



# Audi & Co.



Corporate Responsibility  
Interim Report  
2015





## About Audi

Audi regards economic success and responsible action as inseparably linked. These form the basis of the trust and delight that our customers experience.

“Vorsprung durch Technik” embodies not simply technological innovations, but also our ambition to give equal weight to economic, ecological and social aspects in all the decisions that we make.

The Audi Group is one of the most successful manufacturers of premium automobiles, supercars and sporty motorcycles. In the 2015 fiscal year,



**2,024,881**

vehicles delivered  
in the 2015 fiscal year

**1,803,246**

Audi models delivered  
in the 2015 fiscal year

**3,245**

Lamborghini models delivered  
in the 2015 fiscal year

**54,809**

Ducati models delivered  
in the 2015 fiscal year

**+**

**3.6%**

growth in deliveries to customers  
of the core brand Audi

the Audi Group delivered a total of 2,024,881 vehicles, comprising 1,803,246 Audi models. That corresponds to a growth rate of 3.6 percent in deliveries of the core brand Audi.

The Lamborghini brand handed over 3,245 vehicles to customers, Ducati delivered 54,809 motorcycles.

The Audi Group thus improved its revenue in 2015 compared with the previous year by 8.6 percent to EUR 58,420 million. Operating profit reached EUR 4,836 million, with an operating return on sales of EUR 8.3 percent.



## About this report

### Reporting period

The performance indicators and goals in the Audi Corporate Responsibility Interim Report refer to the period from January 1, 2015, through December 31, 2015. As well as AUDI AG, they include its subsidiaries. Detailed information on the scope of consolidated companies of the Audi Group can be found in the Audi 2015 Annual Report at [www.audi.com/ar2015](http://www.audi.com/ar2015). If the report refers to individual companies, sites or brands only, this is noted accordingly in the text.

### Reporting cycle in accordance with GRI Guidelines

The Audi Corporate Responsibility Interim Report 2015 is not a full report based on the G4 Global Reporting Initiative (GRI) Guidelines. The full report appears every two years and will next be updated in the first half of 2017.

### Report content

As well as giving account of current performance indicators and providing an update on our goals and measures in the area

of corporate responsibility, this report spotlights the topics of the future that are of importance to Audi: Alternative drive systems, digitalization and the changing world of work present numerous challenges to the Audi Group. Our commitment to the ten principles of the UN Global Compact means that we approach these challenges in such a way that we help achieve sustainable, in other words future-proof, solutions. This also includes taking the opinions of external and internal stakeholders into account. We address these topics in the articles “Intelligence & Connectivity,” “Ecology & Emotion” and “Humans & Machines,” and discuss them with external experts.

### UN Global Compact

AUDI AG, as a subsidiary of Volkswagen AG, temporarily suspended its membership of the UN Global Compact at the end of 2015, in light of discussions surrounding emission figures. Independent of our temporary suspension of membership,

we underscore our commitment to the principles of the UN Global Compact.

### Contact

Readers with questions or comments are invited to contact Prof. Dr.-Ing. Peter F. Tropschuh, Head of Corporate Responsibility at AUDI AG, by email at [cr@audi.de](mailto:cr@audi.de).

The Interim Report 2015 and the Audi Corporate Responsibility Report 2014 based on the GRI G4 Guidelines can be accessed in German and English at

[www.audi.com/cr-report](http://www.audi.com/cr-report)  
where the printed reports can also be requested.

This Interim Report has been printed on paper certified by the Blue Angel environmental label and the EU Ecolabel.















# CR program

The Audi CR program links our measures for responsible corporate management with our strategic goals. The corporate goal to ensure “Sustainability of products and processes” points the way for our CR work. The complete Audi CR program is available at [www.audi.com/cr-report](http://www.audi.com/cr-report).

## Operations

Goal	Measure	Date	2014 Degree of completion	2015 Degree of completion
Further develop the systematic stakeholder dialogue at national and international level	Developing dialogue formats for worldwide use	2016	 60%	 80%
Prevent corruption	Consulting and training in all company areas	Continuous development		
Implement key compliance topics in participations	In consultation with the management of the participations, employees from the respective company are provided with information on the Code of Conduct and anti-corruption	Continuous development		
Compliance with environmental and social standards in the value chain	Training for all procurement employees in order to maintain sustainability standards in supplier relationships	Continuous development		

## Product

Goal	Measure	Date	2014 Degree of completion	2015 Degree of completion
Significantly reduce fuel consumption for every new vehicle as compared with the predecessor model	Expanding the range of Audi ultra models as the consumption leaders in all vehicle segments	2016	 70%	 90%
Expand the range to include CNG drive concepts under the Audi g-tron umbrella brand	Developing further engines and vehicle concepts with CNG drive	2017	 50%	 80%
Develop and manufacture carbon-neutral fuels from renewable sources of energy for reduction of greenhouse gas emissions	Market introduction of further Audi e-fuels	2019	 10%	 20%
	Integrating a CO <sub>2</sub> capturing plant (capturing CO <sub>2</sub> from the air) into a power-to-gas or power-to-liquid plant	2017	 10%	 40%
Conserve resources through new recycling concepts for closing material cycles	Developing second-life applications for high-voltage batteries	2018	 10%	 40%
Responsibility for the safety of customers and other road users	Availability of predictive safety systems across all classes	2019	 70%	 80%



## Environment

Goal	Measure	Date	2014 Degree of completion	2015 Degree of completion
Reduce waste for disposal, freshwater consumption, CO <sub>2</sub> and VOC emissions as well as overall energy consumption at the production sites by 25% per reference unit (base year 2010); within the scope of energy supply, a reduction target of 40% per reference unit by 2020 (base year 2010) is in effect for the German sites for CO <sub>2</sub>	Detailed planning and implementation of site-specific packages of measures for attainment of Group-wide reduction targets	2018	30%	50%
Expand and develop measures for reducing freshwater consumption at national and international sites	Realization of water recycling through use of a membrane bioreactor at the Ingolstadt site; reduction target for freshwater requirements: 40%	2016	50%	80%
	Continuous investment in projects with the long-term goal of wastewater-free production in Mexico	2016	10%	20%

## Employees

Goal	Measure	Date	2014 Degree of completion	2015 Degree of completion
Promote employee qualification and training	Continuing dual study programs in cooperation with universities	Continuous development		
Adapt training to future technologies	Introducing new apprenticeship vocations and programs	Continuous development		
Improve compatibility of working life and family	Introducing and implementing measures to support employees in caring for family members	2016	70%	80%
Company-wide coverage with management systems for occupational safety and health protection	Further development of an ergonomic evaluation system, in particular in the indirect area	2015	80%	90%

## Society

Goal	Measure	Date	2014 Degree of completion	2015 Degree of completion
Develop and expand measures for shaping urban mobility of the future	Utilizing the results of research from the Audi Urban Future Awards 2014 for the Company and entering into development partnerships with cities (Urban Future Partnerships)	2015	20%	40%
Early support for children and young people in the areas of mathematics, information technology, natural sciences and technology (MINT)	Holding of five events by the MINTmacher initiative in cooperation with schools and daycare centers in the Ingolstadt region	2016	20%	100%



# Audi & Co.

2015

**The challenges with which we are confronted today are becoming ever more complex. Hand in hand with partners, we need to develop sound ideas and viable solutions. By joining forces, we will be able to make swifter progress from idea to plan, from prototype to product.**

**That is what inspired us to choose “Audi & Co.” as the title of our Corporate Responsibility Interim Report. We seek dialogue, explore fresh trends and also tackle critical issues. Climate change, digitalization and growing flexibility in the world of work are challenges that currently preoccupy not just Audi, but society as a whole. On the following pages we provide an insight into the encounters that we had and the conversations that we conducted on these topics.**

∨  
Contents

2	Foreword by the Board of Management
4	Intelligence & Connectivity
10	Ecology & Emotion
18	Humans & Machines

∨  
Cover

About Audi   About this report
CR program
Key figures
Audit report



Dear Readers,

We live responsibility. This is not simply a slogan for us, but a defined corporate goal. We are aware that this goal has been brought into question in recent months: For the diesel emissions issue has also deeply shocked Audi as part of the Volkswagen Group. We therefore temporarily suspended our member-

ship in the United Nations Global Compact, the largest initiative worldwide for responsible corporate management, at the end of 2015.

Not only must and will we unreservedly expose these accusations, we also have to address the consequences. This means, in particular, the establishing of new structures, new processes and above all new ways of thinking in the Company. Much of this has already been introduced, but a lot still remains to be done.

The experience of recent months makes it all the more important to focus our entire technological expertise on actively shaping the future of our society. We are therefore focusing on three topics in this report which will be decisive for the future viability of Audi: climate change, digitalization and flexibilization of the working environment.

In the future, we will focus even more closely on the environmental impact of our cars along the value chain. For that reason, zero-emission drive units in electric cars are as much a feature of our agenda as is the advancement of hydrogen fuel cells. We are therefore working on eco-friendly production methods, integral logistics chains, a comprehensive recycling concept and new non-fossil fuels. We have started up the first pilot plants that capture climate-damaging CO<sub>2</sub> and use surplus wind power to produce synthetic gas.

