

Audi Stakeholder Forum 2018
“Sustainable Electric Mobility”
- Documentation -

DRIVE. Volkswagen Group Forum
Berlin, September 24, 2018



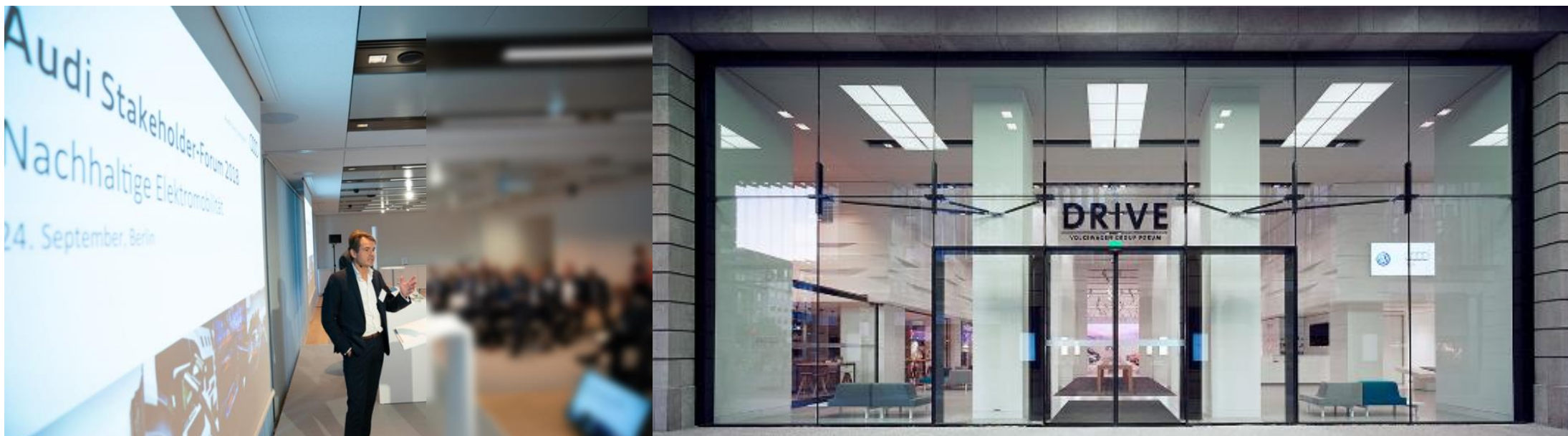
Audi Stakeholder Forum 2018 “Sustainable Electric Mobility”

Electrification of the drivetrain is a central element on the path to sustainable mobility. In addition to the opportunities this presents, Audi is working intensively on current issues of sustainability and the resulting challenges along the value chain. More than ever, consolidating knowledge and competences in the field of sustainable electric mobility requires networking and cooperation. That is why Audi considers this dialog to be part of its corporate responsibility and chose sustainable electric mobility as the theme for this year’s Stakeholder Forum.

Around 60 stakeholders discussed the opportunities and challenges of sustainable electric mobility. The key themes of the event were discussed in three parallel workshops: Circular Economy – Concepts and Processes, Battery – Technologies and Innovation, Utilization Phase – Charging Infrastructure and Customer Attractiveness.

The Audi Stakeholder Forum is characterized by an intensive and open exchange of ideas and information between experts. As a result, the Forum produces important stimulus for Audi as the host, but also for all those who take part, on how e-mobility can and must be reinforced as a key issue for the future.

The event was moderated by Jürgen Pfeiffer.



The Program at a Glance

The focus at the 2018 Audi Stakeholder Forum was placed on exchanges between industry representatives, business partners, scientific institutions and experts from various business units of AUDI AG that are involved in aspects of electric mobility.

At the heart of the whole-day event were three workshops on key issues to do with sustainable electric mobility. On the basis of specific central questions that formed the focus of each workshop, the participants conducted analyses, weighed the arguments and identified the most important approaches for promoting electric mobility in Germany and internationally for Audi and for the industry.

