



H2-international – e-Journal

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South Korea Invests in Fuel Cells

Green growth and little carbon

Global Market

Since 2008, South Korea has aggressively pushed the development of the fuel cell markets for stationary and mobile use. The driving factor behind the government's decision was the global economic crisis, which led to an equally painful economic downturn in Asia. In the country officially called the Republic of Korea, it awakened dark memories of the Asian economic crisis at the end of the 1990s, as this one had just occurred a decade ago and had forced the republic to instigate sweeping changes in the financial and economic sector in order to avoid a sovereign default. With 2008's Low Carbon, Green Growth program, the government again paved the way for a structural change of the economy, this time toward "green" technologies. Today, South Korea is one of the world leaders in the IT, shipbuilding and automotive industry.

Fig. 1: 400 kW modules by Doosan Fuel Cell to generate electricity at the Korea South-East Power Company



Source: Doosan Fuel Cell Korea

As one could guess from the name of the program, the country has since pushed forward the expansion of renewable energies and alternative energy technologies, especially for power generation and transport. The new and renewable energies (NRE) entail PV and solar thermal, wind, water and wave energy, geothermal and biomass, and alternative energy technologies, such as fuel cells and hydrogen as well as the liquefaction and gasification of coal. Besides the aim of creating new,

high-growth business fields and, consequently, jobs by focusing on these new energy technologies, South Korea also intends to reduce its imports of the fossil fuels oil and coal with it (the country does not have any resources of either) and, at the same time, combat climate change. The country ratified the Kyoto Protocol in 2002 and has since had to find a sustainable path to lower GHG emissions.

When the government program was passed, the share of renewable energies was around just two percent. By 2020, this share is to increase to eleven and by 2050, to 20%. Today, it is close to 3.5 percent, according to the Korean Ministry of Trade, Industry and Energy. This means that South Korea lags far behind the renewable energy expansion targets of Germany or the EU (D: 35% by 2020, 55-60% by 2035 and 80% by 2050 – EU: 20% by 2020, 27% by 2030). However, the country's share of nuclear power is around 25 percent in total electricity generation. And that may only change under very specific circumstances, since South Korea is still a strong proponent of the technology.

Large fuel cell plants

To meet the NRE expansion targets as specified in the government program, South Korea has created various subsidy or incentive programs for the power industry and for building and transportation since 2011. Fuel cells play an important role in generating electricity. By the end of 2014, South Korea had installed large fuel cell plants with a total capacity of 177 MW, of which 43 MW were produced in the power industry. In South Korea, fuel cells have been so popular because the installation of large-capacity plants requires considerably smaller plots than, say, PV systems. This is an immensely important factor in a country which has one of the world's highest population densities. Besides power generation, fuel cell plants have become a crucial part of decentralized energy supply, especially in buildings.

Building energy supply is divided into private (apartments, industry) and public use (administrative, school buildings, public institutions, such as residential homes and hospitals). The South Korean government provided USD 554 million in 2015 for the further expansion of fuel cell plants. But since the NRE program was introduced in 2011, incentives have decreased continually.

These are the currently running subsidy programs:

- 1 Million Green Homes Project

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This subsidy program aims at equipping 10% of the altogether around 22 million South Korean households with NRE systems by 2020. So far, it has supported the installation of 2,249 fuel cell units with a total electrical capacity of 1,498 kW.

- Installation of NRE Technologies in Large Newbuilds (e.g., schools, administrative and office buildings, as well as hotels)

Since 2009, NRE systems with a total capacity of 920 kW have been installed at 80 newbuilds. Thirteen of these buildings were equipped with fuel cell systems (total capacity: 168 kW).

- Feed-in-Tariff FIT for power from NRE systems (discontinued)

From 2001 to 2011, the country paid the difference between the market price of electricity (set by the government) and the marginal cost of NRE systems for 15 to 20 years. During those ten years, the program prompted the installation of 2,089 plants with a total capacity of 1,030 MW. The figure includes 20 fuel cell systems of altogether 50.5 MW.

- Renewable Portfolio Standard (RPS)

Seventeen energy suppliers which generate at least 500 MW per year have so far been subjected to this standard, which requires them to produce part of their electricity by NREs (the 2016 share is 3.5%; by 2022, it is planned to increase to 10%). Within two years, the program achieved 1.7 times the installed capacity of the decade-long FIT program. The main goal of the RPS is to increase the number of PV systems, but it also led to the installation of 26 fuel cell systems with a total capacity of 163 MW until the end of 2015.

- Program for Technology Development and Cost Reduction

This program is primarily based on the Hydrogen City Ulsan project. The aim has been to design a decentralized energy supply system for an entire part of a city based on hydrogen and fuel cell technology. The hydrogen required for it is available as a byproduct of the chemical plants located in Ulsan and is being distributed through a network of pipes. The households as well as various private and public buildings that have a fuel cell system installed have been connected to the piping, while the byproduct (hydrogen) is also delivered after processing to H₂ stations in the suburb for electric car refills and used by the energy providers participating in the RPS program (Hyundai's factory, which manufactures the ix35 Fuel Cell model for all markets worldwide, is also based in Ulsan.).

Fuel cells in transportation

Besides the market introduction of fuel cell vehicles, the primary goal in transportation in South Korea – as almost everywhere else – is to set up H₂ filling stations and the related infrastructure for creating, supplying and distributing hydrogen. The vehicles are all from South Korea's leading carmaker, Hyundai, which has been researching and developing fuel cell engines since 1998. By its own account, Hyundai had so far manufactured more than 600 SUVs and buses and demonstrated the potential of the engine technology. Between 2009 and 2013, the company tested a small series of 100 Tucson fuel cell models in South Korea. The trial run experiences were used as a basis for the design of the carmaker's first official fuel cell model, the ix35 Fuel Cell, which Hyundai presented to a global

audience in February 2013 and which it has since offered to customers for leasing, especially in the US and Europe.