A second challenge is digitalization: Data is a valuable commodity today and in the future. Along with other companies, Audi is therefore working in partnership with



the digital map provider HERE to optimize the real-time platform for mobility data. This platform enables us to use swarm intelligence as the basis for predictive driver assistance systems and new mobility services. And amid all this we take data protection and data security very seriously. We will be making driving a car much safer in the future with the help of algorithms. Piloted driving has the potential to cut the number of accidents and road deaths by up to 90 percent in the long term. We will be bringing out the first fully fledged traffic jam pilot in 2017, initially in the Audi A8. At the push of a button, it will take charge of lane-keeping, accelerating and braking at speeds of up to 65 km/h.

In the third section, we will address changes in the work environment, in particular the demand for greater flexibilization. Industrialization in the 19th century pursued the goal of replacing human labor with machines. We are blazing a new trail with our Smart Factory: We are shifting the focus to people. Robots hand components to factory workers, innovative goggles project the next working steps in the wearer's field of vision, and 3D printers accelerate the process of manufacturing new tools. One thing is already clear: Self-learning machines with artificial intelligence will keep making everyday life easier for us – including at the workplace. At the same time there is the growing desire among our employees for more flexibility and for innovative work models which enable work and private life to be combined more easily. That is why our pursuit of taking the lead also includes shaping tomorrow's world of work.

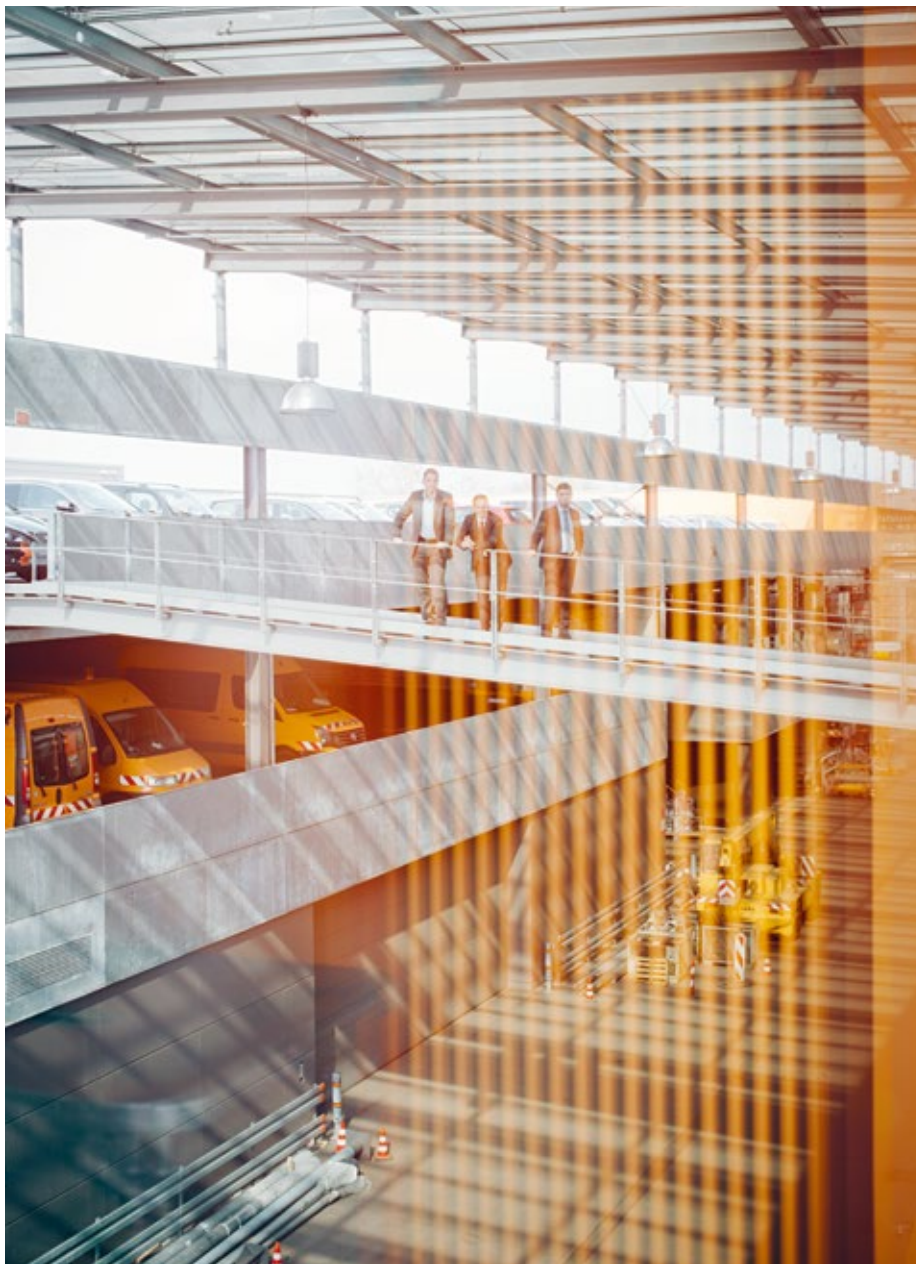
And when addressing these topics, it is also important to listen to the critical voices of our stakeholders. This principle is observed in the report "Audi & Co." Because only an honest and open dialogue will enable us to operate sustainably – with passion, resolve and enthusiasm. So that we at Audi make life better for people.



**Prof. Rupert Stadler**

Chairman of the Board of Management of AUDI AG





# Intelligence & Connectivity





## Prof. Dr. Michael Schreckenberg

Professor for Physics of Transport and Traffic,  
University of Duisburg-Essen



When will the first self-driving cars appear on the market? What new technologies and what level of connectivity will they need? How will we view cars that drive more safely than we do, and how will they change society? Audi developers Marcus Keith and Andreas Reich meet traffic researcher Prof. Dr. Michael Schreckenberg at the Munich Traffic Control Center to discuss the topic.



## Andreas Reich

Head of Electrics/  
Electronics  
Pre-Development,  
Audi Electronics  
Venture GmbH



## Marcus Keith

Head of Development for Display/Operation/Audi connect,  
AUDI AG

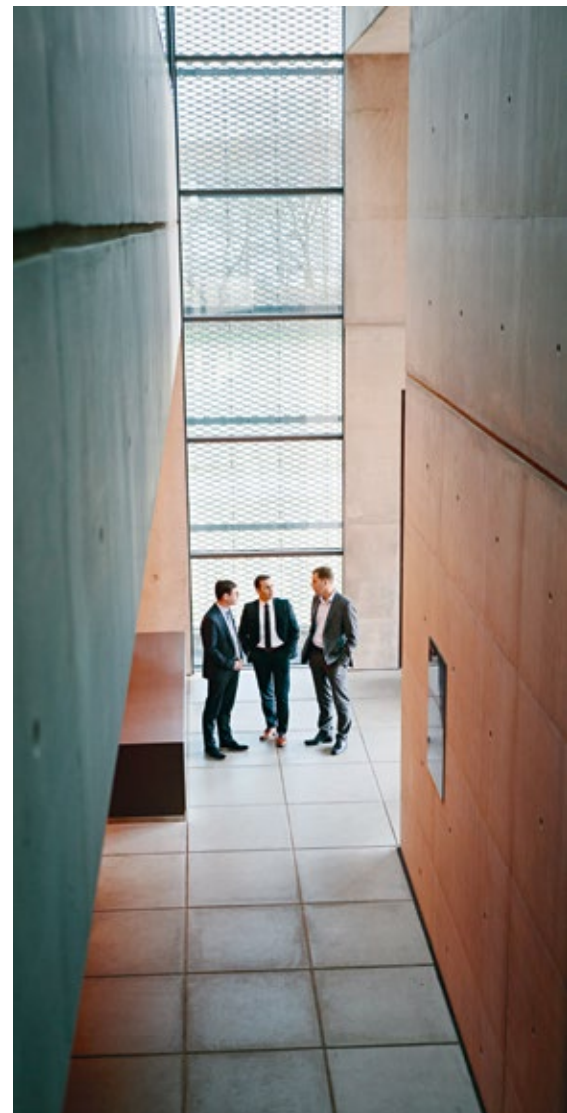






**If vehicles drive themselves, traffic will become more defensive and there will be far fewer accidents.**

Andreas Reich



A discussion on connected mobility:  
 Prof. Dr. Michael Schreckenberg,  
 Marcus Keith and Andreas Reich (from left)  
 in the Technical Operations Center  
 of the City of Munich





The venue for the discussion between Prof. Dr. Michael Schreckenberg, Marcus Keith and Andreas Reich is the City of Munich's Traffic Control Center in the Technical Operations Center, in the suburb of Moosach, opened in 2012. Here, public-administration and police operators control the traffic 24/7 and have to respond to around 2,000 alerts every day. Some 700 cameras, most of them in tunnels, supply video images that are constantly monitored on a 17-meter-wide multi-media wall.

For such driving conditions, we will gradually increase the speed, enable lane-changing and gain a command of complex situations. The other level is piloted driving in the parking garage or on the parking lot. The driver climbs out at the barrier, and the car does the rest all by itself. The low speeds involved here mean that such an environment can be controlled extremely well. Over time these two areas will converge, strongly supported by the new assistance and safety systems.

**Do you think that strategy is coherent, Mr. Schreckenberg?**

SCHRECKENBERG Definitely, development can only advance in stages. The problems that arise with autonomous driving are so wide-ranging that we are only just starting to recognize them bit by bit. Google's situation is entirely different: It can be assumed that their aim is not to build and sell cars, but to collect data. And even though Google cars drive slowly, accidents keep happening – possibly precisely because they obstruct the traffic.