An outline of the 2018 Audi Stakeholder Forum

Welcome by host Prof. Tropschuh and moderator J. Pfeiffer

Keynote by Prof. Tropschuh and M. Bayer (AUDI AG): “Going Electric – What It Takes to Get e.ready”

Keynote by Prof. Stuchtey (SYSTEMIQ): “A Good Disruption – Shifting Towards Resource-Productive Growth”

Three simultaneous workshops “all about the electric car” with a thematic focus on:

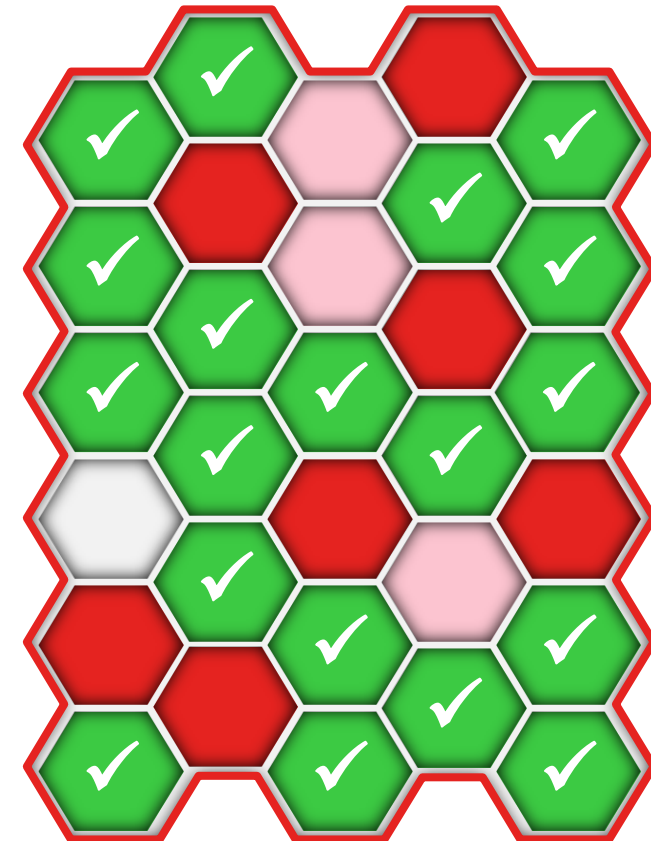
- › Circular Economy – Concepts and Processes
- › Batteries – Technologies and Innovations
- › Utilization Phase – Charging Infrastructure and Customer Attractiveness

Presentation of workshop results in the panel

Discussion by the experts and outlook

Get-together with all participants

Prior to the event, we used an app to survey our guests about their expectations and involved the attendees in the discussions by holding votes during the event.



