



**25 June 2011**

## **MEDIA RELEASE**

### **LAUNCH OF SINGAPORE'S ELECTRIC VEHICLE TEST-BED**

The inter-agency Electric Vehicle (EV) Taskforce, led by the Energy Market Authority (EMA) and the Land Transport Authority (LTA), announced the launch of the electric vehicle test-bed in Singapore today. The objective of the EV test-bed is to test and gauge different EV prototypes and charging technologies given Singapore's urbanised environment and road conditions, before deciding whether to roll it out for mass adoption.

#### **Key features of EV test-bed**

- 2 For a start, the EV test-bed will be launched with:
- Three outdoor and two indoor charging stations;
  - First batch of five Mitsubishi i-MiEVs;
  - Four smart electric drive (ed) Daimler vehicles;
  - First batch of participants comprising LTA, Ministry of Manpower (MOM), Mitsubishi Corporation and Senoko Energy<sup>1</sup>.

3 The test-bed will focus on gathering data and insights to guide the planning for future deployment of EVs, including the optimal ratio of charging stations to vehicles. For the convenience of the test-bed participants, charging stations have been designed to automatically collect data on the EV users' charging patterns. To provide an adequate period for data collection, the test-bed will be extended by one year until end of 2013. (Please see Annex for location of EV charging stations).

4 The first batch of normal charging stations has been deployed at accessible locations for the pioneer batch of EV users. In addition, the first quick charging station<sup>2</sup> will be deployed in the third quarter of 2011 and sited centrally for convenient access.

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<sup>1</sup> One i-MiEV each by LTA, Mitsubishi Corporation and Senoko Energy and 2 such vehicles by MOM.

5 EV test-bed participants can also choose the smart fortwo (ed) vehicles by Daimler South East Asia (SEA) Pte. Ltd. There will be a total 20 smart ed vehicles available for lease under the EV test-bed from July 2011. Daimler has joined the test-bed as part of their global programme of testing driver behaviour and customer acceptance of EVs in real-world conditions in major cities around the world.

6 The EV test-bed will be scaled up over time, with the charging infrastructure growing in tandem with the take-up rate of EVs in the test-bed. In addition to the five Mitsubishi i-MiEVs already in Singapore, another 10 i-MiEVs are expected to be delivered from Japan by end of this year.

7 “The purpose of the EV test-bed is to gain a better understanding of EV technologies, business models and user preferences which will give us more information to determine the feasibility of using EVs in Singapore,” said Mr Chee Hong Tat, Chief Executive of EMA.

8 Mr Chew Hock Yong, Chief Executive of LTA said, “The launch of the electric vehicle test-bed marks a significant milestone for land transport in Singapore. We are encouraged by the support of the business community for this test-bed. We all have the same objective, which is to push towards a cleaner, greener and more sustainable transport system, and a better living environment in Singapore.”

9 Singapore is set to be amongst the first cities in the world to test-bed an ecologically sustainable and integrated transport solution at the system level. Said Mr Tan Choon Shian, Deputy Managing Director, Singapore Economic Development Board, “The EV test-bed is an excellent example of how Singapore presents itself as a ‘Living Laboratory’, in this case for EV manufacturers, charging solution providers and automotive component players, working closely with various stakeholders in both government and utilities sector. In meeting Singapore’s need for sustainable mobility solutions, we invite private sector players to partner us in the development and testing of innovative solutions.”

10 Robert Bosch (South East Asia) Pte Ltd (Bosch) has been appointed as the first Charging Service Provider (CSP) to design, develop, deploy, operate and maintain the charging infrastructure of Singapore’s EV test-bed programme. Bosch will work closely with future test-bed participants to install dedicated charging stations to meet their charging needs.

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<sup>2</sup> Normal charging stations have a longer charging time of 7 to 8 hours compared to quick chargers that have a charging time of 45 minutes.