Confirmed on the monitor wall in the Traffic Control Center in an array of individual images: On the Tuesday afternoon of Audi's visit, Munich's traffic is flowing as it should. Not just because all drivers are keeping to the rules, but also because some of them interpret the rules a little more liberally and occasionally cross a solid line to speed up the process of lane-changing. Self-driving cars do not do that – according to Marcus Keith, it goes without saying that their technology is designed to comply with legal requirements.

**How easily will the driver be able to handle the computer at the steering wheel in the future?**

SCHRECKENBERG Today's traffic works because most of us have signed up to a kind of code of conduct. That equilibrium gets disrupted if a foreign body operates by different rules. The same is true of a person sitting in an autonomous car: If they can't influence the vehicle's responses they'll soon lose confidence in it. That's why we should try to humanize autonomous cars – maybe by providing a kind of humanizer button that will also allow us to do 60 km/h on city streets. But first we need to achieve an even better understanding of how humans behave behind the wheel before we can transfer that idea to the vehicle.

REICH I adopt a different perspective: If vehicles drive themselves, traffic will become more defensive and there will be far fewer accidents.

**A**bout four million cars travel along Munich's streets every day, but only a fraction of them communicate with their surroundings. For all the high tech that the city has at its disposal, the Traffic Control Center in Moosach can only guide the traffic to a certain extent; direct communication with the vehicles is not yet possible. Audi is working on new technologies that cars will use to organize themselves – including comprehensive connectivity, as well as new systems for autonomous driving that Audi calls piloted driving.

Models such as the new A4 and new Q7 already point the way ahead. Their online services, grouped together under the term Audi connect, link them to the Internet, the infrastructure and to other vehicles. Their assistance systems operate predictively – for instance, they can alert the driver to a tight bend that comes just after the crest of a hill, or traffic jam assist can take charge of the steering in slow-moving traffic on good roads, at a speed of up to 65 km/h. These technologies represent a pre-stage to piloted driving, which will be introduced in series production in 2017 with the next A8 generation.

**Mr. Keith, Mr. Reich, Google has generated a huge amount of publicity with its self-driving experimental vehicles. Aren't you being a bit cautious?**

↙ ↘

**The way our customers behave at the wheel – their individual driving profile – is a very important aspect for piloted driving.**

Marcus Keith

↗ ↖

KEITH That's an elementary question of your approach. Here at AUDI AG, we fundamentally only advocate solutions that work in every situation and whose limits we know precisely. We aren't in the business of taking risks; every single step we take has firm foundations.

**Can you describe the Audi roadmap?**

REICH We are moving towards piloted driving on two levels. One is the autobahn.



## So we'll be driving significantly more slowly?

KEITH I don't think so – more fluidly, perhaps. I'm with Andreas Reich on this: Piloted driving cars can save lives. The biggest source of error remains the human being.

### And what does a piloted driving car do if it has to choose who to crash into in an emergency situation?

REICH It's still too early to define ethical criteria in the technology. I assume our technology will have moved on a long way in ten or 20 years' time. And by then, we'll be able to answer such questions reliably.

There are about 1,200 sets of traffic lights in Munich, and most of them work automatically. Audi is now going the next step: In 2017, traffic lights will start connecting with cars in several U.S. cities. The driver of a new Q7 or A4 sees a display in the cockpit telling them what speed to drive in order to reach the next traffic light on green. The new service can cut fuel consumption in urban traffic by 15 percent. In parallel, Audi is adding the first Car-to-X technologies to its connect portfolio in Europe – the new models are becoming part of a swarm. They report the speed limits or hazard points they have identified to a server in the cloud, via the mobile communications network. The server collects the data, processes it and makes it available to other Audi drivers – customized to their situation, and always right up to date.

Connectivity and Car-to-X are inseparable elements of piloted driving – and now this entire field of technology is getting a new platform. A few months ago, AUDI AG acquired the mapping service HERE together with the BMW Group and Daimler AG.

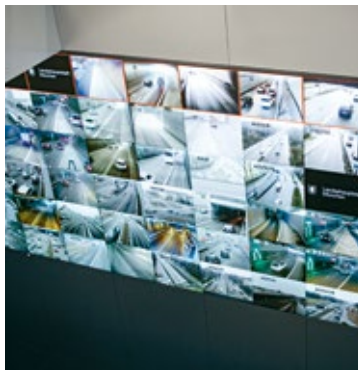
### Mr. Keith, what will HERE be able to contribute in the future?

KEITH HERE has the potential to generate a digital image of our world of mobility – with extreme precision thanks to the enormous level of detail of the data, and up to the minute by virtue of the dynamic content. We can pack many layers of information into the centimeter-precise maps – from traffic light cycles and information on parking spaces to the individual behavior of drivers on the move, a really important aspect. To obtain the algorithms that you need to make precise predictions, there are a number of technology firms in the United States and China who have specialized in the field of artificial intelligence or machine learning.



## The problems that arise with autonomous driving are so wide-ranging that we are only just starting to recognize them bit by bit.

Prof. Dr. Michael Schreckenberg



Present-day hightech: The Traffic Control Center receives images from 700 cameras which record the traffic in Munich, with its population of over one million.



I believe it would be a good idea to talk to such suppliers.

### Communication uses the mobile network, via the HERE back end, in other words via a server in the cloud. How secure is customer data?

REICH We talk of security by design – we consider the topic right at the start of development. And we have given the cars' electronics architecture firewalls and separate control units to prevent a hacker from getting at the brakes, steering and accelerator.

### What about passing on customer data to third parties?

KEITH When we pass on movement data to a traffic flow provider today, this information is anonymized. That must remain the case – we will continue to separate the individual-related entertainment data from the vehicle data that we need for functions. And there is plenty of the latter, because our cars are becoming intelligent systems. Radar-guided cruise control, for instance, will work even more accurately in the future if we can keep optimizing its control algorithm via the back end.

There are many social dimensions to the vision of "piloted driving." One of them was recently set out by Audi Board of Management Chairman Rupert Stadler. "We see the Audi of the future as a place to work, a place of relaxation and a place to experience things. If the cars of the future can drive automatically, people will be able to use the time they spend on board differently. They will reach their destination faster, more conveniently and more relaxed. All that saves time, and time is the most precious gift in today's world."

### Mr. Schreckenberg, will piloted driving reduce or increase traffic levels on our roads?

SCHRECKENBERG There are two opposing trends here. On the one hand, there are plenty of older people who might venture back out onto the roads in a car with autonomous drive – that would prompt an increase in traffic. On the other hand, we have young people who are open to car sharing and the idea of networked transport. I think we will have fewer vehicles in cities, but they will drive more because the fleet will be put to better use, and we will be able to use parking space much more efficiently. We will save energy and our cities will become cleaner – and we will still enjoy driving.

REICH I can echo that. We will often enjoy taking to the wheel ourselves – and will also appreciate that it's still there.

## Piloted driving



Google car



Audi RS7 piloted driving concept ("Robby")

<b>Drive</b>	Electric motor	4.0 TFSI
<b>Sensors</b>	Windscreen camera, front and rear radar, rotating LiDAR laser on roof, inertial navigation system	3D cameras at front and rear, each with opening angle of 103°, aerial for differential GPS
<b>Body</b>	Two-seater city car	Four-door coupe
<b>Info</b>	The two-seater Google car is an experimental vehicle of which around 50 have so far been built (as of: February 2016). It can also travel on public roads at up to 40 km/h.	Audi is using "Robby" above all to explore the dynamic aspects of piloted driving. Its laps around the racetrack in Sonoma were already faster than those of racing drivers.

Sources: Meyer, Nathanael (2015): Das müssen Sie über fahrerlose Autos wissen. URL: [http://www.focus.de/wissen/technik/mobilitaet/das-google-driverless-car-das-muessen-sie-jetzt-ueber-fahrerlose-autos-wissen\\_id.4615803.html](http://www.focus.de/wissen/technik/mobilitaet/das-google-driverless-car-das-muessen-sie-jetzt-ueber-fahrerlose-autos-wissen_id.4615803.html); auto.de (2016): Roboter in den USA legal am Steuer. URL: [http://www.wivo.de/technologie/auto/google-roboter-auto-ist-zu-langsam-fuer-den-strassenverkehr/12585408.html](http://www.auto.de/magazin/roboter-in-den-usa-legal-am-steuer; dpa (2015): Roboter-Auto ist zu langsam für den Straßenverkehr. URL: http://www.wivo.de/technologie/auto/google-roboter-auto-ist-zu-langsam-fuer-den-strassenverkehr/12585408.html) (all as of: April 12, 2016)

## New online services

» Those who try to make a robot intelligent develop a huge amount of respect for the magnitude of human intelligence. «

**Chris Urmson**  
Developer responsible for Google's driverless car

## Car-to-X services

Audi is introducing the first Car-to-X services in series production in the A4 and Q7 in 2017.

### Traffic sign information for Europe

The dedicated on-board camera analyzes the speed limit signs and communicates with a server in the cloud. The information is fed into updates to the Audi navigation maps. One advantage is that speed can be regulated predictively and efficiently.

### Hazard information for Europe

Using the swarm intelligence principle, cars alert each other to hazards such as accidents, black ice or poor visibility. This can appreciably increase safety on the road.