The South Korean government allocated around nine million US dollars in 2015 to establish an H₂ infrastructure. It also decided to support the expansion of a sustainable domestic market for vehicles and a change in the current automotive environment as part of its “third program to develop and use eco-friendly vehicles” (runs from 2016-2020). The aim is to put 9,000 fuel cell cars on the road during the program run. Thus, the government supports investments in fuel cell-electric vehicle technologies, the expansion of the related H₂ infrastructure and awareness-raising among the public, while also aligning the relevant legislation with these goals.

Establishing a national fuel cell industry

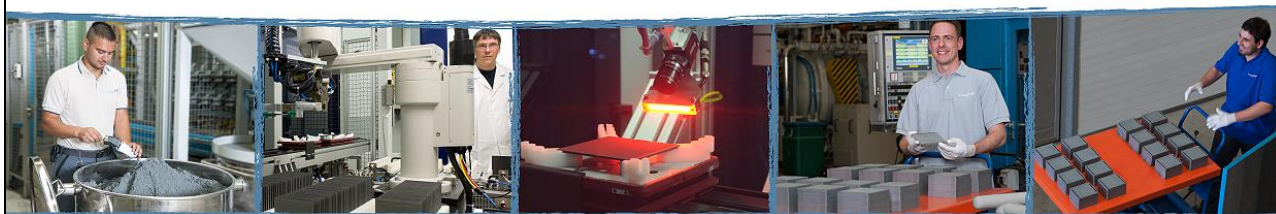
South Korea has shown great interest in building up its own industry for fuel cell systems, including development, manufacturing and installation. The strong growth of the South Korean fuel cell market over the past years has primarily been a result of acquisitions of or joint ventures with North American fuel cell companies. The first company that deserves a mention here is South Korean conglomerate Doosan, which took over US fuel cell manufacturer ClearEdge Power (formerly, UTC Power) in 2014. In 2012, South Korean electronics corporation LG acquired a 51% stake in American Rolls-Royce Fuel Cell Systems. Together, the two companies have been developing SOFC systems for power generation, which are said to be used for the first time in South Korea in 2017. And since 2007, US fuel cell producer FuelCell Energy has been in close collaboration with one of the largest private energy providers in the country, Posco Energy.

Canadian fuel cell manufacturer Hydrogenics founded a joint venture together with South Korean energy utility Kolon Water & Energy in 2014, in order to install and operate PEM-based systems in Korea. During the same year, American fuel cell company Plug Power and South Korean steel corporation Hyundai Hysco signed a declaration of intent to jointly develop and distribute fuel cells on the Asian markets during a five-year partnership.

Author: Alexandra Huss

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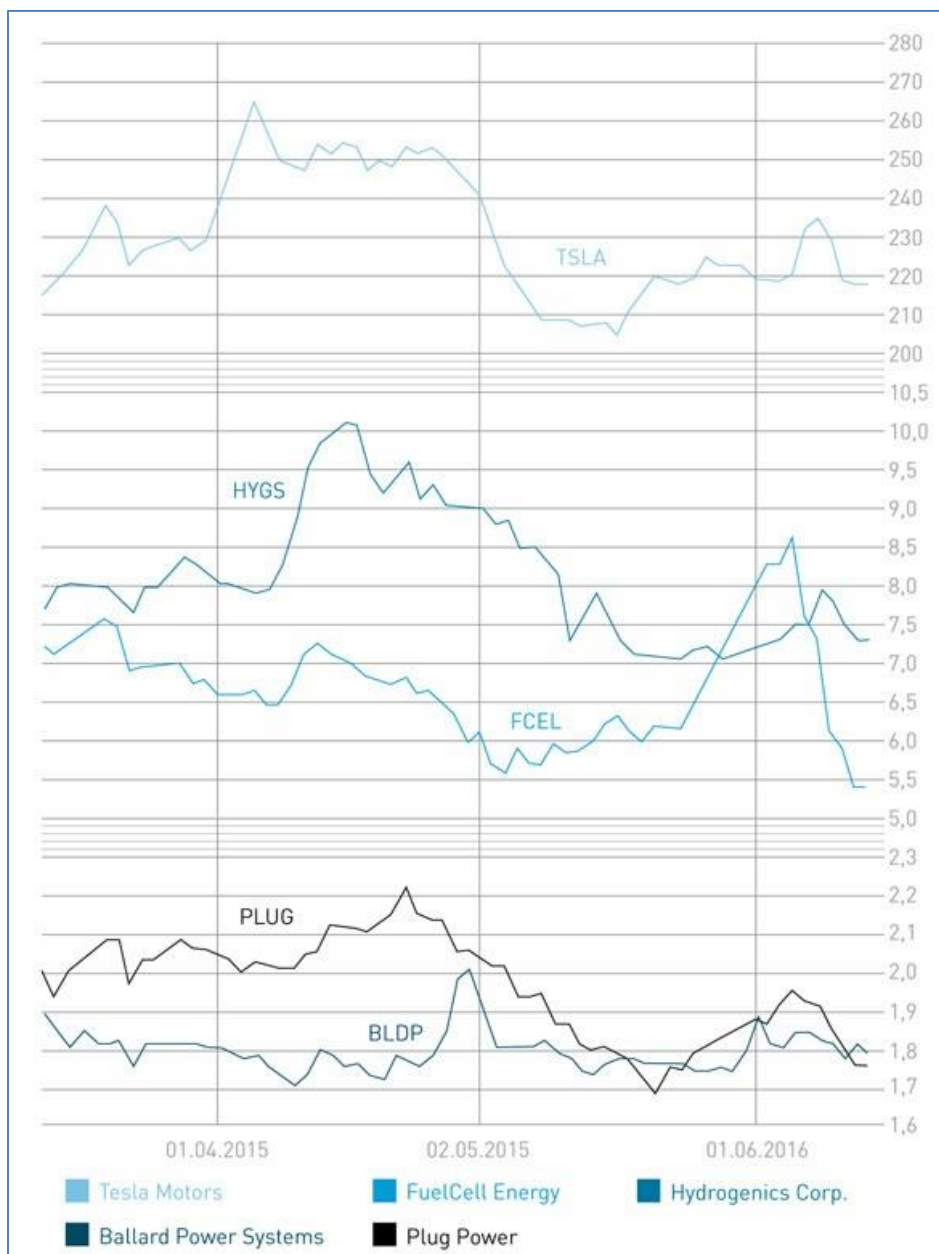
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Hydrogenics, Alstom and H₂ Trains