11 This is the first time that Bosch's eMobility solution is being tested outside of Germany. Mr Martin Hayes, President and Managing Director of Robert Bosch (South East Asia) Pte Ltd said, "Our eMobility solution is a comprehensive and state-of-the-art system for the EV test bed. User-friendly, robust, scalable, cost effective, highly secure and easily adaptable for future concepts, it will support the development of a vibrant electric vehicle city transportation ecosystem for Singapore. This aligns with the Singapore government's vision for an environmental-friendly and self-sustainable transportation infrastructure. We are privileged to contribute to this important milestone."

### **Industry participation in EV Test-bed**

12 Interested companies and organizations are welcome to participate in the EV test-bed. They may apply for the Enhanced Technology Innovation and Development Scheme (TIDES-PLUS) which is jointly administered by EDB and LTA. The scheme waives all vehicle taxes such as Additional Registration Fees (ARF), Certificate of Entitlement (COE), road tax and excise duty, for the purposes of R&D and test-bedding of transport technologies. Under the TIDES-PLUS scheme, participants can enjoy the tax waiver for an initial period of six years. Interested parties can visit [www.ema.gov.sg](http://www.ema.gov.sg) for details.

13 While Bosch has been appointed to roll out the initial charging infrastructure for the test-bed programme, other players are welcome to set up EV charging stations on a commercial basis.

### **About the Energy Market Authority**

The Energy Market Authority (EMA) is a statutory board under the Ministry of Trade and Industry. Our main goals are to ensure a reliable and secure energy supply, promote effective competition in the energy market, and develop a dynamic energy sector in Singapore. Through our work, we seek to forge a progressive energy landscape for sustained growth. Please visit our website [www.ema.gov.sg](http://www.ema.gov.sg) for more information. As co-chair of the EV Taskforce, EMA will identify strategic partners for test-bedding, review power grid regulation/licensing requirements for EV charging systems and develop codes and standards.

### **About the Land Transport Authority**

Land Transport Authority (LTA) is a statutory board under the Ministry of Transport. LTA plans the long-term transport needs and spearheads land transport developments in Singapore. While serving commuters by providing an integrated and user-friendly transport system, LTA addresses wider issues such as sustainable development, economic growth, and community life. As a co-chair of the EV Taskforce, LTA helps ensure that relevant regulations, standards and infrastructure are in place. LTA looks forward to working with leading companies to develop innovative transport solutions, and making Singapore's transport system greener, cleaner, and more people-centred.

### **About the Economic Development Board**

EDB is the lead government agency for planning and executing strategies to enhance Singapore's position as a global business centre and grow the Singapore economy. In so doing, we attract economic opportunities and jobs for the people of Singapore, and help shape our country's economic future. EDB's role in the MOU is to work with industry partners to jointly identify industry development opportunities such as manufacturing, R&D and exportable services. The MOU is aligned with EDB's positioning of Singapore as a "Living Laboratory" where leading-edge urban mobility solutions are tested, developed and exported to the rest of the world.

## FACTSHEET ON ELECTRIC VEHICLES

### What is an Electric Vehicle?

An electric vehicle (EV) is powered entirely by batteries and can be recharged with an electric power source through a connecting plug. In lieu of an engine, an EV is propelled by an electric motor.

### Potential Benefits of EVs

- EVs offer significant advantages in the areas of energy efficiency and pollution reduction as compared to conventional petrol and diesel internal combustion engine (ICE) vehicles.
- The EV motor system is more than twice as efficient as the ICE. The EV is also able to recover part of the energy expended during braking in a process called regenerative braking. As such, overall efficiency<sup>3</sup> for EVs is around 65% as compared to 18-23% for ICEs.
- EVs charged using electricity from renewable energy sources like solar and wind have virtually zero well-to-wheel carbon emissions<sup>4</sup>. EVs charged using electricity generated from natural gas power generation (as is the case in Singapore) would also achieve up to an estimated 66% reduction in carbon emissions compared to conventional ICE vehicles

### Current Constraints of EVs

#### **1. Higher Cost due to Expensive Battery Technology**

- It is expected that EV battery prices are likely to decrease with technological advancement and larger scale of production. The lifespan of batteries used in EVs is also expected to increase as technology progresses.
- Already, battery costs have fallen sharply by 30% since 2006 and this downward trend is expected to continue over the coming years. The current cost of an automotive lithium-ion battery pack, is approximately S\$1240<sup>5</sup> per kWh and the price is likely to decrease to approximately S\$355 per kWh by 2030.