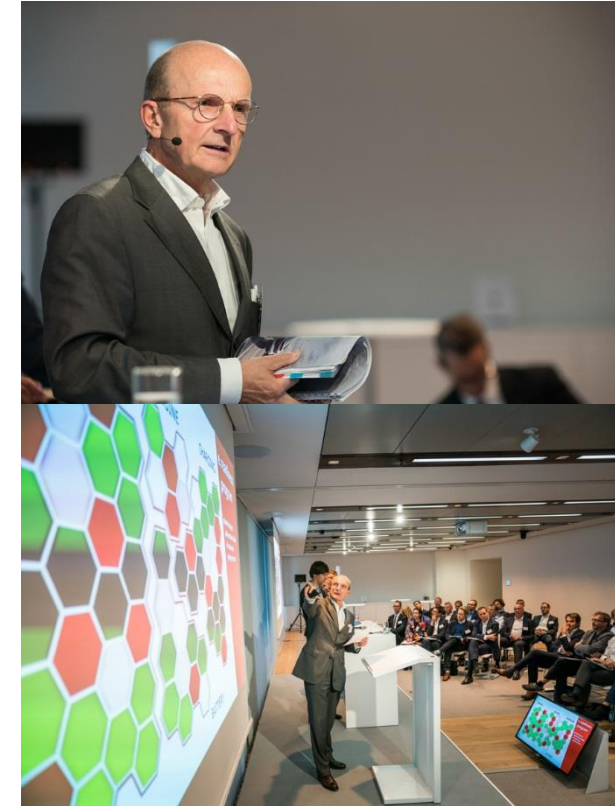
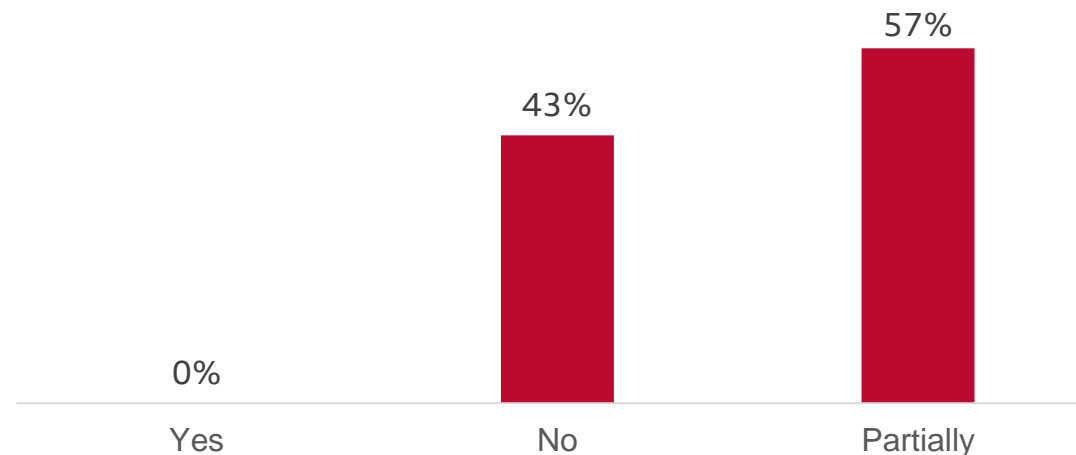
Keynote “Going Electric – What It Takes to Get e.ready”

Prof. Peter F. Tropschuh, Head of Corporate Sustainability Strategy, AUDI AG

Michael Bayer, Head of Concepts for HV Storage Systems & Cell Module Development, AUDI AG

In their keynotes, Prof. Tropschuh and Mr. Bayer first took stock of the company’s last two years. Tropschuh gave a brief progress report on some of the challenges:

- “Plants must be converted for e-mobility very soon—production 4.0.” Audi is now producing its first fully electric vehicle at its Brussels site. Other production sites are getting ready to manufacture additional electric vehicles. For instance, the Audi e-tron GT will be manufactured in Böllinger Höfen in Neckarsulm starting in 2020.
- “Closed-loop raw materials has to be the goal”: Audi has already launched some projects and is working on comprehensive solutions. A milestone was reached in 2018: Assembly and manufacture of the aluminum components for the Audi e-tron battery housing are sustainable. For this achievement, Audi was the world’s first automaker to receive a certificate from the Aluminium Stewardship Initiative (ASI).
- The most important consequence for Audi was the start of the in-house eReadiness program in 2016. The program includes 69 specific tasks that were explained in more detail during the speech.



◀ **Voting by participants**
Are we doing enough to make a success of sustainable (electric) mobility?

Keynote “A Good Disruption – Shifting Towards Resource-Productive Growth”

Prof. Martin Stuchtey, Co-Founder & Managing Partner, SYSTEMIQ Ltd.

Key statements from Martin Stuchtey’s presentation:

Since the start of industrialization, economic growth went hand-in-hand with the rising consumption of resources—the economic, environmental and social costs to our current production and consumption model grew. These costs—which were previously externalities—are increasingly being transferred back by society to consumers and producers. In this new global context, resource efficiency will become a winning strategy for national economies, industries and companies. A change in the consumption of resources must go beyond incremental improvements of a sustainability strategy and requires a more radical approach.

There are six levers that companies can choose from in order to reduce their dependency on non-renewable resources: Regenerate, Share, Optimize, Loop, Virtualize and Exchange (ReSOLVE levers). This decoupling from resources is accompanied by an important step: the transition from the product economy to a service economy.