If one takes into account order bookings, collaborations, product developments and prospective markets, buying shares of fuel cell companies looks ever more promising. But the capitalization of the market leaders in fuel cells described in this article amount to a mere USD 750 million – a stark contrast to Tesla, the electric car pioneer, which has a market cap of USD 34 billion. These companies may very well get closer over the coming years, if Tesla gradually loses in value while fuel cell shares increase considerably in price. This can happen as soon as people become increasingly aware of the fact that fuel cells combined with “green hydrogen” represent a serious and growing competition to battery-only systems.

Fig. 1: Share price development of the five companies quoted on the stock market



Historical prices from June 15, 2016, © www.wallstreet-online.de

Hydrogenics partner Alstom announced that it considered itself a frontrunner in hydrogen-driven railway vehicles and that it would present a world novelty at a German industrial trade show over the coming months. Additionally, the company had actual bookings in the pipeline (in the German state of Lower Saxony). Has Alstom's management not been aware of Ballard's considerable progress in the field in China? Doesn't matter. All in all, it's certainly good news for Hydrogenics, since the train design will likely require their fuel cell know-how. And: The Canadian section of professional service firm PriceWaterhouseCoopers presented Hydrogenics with the Vision to Reality Innovator of the Year Award for its highly innovative technological developments. Definitely a good sign!

The company has additionally received an order from SinoHytec (years-long collaboration) with a total contract value of USD 13.5 million. The sum is for supplying the company's Chinese partner with fuel cell stacks for buses and trucks in 2016 and 2017. Over the next five years, the volume is expected to increase to USD 100 million.

Risk warning

Investors must understand that buying and selling shares is done at their own risk. Consider spreading the risk as a sensible precaution. The fuel cell companies mentioned in this article are small and mid-cap ones, i.e., they do not represent stakes in big companies and the volatility is significantly higher. This article is not to be taken as a recommendation of what shares to buy or sell – it comes without any explicit or implicit guarantee or warranty. All information is based on publicly available sources and the assessments put forth in this article represent exclusively the author's own opinion. This article focuses on mid-term and long-term perspectives and not short-term profit. The author may own shares in any of the companies mentioned in this article.

Author: Sven Jösting

FuelCell Energy Teams Up with ExxonMobil

Who would have thought that the world's largest oil corporation and biggest US gas company is having a change of heart? In May this year, ExxonMobil concluded a research agreement with FCEL to develop the carbon capture technology into something that created a "more economical pathway." Carbon dioxide from chemical and coal plants is said to be added together with hydrogen to produce methane, which would then be converted at high efficiency into electricity and heat. What is most important here is the technology's economic benefit: The CC process for CO₂ capture could lead to a notably greater energy production volume, increasing revenues in the process.

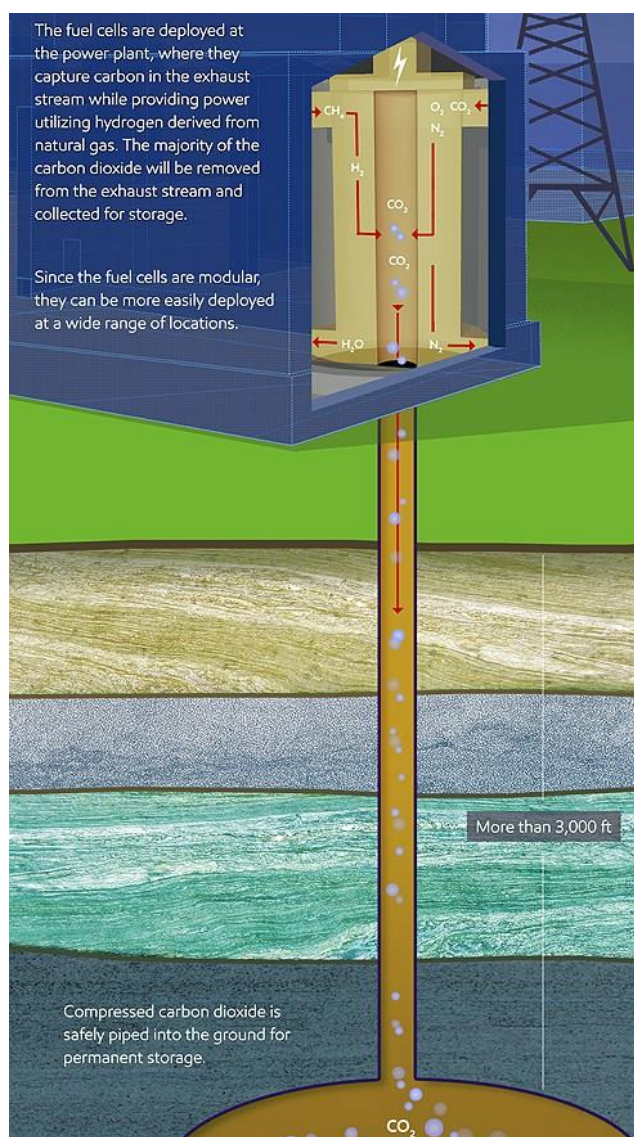
Exxon has so far been one of the companies that most fervently negated climate change; rumors even had it that the corporation was financing certain lobbies to that effect. The widely reported decision of the Rockefeller family, who founded Exxon, to eliminate Exxon shares from several of its foundations might have convinced the executive board to rethink its business strategy. Concluding the agreement with

FCEL seems like a very positive sign, since Exxon will certainly have investigated with whom it entered into a contract.