### Traffic light information for the United States

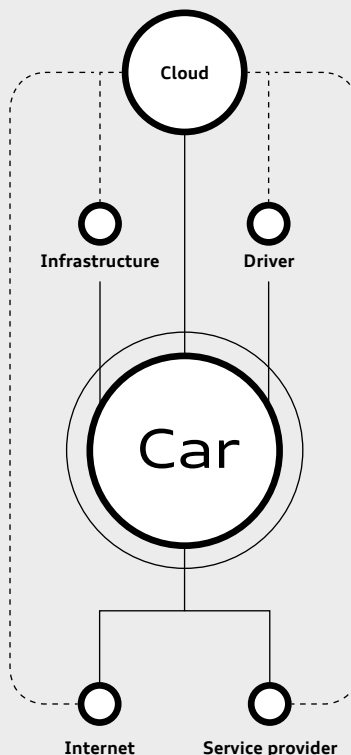
This service uses the mobile communications network to connect Audi models with the central traffic computer that controls the city's traffic lights. The driver receives a speed recommendation to help them reach the next traffic light on green. This saves fuel and makes the driver's task easier.

## Connectivity today



Audi connect services

Vehicles already connect seamlessly with their environment, and will continue to do so in the future.



Digitalization

## Facts & figures



Today

1.3 million

points per second are measured by the Google car's LiDAR radar.

Source: Gulde, Dirk (2015): In kleinen Schritten ans große Ziel, in: auto motor und sport, No. 26, p. 111

20<sup>cm</sup>

is the maximum error in GPS location that is tolerated for piloted driving.

Source: Gulde, Dirk (2015): ibid., p. 112

2:07.67 min

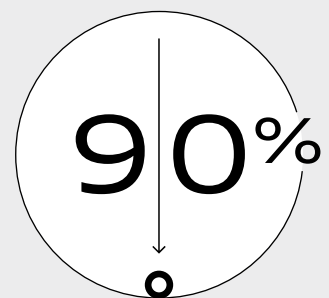
is the time it took for the Audi RS7 piloted driving concept to complete a lap of the FAST Parcmotor circuit near Barcelona in 2015.



Future

» In ten years' time, there will be fully automated cars in the showroom. «

**Alexander Dobrindt**  
Federal Minister of Transport and Digital Infrastructure



of all accidents could be avoided with piloted driving cars, according to Google.

Source: Czyscholl, Harald (2014): Auf Autopilot. URL: <http://www.welt.de/wissenschaft/article126577949/Autos-fahren-schon-bald-wie-von-Geisterhand.html> (all as of: April 12, 2016)

» I estimate that automated driving on the autobahn can cut fuel consumption by up to 20 percent. «

**Prof. Dr. Karsten Lemmer**  
Head of the Institute of Transportation Systems, German Aerospace Center (DLR)





# Ecology & Emotion





## Siegfried Pint

Head of Driveline  
Electrification Development,  
AUDI AG



## Dr. Wiebke Zimmer

Deputy Director of Resources & Mobility,  
Öko-Institut e.V.

The location: a former electrical substation in Berlin. In dialogue: Dr. Wiebke Zimmer of Öko-Institut e.V. and Audi electric powertrain developer Siegfried Pint. The scientist and the engineer are discussing issues that move people: How are young urbanites getting around? How is personal mobility changing? Will we soon be driving cars powered by electricity or innovative fuels? And which path makes ecological and economic sense?





Dedicated cyclist meets  
passionate car fan:  
Dr. Wiebke Zimmer and  
Siegfried Pint.







The past meets the future: Two experts from the field of tomorrow's mobility meet in a historically protected electrical substation. The substation was built in 1927/28 and supplied electricity to many residents of the Prenzlauer Berg district. Today, it primarily serves as a backdrop for movies and photo shoots. And as the perfect location for a highly charged discussion.



Dr. Wiebke Zimmer:  
“Young people view the car less and less as a status symbol.”

## **M**s. Zimmer, what modes of transport do you use to get around in Berlin?

ZIMMER I don't particularly like driving a car. I did get my driver's license, but I've almost never driven. I simply feel much more free this way in the city. I like riding a bicycle very much, and besides, the public transport system here in Berlin is terrific.

### **And what does driving a car mean to you, Mr. Pint?**

PINT I live in Munich and work in Ingolstadt, so I regularly travel longer distances. To me, the car also means emotion and fun, both professionally and personally. To take this even further, I ride my motorbike in my free time in the summer, both cross-country and also on the racetrack.

### **Then you might be one of a dying generation of car fans. Ms. Zimmer, how do young people deal with the issue of mobility?**

ZIMMER There is a noticeable trend among a young urban population to view the car less as a status symbol. If you have to get from A to B, you take a pragmatic approach: You seek out the most convenient

way and piece together a clever mobility chain using your smartphone. The trend toward more sustainable transport is not yet completely clear, but the underlying conditions, such as the building of cycle paths, have not yet been met properly either.

### **Audi can't be all that thrilled about this development. How are you responding to this trend?**

PINT First of all, we want to find out what is causing young people to drive cars less. Maybe the car has become impractical for their changed pattern of use – it just stands around 23 hours a day and has too many bothersome secondary effects. Thanks to today's information density, young people live much faster than we did back then.

### **How would you make the car more attractive to young people?**

PINT I believe it makes sense to establish a new vehicle habitat that is fully networked with the community and with piloted driving. Each of us would like to spare ourselves the time and hassle of dealing with the parking garage and filling station. In the future, this will be possible: If I want to drive somewhere by car, I will have it drive up from the parking garage to my front door, charged and also freshly washed.

ZIMMER More than anything else, piloted driving can offer environmental advantages when people share cars with each other.

When it comes to carsharing, Audi is not yet really visible ...

PINT Traditional carsharing is certainly a good alternative for the volume segment, but we also want to offer premium mobility here. Depending on the type of transport needed – urban, highway or long-haul – our sharing customer would be able to choose from different cars.

### **Whether shared or owned – what kind of drive systems will we be using in the future?**

PINT In ten years, we will probably have a significant share of electric cars in our portfolio, although it is very difficult to make a precise forecast.

### **Does the diesel engine crisis present an opportunity for electric mobility?**

PINT Among customers, the low fuel price is currently having a sharply dampening effect. Nonetheless, I believe that the current debate is certainly accelerating electric mobility ...

ZIMMER ... but much less than I would have thought. Electric cars would be the best motorized solution for reducing NO<sub>x</sub> emissions in cities. But they aren't really being talked about, despite the high pollution levels: Maximum levels were exceeded over the past year at 60 percent of all measurement points in Germany.





Siegfried Pint:  
“With electric mobility, we obviously have a chicken-or-the-egg problem.”



**To me, the car also means emotion and fun, both professionally and personally. And in the summer I like riding my motorbike in my free time.**

Siegfried Pint



**I don't particularly like driving a car. I simply feel much more free on the bicycle, and besides, the public transport system in Berlin is very good.**

Dr. Wiebke Zimmer

**M**s. Zimmer, what do public policymakers need to do to effectively promote electric mobility?

ZIMMER In my opinion, regulatory policy is the most effective. You have to design CO<sub>2</sub> and emission limits so that manufacturers have no other choice than to bring electric cars onto the market. Buying incentives can also provide a boost – getting money from the government is, after all, a psychological factor. These would have to be financed in a way that does not impact revenue, however, through a fee on the petroleum tax, or through a bonus-malus system.

PINT Such a bonus-malus system is actually already established through fleet consumption. In our portfolio management, we always have to consider that for every new large car, many smaller new cars also have to be added.

**So what would you like to see in terms of public policy?**

PINT I would like to see all of the stakeholders do their homework when it comes to the charging infrastructure, since the lack of this infrastructure is a very clear stumbling block to carbon-neutral mobility. When I drove to Berlin yesterday with the Q7 e-tron quattro [1], I couldn't find a decent place to recharge the car on either the autobahn or in the city. We obviously have a classic chicken-or-the-egg problem: The automotive industry does not want to provide the infrastructure for a specific brand, and the public sector is waiting for the cars to be offered.

**And who should go first?**

PINT In my opinion, the issue of charging is an overriding one and is a duty of society or of the national economy. It shouldn't be the case that each car manufacturer constructs its own charging infrastructure with its own energy provider.

**Isn't the CharIN initiative the right approach here?**

PINT CharIN is certainly the right direction in Germany as well as internationally. We have agreed here with other car manufacturers on the same charging interface – that is, the same plug connector and the same charge current, which was not at all easy. As a manufacturer of premium automobiles, we need somewhat more charging capacity, since our cars are of course somewhat larger. However, the energy consumption of a specific car also depends highly on aerodynamic resistance – our Audi e-tron quattro concept technology platform, for instance, is as large as a Q7, but thanks to its superb aerodynamics, uses only as much energy as an Audi A4 when driving long distances.

**Would a car like that be acceptable for you, Ms. Zimmer?**

ZIMMER Not really (laughs). The output is in the range of a cargo truck, and I do have to wonder whether that is absolutely necessary. Electric mobility is a central pillar for climate protection, but it's not the only one – it is also important to reduce energy needs. When electric cars are not efficient enough, electricity needs increase, and we have to consider carefully here where all of these additional renewable energies are supposed to come from.



## What does your analysis look like?

**ZIMMER** In Germany, we currently obtain almost 200 terawatt-hours from renewable energies. That is about one third of our gross electricity consumption. If we were to assume that one day the entire population of passenger cars will consist of small, efficient electric cars only, then it would add up to 100 terawatt-hours of energy consumption for the German vehicle population alone. And that doesn't even include truck traffic!