An example of a radical decoupling strategy and the related potential benefits of a service economy is the car itself (cars are used only for 2% of their life cycle). Consumer goods should therefore be recycled. Solutions for recirculating consumer goods must be developed and implemented to an ever greater extent. We can already see today that companies are rethinking the established ways of making profits and looking for new forms of added value.

The circular economy is designed to operate within the boundaries of the planet’s capacity. Stuchtey encouraged all participants to think about what the changes in policy, industry and society will have to look like in order to create a new ecosystem for electric mobility based on the principles of a regenerative and circular economic model. Stuchtey describes the paradigm change to a circular economy as a “systemic change”—a complex problem that we must tackle together.



Overview: Three Workshops on the Challenges of Electric Mobility

Workshop 1: Circular Economy – Concepts and Processes

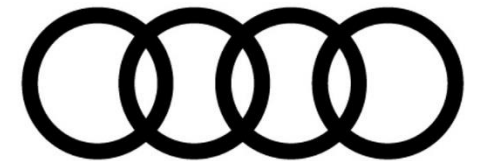
- What expectations are there for the circular economy, and how can this be meaningfully quantified in the automotive industry?
- What approaches can digitalization take to promote the circular economy?
- What steps have to be taken today, and what role(s) should an OEM play with a focus on electric mobility?

Workshop 2: Batteries – Technologies and Innovations

- How should batteries be assessed in terms of their sustainability performance, especially in comparison with alternative technologies?
- What parameters should be used to measure the effectiveness of the circular economy in the case of e-mobile solutions?
- For what tasks should joint approaches be developed—at the domestic, European and international level?

Workshop 3: Utilization Phase – Charging Infrastructure and Customer Attractiveness

- In what way do we have to (re)build in order to strengthen electric mobility infrastructure?
- What conditions for users and service providers will increase interest in charging?
- What charging innovations make sense to ensure that the customer is most likely to enjoy a positive “electric experience in their everyday life”?



Workshop 1: Circular Economy – Concepts and Processes

Host: Audi - Dr. Hagen Seifert, Sustainable Product Development

Moderation: Thomas Sommereisen, Scholz & Friends Reputation

Task: Sustainability challenges in the manufacture and recycling of e-mobile solutions

Key questions:

1.1 Circular economy: expectations & quantification

What expectations are there for the circular economy, and how can this be meaningfully quantified in the automotive industry?

1.2 Circular economy & digitalization

What approaches can digitalization take to promote the circular economy?

1.3 Circular economy & sector coupling

What steps have to be taken today, and what role(s) should an OEM play in this process? (Focus on electric mobility)

Excerpt from key workshop findings and stakeholder expectations:

- **A vision is needed for CE**

Companies must define and communicate their CE vision in which they show their goals, their own roles and the involvement of suppliers. This will bridge the gap between society's "big picture" and everyday business operations.

- **Digitalization in its infancy**

Digitalization is a necessary tool for implementing and reinforcing CE, but its development has just begun. Specific applications are not yet available.

- **"Closing the loop" with clear roles**

Closed loops cannot function unless return concepts are developed, and dealers and suppliers get involved with clear roles. The use of recyclates can be increased greatly but requires changes to formal specifications.

Note: In October 2018, the Board of Management of AUDI AG resolved to significantly increase the targets for recyclates and renewable raw materials in order to conserve resources.

- **The industry, not individuals, has leverage**

A standard industry solution can set the central course, which is why Audi welcomes industry initiatives. Cooperation with startups and research partnerships with universities on CE also provide food for thought and can contribute to great progress.



Workshop 2: Batteries – Technologies and Innovations

Host: Audi - Michael Bayer, Concepts for HV Storage Systems & Cell Module Development

Moderation: Michael Werner, Scholz & Friends Reputation

Task: Viable approaches to develop innovative e-mobile solutions

Key questions:

2.1 Batteries & technical alternatives

How should batteries be assessed in terms of their sustainability performance, especially in comparison with alternative technologies?

2.2 Batteries & future developments

What parameters should be used to measure the effectiveness of the circular economy in the case of e-mobile solutions?

2.3 Batteries & new partnerships

For what tasks should joint approaches be developed—at the domestic, European and international level?

