VDMA Fuel Cells Survey 2019

Economic Situation and Outlook of the Fuel Cell Industry in Germany

Revenues, Employment and Systems in Stationary Applications and Stack components

Dr. Manfred Stefener, Chairman
Gerd Krieger, Managing Director

VDMA Fuel Cells
Preliminary note

» Survey carried out every 2 years since 2009

» Nearly 50% of the members also participated in 2019, a total of 30 answers, with a focus on stationary systems and stack components (see chart).

» Market ramp-up in the mobility and electrolysis sectors begins, but is not (yet) reflected in sales and unit numbers. Focus is to firm-up supply chain.

» German importance as location for world-leading scientific institutes is also insufficiently reflected in figures

» Development depends strongly on regulatory conditions in Germany/EU as well as North America and Asia. This complicates statements for 2024! Companies continue to expect high growth rates.

» Longer-term forecasts from 2030 onwards, gives a clearer picture. For deep decarbonisation the importance of H2 and fuel cells will grow strongly.
VDMA Fuel Cells – Survey 2018/2019

Participants

- systems for transport applications
- systems for stationary applications
- systems for early markets
- stack / stack components
- system components
- manufacturing technologies
- Institutes

Multiple answers allowed
VDMA Fuel Cells – Survey 2018/2019
Revenues – Stationary and Early Markets in Germany in Million Euro

Revenues from production in Germany

Mio. Euro

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<tr>
<th>Year</th>
<th>Survey</th>
<th>Additional Estimation VDMA</th>
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Back on Track
VDMA Fuel Cells – Survey 2018/2019
Employees – Stationary and Early Markets in Germany

Employees in Germany

- Survey
- Additional estimation VDMA

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<th>Year</th>
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Yearly employment growth from 2018 to 2024.
The industry expects high growth rates the next years
Fuel Cell Industry Review 2018

Franz Lehner
Hannover, 3 April 2019

E4tech’s annual Fuel Cell Industry Review
www.FuelCellIndustryReview.com
2018 was a good for fuel cells and hydrogen: Shipment numbers grew further, lots of groundwork was laid, serious players entered and invested in the sector

Buses and other heavy-duty applications are starting to get real traction

Costs are coming down, and the supply chain is starting to firm up

Announcements are frequent and sometimes big:
- Toyota 30,000 units/yr 2020
- Hyundai 40,000 units/yr by 2022

China is important: Strong policy and desire, good opportunity but rapid/chaotic evolution

Europe has seen a number of larger power-to-X/hydrogen projects being announced

Subsidy ‘carrots’ and regulatory ‘sticks’ still play an important role for the current fuel cell market

Fuel cell industry remains in flux, and the next two years will be very important
Data from the Fuel Cell Industry Review show how vehicle unit shipments have increased, and their major impact on MW shipped.

Shipments by application 2014 - 2018 (1,000 units)

- **Mainly mCHP units in Japan**, some back-up power systems
- **Many forklifts and cars**, some trucks and buses

Megawatts by application 2014 - 2018

- **Mainly 100kW+ systems in US and Korea**, plus mCHP in Japan
- **Mainly cars**

Full annual report available for download (free):
www.fuelcellindustryreview.com
Asia and North America dominate the deployment, with Asia leading by far in manufacturing. Europe is small but growing.

Shipments by region of adoption 2014 - 2018 (1,000 units)

Megawatts by region of adoption 2014 - 2018

Mainly <1kW EneFarm units in Japan

Cars and large stationary units

Full annual report available for download (free):
www.fuelcellindustryreview.com
Conclusion

» Unit numbers, turnover and employment increase. Export ratio growing, especially in the components sector and in the direction of China and South Korea.

» The main pillar for German Fuel cell manufacturers is currently further development in the building sector and in special markets (UPS). Existing programmes (Technologieentwicklung-Program KfW 433, NOW/NIP II) must be continued here.

» The next two years will decide whether it will be possible to create a stable market perspective on the basis of the technical knowledge built up over the last decade and the experience gained from demonstration projects. In the mobility sector the focus will not be on the passenger car, but rather on light- and heavy-duty applications.

» If this does not succeed in Germany/EU, the industrial policy opportunity of a German fuel cell industry will be squandered!
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