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<sup>3</sup> Efficiency (%) is defined as the degree of effective use of energy drawn from the battery or fuel tank to move the vehicle.

<sup>4</sup> Well to wheel carbon emissions refers to the total environmental impact from the extraction of the fuel to the point it is used either directly or indirectly by the car.

<sup>5</sup> Conversion rate used: 1 EUR = 1.77 SGD

- The upfront cost of an EV is currently much higher than its ICE equivalent due to the high battery cost. However, this cost differential is expected to narrow as battery prices fall with technology improvements.

**2. Limits in Charging Time and Travelling Distance**

- Most EVs are powered entirely by lithium-ion batteries. A standard full charge at 3-6 kW (230 volt (V), 15 ampere (A) will take about 8 hours, although ‘quick charging’ technologies exist which can markedly reduce charging time by providing high levels of power to EVs. Typically, an EV battery can be quick charged within 30 - 45 minutes.
- The driving range of EVs depends on
  - the capacity of the battery;
  - the type of routes travelled (such as city or highway driving);
  - whether air-conditioning is turned on (air-conditioning is energy-intensive and will drain the battery faster);
  - driver habits/driving style.
- With the current battery technology, a full charge would normally allow the EV to travel for a range of between 90 km to 160 km. This is more than the average daily driving distance of around 55km in Singapore. With further breakthroughs in battery technology expected in the next few years, the range could be increased by up to 50%.

**EVs – Two types of charging infrastructure for Singapore**

A summary of the different charging technologies is listed below.

| <b>Types of Charging Infrastructure</b> | <b>Description</b>   | <b>Recharging Time</b> |
|---|--|------------------------|
| 1. Normal Charger (Public)              | There are two types of normal chargers – public and residential chargers. Public chargers are installed in public locations like shopping mall and HDB car parks while private chargers are installed in private premises. Normal chargers have a longer charging time of 7 to 8 hours compared to the quick chargers. | 7-8 hours              |
| 2. Normal Charger (Private)             |  | 8 hours                |
| 3. Quick Charger                        | Compared to the normal chargers, the quick chargers have shorter recharging time and hence, require more electrical power.   | 30 - 45 min            |

Normal Charger (Outdoor)



Normal Charger (Indoor)



### Public Charging Infrastructure

- Locations



### Legend:

- Company names' in bold have charging stations that are installed & operational by mid-June.

- Other locations represent charging stations for users who have signed the Premise Owner & End-User agreements by mid June.

- **Bosch’s monthly subscription model**

EV test-bed participants can have unlimited access to Bosch’s public charging network at a fixed monthly subscription fee of S\$180 (before GST).

- **Repair / Maintenance services**

Bosch would be providing all repair and maintenance services for the charging network it has deployed till 2016, thereafter the ownership of all assets associated with EV charging infrastructure would be transferred to EMA or EMA appointed parties.

