

**Joint News Release****Singapore, 29 June 2015****BMW Group and NTU embark on S\$1.3 million  
electromobility research  
NTU receives BMW i3 and BMW i8 as research platforms**

BMW Group and Nanyang Technological University (NTU Singapore) today launched a new electromobility research programme, involving the all-electric BMW i3 and plug-in hybrid sports car BMW i8 that runs on electricity and petrol.

This new research programme will be conducted at the Future Mobility Research Lab located on the NTU campus, which is the BMW Group's first joint lab in Southeast Asia.

Both parties will be injecting a combined S\$1.3 million to drive the new research projects, on top of the initial S\$5.5 million funding allocated to the joint lab in 2013.

The new research programme will focus on two new areas, Electromobility in Asia and also Smart Materials. This is in addition to the original three research topics that the joint lab is working on: Advanced Battery, Driver Enhancement and Intelligent Mobility.

At the launch ceremony today at NTU, the BMW Group announced that the BMW i3 and BMW i8 will be provided as research platforms to the Future Mobility Research Lab.

The ceremony was graced by Mr Teo Ser Luck, Minister of State at Singapore's Ministry of Trade and Industry; Mr Volker Bouffier, Prime Minister of the Federal State of Hesse and President of the German Bundesrat; and His Excellency, Dr Michael Witter, Ambassador of the Federal Republic of Germany to Singapore.

The scientists at the joint lab will use the two BMW i vehicles to conduct research on real-life driver behaviour and to collect in-depth data on vehicle performance. The two cars will also conduct on-road trials of new technologies such as a mobile application that can accurately predict traffic and estimated end-to-end travelling time.

Mr. Axel Pannes, Managing Director of BMW Group Asia said: "We are very satisfied with our partnership with NTU and the establishment of the Future Mobility Research Lab, thanks to the high level of competency from NTU's research staff and interdisciplinary teams."

“Through the relentless efforts of the dedicated researchers, we have already made some important findings through the earlier research topics in a short period of just two years. With the expanded research scope on Electromobility in Asia and Smart Materials, more invaluable knowledge will be gained by both parties. Further, the knowledge will also be transferred to Singapore’s academia and broaden their technical understanding of modern full-electric and plug-in hybrid electric vehicles. It will definitely forge a stronger technological partnership between the BMW Group and NTU,” added Mr. Pannes.

Professor Lam Khin Yong, NTU’s Chief of Staff and Vice President (Research), said the new research programme will build on the research successes of the NTU-BMW joint lab.

“The new research programme will further exploit the synergy between BMW Group’s leadership and expertise in automotive sciences and NTU’s leading research in sustainability and clean technologies. The NTU-BMW joint lab has already made important advancements in areas such as new battery materials that can extend the range of an electric vehicle and innovative driver assistive technologies to greatly enhance safety.”

“NTU is one of the eight top universities across the globe that BMW has established a strategic partnership with. The BMW i3 and i8 will be used by BMW and NTU scientists to develop and test innovative technologies in real-life conditions and this new research programme extends NTU’s efforts in developing future mobility solutions with global impact,” said Prof Lam.

Mr Volker Bouffier, Prime Minister of the Federal State of Hesse and President of the German Bundesrat, said: “The new electromobility research programme launched by NTU and BMW emphasises the strong and fruitful bilateral relations between Germany and Singapore in the fields of research. Certainly the programme will further strengthen the ties on each side. Thus, to study and develop key areas which relate to future transportation will be a crucial factor on our way to a modern globalised world based on sustainable development.”

Mr Tan Kong Hwee, Director, Transport Engineering, Singapore Economic Development Board, said: “BMW’s partnership with NTU for the set-up of its Future Mobility Lab is testament to the increasing interest in urban mobility and Singapore’s attractiveness for the conduct of research and development in this area.”

### **Electromobility in Asia**

The main goal of embarking on the Electromobility in Asia project is to find out how drivers interact with BMW i vehicles in real life, so as to better understand user behaviours and to improve electric and plug-in hybrid technology for the future.

By conducting the research in Singapore, a densely-populated, urban city state, it will enable researchers in the joint lab to gain insights on how electric vehicles can be made more relevant for global megacities. Other study topics include how emerging technologies like fast charging, wireless charging and smart assistant driving technologies will impact the consumer.

### **Smart Materials**

With today's proliferation of touchscreen interfaces being used increasingly in vehicles, there is a need to study how these touchscreen surfaces can be made more tactile.

Through research in various shape memory materials and dielectric polymers, scientists will look at developing technologies which can enable buttons to appear on interactive surfaces and touch screens when needed.

Mr Pannes added that Singapore is the perfect venue for the BMW Group to conduct research on electromobility.

"In Singapore, the second most densely populated country in the world, we anticipate that electric vehicles with its zero tailpipe emissions and exhaust fumes will be a key player in the transportation network of the future. The city-state also has high connectivity and a tech-savvy population, which makes it more receptive towards new cutting-edge technology. Further, we believe Singapore has the potential to become a R&D hub for electromobility, especially with its clearly expressed ambitions to become a Smart Nation. We want to play a contributive role in that," said Mr Pannes.

### **Future Mobility Research Lab breakthroughs**

The Future Mobility Research Lab, set up in April 2013, aims to research and develop key areas relating to future transportation, which includes Advanced Battery, Driver Enhancement, and Intelligent Mobility.

After two years of intensive research, the Future Mobility Research Lab has made some significant findings in the following areas:

- **Advanced Battery**
  - New battery materials are being experimented on, such as high-voltage cathodes and anodes (the positive and negative poles of a battery), which can potentially double the energy density, which is important in extending the range of an electric car as well as enable faster charging times.
  