FCEL, on the other hand, will benefit from the agreement through higher media exposure and could retain Exxon as a large customer over the medium and long term. Last but not least, Exxon's research funds could provide quicker market access for FCEL technologies: A perfect win-win situation that the stock exchange seems not yet ready to appreciate fully.

After hearing about the order for a 20 MW fuel cell plant in South Korea, the stock market is now waiting for the final decision in the Beacon Falls project (above 64 MW), which is said to amount to USD 500 million in total. The discussions about contractor selection are still ongoing.

Fig. 1: Carbon capture technology combined with fuel cells



Source: ExxonMobil

Quarterly figures and highlights

The net loss attributable to common shareholders for the second quarter as of April 30, 2016, was around USD 16 million. The company said that this figure included

many items that were incurred periodically, but were not the result of the company's normal business operations, and costs for bids, as the company had applied for many large projects. I will focus on the overall outlook and some potential avenues and will name a few highlights that are of great importance for growing the company:

- Contract with ExxonMobil on R&D for carbon capture research expands global potential
- Decisions (orders?) on projects totaling 125 MW will be made in the near future
- Order backlog has exceeded USD 400 million

Additionally, the cash on hand at the end of the quarter has risen to above USD 82 million (plus 34.7 million of restricted cash). And besides the credit line by NRG Energy (USD 29 million), there is another one from PNC Energy amounting to USD 23.1 million.

[Risk warning: see below](#)

Author: Sven Jösting

Eco-Power for Orkney Islands

Energy Storage

Electric car with range extender



© Symbio Fcell

An energy self-sufficiency project is set to be tested on the Orkney Islands, UK: Hydrogen from wind power will be used for fuel cell range extenders integrated into electric vans to offer clean transportation. In April 2016, twelve partner companies from six EU countries were awarded the contract for this project, which will be subsidized by the European Union with EUR 5 million. British ITM Power is said to install a 1.5 MW electrolysis system, which will then be fed with clean electricity from

the community's wind power plants on Shapinsay and Eday. Instead of turning off these systems because of excess capacities, as is currently done in 30% of all cases, they are to be used for hydrogen creation in the future.

The Scottish Orkney Islands have so far been supplied by wind, wave and tidal power plants totaling 50 MW of capacity and producing 46 GWh of green electricity each year. To be able to store the electrical energy, the Fuel Cells and Hydrogen Joint Undertaking chose the five-year project BIG HIT (Building Innovative Green Hydrogen systems in an Isolated Territory), in order to test an "innovative, green hydrogen system in an isolated location." Besides H₂ generation, it should also equip ten electric vans with a Symbio FCell range extender. Graham Cooley, CEO of ITM Power, was looking forward to the project: "BIG HIT is a major step in turning the Orkney Islands into a genuine hydrogen territory."

BIG HIT is based on the already existing Surf-'n'-Turf initiative, which utilizes wind and tidal energy in a similar fashion to create hydrogen and use it for a fuel cell in Kirkwall. The Scottish government has been supporting this measure with GBP 1.35 million.

Magna Goes Fuel Cell

Electric Transportation

Demonstrator of an electric van with fuel cell range extender



Source: Magna

The idea to use fuel cells as range extenders for electric cars is gaining in popularity. Now, Magna International presented its own approach during the 37th International

Motor Symposium in Vienna, Austria, at the end of April. As a base component, the Austrian automotive supplier uses a medium-size van, which can go 90 kilometers (56 miles) on electricity alone. But when the battery charge drops below a certain threshold, the fuel cell is turned on to regenerate the power storage and increase the range to as much as 500 kilometers (311 miles) in hybrid mode. The company responsible for the retrofit of the demonstrator is Magna Steyr, a subsidiary of Magna International. Additional support for the national development project comes from the Institute for Powertrains and Automotive Technology (IFA) of the Vienna University of Technology, the Hydrogen Center Austria (HyCentA) as well as Proton Motor. According to Karl-Friedrich Stracke, president of vehicle technology and engineering at Magna Steyr, this collaboration was proof that “the automotive industry has accepted the challenge of developing alternative zero-emission powertrain systems and vehicles.”

H₂ MOBILITY Under New Leadership

Shell Hydrogen Increases Involvement in Joint Venture

Electric Transportation

Fig. 1: Nikolas Iwan



On May 1, 2016, Nikolas Iwan became the new CEO of H₂ MOBILITY Germany. Iwan had previously worked for eight years in different management positions at Shell. His predecessor, Frank Sreball, who has had his own consultancy for

management and interim management since 2005, had been the one originally setting up H₂ MOBILITY on his own. At that time, it wasn't immediately clear that this was only a temporary assignment for the physicist engineer. The decision to replace him by Iwan came as a surprise to many market stakeholders. Officially, Sreball remains as a consultant on the project.

Much confusion arose when Oliver Bishop, a Shell manager, showed up at the H2Mobility Conference in Berlin in mid-April instead of Sreball. There, Bishop spoke in his capacity as general manager of Shell Hydrogen as well as for H₂ MOBILITY Germany and mingled Shell and H₂ MOBILITY activities in his speech, but did not say one word about the upcoming change in personnel, which was officially announced no earlier than April 22.

So far, both the Clean Energy Partnership (CEP) and NOW have been in charge of setting up locations for demo projects. At the beginning of 2017, the responsibility for it is to be transferred to H₂ MOBILITY, introducing the startup to a new project stage, as the company said. After the joint venture had acted as a business initiative between the time of the merger and the establishment of the organization at the beginning of 2015, it will now be in charge of developing the H₂ infrastructure. But because of antitrust laws, H₂ MOBILITY can only be in business up to 2023; then, it has to be disbanded. Thomas Bystry, chair of the Clean Energy Partnership, has recently told the Handelsblatt: "Based on what we know today, we expect there will be a commercially viable hydrogen market beyond 2023."

