

The South African-German Energy Partnership

Hydrogen Fuel Cell Bus Study Tour, 14 - 22 October 2017, Germany

Introduction

On behalf of the German Federal Ministry for Economic Affairs and Energy (BMWi) in partnership with the South African Department of Trade and Industry (the dti), the Secretariat of the South African-German Energy Partnership at the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) has organized this Hydrogen Fuel Cell Bus Study Tour to Germany. The study tour takes place from the 14.10.17 – 22.10.17 (including travel dates).

The purpose of the study tour is for Germany to share lessons learnt with selected South African municipalities, bus operators and policy developers about the journey in deploying fuel cell busses. The primary driver of the use of non-petroleum fuels in transport globally is the world's response to climate change. Significantly high levels of greenhouse gases (GHG) are found in large cities as a result of transport based emissions. Reducing GHG emissions in line with the relevant targets requires a shift away from petroleum based fuels to a lower/zero emissions fuel such that from hydrogen fuel cells. South Africa is the largest producer of platinum, a key mineral required in the manufacturing value chain. Fuel cells containing a platinum catalyst present a value proposition for the South African economy in terms of the potential for job creation and growth in the platinum mining and mineral beneficiation industry.

It is envisaged that 6 major metros (City of Johannesburg, City of Cape Town, eThekweni Municipality, Ekurhuleni Metro Municipality, Nelson Mandela Bay Metro and the City of Tshwane), bus operators, the Departments of Energy, Transport, Trade and Industry and Environmental Affairs will participate in the study tour.

The programme for the study tour includes meetings with key German metros who have successfully deployed this technology. Additionally, site visits to bus depots, filling stations and various workshops with the managers, engineers and operators of the technology, as well as German ministry representatives are included in the itinerary to further deepen peer to peer learning and cross-border exchange.



Agenda (as of 02 Oct 2017)

Flight Outbound						
14OCT	LH 573	JNB	FRA (Frankfurt)	1900	0535	15OCT
15OCT	LH 170	FRA	TXL (Berlin)	0645	0755	15OCT

Day/ Time	Visit	Description/ Topics
SUNDAY, 15th October		
07.55	Arrival at Berlin Tegel Airport – Transfer to Hotel	
	<u>Overnight stay:</u> Motel One Berlin-Hauptbahnhof Address: Invalidenstrasse 54, 10557 Berlin Phone: +49 30 3641005-0	
		The rooms are booked for early arrival and breakfast on Sunday morning (until 11.00) is included.
MONDAY, 16th October		
08.15	Transfer to NOW (National Organisation Hydrogen Technology and Fuel Cells) By chartered bus, 5 km, 30 Min.	Address: Fasanenstrasse 5 Berlin Charlottenburg (Zoo)
09.00	NOW GmbH	Arrival at NOW GmbH (National Organisation Hydrogen and Fuel Cell Technology) Good morning coffee and brief outlook on the day's programme
09.30	Transfer to Total's Multifuel station in Schoenefeld By chartered bus, 26 km, 30 Min.	
10.00	Visit of the Hydrogen Fuel Station at Airport Berlin- Schoenefeld (TOTAL)	Newly-built Multi-Energy Service Station at the airport Berlin-Schoenefeld (under construction) is a flagship project of TOTAL. The electricity necessary for the electrolysis to produce green hydrogen comes from renewable sources, which makes the station CO2-neutral. The electricity is excess energy from local sources (e.g. a nearby wind park).