**PINT** I prefer to calculate here with the necessary output. In Germany, we have more than 160 gigawatts of installed capacity, far exceeding the average load of 70 gigawatts, since only 15 to 20 percent of alternative energy capacities are used, due to their fluctuation. If you consider annual kilometers driven and the time, the average power requirement of a passenger car amounts to only about 300 watts, which is not much at all. The nearly 50 million cars together therefore need just 15 gigawatts, and this we can obtain relatively easily from alternative energies.

**What about storing the non-usable peaks of clean energy? AUDI AG has the fuel Audi e-gas, which operates according to the power-to-gas principle.**

**ZIMMER** Electricity-based fuels don't solve the problem of pollution emissions in the cities. And if we compare them with technologies like the battery electric drive system, their energy use during manufacture is considerably higher. Still, I think it makes sense to look closely at electricity-based fuel, because we will need it if we envision having a decarbonized transport sector by 2050 – not so much for cars, but rather for where there are no good alternatives, such as in air transport.

**PINT** In the production chain as we have designed it, hydrogen is produced already before synthetic methane. If we were to use it in a fuel cell, it would guarantee zero emissions locally. Hydrogen can certainly be of interest for long-distance mobility, including, incidentally, for commercial vehicles. Compared with the battery electric vehicle, the environmental footprint and capacity is much more favorable when driving this way.

**And who will build the hydrogen infrastructure?**

**PINT** Here I would call even more loudly for the national economy or public sector than I do in the case of electric mobility (grins).

**ZIMMER** It will be essential to decide which fuel and which drive system will be used to cope with long distances, so that we can achieve an infrastructure that is as



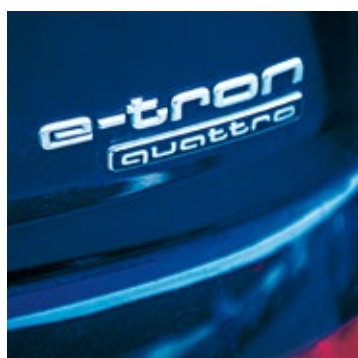
**To have a high share of electrified cars and electricity-based fuels in the long term, we have to consider where we will get the additional renewable energies required for this.**

Dr. Wiebke Zimmer



**We can easily cover the additional capacity needs for electrified cars with existing alternative energies.**

Siegfried Pint



Electric energy, yesterday and today: the Audi Q7 e-tron quattro [1] in the former substation at Prenzlauer Berg

standardized as possible. In our analysis, we come to the conclusion that the fuel cell has the highest cost in national economic terms even over the long term, despite technical improvements. The main factors are the costs of the fuel-cell drive system and the high cost of providing the energy – although its future development is not fully clear.

**PINT** That's true: The material and manufacturing costs currently exceed that for battery electric cars.

**ZIMMER** The vision, however, would be to directly use the electricity anywhere it is possible. Why don't we build battery electric vehicles with range extenders? For the tiny amount of liquid fuel we would use here, we could take electricity-based fuels and dispense with the expensive hydrogen infrastructure.

**PINT** That could be an economically acceptable method, if we limit ourselves to 180, 200 kilometers of battery range and also install an economical combustion engine that operates on Audi e-gas. But I would like to continue pursuing fuel cell technology anyway, because for us as a manufacturer it would be too risky to put all our eggs in one basket. If the matter takes off and customer demand comes, we have to be in the position to respond quickly.







**W**hat does the well-to-wheel analysis for an electrified car look like? Isn't it carrying a heavy ecological backpack – just considering the rare earths alone?

PINT Rare earths are only used in permanently excited electric machines, and there are alternatives to these. The battery contains nickel, manganese and cobalt, among other things – these materials have to be introduced into a recycling loop. After their initial use in the car, they would first be further used in a storage power station, and only then would they be recycled in a way that makes sense.

ZIMMER But despite the recycling, we should handle resources efficiently and minimize their use as much as possible. The lithium-ion battery in your concept car is very large. If all three million cars that are newly introduced to German roads each year were similarly equipped electric cars, then almost 90 percent of the lithium production worldwide would go into these cars. That would be an argument for less high-powered and somewhat smaller premium cars, wouldn't it?

PINT The lithium content determines the range, and we want to offer 500 kilometers and more – since to us this means it is suitable as a household's main car. A small electric car that is only an add-on for the customer does not replace any other car.

Not always in agreement, but always relaxed and constructive: the scientist and engineer in dialogue



**We are pursuing various drive technologies. It would be too risky for us as a manufacturer to put all our eggs in one basket.**

Siegfried Pint



**We should decide which fuel and which drive system we will use to cope with long distances, so that a standardized infrastructure can be created.**

Dr. Wiebke Zimmer



**How is the Audi A3 Sportback e-tron [2] doing in the market?**

PINT Well, this is a car that would more likely appeal to you, Ms. Zimmer. It's a compact plug-in hybrid that can cover a lot of journeys on all-electric power. At the moment, the A3 Sportback e-tron [2] is so popular that we have already had to increase our planned volume twice. And in practice on the roads, we see that customers develop the ambition to reduce consumption all on their own.

**Ms. Zimmer, Mr. Pint, you have talked a lot now about economy, ecology and transport, and you have not always agreed. What would you like to say to each other in conclusion?**

PINT I would like to invite you, Ms. Zimmer, to take a drive with me in an Audi e-tron quattro concept, right here in Berlin. The concept with the three motors is a lot of fun because it adds transverse dynamics to the longitudinal dynamics, so the car is really snappy when taking corners. You can even experience this when driving down Prenzlauer Berg to go shopping. ZIMMER Thank you very much, Mr. Pint, but I'd rather continue riding my bicycle. But I will be happy to accept your offer when something really changes in the area of transport – when electric mobility, renewable energies, efficient vehicles and alternative mobility concepts go hand in hand.

**[1] Audi Q7 e-tron 3.0 TDI quattro**  
Combined fuel consumption in l/100 km: 1.9–1.8;  
combined electricity consumption in kWh/100 km: 19.0–18.1;  
combined CO<sub>2</sub> emissions in g/km: 50–48

**[2] Audi A3 Sportback e-tron**  
Combined fuel consumption (gasoline) in l/100 km: 1.7–1.5;  
combined electricity consumption in kWh/100 km: 12.4–11.4;  
combined CO<sub>2</sub> emissions in g/km: 39–35

**[3] Audi A3 Sportback g-tron**  
Combined fuel consumption (gasoline) in l/100 km: 5.5–5.1;  
combined fuel consumption (CNG) in kg/100 km: 3.6–3.3;  
combined CO<sub>2</sub> emissions in g/km: 128–89

## Electricity-based fuels



### Power-to-gas

Audi e-gas is a sustainable fuel: Green electricity powers a process in which synthetic methane is created in two stages from water and CO<sub>2</sub>. Drivers of g-tron models can use the Audi e-gas tank card as a balancing tool: The amount they fill their tanks with is fed back into the CNG grid as Audi e-gas.

# 1,000<sup>t</sup>

of synthetic methane comes each year from Audi's own e-gas plant in Werlte (Lower Saxony). Up to 2,800 metric tons of CO<sub>2</sub> are bound in it.

# 1,500

Audi A3 Sportback g-tron [3] cars can thus drive 15,000 carbon-neutral kilometers each year.

## Carsharing



### A growing market

The carsharing market has grown sharply in recent years. Yet it still hardly presents a medium-term threat to the new car business: Up to 2021, only 1.3 percent of private customers want to forgo buying a new car in favor of carsharing.

# ≈ 90,000

carsharing vehicles were on the roads worldwide in 2015.

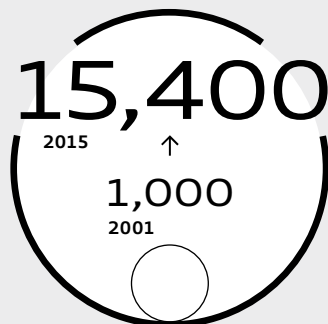
# ≈ € 4,700 million

is forecast to be the global total sales figure for carsharing in 2021.



### Strong growth

Carsharing cars in Germany



Source: The Boston Consulting Group (2016): Deutschland ist Europameister im Carsharing. press release, Munich. URL: [www.bcg.de/media/PressReleaseDetails.aspx?id=tcn:89-205543](http://www.bcg.de/media/PressReleaseDetails.aspx?id=tcn:89-205543) (as of: April 12, 2016)

## Electric mobility



»Electrification of the powertrain is necessary and makes sense. But fully electric cars are not the only solution.«

**Prof. Dr.-Ing. Michael Bargende**

Chair of Automotive Powertrains at the University of Stuttgart's Institute for Internal Combustion Engines and Automotive Engineering



### Current situation

In Germany, electric mobility is only slowly gaining momentum. According to an analysis by the international management consultancy Bain & Company, the German government will no longer achieve its goal of having one million electrified cars on the road by 2020. Other countries are ahead in this area.

Source: Bain & Company (2015): Eine Million E-Autos in Deutschland bis 2020 nicht zu schaffen. Press release, Munich. URL: <http://www.bain.de/press/press-archiv/bain-analyse-zur-elektromobilitaet.aspx> (as of: April 12, 2016)



### Facts and figures

Share of electric cars and plug-in hybrids among all new registrations in the first quarter of 2015

Source: Bain & Company (2015): ibid.

**N** 33.1%  
Norway

**NL** 5.7%  
The Netherlands

**D** 0.6%  
Germany

# ≈ 47,000

all-electric cars and plug-in hybrids were in Germany at the end of 2015.

# ≈ 5,600

charging points were available at 2,500 publicly accessible charging stations in Germany in mid-2015. Among these, only a good 100 were direct-current quick-charging outlets.

