

**“ELECTRIFICATION OF SINGAPORE’S LAND  
TRANSPORT” BY MR DAVID TAN, DEPUTY CHIEF  
EXECUTIVE, ENERGY MARKET AUTHORITY AT  
PLUG-IN SINGAPORE 2009 ON 20 NOV 2009, 9.15AM**

Distinguished Speakers and Guests,

Ladies and Gentlemen,

INTRODUCTION

1. Good morning and a warm welcome to all of you to Plug-In Singapore 2009.
2. The Singapore International Energy Week is happy to host the Plug-In Singapore 2009 as we discuss our common objectives to electrify our land transport system and the role of electric vehicles, or EVs, in this endeavour.

GLOBAL TRENDS IN EVS

3. Contrary to popular belief, EVs are not a new concept. EVs have been in existence since the 1800’s and actually outsold all other cars in the US at its high point during the turn of the 20<sup>th</sup> century. However, with the subsequent advent of cheap fossil fuels brought on by the discovery of new petroleum reserves in the US and other parts of the world, the electric vehicle lost its pole position to vehicles running on the internal combustion engine (ICE). Since then, the latter has firmly established itself as the dominant technology option for the automotive industry. However, whilst we expect the ICE to

extend its dominance through to 2020, recent developments, including technological advancements and the prospect of a carbon-constrained future, are leveling the playing field between EVs and ICE-based vehicles.

4. In fact, there are growing expectations that EVs may eventually replace ICE-based vehicles as the vehicle of choice for drivers. The electric vehicle has various innate characteristics that enable it to adapt well to a carbon-constrained world. EVs have higher efficiency than conventional internal combustion engine vehicles, and generally consume less energy. They also contribute to lower greenhouse gas emissions, especially for EVs charged with electricity generated by renewable sources, where the carbon footprint is zero. Even in an alternative energy disadvantaged country like Singapore, which is powered mainly by natural gas, it is estimated that we can reduce up to 4% of our land transport sector's carbon emissions by 2020 with just a 2% EV penetration rate.

5. Cognizant of the advantages offered by EVs, many governments, auto manufacturers and power utilities worldwide are now partnering each other to invest in EV programmes. These players include big names like Renault-EDF in Paris, Daimler-RWE in Berlin and Mitsubishi-TEPCO in Tokyo. The Hong Kong government has also recently announced that it will buy 10 Mitsubishi i-MiEV electric cars to promote the use of environmentally friendly vehicles.

6. Given the current global interest in EVs and the fast pace of development in related technologies such as high capacity batteries, high efficiency electric motors and power electronics, the use of EVs are expected to pick up from 2015 onwards and become fully commercially viable and ready for the mass market after 2020. To prepare for such an outcome, countries, in particular cities, need to start putting in place the appropriate physical infrastructure, policies and regulations to meet the demands of this new solution.

#### SINGAPORE'S EV TEST-BEDDING PROGRAMME

7. It is with this consideration in mind that Singapore embarked on a national EV test-bedding programme. This programme was launched in May this year to provide an open platform for all auto manufacturers and technology companies to examine the infrastructure requirements of an EV system, to test the performance of EVs under local road conditions and in the tropical environment, and to identify related industry and R&D opportunities. A total of S\$20 million has been set aside for this programme to support infrastructure development and test-bed EVs. This test-bed will run for three years, starting from next year and will be driven by a multi-agency Taskforce, co-chaired by the Energy Market Authority (EMA) and the Land Transport Authority (LTA).

## SINGAPORE IS AN IDEAL LOCATION FOR EVs

8. There are several factors that make Singapore an ideal location to launch such a test-bed, including our size, compact urban environment, and robust power grid and ICT infrastructure.

9. As a small and densely-built up urban city state, average driving distances in Singapore are short, with the average passenger vehicle mileage estimated at less than 55 km per day. This is well within the typical driving range of a fully charged electric vehicle, which currently comes in between 90 and 160 km. In addition, our robust electricity and ICT networks will enable us to deploy charging infrastructure to support EVs with relative ease.