Bystry, who as project manager used to be in charge of Shell's H₂ business and the introduction of project methodology in the New Energies division, was unanimously voted in as the new CEP chair at the end of 2015 (see HZwei issue from February 2016), after Patrick Schnell had asked to leave the government-supported initiative under the auspices of the federal transportation ministry. Asked why a central position in the H₂ infrastructure division was filled by another manager from the Shell oil corporation, Bystry responded that the H₂ MOBILITY joint venture was a startup which Sreball headed only as interim manager (see [H2 Mobility Officially Launched](#)). At the beginning of 2015, the company had started to look for a suitable replacement outside the venture, and Iwan responded to the job advertisement that the company had posted.

H₂ filling stations for Ulm and Wuppertal

Regarding infrastructure expansion, NOW chair Klaus Bonhoff said in April 2016 that so far, 20 filling stations had gone online. Guillaume Larroque, Director Service Stations Total Germany, also announced during the H2Mobility conference in Berlin that with some delay, the H₂ filling station in Ulm had been inaugurated at the beginning of April. Since there were regulatory limitations, the station would initially be operated as a research system. Another unit went online on June 15, 2016, at a shell gas station in Wuppertal.

2016 or 2017

The carmakers said during this year's Hannover trade show that the envisioned 50 H₂ filling stations, which were supposed to have been installed by the end of 2015, will be completed by the end of this year – or the next one. Asked by HZwei what prompted the delays, Thorsten Herbert from NOW responded: "Nothing went wrong."

Connected – Autonomous – Emission-Free

BMVI's H2Mobility Conference in Berlin

Electric Transportation

Fig. 1: Handshake Dobrindt – Gang



Many prominent figures from politics and business showed up to the H2Mobility conference in Berlin, Germany, in order to re-assure each other of the promises they had already made. Alexander Dobrindt kicked off the event held on the premises of his government department, the Federal Ministry of Transport and Digital Infrastructure (BMVI), before the Chinese transportation minister, Wan Gang, addressed the audience. Several company heads followed up with their own speeches touting the advancements they had made in developing hydrogen technology. Although there was hardly anything new to report, they all agreed that electric transportation was the technology of the future.

During the conference, subtitled “Electric Transportation by Fuel Cell,” minister Dobrindt officially announced his new “Strategy for emission-free transportation by hydrogen.” He went on to explain that his approach was based on three pillars: “We have made more investments than ever before, are in the process of establishing a charging point infrastructure for nationwide coverage, and have been specifically promoting innovative ideas.”

The “investments” to which he referred consist of EUR 161 million, which the BMVI has allocated to H₂ transportation between 2016 and 2018 and which state secretary Rainer Bomba had already announced in Berlin on June 1, 2015, during the general assembly of the National Innovation Program Hydrogen and Fuel Cell Technology

(NIP). By “nationwide coverage,” he was alluding to the up to 400 hydrogen filling stations, which should be installed in Germany by 2023. Fifty of them were supposed to be completed until the end of 2015, but only 20 of them have been in operation to date. In this context, he also spoke of “EUR 350 million to be allocated.” Whether this second figure includes the already budgeted EUR 161 million was not immediately clear.

The above-mentioned “innovative ideas” indeed refer to new subsidy guidelines for market ramp-up, which would support, among other things, special vehicles in logistics, autonomous electricity supply units for critical or grid-remote infrastructures as well as systems to create fuels based on electricity. However, the guideline details are still in the works. They could describe the part of NIP 2 that cannot be categorized among the other two above-mentioned issues, but which hasn’t been specified yet.

German-Chinese cooperation

Of great importance to the conference was the presence of China’s transportation minister Gang, who agreed with Dobrindt on intensifying the German-Chinese cooperation. For example, representatives from the National Organization Hydrogen and Fuel Cell Technology (NOW) and the China Automotive Technology and Research Center signed a declaration of intent about strengthening their cooperation in the field of innovative engine technologies and infrastructure.

A central topic, the merging of digitalization and electric transport, was subsequently mentioned by minister Gang: He said during his speech that China’s People’s Congress had just passed a new plan stating that transport should be “green and smart.” Added Dobrindt: “The car of the future runs on data, electricity and hydrogen.”

Gang also said that the People’s Republic had manufactured close to 500,000 electric cars between 2009 and 2015, of which 380,000 had been built in 2015 alone (incl. plug-in hybrids). And this although the number of vehicle registrations in China (137 million in 2013) was relatively low compared to the US or Germany based on the number of cars per capita. In 2020, the figure is expected to rise to 200 million.

Likewise, China’s production of renewable energies is growing rapidly: The wind power installed across the country is currently at 129 GW (33 GW added in 2016). By 2020, it is said to increase to 200 GW of wind and 150 GW of PV power.

Reinventing the automobile

The carmaker representatives, too, re-affirmed their commitment to electric transportation. First and foremost it was professor Thomas Weber, head of research at Daimler, who did say that increasing the range beyond today’s battery-driven car models was still a firm goal. But he also stressed that the company was “simultaneously developing the fuel cell. It remains an essential part of our roadmap,” adding: “The fuel cell’s market readiness is not the issue. This technology has enjoyed tremendous support.”

Weber, who will be succeeded on the executive board by Ola Källenius at the end of the year, explained during the conference: “We need to reinvent the automobile. It needs to be connected, autonomous and emission-free.” Addressing the participants directly, he continued: “I’d like to tell you: Let us really push forward. [...] This will only work if we work together.” However, he seemed to not remember that in the past, such calls to action rather had to be directed at Stuttgart.

Fig. 2: Wan Gang**2016: The transitional year**

Bernd Eulitz, executive board member at Linde, conceded in his speech that there was "still a lot of room for improvement." But he also added: "All of us have learned to be patient." At the same time, he called on the federal government to provide additional support – both financially and publicity-wise – and asked about a big enough budget for NIP 2. Additionally, he announced that the number of H₂ filling stations should rise to 100 by 2018/19, independent of the number of fuel cell vehicles. The next target (400 H₂ filling stations by 2023), however, will still depend on how many fuel cell cars will have been sold by then.