Source: auto motor und sport, issue 4/16, p. 112



Climate Change

## Fuel consumption



### Study on efficiency

Population of passenger cars (in millions)



Total kilometers driven (in billions)



Average fuel consumption (in l/100 km)



Germans are driving more and more kilometers by car – but more and more economically.

□ 2002 ■ 2013

Source: German Federal Statistical Office (pub.) (2015): Umweltökonomische Gesamtrechnungen. Wiesbaden, p. 12

## Audi e-tron quattro concept:



### An electric future

The Audi e-tron quattro concept technology study, presented at the IAA 2015, offers a real glimpse of what Audi is planning in the near future. The sporty full-size SUV is an all-electric car. Under its passenger compartment is a large lithium-ion battery that powers three electric motors – one on the front axle and two on the rear axle.

# 4.6 sec.

from 0 to 100 km/h

# 320 kW

power output

# 95 kWh

battery capacity

# > 500 km

range

# > 800 Nm

torque



# Humans & Machines





Dual study programs, part-time professional development, parental leave, international work assignments, caregiver leave, partial retirement: These days, careers adapt to the employee's phase in life, not the other way around. Internationalization and digitalization further intensify the demand for flexible solutions – for both the company and for each individual employee. During a tour through the Audi plant in Ingolstadt, Dr. Jochen Haberland, Karl Unger and Prof. Dr.-Ing. Wilhelm Bauer discuss the dynamic transformation of the workplace.



### Dr. Jochen Haberland

Head of HR Policy and Key Issues,  
AUDI AG



### Karl Unger

Head of Production  
Strategy/System and  
Technology Development,  
AUDI AG



### Prof. Dr.-Ing. Wilhelm Bauer

Head of the Fraunhofer Institute for  
Industrial Engineering (IAO)







Industrial robots: The tour through the Audi plant in Ingolstadt leads Prof. Dr.-Ing. Wilhelm Bauer, Dr. Jochen Haberland and Karl Unger through the fully automated body shop of the Audi A4.







Virtually every single Audi that rolls off the assembly line is one of a kind. The variety is vast. This requires extremely flexible production processes. This trend toward personalization can not only be observed on products; it also defines the requirements of employees with respect to things such as working hours, the workplace, working practices and work content.

**C**o-workers are sitting, deep in conversation at the entrance to office building T02 at Technical Development. A couple of steps further, voices can be heard through one of the two revolving doors. In the colorfully decorated cafeteria with high tables and sitting areas, the prevailing atmosphere is one of a motivated work environment. “There is a strong desire for personalization,” confirms Dr. Jochen Haberland, Head of HR Policy and Key Issues at Audi. “This also impacts seemingly very trivial things such as interior design: It involves more than just quiet corners in open-plan offices – it also calls for an ambiance that promotes creativity and makes it possible to network with colleagues.”

Working practices that are adapted to individual needs are highly prized by employees. This raises the obvious question of where things stand regarding the use of telecommuting arrangements. Thanks to powerful PCs and fast Internet connections, many tasks can – at least theoretically – be handled from anywhere. Working from home is an attractive idea for many people – and many employees at Audi also regularly use this option. “I don’t at all subscribe to the notion that we will all be working only from home in the future and will only be connected with each other digitally,” explains Prof. Dr.-Ing. Wilhelm Bauer, Head of the Fraunhofer Institute for Industrial Engineering (IAO).

↘ ↙

**We should be concerning ourselves with how companies in the future can generate new, interesting work.**

Prof. Dr.-Ing. Wilhelm Bauer

↗ ↖

“Much more exciting, in my view, is a so-called space for possibilities that leaves employees free to decide which tasks they want to accomplish when and where. Depending on the needs and the situation, telecommuting can then be one of multiple options.”

The exclusive use of an employee’s own four walls as a workplace can even have negative consequences: A corporate culture developed over the years is lost and the creative exchange of ideas between employees suffers. Karl Unger, Head of Production Strategy/System and Technology Development at Audi, therefore sees working from home as more of an option for special tasks: “If a longer text document needs to be read or edited, for example, employees like to take advantage of the peace and quiet at home. In my environment, I have only had good experiences with that.”

Still, even in the 21st century, cars are built on an assembly line in a production hall. There’s no question that work in Production is very different from, for example, work in an office. The workstations in a precisely timed production facility must be staffed at all times. Yet there is freedom for Production employees even within the shift system, Karl Unger says: “The group-work system introduced many years ago allows various work positions to be staffed flexibly, such as in rotation.” Aside from changing workstations and the part-time models offered by Audi, there are however some limits to the options for variation in Production.

So will that change in the future? “Progress that’s being made in cooperation between humans and machines could relax the situation in the future,” says Wilhelm Bauer, predicting future improvements. “When, for example, partially automated systems in assembly support this type of group work, so that not every station has to be continuously staffed any longer.”





**The robot has to be working at the same pace as the human – not the human working at the robot's pace.**

Karl Unger



In sync: Robot Adam autonomously removes the expansion tanks for coolant from the large box. This eases the workload on Production employee Rainer Kölbl.

**R**ationalization through digitalization: Is there a risk in coming years of a battle for supremacy between humans and machines? Concern about losing your own job due to technical advances is not a new phenomenon. Since the dawn of the industrial age, occupations have repeatedly disappeared – and with them, at first glance, jobs ceased to exist. But in many cases, completely new occupations – and therefore new fields of activity – have been created at the same time. Wilhelm Bauer views future development as an opportunity: “We should not be so focused on the question of how many jobs will be eliminated – or in what time frame. We should instead be concerning ourselves with how companies can in the future create interesting products and sufficient added value in order to generate new, interesting work.”

The use of industrial robots does not at all automatically mean that jobs will be eliminated. On the contrary: A body shop of today's scale would be unthinkable without

robots. One example at the main plant in Ingolstadt shows that robots could also take on more tasks on the assembly line: There on the Audi A4 assembly line, a robot has been used for more than a year, working hand in hand with the people – without a safety barrier. “This is Adam,” says Audi employee Rainer Kölbl, introducing his one-armed colleague. With a suction cup, Adam fishes an expansion tank for coolant out of a large box and hands it over, always at the right time and in the correct position. “This takes the strain off my back and saves me a step in the process,” Kölbl says, listing the ergonomic advantages of the orange robot. He watches its flowing movement as Adam's arm disappears into the transport box again.

Such human-robot cooperation opens up new possibilities for letting machines

take over strenuous and ergonomically problematic tasks in the future. “Here, the robot has to be working at the same pace as the human – not the human working at the robot's pace,” Karl Unger emphasizes. “If we keep this rule sacred, the expansion of human-robot collaboration will be readily accepted by the employees.”

Digitalization brings with it a whole series of changes, including when a producing company is selecting a site. It's no longer the place with the least costly workforce that scores bonus points as a production location, but instead it's the country with the best industrial robots and the most skilled employees. With respect to the networked factory of the future, Wilhelm Bauer expects an increased need for training and development in coming years: “IT skills – and not necessarily the traditional programming tasks, but rather the intuitive ability to handle systems – play a decisive role here. Digitalization is advancing quickly. It is important to develop employees – and ideally with the help of digital teaching aids.”



**T**his is already reality at Audi: Apprentices receive their course content on a tablet provided to them especially for that purpose. “This makes connected learning easier, even in the group,” says Jochen Haberland regarding the targeted use of technology. He risks a look into the future: “Traditional development programs in the form of classroom instruction will decline. We are developing in the direction of computer-assisted, self-guided study, which is supplemented through concrete applications in the group.” Jochen Haberland wants to continue promoting the model of life phase-oriented work organization, in part to create more scope for lifelong learning: “Continued education, part-time degree courses, parental leave, sabbaticals – these days, there are not many resumes that don’t feature at least one of these. As a company, we can respond to this with new models that consider the varying intensities of work phases, and reward them more consistently.” Within a career, the necessary time could be set aside not only for time off, but also for the various development opportunities.

The desire for greater flexibility in daily work routines and a more personalized course for one’s professional life requires a corporate culture based on mutual trust. The Audi leadership principles reflect these values and focus on appreciation and respect. Much of what has been developed and proven successful over the years at the German sites in Ingolstadt and Neckarsulm is now being incorporated into international standards, such as in the building of the new Audi plant in Mexico. For instance, about 750 Mexicans spent several months

in Ingolstadt to interact with their German colleagues and develop the knowledge necessary for the start-up. Because responsible corporate conduct does not stop at national borders, Audi implements processes and organizational forms globally – while considering cultural differences at the international locations. The opportunity to acquire experience in another country is popular among employees – in 2015, a total of 1,406 expatriates worked at a foreign site.

As the group tour through the Ingolstadt plant comes to a close, Wilhelm Bauer addresses a topic that affects all companies: “We are currently experiencing a change in leadership style. I expect that in many areas there will soon be no more weekly work schedules – and instead, employees in management positions will take over softer tasks such as facilitation and team-building.” Audi is also responding to the changing work environment with leaner hierarchies and more project work. “It is becoming increasingly important for project organization to be as agile as possible,” stresses Jochen Haberland. “In the future, it will be normal for groups of people to continuously be reshuffling and restructuring within the company for projects.”