10. Beyond these intrinsic advantages, Singapore also has a wealth of technology and research expertise in electronics, power and precision engineering, accompanied by a critical mass of skilled workers and technicians in these sectors. This will stand us in good stead in attracting high value-add activities centered on batteries, power electronics and electric drive trains.

11. Leveraging on these capabilities, Singapore is positioning itself as a “living laboratory” for companies to research, develop, and test innovative solutions for EVs in a real environment with human activities. As a “living laboratory”, Singapore also aims to develop sustainable EV solutions that can be exported to the region and beyond.

12. An example of such innovative EV solutions that we at EMA are interested in is the concept of vehicle-to-grid (V2G) power. V2G solutions allow EVs to draw power from the grid during off-peak periods and sell power to the grid during peak periods. This will make load leveling possible and allow for a more efficient operation of the power system.

#### SINGAPORE'S EV DEPLOYMENT PLAN

13. As part of our deployment plan for the EV test-bed project, the EV taskforce has been working with Renault-Nissan, Mitsubishi and other auto manufacturers to secure a supply of EVs for Singapore. Mitsubishi plans to roll out its i-MiEV model of electric cars next year. So we are expecting our first batch of up to 50 i-MiEVs to arrive from September 2010. Meanwhile, Renault-Nissan has indicated that its EVs will only be available for commercial sale in 2011.

14. We are now looking for interested companies to participate in the test-bed and be an early adopter of EVs in Singapore. Companies taking part in the test-bed can register their EVs under the Transport Technology Innovation and Development Scheme (TIDES), jointly administered by LTA and EDB. Participants will be required to collate data on the performance of the EV such as driving range between charging, ease of charging, annual mileage and total costs of operation. The data collected will be instrumental in evaluating the costs & benefits and overall feasibility of the future adoption of EVs in Singapore.

15. In the area of infrastructure, the EV Taskforce will be rolling out a small network of EV charging stations. We will launch a competitive tender next year to select an EV infrastructure service provider. A study will also be carried out to determine the number of EV charging stations that will be required for the EV test-bed and the specific location of these stations. In general, we expect most of the charging to be done overnight in the car parks of the EV users' homes or offices. The deployment of these EV charging stations will be timed to coincide with the actual take-up of EVs under the test-bed.

16. Singapore's EV test-bed is envisaged to be an open platform for all auto-manufacturers and EV charging technology providers. The first batch of EV charging stations will have to be compatible with the EVs produced by the major auto-manufacturers. This is no simple task, as there are currently differing standards adopted by different markets. There is still no commonly accepted international standard for the power charging cable and it was only recently that the major auto-manufacturers have agreed on adopting the SAEJ1772 standard for the EV couplers.

17. To address this, EMA, together with SPRING Singapore and our industry partners, have taken the initiative to work on a Technical Reference for public EV charging systems that is aligned with international practices and will take into consideration Singapore's local conditions and electrical safety requirements. This Technical Reference, which we are targeting to launch next year, will set

minimum standards for the development of EV charging systems and safe charging of EVs.

## CONCLUSION

18. While EVs offer tremendous potential for improvements to both our energy and transportation landscape, there are also uncertainties that we need to manage. At this early stage, it is premature for us to tell whether EVs will eventually take off commercially and replace ICE-based vehicles, or if they will be superseded by other competing technologies, such as hydrogen fuel cells. Whilst the initial signs are hopeful, as effective policy-makers, we would need an evolving, creative response that is adaptable to new technological developments and which will allow us to leverage on new technologies wisely to meet our energy and transportation needs.

19. It is in this spirit that we have embarked on this EV test-bed to allow policy-makers, industry players and consumers to come together to demonstrate and test concepts, and prepare ourselves for a new future. While the government can facilitate the development of EVs, the test-bed will only be successful if other stakeholders such as industries and consumers believe in the value of EVs. We look forward to our partnership with you in this exciting new endeavour to shape the future of energy and transportation.

20. Thank you.