

**OPENING ADDRESS BY MR LAWRENCE WONG, CHIEF EXECUTIVE,
ENERGY MARKET AUTHORITY, AT THE SMART GRIDS CONFERENCE ON
19 NOVEMBER AT 9.10AM**

1. I am very happy to join you for this conference on Smart Grids. Let me extend a warm welcome to all of you, especially our overseas guests.

WORLDWIDE PUSH TOWARDS SMART GRIDS

2. The electricity grid is one of the greatest engineering achievements of the 20th Century. However, it is often taken for granted as basic infrastructure for the economy. To date, little has been done to modernise and improve the electricity grid in many countries. As a result, today's electricity grid focuses largely on the passive transmission of electricity from the power plant to the consumer. Limited information is exchanged between power suppliers and consumers. The grid does not intelligently integrate the behaviour, actions and responses of all the parties connected to it.

3. The current design of the grid therefore results in sub-optimal outcomes for all. Most utilities have limited visibility into what happens after electricity has been dispatched and so are unable to tell if a power outage has occurred. Most consumers do not know much electricity they are using or how much they are spending until they receive a bill at the end of the month. The growing use of renewable power like wind and solar will also create more complications for the grid, due to their highly intermittent and variable nature.

4. Across the world, countries have come to realise the limitations of the existing electrical grid as the demands placed on the power system grow in size, scale and complexity. Hence, they are making the modernisation of the electrical grid a priority in their policy agendas.

5. For example, America is investing more than US\$4 billion for projects to upgrade the country's electricity grid as part of its economic stimulus package. The European Union has launched efforts to promote and co-ordinate smart grid developments across its member countries. China has rolled out a 5-year plan to make its grid smarter. Meanwhile, Japan has announced a ¥6 billion investment for Smart Grid pilot projects on 10 islands.

SMART GRID IN SINGAPORE'S CONTEXT

6. The specific considerations for smart grid deployment will vary from country to country. Some countries are further ahead, while others face more pressing challenges as their grids are ageing and need urgent upgrades and replacements.

7. In Singapore's case, we have continuously invested in our grid infrastructure to keep it up-to-date and reliable. Hence we already have a high-quality power grid with many smart features in place. For example, we have 2-way communication systems at higher voltage levels as well as online condition

monitoring systems to detect incipient faults. As a result, Singapore's electricity grid is one of the most reliable in the world, with an average interruption time of less than 1 minute per customer in a year.

8. Our grid owner and operator Singapore Power has also built up strong capabilities in grid management. They have worked hard not only to keep the lights on and the factories running in Singapore, but also to export their capabilities abroad. When China hosted the Beijing Olympics last year, the organisers engaged Singapore Power as their power system consultant to assist with condition monitoring of their distribution network. This is a testament to the expertise Singapore has developed in the field of grid operations.

9. While we have much to be proud of in our grid infrastructure and operations, there is still scope for improvement. In particular, there are several benefits we can reap from investing in a smarter grid.

10. First, a smarter grid will enable us to make better decisions about energy usage and enhance efficiency in the power system as a whole. Consumers will have access to information on their electricity usage patterns and will be able to manage their overall energy needs based on this information.

11. EMA recently concluded trials in two local housing estates, Marine Parade and West Coast, to evaluate a basic system of smart meters as well as time-differentiated electricity tariffs. As part of the trial, households were provided with real time information on their electricity usage. Awareness of this information alone resulted in a reduction in electricity consumption by about 2%. In addition with differential pricing, these households shifted about 10% of their usual electrical load from peak periods to off-peak periods, thereby enjoying savings in their electricity bills.

12. These findings also have important implications at the system level. If demand can be shifted away from peak periods, power companies would not need to build extra power plants to cope with such high demand requirements. We would also be able to reduce the spare generation capacity that power companies are required to maintain and thus bring down the overhead costs in our power system.

13. Second, a smarter grid will make it easier to facilitate the integration of intermittent and distributed sources of power. In recent years, we have seen more companies set up small-scale co-generation plants to produce both steam and electricity. We have also seen an increase in the deployment of solar PVs, which will accelerate as the cost of solar power comes down. Over time, the grid will become harder to manage if there are more distributed and variable sources of power connected to it. Added intelligence in the grid is therefore needed to integrate renewable and distributed energy sources, and ensure continued reliability in our electricity supply.

14. Third, a smarter grid is also critical to facilitating the electrification of transport. Significant investments in electric transport are being made worldwide,

and major automakers like Nissan, Renault and Mitsubishi are gearing up for new electric vehicle models. As the technology takes off, there will be increasing demand for electricity charging by both plug-in hybrids and full-battery electric vehicles. For example if 10% of the vehicles in Singapore are electric, an additional 1.3 terra watt hours of electricity per annum will be required, equivalent to 6 times the energy needs of our public housing estate in Ang Mo Kio. But these vehicles will contribute less to greenhouse gas emissions compared to regular cars running on fossil fuels. Furthermore, they have the potential to serve as vast energy storage systems and feed power back into the grid during peak periods. The technology for vehicle-to-grid power is still several years away but we need to start thinking about an intelligent interface to coordinate and facilitate interactions between electric vehicles and the power grid.

INTELLIGENT ENERGY SYSTEM PILOT PROJECT

15. There are many opportunities to exploit the potential of smart grids in Singapore. Our science and technology agency, A*STAR is building an Experimental Power Grid Centre, which will facilitate R&D efforts in this area. An important complement to such research is a platform on our main grid itself to test smart grid applications and assess the business case for future investments.

16. Hence, EMA has decided to launch a pilot project for an “Intelligent Energy System” aimed at the development and testing of comprehensive smart grid solutions. This pilot is a first step towards realising our vision of an intelligent and sophisticated energy infrastructure, capable of managing and integrating the decisions of all players connected to it by combining the supply of electricity with the benefits of information and communications technology.

17. As part of this pilot, we intend to deploy the key technology components for a smarter grid, including advanced metering infrastructure (or what is commonly referred to as “smart meters”) and various communication, IT and data management systems. The focal point of the pilot project will be at the Nanyang Technological University and its neighbouring area, including the upcoming CleanTech Park at Jalan Bahar. EMA will be calling a tender to identify and select companies interested in offering smart grid solutions. We will then work with these companies and with Singapore Power to implement the project.

18. In many ways, Singapore is well positioned to play a leading role in the smart grid arena. We already have an advanced power grid to build upon. We also have a well-developed communications infrastructure, which will become even more pervasive when the next-generation national broadband network offering high-speed broadband access is ready. With this pilot, we will lay the foundations for an even more intelligent energy system in Singapore. We will bring the capabilities of our power grid to the next level and ensure that our electricity infrastructure is ready for the future.

CONCLUSION

19. Smart grids offer tremendous potential for improvements to our energy infrastructure. But there are also risks to manage. Industry standards for smart

grids are still evolving, and the benefits of smart grid technologies scaled up to a national level have not been fully evaluated. In addition, the interests of various parties will have to be aligned before a national smart grid can be fully deployed in any country.

20. As with all new technologies, developmental work will continuously evolve, and adjustments and refinements will be needed before we see widespread adoption. Nonetheless, there is a growing consensus around the world that the time of the smart grid has come. If we make the right moves, the smart grid presents an enormous growth opportunity. It will provide the platform for new products and services, spur energy innovations, and completely transform the shape of the energy industry in future.