BMW had its say, too. Gerd Schuster, head of strategy, targets, innovation and vehicle testing, said that in retrospect, his company's earlier approach to liquid hydrogen use was a mistake ("individual approaches aren't that helpful"). Instead, he threw his support behind the 700-bar technology. The company was still looking into cryogenic pressure for other applications, but it was no longer a contender for fuel cell engines.

Klaus Bonhoff, CEO of NOW, concluded that the federal government had done enough to show its commitment to the technology, as it had invested a lot of time into a successful NIP follow-up ("In 2013, we started discussing NIP 2.0."). Despite the numerous delays, he exuded confidence: "I'm not at all frustrated. [...] We are still waiting for the industry and for politics to give their go-ahead to continue this public-private partnership. But we will have it this year, definitely." To him, 2016 is a

“transitional phase” which will still have a great deal to offer: “As simple as it is to continue research and development, it is much harder to find the appropriate instruments for market deployment.” (See Bonhoff interview – following soon)

Confusion abounds

Several issues surrounding the conference caused a great deal of confusion:

The H2Mobility Conference is in no way associated with H₂ MOBILITY Germany. Although someone from the company attended the 2015 edition, the event was organized by the BMVI. It is unknown why the ministry didn't simply choose another title (e. g. H₂ Transportation Conference) to avoid any such confusion.

The German minister for transportation, Alexander Dobrindt, seems to enjoy surrounding himself with high-ranking company representatives. At least, his events are usually attended only by board members of corporations. For example, Frank Sreball, who was “only” president of H₂ MOBILITY at the time of the conference, was not able to present his joint venture at the conference. Oliver Bishop, General Manager of Shell Hydrogen, addressed the participants instead.

It was almost like a déjà vu of the events in October 2015, when H₂ MOBILITY had officially been announced: The participating company heads met with Dobrindt for a photo-op. Sreball, however, was not invited, although he was in charge of the start-up. He has meanwhile been replaced by Nikolas Iwan (see [H2 MOBILITY Under New Leadership](#)).

1.4 MW for Mannheim

News



Source: *Friatec*

Large fuel cell systems in the megawatt range have so far been set up primarily in South Korea or the States. Now, Germany is said to get its first 1.4 MW plant. The

new system by FuelCell Energy Solutions is currently being built in the Friedrichsfeld suburb of Mannheim (see photo). E.ON Connecting Energies has been implementing the Direct FuelCell® unit since February 2016 on the premises of Friatec. Michael Schaefer, head of production engineering at Friatec, said that technical acceptance of the molten carbonate fuel cell should be completed at the end of July, and the inauguration ceremony was scheduled for September 2016. The fuel cell is said to cover 60% of the total energy demand of the plastics processing company through combined power and heat (electric efficiency: 47%). Friatec CEO Klaus Wolf explained: "Our production processes require a lot of power and heat. The use of fuel cell technology covers this demand in an efficient and clean manner." (See [FuelCell Energy Teams Up with ExxonMobil](#))

Exytron Wins GreenTec Award

News



Source: GreenTec Awards

Being nominated for this year's GreenTec Awards had already been a success in its own right. But the company based in Rostock, Germany, even won the special startup award during the ninth edition of the eco-prize ceremony. The prizes were handed over during a gala at the International Congress Center Munich on May 29, 2016. Exytron, founded in 2013, had already received its award endowed with EUR 10,000 during the Hanover trade show at the end of April (see picture). The award recognized the company's SmartEnergyTechnology® developed by the team of Manfred Grigo for its extremely efficient electricity storage.

The technology uses a special catalyst developed by the Rostock-based Leibniz Institute for Catalysis to temporarily hold excess green power before methanizing the energy-rich gas and storing it in a natural gas tank. If needed, the methane can be burned off, while the carbon dioxide released during the process is being reintroduced into the closed loop and reused for methanization. This means that the system will not require any outside fossil fuel source, nor will it release any CO₂ into the atmosphere. The generated heat can be utilized for heating or warm water – in single-family homes as well as large commercial buildings. The technology is currently being tested in the Rhine-Hessian city of Alzey, Germany, where occupants of 37 buildings in a new settlement (commercial pilot project) are being supplied with power and heat through decentralized means until October 2016 – CO₂- and NO_x-free.

Kuhn Now at Elcore

News



Source: Elcore

Elcore, a manufacturer of fuel cell heating systems, had already elevated Sascha Kuhn to a board position at the beginning of this year. The former CEO of Bayerngas Energy Trading is expected to use his management skills to advance the growth of the company located in Munich, Germany. Kuhn has had longtime experience in the energy industry and is considered a specialist in helping growth-phase businesses. At Elcore, he has taken over the commercial tasks at board level. He said: “I’m very much looking forward to the opportunity of supporting Elcore in advancing an efficient and promising technology such as the fuel cell and to apply my expertise also to physical product manufacturing.” The company’s founder, Manfred Stefener, added:

“Now is the time to expand our sales network and enhance our business organization. Such a task requires precisely the economic and legal expertise Mr. Kuhn brings to the job.”

Käppner Joins Thyssenkrupp

News

Roland Käppner's journey continues: After he had worked for Siemens for many years, he became CEO of McPhy Energy Germany. In August 2015, he then left for GKN Sinter Metals (see [Roland Käppner Leaves for GKN](#)). On July 1, 2016, he changed jobs and took on the position of head of business development and sales at the industrial division of thyssenkrupp. At thyssenkrupp Industrial Solutions, he is now responsible for the construction of fuel cell-driven submarines, chloralkali and water electrolysis, as well as de-carbonization solutions (e.g., Carbon2Chem).