The introduction of so-called product line management at Audi is also aimed in a similar direction, as a foundation of product line organization. With the introduction of

↙ ↘

**Continued education, part-time degree courses, parental leave, sabbaticals – these days, there are not many resumes that don’t feature at least one of these.**

Dr. Jochen Haberland

↗ ↖

the new system, a single manager will supervise a model family from A to Z, so to speak, and carry out the individual work steps in project form together with experts from the individual departments: from the first letter of the specifications, through design and engineering, production and product improvement all the way to the end of the model cycle. The work assignments are therefore every bit as diverse as the product portfolio.

Modern work environment: Prof. Dr.-Ing. Wilhelm Bauer, Dr. Jochen Haberland and Karl Unger (from right) conclude their tour in Technical Development building T02.



↙ ↘

**Digitalization is advancing quickly. It is important to develop employees – and ideally with the help of digital teaching aids.**

Prof. Dr.-Ing. Wilhelm Bauer

↗ ↖



## Flexibility

↘  
Part-time employees  
at AUDI AG

**1,287**

of a total of 28,067 employees  
in Production at AUDI AG

**1,815**

of a total of 28,907 office employees  
at AUDI AG

↘  
Multi-space office

Audi  
&  
the  
Fraunhofer  
Institute

### Modern workplaces at Audi

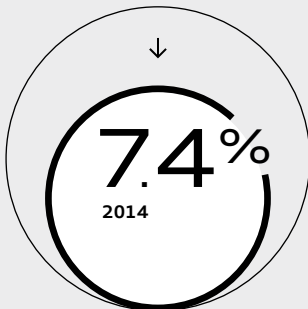
Together with the Fraunhofer Institute for Industrial Engineering (IAO), Audi has developed a visionary office and work concept for a new building at the Ingolstadt plant. The work environment will offer various work zones – from meeting rooms and seating areas for informal discussion to places where employees can retreat and concentrate on individual tasks.

↘  
Telecommuting

Germany is below the EU average and significantly behind other economically powerful countries when it comes to the share of employees working from home. Scandinavia is the leader here.

**10%**

2008



Employees in Germany  
who work from home

Source: Brenke, Karl (2016): Heimarbeit – Home Office: Möglichkeiten werden bei weitem nicht ausgeschöpft. In: DIW Wochenbericht, No. 5, Berlin, p. 95–105

## Work-life balance

↘  
Employee  
leave times for  
AUDI AG in 2015

**616**

employees took a sabbatical lasting  
an average of 8 months.

**2,362**

employees took parental leave –  
63% of whom were men.

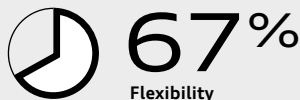
↘  
Generation Y

What does Generation Y expect  
from employers?

Source: Absolventa (2013): Die Generation Y und die Arbeitswelt, www.absolventa.de/karriereguide/infografiken/Infografik-geny (as of: April 12, 2016).



**80%**  
Work-life balance  
Collegial environment, parental  
leave, company sport program



**67%**  
Flexibility  
Telecommuting, flexible  
working hours, sabbatical

**19,947**

employees of AUDI AG belong  
to Generation Y.

## Training and development

↘  
Leave of absence  
for training at  
AUDI AG in 2015

**335**

Number of employees who were granted  
leave for non-work-related training with  
a promise of reinstatement

↘  
» In the future of produc-  
tion work, the people will  
act more strongly as con-  
ductors and coordinators  
of the plant. Machines  
will take over the heavy  
muscle-work and even  
some of the thinking.«

**Prof. Dr.-Ing. Gunther Reinhart**  
Head of the Institute for Machine Tools  
and Industrial Management (iwb) at the  
Technical University of Munich

↘  
Audi & Co.

Audi cooperates worldwide with more  
than 30 research establishments. The goal  
here is also to attract highly qualified  
young people to the Company. In 2015,  
more than 140 doctoral candidates pur-  
sued their doctorates in research projects  
funded by Audi.

## Internationalization

↘  
Experience is created  
through interaction

**1,406**

Number of Audi employees who were  
working as expatriates abroad in 2015

↘  
Diversity enriches the  
work environment

**> 100**

Employees from more than  
100 countries work at AUDI AG



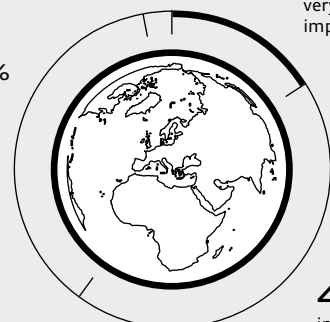
World of Work

↘  
How important are  
international assignments  
to Generation Y?

Source: Staufenbiel Institut GmbH (pub.) (2013):  
JobTrends Deutschland 2013 – Die Studie zu Entwicklungen  
am Arbeitsmarkt für Absolventen. Berlin, p. 76

**3%**  
unimportant  
**16%**  
very  
important

**37%**  
somewhat  
important



**44%**  
important



# Key figures

Audi uses key figures to make its sustainability activities measurable and present them in a transparent way. The following tables contain important key figures relating to our five CR core themes. The complete tables can be called up online at [www.audi.com/cr-report](http://www.audi.com/cr-report).

The figures for the years 2013 to 2015 apply to the calendar year and refer to the Audi Group. If key figures refer to individual Audi Group companies only, this is specified accordingly. Figures are rounded up or down, which may result in slight deviations from the totals stated.

	Unit	2013	2014	2015
<b>Operations</b>				
Revenue ✓	EUR million	49,880	53,787	58,420
Operating profit ✓	EUR million	5,030	5,150	4,836
Profit before tax ✓	EUR million	5,323	5,991	5,284
Profit after tax ✓	EUR million	4,014	4,428	4,297
Operating return on sales ✓	Percent	10.1	9.6	8.3
Return on investment (ROI) ✓	Percent	26.4	23.2	19.4
Total capital investments ✓	EUR million	3,680	4,500	5,700
Research and development activities ✓	EUR million	3,966	4,316	4,240
<b>Product</b>				
<b>Production</b>				
· Automotive segment ✓	Cars [1]	1,608,048	1,804,624	1,830,334
	Engines	1,926,724	1,974,846	2,023,618
· Motorcycles segment ✓	Motorcycles	45,018	45,339	55,551
<b>Deliveries to customers</b>				
· Audi brand [2] ✓	Cars	1,575,480	1,741,129	1,803,246
· Lamborghini brand ✓	Cars	2,121	2,530	3,245
· Ducati brand ✓	Motorcycles	44,287	45,117	54,809
<b>Product-related CO<sub>2</sub> emissions/consumption [3]</b>				
CO <sub>2</sub> emissions of the European fleet (EU 28) ✓	g/km	134	131	125 [4]
Fleet consumption, China (FBU) ✓	l/100 km	8.9	8.6	8.2
Number of Audi models ≤ 140 g CO <sub>2</sub> /km [5] ✓	Cars	150	205	188
Number of Audi models ≤ 120 g CO <sub>2</sub> /km [5] ✓	Cars	63	94	114
Number of Audi models ≤ 100 g CO <sub>2</sub> /km [5] ✓	Cars	11	15	24
<b>Environment [6]</b>				
<b>Energy</b>				
Total energy consumption [7] ✓	MWh	2,621,068	2,543,352	2,707,324
· Electricity ✓	MWh	1,459,401	1,520,710	1,583,466

✓ = Key figure adopted from the audited 2015 Annual Report of the Audi Group

✓ = Key figure verified in the course of auditing the 2015 sustainability data of AUDI AG

[1] Including vehicles built in China by the associated company FAW-Volkswagen Automotive Company, Ltd., Changchun (China) — [2] Including delivered vehicles built locally by the associated company FAW-Volkswagen Automotive Company, Ltd., Changchun (China) — [3] Based on regulation UN ECE R83/101 for the measurement of CO<sub>2</sub> emissions and fuel consumption. The CO<sub>2</sub> and fuel consumption figures specified are not affected by the diesel issue — [4] According to provisional calculations, the average CO<sub>2</sub> emissions of new vehicles newly registered in the European Union (EU 28) in 2015 was around 125 g/km — [5] All data apply to features of the German market (in each case year-end position) — [6] All key figures refer to the Ingolstadt, Neckarsulm, Brussels, Győr, Sant'Agata Bolognese and Bologna sites; since 2014 including component manufacturing in Münchmünster; 2015 figures are provisional — [7] Total energy consumption: This figure is made up of electricity and heat consumption