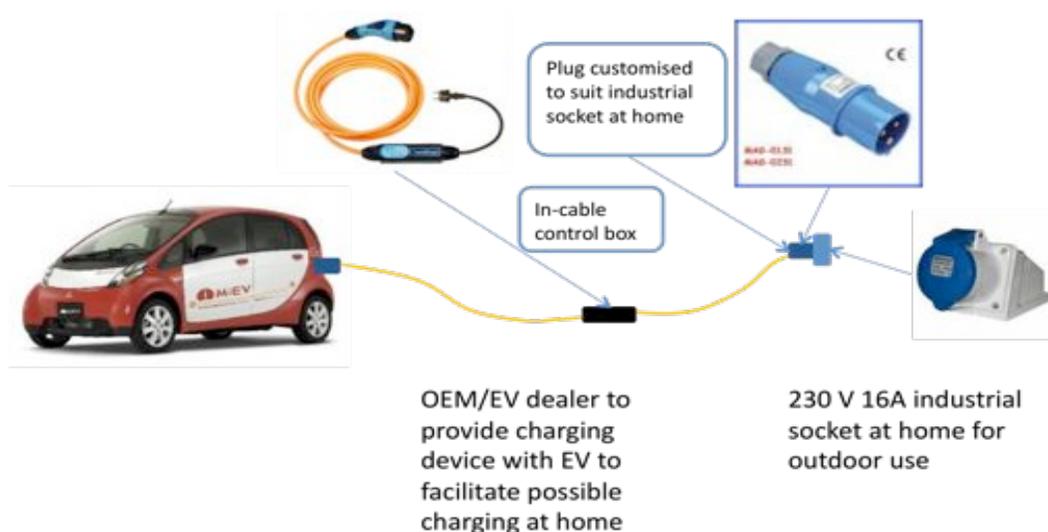
- **Subscription to other charging service providers**

As Bosch is the designated CSP for the EV test-bed, its charging service is designed to simplify the data collection process by automating the capture of information from the EV while it is charging.

## Private Charging

- **Charging the EV at home**

Test-bed participants will be able to charge their EV at home. They can use the charging device and cables provided by their EV dealer if they have an existing 230V, 16A industrial socket at home for outdoor use. Otherwise, they are advised to engage a licensed electrician to install the industrial socket.



## **Data Collection**

- To minimise inconvenience to participants during the test-bed, EVs participating in the test-bed will be installed with devices to automatically collect data wherever possible. The information will be downloaded by the EV Taskforce on a regular basis during the period of the test-bed. Other information which cannot be automatically collected by the device would have to be manually filled using the forms provided.

## **Enhanced Transport Technology Innovation and Development Scheme (TIDES-PLUS)**

- TIDES-PLUS is jointly administered by the Economic Development Board (EDB) and the Land Transport Authority (LTA). The purpose of this scheme is to support EDB's effort in attracting automobile companies to undertake knowledge-based manufacturing, Research and Development (R&D) activities and testing of vehicles in Singapore.
- Under the scheme, programs with new technology vehicles undergoing R&D and test-bedding in Singapore are granted Certificate of Entitlement (COE), Additional Registration Fee (ARF) and Road Tax exemptions upon approval. Duty exemption permits can also be applied from the Customs & Excise Department.
- The tax exemption period has been extended to six years, up from two years under the previous scheme.

## **Background information on Singapore's Electric Vehicle Test-bed**

- Since 2009, a multi-agency taskforce chaired by the Energy Market Authority (EMA) and Land Transport Authority (LTA), and comprising members across different government agencies, including the Agency for Science, Technology and Research (A\*STAR), Economic Development Board (EDB), Ministry of Environment and Water Resources (MEWR), Ministry of Trade and Industry (MTI), National Environment Agency (NEA), Housing & Development Board (HDB) and SPRING Singapore has been set up to assess the benefits and feasibility of adopting EVs in Singapore.
- The EV test-bed will involve key industry players to examine infrastructure requirements and new business models arising from EVs, as well as to identify industry and R&D opportunities. The test-bed is open to all automobile manufacturers and technology companies interested in shaping the future of

electric transport. The test-bed has been extended by one year and will run till the end of 2013.

- Besides Mitsubishi Motors and Daimler, the EV Taskforce is also in talks with Renault-Nissan to provide EVs to the Singapore market in 2011. Other auto-manufacturers are also welcome to participate in the EV trial as it is intended to be an open test-bed for all interested parties.

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