- **Driver Enhancement**
  - Current sensor technologies are able to tell if a driver is sleepy or alert and if the vehicle is on a collision course with another vehicle, based on the speed and direction it is travelling. However, the sensor systems are independent of each other, and does not take into account the driver's present condition and adjust to it.

- A driver enhancement system is now being developed to adapt to the driver's condition, to either increase or decrease the number of assistance technologies deployed to help the driver. It is based on parameters such as whether the driver is alert or sleepy, if he/she is paying attention to the road, and if traffic conditions around the vehicle is congested or sparse.
- **Intelligent Mobility**
  - A mobile application has been developed which can better predict the traffic conditions and accurately estimate arrival time at the destination. This app is based on an intelligent routing system that calculates individual driving style and current traffic situation based on real-time traffic information. It also has a parking search system that analyses the parking situation around the destination.

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Additional information enclosed:

1. About BMW i

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**The BMW Group**

With its three brands BMW, MINI and Rolls-Royce, the BMW Group is the world's leading premium manufacturer of automobiles and motorcycles and also provides premium financial and mobility services. As a global company, the BMW Group operates 30 production and assembly facilities in 14 countries and has a global sales network in more than 140 countries.

In 2014, the BMW Group sold approximately 2.118 million cars and 123,000 motorcycles worldwide. The profit before tax for the financial year 2014 was approximately € 8.71 billion on revenues amounting to € 80.40 billion. As of 31 December 2014, the BMW Group had a workforce of 116,324 employees.

The success of the BMW Group has always been based on long-term thinking and responsible action. The company has therefore established ecological and social sustainability throughout the value chain, comprehensive product responsibility and a clear commitment to conserving resources as an integral part of its strategy.

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## **About Nanyang Technological University**

A research-intensive public university, Nanyang Technological University (NTU) has 33,500 undergraduate and postgraduate students in the colleges of Engineering, Business, Science, and Humanities, Arts, & Social Sciences. It has a new medical school, the Lee Kong Chian School of Medicine, set up jointly with Imperial College London.

NTU is also home to world-class autonomous institutes – the National Institute of Education, S Rajaratnam School of International Studies, Earth Observatory of Singapore, and Singapore Centre on Environmental Life Sciences Engineering – and various leading research centres such as the Nanyang Environment & Water Research Institute (NEWRI), Energy Research Institute @ NTU (ERI@N) and the Institute on Asian Consumer Insight (ACI).

A fast-growing university with an international outlook, NTU is putting its global stamp on Five Peaks of Excellence: Sustainable Earth, Future Healthcare, New Media, New Silk Road, and Innovation Asia.

The University's main Yunnan Garden campus has been named one of the Top 15 Most Beautiful in the World. NTU also has a campus in Novena, Singapore's medical district.

For more information, visit [www.ntu.edu.sg](http://www.ntu.edu.sg)

## 1. About BMW i.

### **BMW i: A new era in electric mobility.**

As the world and the sphere of personal mobility experience a period of radical environmental, economic and social change, it has led to global developments such as climate change, dwindling natural resources and increasing urbanization. The calls for a new balance between the demands of the planet and the desires of the individual have never been higher, and with it the need for greater sustainability via Future Mobility, which BMW Group has translated, in the form of BMW i, EfficientDynamics and ConnectedDrive technology.

BMW i is a newly established sub-brand that marks the initial step towards Future Mobility, while Efficient Dynamics is the technology that helps to reduce fuel consumption and CO2 emission, but at the same time, increases performance to fulfil BMW's promise of delivering Sheer Driving Pleasure. Meanwhile, the Connected Drive technology is an intelligent link-up between the driver, his car and the outside world to achieve greater safety, convenience and infotainment. Both EfficientDynamics and ConnectedDrive serve as the foundation for Future Mobility.

### **BMW i3: All-electric vehicle.**

The new BMW i3 is the first premium-segment model conceived to run purely on electric power. The electric motor powering the BMW i3 generates a maximum output of 170 hp and peak torque of 250Nm. It can reach 0-60km/h in a mere 3.7 seconds, and a 0-100km/h sprint in 7.2 seconds. Its instantaneous power flows to the rear wheels via a single-speed transmission. The motor sources its energy from lithium-ion storage cells integrated into the car's underfloor section. The high-voltage lithium-ion battery gives the car a range in everyday conditions of up to 150km for everyday driving when fully charged from a conventional domestic power socket, BMW i Wallbox or public charging station. This rises by around 20km in ECO PRO mode and by the same distance again in ECO PRO+ mode.

This is the first time an all-electric BMW i3 capable of zero tailpipe emissions has been brought into Singapore because the ones retailed locally are currently equipped with a range extender (REX).

### **BMW i8: Plug-in hybrid sports car.**

The BMW i8 is the world's first sports car to be purpose-built with sustainability in mind. The BMW i8 features the latest BMW EfficientDynamics technology, including a rear-mounted 1.5-litre three-cylinder petrol engine with BMW TwinPower Turbo technology that can generate up to 231hp and a maximum torque of 320 Nm. It also features a hybrid synchronous electric motor that can channel a maximum output of 131hp and maximum torque of up to 250 Nm to its front wheels via a two-stage transmission, during which it is capable of delivering zero tailpipe emissions.

When the BMW TwinPower Turbo and BMW eDrive technology are activated concurrently, the BMW i8 is capable of producing up to 362 hp and 570 Nm that can propel the car from 0-100km/h in just 4.4 seconds. Yet, the BMW i8 has the fuel economy and emissions better than a compact car at an amazing 47km per litre [2.1litres per 100km; as per average EU test cycle].

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