

NOTABLE ENERGY DEVELOPMENTS SINCE EWG44 SINGAPORE

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Introduction

1. As an island city-state with no indigenous energy resources, Singapore has more than its fair share of energy challenges. Nevertheless, we are committed to realising a smart energy economy, and to bringing about reliable, sustainable and competitively-priced energy to fuel our growth.

2. To achieve these goals, Singapore has adopted a long-term holistic approach based on the following key recommendations of the Economic Strategies Committee:

- Diversify energy sources
- Enhance infrastructure and systems
- Increasing energy efficiency
- Strengthen green economy
- Pricing energy right

Diversification of energy sources

LNG

3. Today, more than 80 percent of Singapore's electricity is generated from natural gas supplied by Malaysia and Indonesia through pipelines. To diversify our gas supply, Singapore is building a terminal to import liquefied natural gas (LNG). The terminal is on track to commence operations by the second quarter of 2013.

4. Since the terminal's groundbreaking in March 2010, construction of key installations including the first two LNG storage tanks and the primary jetty are well under way. The LNG terminal will have a throughput capacity of 3.5 million tonnes per annum (Mtpa) when it is operational in the second quarter of 2013. A third LNG storage tank, targeted for completion by the fourth quarter of 2013, will increase the throughput capacity to 6 Mtpa. To ensure that our infrastructure can cater to our future energy needs, a fourth LNG storage tank will be built which will boost the capacity of the terminal to 9 Mtpa. This fourth tank will enhance our energy security by allowing further diversification of our fuel sources. The additional capacity will also allow us to respond to new opportunities in global LNG markets.

5. Beyond LNG, there are practical limitations to fuel diversification due to Singapore's limited energy options. However, as technologies are constantly changing, solutions not viable for Singapore today may be viable tomorrow. In

recognition of this, Singapore is looking to develop alternative energy options such as solar, biofuels, and nuclear energy.

Solar PV

6. Singapore's geographical location, with an average annual solar irradiation of 1,150 kWh/kWp/year, makes solar photovoltaic (PV) technology a promising option as a source of renewable energy. Currently, solar PV systems deployed in various pilot projects generate some 220 kWh of electricity per day and are funded by the Clean Energy Research & Test-bedding (CERT) grants. For example, the Housing Development Board (HDB) will invest \$31 million to install solar panels on the rooftops of residential blocks and multi-storey car parks in 30 public housing precincts by 2015. Singapore has also allowed for a simplified "credit treatment" for residential consumers to get paid for solar PV power exported to the grid without having to register with the Energy Market Company and participate in the electricity market.

Nuclear

7. Singapore's nuclear pre-feasibility study was introduced to examine the prospects of introducing nuclear energy into our energy mix, with safety and site suitability as the dominant priority areas due to Singapore's high urban density. The conclusions of the study are that nuclear energy technologies presently available are not yet suitable for deployment in Singapore. Nonetheless, Singapore must continue to monitor developments and will develop capabilities to prepare for the growth of nuclear energy in the region. Singapore must also contribute actively to global and regional nuclear safety efforts, and keep abreast of progress in nuclear energy technologies so as to keep our options open for the future.

Electricity Imports

8. To further diversify our energy mix, Singapore is considering electricity imports, which will allow us to tap into new energy options that may be economically unfeasible or unavailable in Singapore, such as renewable energy sources (hydropower and geothermal) and coal. Importing electricity will also reduce the demand for land to build power plants in Singapore. The Energy Market Authority (EMA) is in the midst of consulting stakeholders on the regulatory framework for electricity imports.

Electricity Market Retail Contestability

9. Singapore has progressively liberalised the retail electricity market to enable more consumers to become contestable. Today, about 75% of total electricity demand in Singapore has been opened up for competition. Large non-residential consumers with an average monthly electricity consumption of 10,000 kWh or more at a single location can choose to become contestable. As a step towards full retail contestability (FRC), EMA will lower the contestability threshold from the current 10,000 kWh to 8,000 kWh on 1 April 2014, and then to 4,000 kWh on 1 October 2014. This will allow more non-residential consumers to be

eligible for retail contestability. As part of the efforts to implement FRC, EMA is studying the experiences of other jurisdictions, such as the UK, Australia and New Zealand. These include measures to lower the costs of implementation and safeguard the interests of smaller consumers.