Excerpt from key workshop findings and stakeholder expectations:

- **The move toward a service economy**

Stakeholders expect OEMs to move from a product economy to a service economy. The life cycle of a product (first life) should be as long as possible. For second-life applications, all consumables including batteries should be kept in small loops. For batteries, access is uncertain, but a recycling quota can help.

- **Key materials in the spotlight**

The manufacture of plastic, steel, cement and aluminum alone emits huge amounts of CO₂. This is where companies should focus with regard to the two-degree goal.

- **Controlled supply chains**

The supply chains should be verified with certificates and expert opinions. A critical point is cobalt, used for cathodes in battery cells. Alternative materials are important.



Workshop 3: Utilization Phase – Charging Infrastructure and Customer Attractiveness

Host: Audi - Alexander Claus, Product Marketing for Electrification

Moderation: Christiane Stöhr, Scholz & Friends Reputation

Task: Promote e-mobile solutions in our society

Key questions:

3.1 Use & urban architecture

In what way do we have to (re)build in order to strengthen electric mobility infrastructure?

3.2 Standards & regulation

What conditions for users and service providers will increase interest in charging?

3.3 Activation of use

What charging innovations make sense to ensure that the customer is most likely to enjoy a positive “electric experience in their everyday life”?

Excerpt from key workshop findings and stakeholder expectations:

- **Harmonization of standards for the charging infrastructure**

Different technical solutions and billing systems should be harmonized and simplified. Controlled charging will become an essential function for storing and distributing energy. Lawmakers must provide the appropriate framework to this end.

- **Charging at every opportunity**

The charging process and time restrictions are the largest obstacle to customer acceptance at present. Instead of long charging times, we need “casual charging opportunities” so that customers can easily fit this into their day. The idle times during charging should be used sensibly in order to provide a positive charging experience.

- **Amendments to construction laws with regard to electric mobility**

A comprehensive infrastructure for charging cannot be provided unless construction projects automatically plan and account for conduits. This should be part of the construction regulations.

- **Multi-sector data exchange**

At present, there is no cooperation among energy companies, OEMs and the mineral oil industry when it comes to data exchange. For instance, to date there is no exchange of root certificates between OEMs and the energy sector. Data certificates should be issued for multiple sectors where possible.



Panel and Discussion (1/2)

Panel guests

- **Prof. Peter F. Tropschuh** (Head of Corporate Sustainability Strategy, AUDI AG)
- **Sebastian Stegmüller** (Head of Mobility Innovation, Fraunhofer-Institute for Industrial Engineering IAO)
- **Stefan Crets** (Executive Director, CSR Europe)
- **Jürgen Pfeiffer** (Moderation)

A sampling of ideas discussed

- Can we make better progress with more legal requirements? Politicians are in charge of setting the legal framework, and the industry is in charge of offering sustainable, customer-friendly solutions.
- E-mobility cannot be sustainable unless renewable energy is used for the power supply. The required infrastructure must be comprehensive and in place internationally.
- Hydrogen remains an alternative as a future drive model. This would be easy to implement especially in heavy manufacturing.
- Strategic cooperation among competitors could help solidify society's acceptance of electric mobility. A national platform as an industry initiative could greatly improve the circular economy.
- We must focus clearly on the user perspective. We must recognize customer wishes/concerns and implement the available solutions. The "range anxiety" for e-mobility can be overcome by "casual charging."

Survey using the event app:

What social and political steps have to be taken in your opinion for the change to an "electro-friendly society" to succeed?

CO₂ tax, abolition of commuter tax allowance, active management of mobility coordination

Establishment of an adequate charging infrastructure

Can we (the automotive sector) do more?
If yes, what?