NPE: Battery Is Core Component

Electric Transportation

Gigafactory envisioned by Tesla



Source: Tesla Motors

Many years ago, Germany still had important expertise in battery technology. After crucial stakeholders left the country, the market has been dominated by Japanese and South Korean manufacturers. The National Platform for Electric Mobility (NPE) is now feverishly looking for ways to bring cell and battery production back to the country, in order to make Germany a leading supplier in electric transportation. On March 17, 2016, the NPE presented a roadmap which states that such a turnaround would require a promising global market environment, further technological advances as well as inexpensive site-specific costs for energy, wages and logistics. The chair of NPE, professor Henning Kagermann, explained: “The battery makes up 30 to 40% of the electric car value chain. It is the core component of the vehicle and an

essential link in the chain. It is also a crucial factor in electric vehicle design [...] and directly influences user acceptance of electric transportation.”

The NPE’s concrete suggestion is to construct a cell factory in Germany and gradually expand it to a capacity of 13 GWh per year by 2025, since such a move would secure know-how and create jobs. The plant would require an investment of around EUR 1.3 billion. Additionally, Daimler affirmed its commitment to invest EUR 500 million in the construction of another battery factory in Kamenz, Germany. And at the end of May 2016, news broke that Volkswagen was also evaluating whether the set-up of a battery factory would make sense for the corporation. In the meantime, Tesla has confirmed that it would officially inaugurate its Gigafactory in the US state of Nevada on July 29, 2016. It is said to have a total annual capacity of 35 GWh.

NPE, Roadmap for integrated cell and battery production in Germany, 2016

eCarTec Keeps Its Name – For Now

Trade Shows / Conferences

MunichExpo, Germany, has taken a small step back by retracting the name change made in summer 2016 for this year’s event, postponing the issue to 2017. A spokesperson for the Bavarian organizer explained to HZwei that the move was necessary for “legal reasons.” This means that 2016 will still see an eCarTec trade show and an eCarTec Award. The eCarTec Conference will also remain part of the World Mobility Summit for now. Despite all of the above, there will be an eMove360° Europe – as an additional trade show taking place at the same time as the eCarTec, the sMove360° and the Materialica in Munich from Oct. 18 to 20, 2016. But regarding 2017, Robert Metzger, CEO of MunichExpo, announced: “Starting next year, all of the technologies and applications will be presented at the eMove360° Europe 2017 – the 2nd International Trade Fair for Mobility 4.0 – electric – connected – autonomous.”

Once You Go Electric, You Never Go Back

Closing Conference of Electromobility Showcase

Electric Transportation

It has been four years since the start of the four German Electromobility Showcase projects. In 2012, they became the follow-up to the eight Electromobility Model Regions, across which electric engine technologies had been researched and developed. Before this demonstration and market preparation stage will ultimately be concluded at the end of 2016, the projects were discussed during an official closing conference in Leipzig, Germany, on April 14 and 15. There, the four German federal ministries, the four regional offices as well as the National Platform for Electric Mobility (NPE) jointly presented the project results.

Fig. 1: Barbara Hendricks

It all started out in 2011 with a call for applications from regions which intended to become an Electromobility Showcase and thus a government-supported test area for electric cars. As eight “model regions” had previously gathered their first experiences with the technology over a four-year period, there was great interest from other towns, cities and communities to become part of these forward-looking projects. All in all, the 13-people jury received 23 applications, from which it was told to select five showcases. In the end, however, the number was reduced to four, since the federal revenues from the Energy and Climate Fund were lower than expected, which means that there was less money available to fund those test regions.

The number of individual initiatives was expected to be 230 at that time; in the end, the figure was lower, amounting to 145 separate initiatives, with 500 partners involved, EUR 180 million of subsidies granted by four federal ministries and 3,600 electric vehicles as a result. Combined with the financial incentives from the participating federal states and other investments, the showcases were supported with a total of EUR 400 million.

Four instead of five showcases

Metropolitan region Hanover, Braunschweig, Göttingen, Wolfsburg – Our Horsepower Turns Electric

Capital region Berlin/Brandenburg – International Showcase of Electromobility

Bavaria/Saxony – Electromobility Connects

Baden-Württemberg – LivingLab BWe mobil

Numerous stakeholders and other interested parties met on the Leipzig trade show premises in mid-April 2016 to receive a final overview of all the different initiatives despite the multitude of individual measures and to use the opportunity to test out some electric cars. The original plan was to host the event at the same time as the Auto Mobil International (AMI), so that the closing conference would have been embedded into a broader framework. But the trade show was cancelled after more than a dozen big carmakers had let the organizers know that they would not be in attendance.

So it seemed all the more remarkable that there were still 800 people at the Showcase Conference – considerably more than expected.

Positive results

At the beginning of the event, the federal environment minister, Barbara Hendricks, spoke about the climate conference COP 21 as well as the German Climate Action Plan 2050 and said that the transportation statistics hadn't moved an inch: Energy was indeed saved, but the saving was offset by a higher number of cars or greater distances travelled. She said: "After the transformation of the energy industry, we now need one for transport. We must design new transportation means to avoid, shift and streamline traffic patterns."

She left no doubt as to her thoughts on the potential offered by electric transportation: "The future will be electrifying. [...] Electric transportation is already part of our daily lives and it is economically feasible in many areas." Her "The showcases have been brightly illuminated," however, prompted some chuckles around the room, since the complaint halfway through the project run had been that the showcases were displaying too little.

About the expressed aim of the German federal government to have one million electric cars on the road by 2020, the minister said that from now on, every fifth car had to be an electric model to accomplish that goal – which could theoretically be achieved. Whether it was also realistic she did not say.

Her colleague, federal transportation minister Alexander Dobrindt, had also been invited but did not attend. State Secretary Rainer Bomba, who said that he had travelled from Berlin to Leipzig on electricity only, arrived in his place. In his typical bluntness, he conceded that it was "of course, terrible," that there were only 54,000 electric cars (plug-in hybrids and purely electric ones) registered across Germany. Bomba said: "We need to raise awareness and let people know we support them. The customer must be convinced." He referred to Tesla and concluded: "It can be done, and it can be done quickly." Changing to a somewhat reconciliatory tone, he lauded the accomplishments achieved so far: "The four showcase projects have produced remarkable results."

