

## Report on the IPS Corporate Associates Breakfast Dialogue on “Enhancing Energy Security and Resilience Amidst Market Volatility, While Staying the Course for Our Energy Transition”

By R Avinash

### Introduction

On 30 August 2022, the Institute of Policy Studies (IPS) hosted a Corporate Associates Breakfast dialogue titled, “Enhancing Energy Security and Resilience Amidst Market Volatility, While Staying the Course for Our Energy Transition”.

The speakers were Mr Ngiam Shih Chun, Chief Executive, Energy Market Authority (EMA); and Ms Cindy Lim, Chief Executive Officer, Keppel Infrastructure Holdings Pte Ltd. IPS Deputy Director (Research) Dr Gillian Koh moderated the dialogue, which was attended by about 50 people.

The dialogue traced the origins of the recent current energy crisis and how Singapore has initiated various measures to mitigate this, while keeping in view its medium- and long-term plans of achieving net-zero carbon emissions by 2050. Industry players like Keppel Infrastructure have also responded decisively by enhancing energy efficiency in the use of liquified natural gas (LNG), developing solar energy supply, establishing infrastructure to use green hydrogen and ammonia, and building the ASEAN power grid to tap regional sources of renewal energy.

### Ngiam Shih Chun: Factors that Aggravated the Energy Crisis

Mr Ngiam from EMA set the context by saying that the energy crunch crisis and climate change crisis were closely related. The energy crisis was a complex challenge that emerged in September 2021 as countries recovered from the COVID-19 pandemic, reopened their borders, and restarted economic activity.

However, supply fell short of demand due various reasons such as lack of investment, and delays to maintenance works. Since the Russian invasion of Ukraine in February 2022, international sanctions against Russia and Russia’s own response of tightening gas supplies aggravated the situation, and these resulted in record high prices.

### *Impact to Singapore*

The energy crunch affected Singapore, where around 95% of electricity is generated from imported natural gas.

Mr Ngiam explained that Singapore has a fully liberalised energy market. The government did not subsidise energy prices. In addition, Singapore has an energy-only market such that fuel prices paid by generation companies (gencos) are influenced by market conditions and determine the marginal price cleared in the market. Therefore, consumers are affected by the current global market conditions.

In response, Singapore implemented three groups of measures to deal with the crisis and help producers and consumers:

**(a) Direct intervention**

The Standby LNG Facility (SLF) was set up to ensure a steady supply of gas through the crisis. Gencos could draw natural gas from the SLF to generate electricity when their supplies were disrupted.

**(b) Legislation & regulation**

The gencos were directed to maintain sufficient fuel for power generation to ensure stability in the electricity market. EMA would also be able to direct gencos to generate electricity using the gas from the SLF pre-emptively if there were potential shortages in energy supply in the market.

**(c) Partnership**

Besides the above, EMA worked with the gencos and electricity retailers to help large consumers secure fixed plans and retail contracts with significantly fixed price components to reduce their exposure to market volatility, through the Temporary Electricity Contracting Support Scheme.

With these measures, energy supply is kept secure and energy markets remain stable.

***The Singapore Energy Transition***

Mr Ngiam also highlighted the Singapore Energy Transition plans. He shared the policy considerations and strategies for the “4 Switches” and reinforced the need for demand-side management to complement the supply measures. He added that the high energy costs were making clean energy projects more viable, and electricity trading projects were creating new business opportunities in the region.

***Three key lessons***

Mr Ngiam outlined three key lessons from the crisis. First, energy systems are complex. While some actions have a direct and immediate impact on supplies and prices globally, there are those with indirect and longer-term impacts. An example of the former is Russia turning off the gas taps of Nord Stream 1, which had occurred against the backdrop of the shut-down of nuclear power plants in many countries, as well as droughts and heatwaves in the Northern Hemisphere.

Second, existing market structures in Singapore are suitable for business-as-usual conditions, improving efficiency, and allocating resources well. However, with external shocks, these

structures could become strained. It raises the question of what needs to be changed in the market structure to provide stability and resilience if the energy system is likely to face disruptions regularly.

Finally, even as Singapore pushes towards achieving net-zero carbon emissions, key stakeholders must ensure that the energy transition is planned carefully. Sustainability must be balanced with security and affordability, and this is why stable and secure options such as natural gas will continue to remain important during this transition.

### **Cindy Lim: Four Switches in Energy**

Ms Lim began her presentation by highlighting how the Ukraine crisis had pushed nations and industries to think more deeply about being energy- as well as resource-resilient. Issues such as climate action, energy security, and inclusive energy transitions have become more prominent and pressing. For Singapore, this will require the use of the four energy switches.

