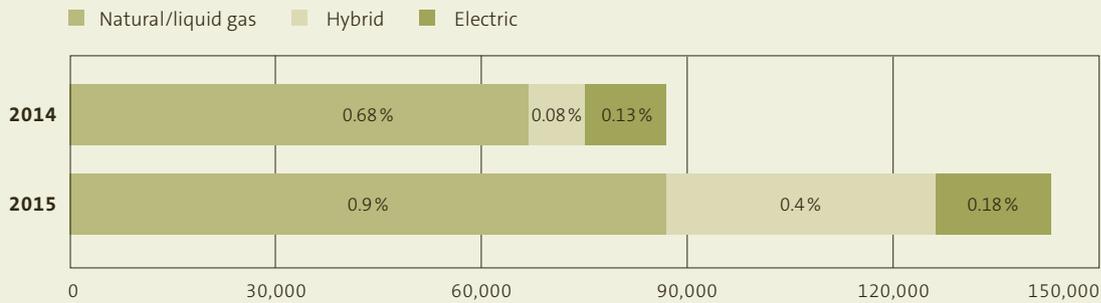
All of our activities are geared toward our “Vision Zero” – a future in which no one is killed or severely injured in or by Group vehicles.

ENVIRONMENT

ALTERNATIVE DRIVE SYSTEMS

Worldwide, the Volkswagen Group produced 143,246 vehicles with alternative drive systems in 2015 – 81,706 of these were made in Western Europe.

Share of respective drive systems among all vehicles produced worldwide, in percent



REDUCED ENVIRONMENTAL IMPACT OF PRODUCTION

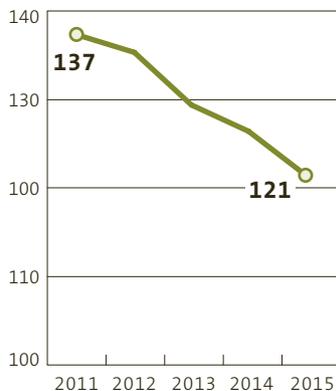
Energy, solvent and fresh water usage, CO₂ and solvent emissions, and waste in 2015 compared to 2010

-21.5%

VEHICLES

In 2015, the CO₂ emissions of the Volkswagen Group's European fleet of new cars averaged 121 grams per kilometer.

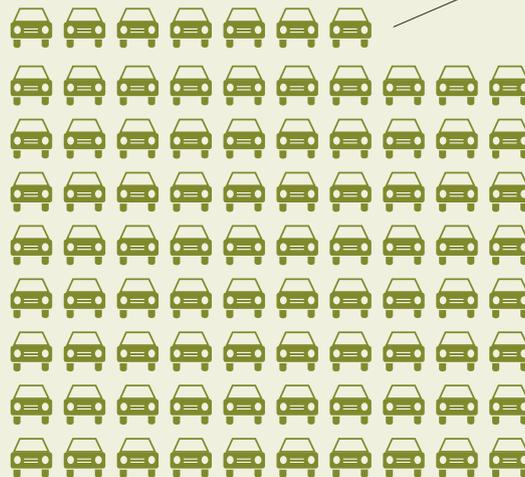
In g/km per year



DRIVING THE FUTURE

Number of Group models with CO₂ emissions already below the 2021 limit of 95g/km

87



SCOPE 3 INVENTORY

Volkswagen publishes a Scope 3 inventory for CO₂ emissions for

12 of the total of 15 categories.

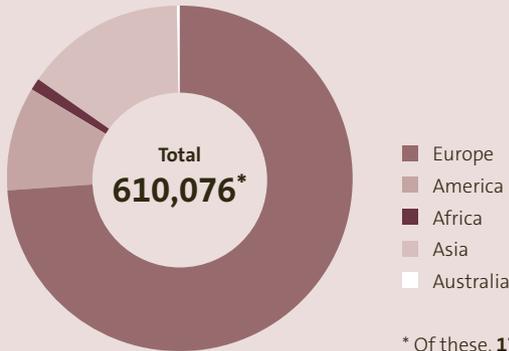
sustainabilityreport2015.volkswagenag.com/facts-and-figures/environmental-indicators

PEOPLE

All information is available at:
sustainabilityreport2015.volkswagenag.com

WORKFORCE

Over 600,000 people worked for the Volkswagen Group on five continents in 2015.



* Of these, **17,909** had temporary contracts

NEXT GENERATION

18,651

trainees learned a blue- or white-collar profession at the Group in 2015, 12,997 of these in Germany.

CORPORATE CITIZENSHIP

Thousands of patients have been seen at the **mobile health clinic** near the plant in Pune, India, since August 2015. Volkswagen India launched the clinic in a mini-bus, and pays for medication and two doctors. Worldwide, Volkswagen sponsored some 200 further projects in 2015 which make long-term improvements in local economic and social structures or help protect the environment.

HR POLICY

The Group has a family-friendly HR policy. Volkswagen seeks to increase the proportion of women at the company over the long term.

Proportion of women at the Group
16% in total



At management level in Germany
10.3%



Proportion of women among newly hired university graduates
37.0%

Men on paternity leave
2,112



Returners
2,308

HEALTH

109,958

initial and follow-up checkups worldwide

“Profitability and employment are – and remain – equally important objectives at Volkswagen, even in difficult circumstances.”

Bernd Osterloh
Chairman of the General and Group Works Councils of Volkswagen Aktiengesellschaft

VOLKSWAGEN FINANCIAL SERVICES

THE KEY TO MOBILITY



Our contribution to CO₂ reduction.

We protect moors because they protect our climate

Moors worldwide store twice as much carbon as forests. What's more, they take up an additional 250 million tonnes of CO₂ every year. However, many moors have already been drained, dug up for peat, built on, or used for agriculture. To protect intact moors and restore dried-up moor areas, Volkswagen Financial Services has been working together with Germany's Nature and Biodiversity Conservation Union (NABU) since 2009. In Germany alone, Volkswagen Financial Services is supporting 13 moor conservation projects. The first international projects are taking place in Poland.