Enhancing infrastructure and systems

Intelligent Energy System (IES)

10. EMA has embarked on the Intelligent Energy System (IES) or 'smart grid' pilot project, which would be an important step towards a smarter power grid. The success of the IES pilot project will enable the adoption and roll-out of workable solutions for Singapore's power system, thereby enhancing its efficiency and resilience of Singapore's energy system as a whole. The pilot comprises two phases: Phase 1 which focuses on the development of the enabling smart grid infrastructure has been completed and the second phase has started with about 4,000 smart meters installed for commercial and industrial consumers and households in the Western precinct of Singapore.

Electric Vehicles

11. EMA and the Land Transport Authority (LTA) launched the Electric Vehicle (EV) test-bed in June 2011 to assess the costs, benefits and feasibility of adopting EVs and to examine future infrastructure requirements in Singapore. Robert Bosch (South East Asia) Pte Ltd is the appointed charging service provider to set up the charging infrastructure around Singapore to support EVs participating in the test bed. To date, there are a total of 55 EVs on the road and 39 normal charging stations have been installed and a total of 19 charging stations (including 1 quick charging station) have been rolled out as part of the test bed.

Increasing energy efficiency

12. Energy efficiency is a key priority area for Singapore. A series of joint initiatives by various governmental agencies and industry stakeholders have been implemented to improve energy efficiency across the various sectors of power generation, industry, transportation, households and buildings. Supporting ongoing efforts in APEC to drive energy efficiency improvements in the region, Singapore hosted the second APEC Cooperative Energy Efficiency for Sustainability (CEEDS) Phase III workshop on energy efficient urban passenger transportation from 17 – 19 January 2012.

Strengthening the Green Economy

13. Singapore's investments in our clean energy ecosystem have positioned us well to seize global research and business opportunities. To date, we have attracted several leading industry players to Singapore to create, demonstrate and commercialise sustainable development solutions. Notable energy

corporations with a presence in Singapore include Renewable Energy Corporation, Vestas and Neste Oils.

Pricing Energy Right

14. The price of energy should reflect its total cost, taking into account various externalities and constraints, such as energy security and environmental sustainability. Price signals will raise awareness and influence energy consumption and investment decisions to achieve energy efficiency and conservation. Singapore is thus deliberating various options for carbon pricing, including carbon tax and cap-and-trade regimes.

15. Ongoing studies on the suitability of energy pricing schemes for Singapore are being undertaken to encourage consumption and investment decisions that take into account global market trends and externalities. This is to ensure that our economy is able to adapt to the rising cost of energy and to a carbon-constrained world, in the event of a global agreement on climate change. Any pricing scheme should be carefully calibrated and introduced gradually with appropriate offsets for groups such as low-income households.

Singapore Energy Statistics

16. The Energy Market Authority released the second Singapore Energy Statistics (SES) report in October 2012. The SES is an annual publication which provides an integrated one-stop compilation of Singapore's key energy statistics (including supply, consumption, and prices) and trends in the electricity and gas sectors. This is part of Singapore's efforts to support the development of a dynamic energy sector.

Singapore International Energy Week

17. The fifth run of SIEW was successfully held on 22 to 25 October 2012 and saw more than 10,000 participants from around the world. Eminent energy leaders from the public and private sectors engaged in active discussions at co-located conferences, roundtables and networking events across the full spectrum of energy verticals including oil & gas, renewable energy, energy trading and smart grids. The high-level debates on pertinent energy issues also attracted strong media presence.

18. Some of the notable participants were: H.E. Dato' Sri Peter Chin, Minister of Green Technology, Energy And Water of Malaysia; H.E. Soulivong Daravong, Minister of Energy and Mines of Lao PDR; Ms Maria van der Hoeven, Executive Director of the International Energy Agency; Dr Adnan Z Amin, Director General of the International Renewable Energy Agency; and Mr Jose Maria Figueres, President of Carbon War Room and the former President of Costa Rica.

19. The next SIEW will be held from 28 October to 1 November 2013.

Singapore Energy Awards

20. EMA has established the Singapore Energy Awards (SEA) to recognise organisations and individuals who have made outstanding contributions to Singapore's energy sector through achievements in the areas of capability development (e.g. raising the skills of the workforce) or innovation (e.g. development of new energy technology or business models). The entire energy industry – power utilities and oil and gas sectors, as well as emerging sectors such as energy efficiency and clean and renewable energy - are eligible for the awards, which will be given out at SIEW 2013.

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