	Unit	2013	2014	2015
<b>Environment</b> (continued)				
· Heating (incl. district heating) ✓	MWh	829,500	703,595	764,178
· Combustion gases for production processes ✓	MWh	322,121	319,047	359,679
· Refrigeration (externally sourced) ✓	MWh	10,046	0	0
<b>Emissions</b>				
Total CO <sub>2</sub> emitted ✓	t	633,354	643,866	651,694
VOC emissions [8] ✓	t	2,041	1,959	1,774
Direct NO <sub>x</sub> emissions [9] ✓	t	184	187	194
CO <sub>2</sub> reductions in logistics [10] ✓	t CO <sub>2</sub> (e) [11]	11,086	11,443	12,502
<b>Water</b>				
Total freshwater consumption ✓	m <sup>3</sup>	3,702,249	3,867,569	4,044,587
· Freshwater consumption, internal catchment ✓	m <sup>3</sup>	1,735,291	1,989,956	1,988,622
· Freshwater consumption, externally sourced ✓	m <sup>3</sup>	1,966,959	1,877,614	2,055,965
Volume of wastewater ✓	m <sup>3</sup>	2,431,220	2,624,488	2,695,054
<b>Waste [12]</b>				
Total volume of waste (excluding scrap) ✓	t	78,815	82,285	87,872
· Recyclable waste ✓	t	65,274	68,279	73,775
· Disposable waste ✓	t	13,540	14,006	14,097
Metallic waste (scrap) ✓	t	332,294	345,855	353,741
<b>Employees</b> [13]				
<b>Workforce, Audi Group</b> ✓				
Total		71,781	77,247	82,838
· AUDI AG (excluding apprentices) ✓	Total	49,239	52,132	56,058
· Apprentices ✓	Total	2,363	2,421	2,486
<b>Average age, Audi Group</b> ✓				
Years		40.4	40.4	40.3
<b>Age structure, AUDI AG</b>				
< 30 years ✓	Percent	17.9	19.5	19.9
30 to 50 years ✓	Percent	58.0	56.3	55.3
> 50 years ✓	Percent	24.2	24.2	24.8
<b>Average length of service, AUDI AG</b> ✓				
Years		17.2	16.6	16.1
<b>Fluctuation rate</b> ✓				
Percent		0.4	0.5	0.5
<b>Proportion of women, AUDI AG</b> ✓				
Percent		14.1	14.2	14.8
<b>Proportion of women apprentices</b> ✓				
Percent		25.2	26.9	28.1
· Industrial apprentices ✓	Percent	22.1	23.3	24.6
· Clerical apprentices ✓	Percent	79.4	81.7	81.2
<b>Proportion of women in management</b> ✓				
Percent		8.0	8.3	8.9
<b>Other structural data, AUDI AG</b>				
<b>Proportion of academics</b> [14] ✓				
Percent		43.9	46.6	48.0
<b>Proportion of foreign nationals</b> ✓				
Percent		8.0	8.3	8.3
<b>Proportion of people with severe disabilities</b> ✓				
Percent		6.1	6.0	5.8
<b>Contracts to workshops for people with mental disabilities</b> ✓				
EUR million		6.5	6.6	6.8
<b>Frequency of accidents</b> [15] ✓				
-		2.9	3.1	3.9
<b>Attendance rate</b> [16] ✓				
Percent		96.3	96.3	96.0
<b>Audi profit share per employee</b> [17] ✓				
EUR		6,900	6,540	5,420
<b>Society</b>				
<b>Employee donations</b> [18] ✓				
EUR		1,074,000	1,160,000	1,226,000
<b>Expenditure on corporate citizenship</b> [19] ✓				
EUR		-	19,500,000	22,939,000

as well as the use of fuel gases for production processes and externally supplied refrigeration at the plants — [8] VOC emissions (volatile organic compounds): This figure is made up of emissions from the paint shops, test rigs and other facilities — [9] Direct NO<sub>x</sub> emissions: This figure comprises NO<sub>x</sub> emissions generated by the boiler houses at the plants, paint shops and by the operation of test rigs — [10] Transportation of cars from Ingolstadt to Emden, the port of loading on the North Sea coast, by CO<sub>2</sub>-free rail freight; since October 2012 also from Neckarsulm — [11] Specified in t CO<sub>2</sub>e since 2015 — [12] Our German plants participate in the statutory electronic verification procedure for waste management (eANV). Hazardous waste is not mixed with non-hazardous waste; the recycling and disposal of hazardous waste is monitored by the eANV. Key figures include non-production-specific waste — [13] The employee figures are annual averages — [14] With respect to indirect employees — [15] The accident frequency figure indicates how many industrial accidents involving one or more days' work lost occur per million hours worked — [16] The attendance rate is calculated using the formula 100 - (sick days/payment-relevant days) × 100 — [17] Bonus paid in the following year; average figure for pay-scale employees at AUDI AG — [18] Christmas donation (topped up by the Company) and Spare Cents donation; initiated by the Works Council. Donations are collected throughout the fiscal year, the complete amount may also be paid out in the following year — [19] Key figure recorded since 2014. Includes all expenditures in the areas of education, science and socially relevant projects; including donations; not including sponsorship and research



## Audit report

### Independent Practitioner's Limited Assurance Report

#### To AUDI AG, Ingolstadt

We have been engaged to perform a limited assurance engagement on the sustainability information marked with "✓" in the interim reporting of sustainability information (hereafter the "Interim Report") of AUDI AG, Ingolstadt (hereafter the "Company") for the business year from January 1st, to December 31st, 2015. [1]

#### Management's Responsibility

Company's Management is responsible for the preparation and presentation of the Interim Report in accordance with the relevant criteria regarding the scope of our review (completeness, clarity, accuracy, timeliness, comparability and reliability), as set out in the G4 Sustainability Reporting Guidelines of the Global Reporting Initiative (GRI) (hereafter the "relevant Criteria") and for the selection of the information to be assessed.

This responsibility includes the selection and application of appropriate methods to prepare the Interim Report as well as the use of assumptions and estimates for individual sustainability disclosures which are reasonable in the present circumstances. Furthermore, the responsibility includes designing, implementing and maintaining systems and processes relevant for the preparation of the Interim Report, which is free of material misstatements due to intentional or unintentional errors.

#### Audit Firm's Independence and Quality Control

We have complied with the German professional provisions regarding independence as well as other ethical requirements.

The audit firm applies the national legal requirements and professional standards – in particular the Professional Code for German Public Auditors and German Chartered Auditors ("Berufssatzung für Wirtschaftsprüfer und vereidigte Buchprüfer": "BS WP/vBP") as well as the joint opinion of the Wirtschaftsprüferkammer (Chamber of German Public Auditors; WPK) and the Institut der Wirtschaftsprüfer (Institute of Public Auditors in Germany; IDW): Requirements to quality control for audit firms ("Gemeinsamen Stellungnahme der WPK und des IDW: Anforderungen an die Qualitätssicherung in der Wirtschaftsprüferpraxis": "VO 1/2006") – and accordingly maintains a comprehensive system of quality control including documented policies and procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements.

#### Practitioner's Responsibility

Our responsibility is to express an opinion on the sustainability information marked with "✓" in the Interim Report based on our work performed.

We conducted our work in accordance with the International Standard on Assurance Engagements (ISAE) 3000 (Revised): "Assurance Engagements other than Audits or Reviews of Historical Financial Information" published by IAASB. This Standard requires that we plan and perform the assurance engagement to obtain limited assurance whether any matters have come to our attention that cause us to believe that the sustainability information marked with "✓" in the Interim Report has not been prepared, in all material respects, in accordance with the relevant Criteria.

In a limited assurance engagement the evidence-gathering procedures are more limited than for a reasonable assurance engagement and therefore significantly less assurance is obtained than in a reasonable assurance engagement. The procedures selected depend on the practitioner's judgement. This includes the assessment of the risks of material misstatements of the sustainability information marked with "✓" in the Interim Report with regard to the relevant Criteria.

Within the scope of our work we performed amongst others the following procedures:

- ▶ Inquiries of personnel at the corporate head office and at the production site in Ingolstadt in charge of the data collection and consolidation of sustainability information regarding the underlying internal control system and selected information in the Interim Report
- ▶ Inspection of supplemental documents and supporting systems
- ▶ Analytical procedures on selected sustainability information of the Interim Report
- ▶ Comparison of selected sustainability information with corresponding data in the consolidated financial statements and in the group management report
- ▶ Assessment of the presentation of selected sustainability information in the Interim Report regarding the sustainability performance
- ▶ Inquiries of personnel involved in the preparation of information in the Interim Report concerning fleet emissions and fuel consumption as well as comparison of selected information on fleet emissions and fuel consumption with the official documents of the certification authorities

#### Conclusion

Based on our limited assurance engagement, nothing has come to our attention that causes us to believe that the sustainability information marked with "✓" in the Interim Report of the Company for the period from January 1st to December 31st, 2015 has not been prepared, in all material respects, in accordance with the relevant Criteria.

#### Additional Notice – Interim Reporting

Without qualifying our opinion, we draw attention to the fact that as pointed out by AUDI AG in the printed version of the Interim Report, the Interim Report does not represent a complete sustainability reporting in accordance with the G4 Sustainability Reporting Guidelines of the Global Reporting Initiative. The Interim Report is essentially the update of last year's key performance indicators. Against the backdrop of the diesel emissions issue it would have been required for a complete sustainability reporting, as envisaged in the reporting year 2016, to adequately consider the diesel emissions issue on the basis of an updated materiality analysis.

#### Restriction on Use and Distribution

We issue this report on the basis of the engagement agreed with AUDI AG. The review has been performed for purposes of AUDI AG and is merely intended to inform AUDI AG about the results of the review. The report is not intended for any third parties to base any (financial) decision thereon. Our responsibility pertains solely towards AUDI AG. We do not assume any responsibility towards third parties.

Frankfurt, April 15, 2016

PricewaterhouseCoopers  
Aktiengesellschaft  
Wirtschaftsprüfungsgesellschaft



Michael Conrad  
Wirtschaftsprüfer  
(German Public Auditor)

ppa. Heinke Richter

[1] Our assurance engagement applies to the German version of the Interim Report.



**None of us  
is as smart as  
all of us.**

Kenneth Blanchard



**AUDI AG**

85045 Ingolstadt  
Germany  
Phone +49 841 89-0  
Fax +49 841 89-32524  
email [zentrale@audi.de](mailto:zentrale@audi.de)  
[www.audi.com](http://www.audi.com)

Prof. Dr.-Ing. Peter F. Tropschuh  
Head of Corporate Responsibility  
I/GX  
email [cr@audi.de](mailto:cr@audi.de)  
[www.audi.com/cr](http://www.audi.com/cr)