	<p>H2BER partners are Total Deutschland, Linde, McPhy Energy, Enertrag and 2G Energy.</p> <p>The McPhy 45 bar (650 psi) electrolyser is operated by Enertrag. The optimised and extendable 500 kW alkaline electrolyser can produce more than 200 kg/day of hydrogen, enough to refuel around 50 FCEVs. McPhy is also operating a <i>solid-state</i> hydrogen storage system with a capacity of 100 kg; Linde is responsible for the overall hydrogen handling process, from production in the electrolyser to dispensing from the pumps. This includes storing <i>gaseous</i> hydrogen in a 45 bar high-level tank, compression to 900 bar (13 000 psi).</p> <p>The station includes two hydrogen fuelling pumps at the site, one for cars and one for buses, as well as offers natural gas (CNG) and LPG fueling, and even charging points for battery electric vehicles. 10 buses and 100 cars per day can be re-fuelled with hydrogen http://www.renewableenergyfocus.com/view/38624/green-hydrogen-facility-opens-at-berlin-airport-with-first-refueling-of-fuel-cell-vehicle/</p>
<p>11.30 Transfer back to NOW</p>	
<p>12.00 LUNCH</p>	<p>Restaurant nearby or snack at NOW, tbc</p>
<p>13.00 Discussion round with German ministries and NOW</p> <p><i>(arranged by NOW and GIZ)</i></p>	<p>Federal Ministry for Economic Affairs and Energy (BMWi)</p> <p>Federal Ministry of Transport and Digital Infrastructure (BMVi)</p> <p>TOPICS:</p> <ul style="list-style-type: none"> ▪ Fuel Cell technologies: Their role in the national energy strategy and in the transportation sector ▪ Promotion of Fuel Cell Technologies and public support programmes ▪ Interfaces and coordination between the Ministries in regard to fuel cell technology (in transportation) ▪ Others
<p>14.30 NOW GmbH</p>	<p>NOW GmbH (National Organisation Hydrogen and Fuel Cell Technology) is responsible for the coordination and management of the National Innovation Programme for Hydrogen and Fuel Cell Technology (NIP) and the Electromobility Model Regions programme of the Federal Ministry of Transport and Digital Infrastructure (BMVI).</p> <p>TOPICS:</p> <ul style="list-style-type: none"> ▪ Germany's energy strategy in the public transportation sector ▪ Opportunities and challenges in the policy & regulatory framework for hydrogen fuel cell busses ▪ Roles and responsibilities in the National Innovation Programme (NIP) – Ministries of Science &



		<p>Technology, Economic Affairs, Environment and Transportation, NIP implementation agencies etc.</p> <ul style="list-style-type: none"> ▪ Funds and their allocation mechanisms ▪ Networks as key to bring pilot projects on the ground: Approaches and experiences in Germany ▪ Success factors for effective networks ▪ Role of hydrogen and fuel cell technologies in the energy transition, in general and in mobility sector ▪ Energy scenarios for a GHG neutral transport sector by 2025 ▪ Cost effectiveness of various energy options, including fuel cell vehicles, in consideration of all costs: energy supply costs, infrastructure and manufacturing of vehicles ▪ Dynamics and developments in regards to cost-effectiveness ▪ Required regulatory framework for promoting fuel cell buses ▪ Required governmental grants/ subsidies and other incentives to promote fuel cell buses.
16.30	Transfer to Motel One And 5 minutes walk to "Hauptbahnhof"	Picking the luggage
18.34	IC2242 Inter City Train from Berlin Hbf (track 14) to Münster Hbf (track 9) Dinner: individually arranged in the BordBistro restaurant coach Arrival: 22.25	
	6 minutes walk to	
	<u>Overnight stay:</u> H4 Hotel Münster City Centre, Address: Stubengasse 33, 48143 Münster Phone: +49 251 49099-0	
TUESDAY, 17th October		
8.30	Transfer from hotel to Municipal Utility Münster Walking, 1,5 km, 20 Min	<p>Münster has a population of around 300,000 people. It is located 300 km south-west of Hamburg and 150 km north-east from Cologne. It is a quite "young" city with a lot of students due to a large university, with around 60,000 students.</p> <p>Steinfurt is a small town and capital of Steinfurt District, 30 min. outside of Münster</p>
09.00	Municipal Utility Münster, Municipal Utility Steinfurt and County Municipality of Steinfurt	<p>Address: Stadtwerke Muenster Hafenplatz 1 48155 Muenster</p> <p>Stadtwerke Münster, the Münster utility, operates energy, water and transportation infrastructure facilities.</p>