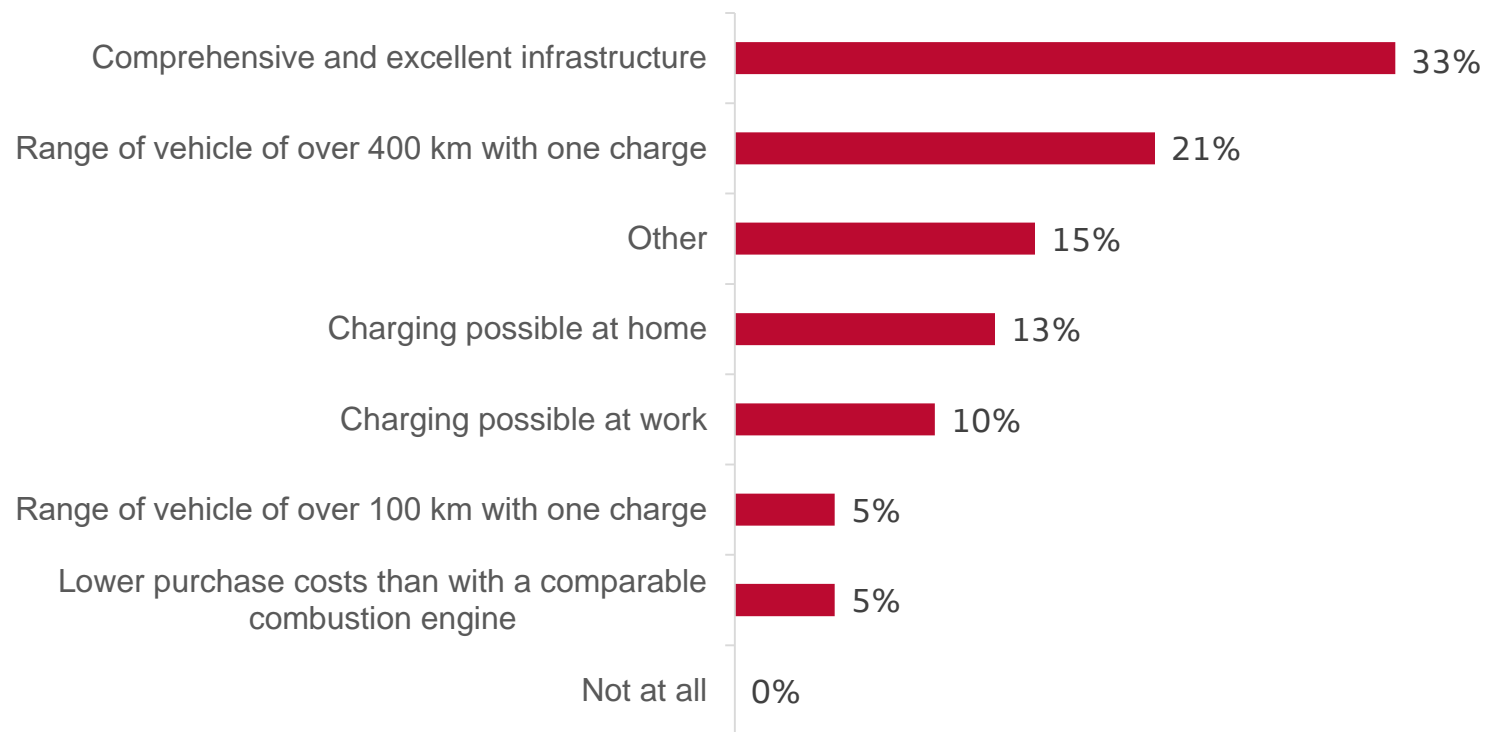
An end-customer focused mobility provider should also offer infrastructure, platform, etc.
—not just the product

We must face the challenges in a more consistent and proactive manner. Shape the future with new ideas.

Panel and Discussion (2/2)

Voting by participants

Under what conditions would you personally be prepared to switch to an electric vehicle?

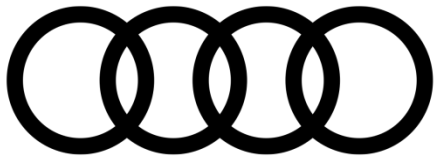


Survey using the event app:

What influence should an automotive company exert to strengthen electric mobility?

Offer exciting vehicles at attractive prices in all segments

The advantages of electric mobility should speak for themselves; this is not a job for the automotive companies



Questions or suggestions on the content? Get in touch!

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