Kagermann foresees huge rush to e-cars

Professor Henning Kagermann, chair of NPE, then outlined the project developments over the past years, the initial targets and the project results. The primary aim, networking, had been well achieved, in his opinion, just like the creation of a roadmap. He also crossed market preparation off the to-do list, which had been achieved according to NPE's planning in 2014. He said: "We had a good first project stage."

The more difficult part seems to be the market ramp-up, which was supposed to occur in 2017, but hasn't progressed yet (Kagermann: "54,000 – that number is too low"). The same could be said of the delays in standardization, the NPE chair confessed. He was especially critical of the entire standardized plugs issue: "That took some kind of effort!" But he also stressed that the showcases had played an important role there in putting on the pressure. He additionally expressed his profound thanks for the continuous flow of information as well as the many helpful responses to requests for feedback.

Fig. 2: Bomba had both criticism and praise for the projects



As Hendricks before him, the president of acatech was optimistic that "electric transportation will become the dominant technology by 2025, as electric cars will be cheaper than conventional ones by that time." This was "as certain as sunrise," Kagermann added. He predicted that "there will be a huge rush. [...] The only question is what role Germany will play in it."

During the rest of the conference, it became clear that the showcases also had to cope with some considerable difficulties. Especially in the starting months, there were hardly any electric cars available. Some were speculating whether in hindsight, it would have been better to launch some initiatives at a later time. The installation of quick-charge stations along the A9 autobahn was another costly lesson learned, since their availability and coverage wasn't coming along as expected.

One may take as a positive sign the assurance that some of the project offices will remain. For instance, Johann Schwenk from Bayern Innovativ explained: "It would be a shame to lose out on the networking." All in all, the participants agreed that the

“overall results have not been negative” and that the motto was still: “Once you go electric, you never go back.”

Recommendations for action

After the political statements, Bertram Harendt from Deutsches Dialog Institut presented a total of 22 recommendations for action to the government representatives and the NPE. The Frankfurt-based organization had summarized the findings and experiences from the showcase projects in the course of the accompanying and impact-oriented research. One example from the paper is a call on carmakers to provide “significantly higher ranges.” Additionally, the authors “urgently recommend an expansion of the product portfolio.” Infrastructure-wise, they suggest that the government support and establish publicly available and barrier-free charging points. And, last but not least, there should be more electric fleet vehicles (at driving schools, cab companies, businesses in the health sector and the trades).

No Love for Cash Incentives in Germany

Electric Transportation

A recent study has exposed deeper issues with the new German cash incentive. The low range of the cars and the poor infrastructure for refills aren't the only reasons why electric vehicle sales haven't been taking off: Prospective buyers don't even find a model they like. Additionally, people view the financial incentives as “supporting the upper class” or “subsidizing carmakers,” as Conslin pointed out in mid-June 2016. And the study said: “Only around one percent of these online users are planning to buy an electric car because of the economic incentive.” In contrast, 98 percent of the people who have left a comment on a news portal, with a professional online publication, in a forum or on social media after the incentive was introduced had a negative view of the situation and described the incentive as a “waste of taxpayer money,” as “missing the environmental mark,” or as offering “no credible daily use scenario.” Hybrid cars were even called “way too heavy and overpowered monsters.”

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- October 5th to 6th, 2016, **California Hydrogen and Fuel Cell Summit**, in Sacramento, CA, USA, www.californiahydrogensummit.com
- October 10th to 12th, 2016, **World of Energy Solutions**, on the Stuttgart Fair Ground, Germany, www.world-of-energy-solutions.de
- October 18th to 20th, 2016, **eMove 360° Europe**, Mobility 4.0: electric – connected – autonomous, in Munich, Germany, www.emove360-expo.com
- November 1st to 2nd, 2016, **Battery Safety & Lithium Battery Power**, Bethesda, MD, USA, www.knowledgefoundation.com
- November 3rd to 5th, 2016, **23. Energiesymposium** - Nutzung regenerativer Energiequellen & H2-Technik, in Stralsund, Germany, www.stralsund.de
- November 8th to 10th, 2016, **gat + wat** - , Conference and Fair for Gas and Water, in Essen, Germany, www.gat-dvgw.de
- November 9th to 11th, 2016, **17. Forum Solarpraxis** - The next energy era, in Berlin, Germany, www.neue-energiwelt.de
- November 21st to 23rd, 2016, **9th FCH JU Stakeholder Forum** - Fuel Cells and Hydrogen 2 Joint Undertaking, in Brussels, Belgium, www.fch.europa.eu

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- **23rd Group Exhibit Hydrogen + Fuel Cells + Batteries**, HANNOVER MESSE 2017, April 24 – 28, Tobias Renz FAIR, Tobias Renz, tobias@h2fc-fair.com, www.h2fc-fair.com



- **European Fuel Cell Forum**, Obgardihalde 2, 6043 Luzern-Adligenswil, Switzerland, Phone +41-4-45865644, Fax 35080622, forum@efcf.com, www.efcf.com
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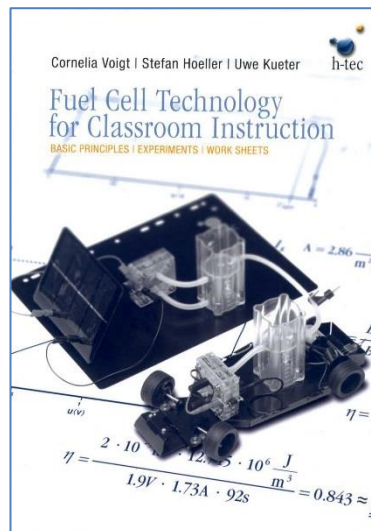
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