		<p><u>TOPICS:</u></p> <ul style="list-style-type: none"> ▪ Overall strategy of Münster and Steinfurt in regard to (green) public transportation ▪ Energy Masterplan of Steinfurt ▪ Status of electro-buses with batteries and of FC buses ▪ (First) experiences with hired FC bus (Münster) ▪ Project on procurement of 2 own FC buses (Münster) ▪ Project HyTRUST of Steinfurt: Role of Hydrogen and Fuel Cell to realize the energy masterplan; relationship between hydrogen/ fuel cell and other energy technologies and solutions ▪ Major barriers and challenges to integrate hydrogen/ fuel technologies into the implementation of the masterplan ▪ Organizational approaches/ changes to address the interconnectivity of the various technologies. ▪ Involvement of various stakeholders (incl. civil society)
12.00	Lunch	
12.00	Transfer to Gladbeck/ Hydrogenics By chartered bus, 75 km, 1 hr	Address: Am Wiesenbusch 2 Halle 5 45966 Gladbeck
14.30	Hydrogenics	<p>An internationally leading company in designing, manufacturing, building and installing industrial and commercial hydrogen generation, fuel cells and MW-scale energy storage solutions</p> <p>Hydrogenics supplied the electrolyser of the Hamburg Hydrogen Refuelling Station.</p>
17.00	Transfer to Cologne By chartered bus, 150 km, 2 hrs <u>Overnight stay (2 nights)</u> Hotel Inn Express Cologne – City Centre, Address: Perlengraben 2, 50676 Koeln Phone: +49 221 130810	
WEDNESDAY, 18th October		
08.15	Transfer to Regional Verkehr Koeln/ HyCologne e.V. By chartered bus, 14 km, 45 Min	Address: Goldenbergstraße 1 50354 Hürth
9.00	Regional Verkehr Köln (RVK)/ HyCologne	<p>Regional Verkehr Köln (RVK) is the public transport operator in the region of Cologne and covers a region of approx. 4.5 million inhabitants; fleet of 290 own buses</p> <p>Fuel cell bus operation in Cologne:</p>

- 4 buses operate in regular service as a joint venture between the public utilities of the city of Brühl, Hürth and RVK.
- Two Phileas 18 metre buses started their operation in 2012. Those buses are prototypes buses: only four of them exist worldwide! The two other buses are in operation in the Netherlands.
- Two Van Hool 13 metre buses started their regular service operation in May 2014

TOPICS:

- Public transportation strategy of the Municipality Cologne
- Organization of the public transportation sector in Cologne
- Genesis & status of the fuel cell bus introduction and further roadmap
- Implemented pilot projects and “good practices”:
 - Scope of projects,
 - Funding (sources of finance for the pilot projects)
 - project phases and duration,
 - partners and their roles,
 - Change Management
 - Institutional and organizational set-up to manage the shift towards electro buses/ FC buses and to manage the FC pilot projects
 - Procurement management
 - results in terms of economics and environmental impact
 - Customer response/ feedback (communication channels with customers)
- Lessons learnt, e.g. challenges along the whole process, including planning, procurement, operation

11.30 Hydrogen Fuel Station

Transfer to the Fuel Station by Fuel Cell Bus

- is located in Hürth, was built by Air Products and entered in service in 2011
- has no building (only a protective wall and a fence surrounding it)
- Hydrogen is provided through pipeline from a nearby/ neighbouring chemical plant (hydrogen as by-product)
- has a capacity of production of 120kg hydrogen/day
- has a total storage capacity of 420 kg hydrogen
- shows a high level of availability (>95%)

13.00 LUNCH

By chartered bus, 7 km, 15 min.

OSTERIA

Address:
Luxemburger Straße 146, 50354 Hürth
T: +49 2233 9665011, huerth@losteria.de

14.00 Cultural Tour

tbc

THURSDAY, 19th October

09.00 Transfer to Düsseldorf

By chartered bus, 50 km, 1 hr

Düsseldorf is the capital of the federal state of Northrhine-Westphalia and has approximately 600,000 inhabitants.



10.00	Network Fuel Cell and Hydrogen technologies NRW, Energy Agency NRW (Northrhine Westphalia)	<p>Address: Roßstraße 92 40476 Düsseldorf Tel.: 0211-866420</p> <p>Platform, founded in 2000, for promoting the development of fuel cell and hydrogen technologies and of their markets</p> <p>4 expert groups are working on hydrogen in public transportation sector.</p> <p>TOPICS/ Presentation:</p> <ul style="list-style-type: none"> ▪ Networks as key to bring pilot projects on the ground: Approaches and experiences in Northrhine Westphalia ▪ Success factors for effective networks <p>Including discussion round with few selected stakeholders from the region, tbc e.g. roundtable with the private sector to discuss what German companies can bring in a potential pilot project in a South African municipality.</p>
13.00	LUNCH	<i>At the River Rhine (maybe with a small Rhine Tour)</i>
14.30	Transfer to Düsseldorf Main Train Station “Hauptbahnhof”	
15.27	<p>ICE611 Inter City Express Train from Düsseldorf Hbf (track 16, direction Munich) to Stuttgart Hbf (track 15) Arrival: 18.08</p> <p>4 minutes walk to</p> <p><u>Overnight stay (2 nights):</u> Novum Hotel Rieker, Address: Friedrichstr. 3, 70174 Stuttgart Phone: +49 711 2296580</p>	
FRIDAY, 20th October		
07.45	<p>Transfer to Municipal Government By chartered bus, 2 km, 15 Min. Alternatively: 3 stations with U5, U6, U7 (9 minutes)</p>	<p>Address: Amt für Umweltschutz Gaisburgstr. 4 70182 Stuttgart</p>
08.00	Municipal Government of Stuttgart	<p>Stuttgart has a population of 606 588. The city is the capital of the federal state of Baden-Wuerttemberg. Stuttgart is a high-tech location, home of Mercedes-Benz, Porsche and Bosch amongst others.</p>

		<p><u>TOPICS:</u></p> <ul style="list-style-type: none"> ▪ Clean Air Programme of Stuttgart: Its background such as the Federal Emissions Control Act and the relevant EU laws ▪ Development of nitrogen oxide and particulate matter values in Stuttgart and of other air pollution parameters, the limits by law ▪ Measures to reduce the air pollution in general and in the public transportation sector in particular ▪ Role of electromobility in the clean air programme ▪ Effectiveness of electromobility in the local public transportation on the improvement of the air quality ▪ Costs for implementation of the air pollution reducing measures, financing of these measures <p>(According to the Regulations for the Implementation of the Federal Emissions Control Act, all cities and towns where the air pollution limits are exceeded must set up a clean air programme)</p>
09.30	<p>Transfer to Stuttgarter Strassenbahnen AG By chartered bus, 4 km, 30 Min.</p>	<p>Address: Ulmer Straße 140 70188 Stuttgart</p>
10.00	<p>Stuttgarter Straßenbahnen AG</p>	<ul style="list-style-type: none"> ▪ Public transportation strategy of the Municipality Stuttgart ▪ Organization of the public transportation sector in Stuttgart ▪ Genesis & status of the fuel cell bus introduction and further roadmap ▪ Implemented pilot projects and “good practices”: <ul style="list-style-type: none"> ○ Scope of projects, ○ funding, ○ project phases and duration, ○ partners and their roles, ○ Change Management ○ Institutional and organizational set-up to manage the shift towards electro buses/ FC buses and to manage the FC pilot projects ○ Procurement management ○ Customer response/ feedback (communication channels with customers ○ Procurement management ○ results in terms of economics and environmental impact ▪ Lessons learnt
11.30	<p>Bus depot and workshop</p>	<ul style="list-style-type: none"> ▪ Workshop adjustment realized for maintenance of the fuel cell busses ▪ Operation management ▪ Adjustments in HR recruitment and qualification/ training/ skills development
13.00	<p>Stuttgarter Straßenbahnen AG</p>	<ul style="list-style-type: none"> ▪ Final discussion with Stuttgarter Strassenbahnen AG

		<ul style="list-style-type: none"> ▪ Presentation Daimler “F-Cell Project Chic”
14.00	Lunch/ Snack	
15.00	Stuttgarter Straßenbahnen AG	
	Presentation of Daimler Buses	<p>Daimler Buses on the way towards E-Mobility</p> <p><u>TOPICS for discussion, e.g.:</u></p> <ul style="list-style-type: none"> ▪ Cost reductions through further technological developments ▪ Demonstration projects with Evobus and project results & lessons learnt ▪ Plan for commercial production/ perspective on chances & challenges for roll-out of fuel cell busses ▪ Challenges on the path to the commercial production
16.30	Transfer to Mercedes-Benz Museum By chartered bus, 2 km, 15 Min. Alternative: by foot 25 minutes	Address: Mercedesstraße 100 70372 Stuttgart
17.00	Visit of Mercedes-Benz Museum	
18.00	<i>DINNER in Mercedes-Benz Museum on invitation by Daimler AG</i>	
Saturday, 21st October		
De-Briefing		
Cultural tour, Stuttgart (e.g. biking tour?)		
15.55 or 16.15	Transfer to Stuttgart Airport “Flughafen” By Suburban train S2 or S3, every 20 minutes	

Flight Inbound						
21OCT	LH 137	STR (Stuttgart)	FRA	1830	1920	21OCT
21OCT	LH 572	FRA	JNB	2205	0830	22OCT

Selected individuals will have deviating flight details including connecting flights to/from other South African airports or the feeder flight from Stuttgart to Frankfurt (outbound).

Please check your ticket carefully in regard to your individual flight time