#### ***First switch — natural gas***

As the cleanest fossil fuel, natural gas provides flexible and reliable power. Keppel Infrastructure owns and operates 1.3 gigawatts of power generation on Jurong Island. This comprises four units of combined cycle gas turbines (CCGTs). In 2021, Keppel upgraded one of its CCGTs and completed the process in August 2022, resulting in significant improvements in energy efficiency. The planned completion of an advanced “H” Class CCGT plant will also result in the further abatement of 220,000 tons of fuel emissions.

#### ***Second switch — solar energy and other renewables***

The second switch is renewable energy. In Singapore, solar photovoltaic (PV) technology is by far the most reliable and cheapest renewable technology available. In early 2022, Keppel was able to secure a grant from EMA and Jurong Town Corporation to pilot the deployment of a membrane-based floating solar PV system on Jurong Island. It has greater resilience to harsh marine environments including wave and wind impacts, compared with conventional pontoon systems. Since Singapore is land-scarce, water bodies and offshore islands present great potential in hosting energy systems.

#### ***Third switch — regional power grids***

The third switch is regional power grids. Keppel Infrastructure has 1.3 gigawatts of power generation capacity. If Keppel Infrastructure were to reduce carbon emissions through solar PV, it would have to install 6 gigawatts of PV. This would translate to 3,300 hectares of land and cost S\$6 billion, which is not feasible. In September 2021, one of Keppel Infrastructure’s companies, Keppel Electric, signed an exclusive framework agreement with Laos to import hydroelectric power via the LTMS PIP (Laos-Thailand-Malaysia-Singapore) Power Integration Project. The flow of hydroelectric power commenced in June 2022.

#### ***Fourth switch — low-carbon alternatives***

The fourth switch is to resort to the use of low-carbon alternatives such as green hydrogen and ammonia. For this, Keppel Infrastructure established a supply chain of green ammonia

from Queensland, New South Wales, Australia, which is transported, stored and used for power generation.

### ***Carbon capture***

Even with regional power grids and other renewable alternatives, reaching net-zero emissions still requires industrial carbon capture. Keppel Infrastructure is partnering the National Environment Agency to integrate carbon capture in Waste-to-Energy (WTE) plants in Singapore. This will lead to a massive volume reduction of carbon and even generate energy from non-recyclable waste. WTE will also prevent harmful landfill gas emissions.

### **Q&A Session**

#### ***Upcoming challenges to expect in the energy sector***

A participant asked about the upcoming risks and challenges that we should be worried about.

Mr Ngiam replied that in the short-term, countries would ensure their fuel supplies could meet rising peak demand in winter. If Russia were to cut off its gas supplies to Europe, European countries may seek more gas to cover their baseload demand. This would affect gas prices for Asia.

In the long term, we would need to manage challenges related to the energy transition. When it came to the regional power grid, there would be risks associated with cable damage and the source country. The technology used to generate the electricity also had its own risks. For example, solar power is intermittent and hydropower is weather-dependent.

Ms Lim stressed the need to think outside the box to find solutions like regional cooperation and development. For that, Singapore entities have to assure regional partners that the former are not acting as consumers just looking for the best deal available, but are long-term investors with a keen interest in the development of their regional partners.

### ***Nuclear energy***

A question was posed about nuclear energy as an alternative energy source, given the availability of the technology and how much safer it had become.

Mr Ngiam responded that a pre-feasibility study on nuclear energy had concluded in 2012 that technologies available then were not suitable for deployment in Singapore.

Following the Fukushima nuclear disaster, some countries shifted away from nuclear. Since then, countries had made stronger climate change commitments, particularly at the 2021 United Nations Climate Change Conference (COP26). As such, there had been a growing recognition that to achieve net-zero emissions, nuclear energy was likely to be integral to the plans of many countries. In early 2022, the Energy 2050 Committee reported that advanced nuclear technologies could play a part in helping the power sector achieve net-zero in 2050. Mr Ngiam agreed that this could be a possible long-term solution and EMA would continue to study this option, even though this would unlikely be a near-term solution. Issues about safety, nuclear waste, and public acceptance would first need to be addressed.

Ms Lim reminded the audience that many things would have to be in place before it is possible to adopt nuclear energy solutions. If the role of renewables is not fully exhausted, Singapore should not be in a rush to adopt nuclear energy.

### ***Market design***

A participant asked if there was a need to change the way the energy market is structured in Singapore and if so, how it is possible to avoid the problem of stranded assets, i.e., long-term investments in energy sources being devalued due to regulatory and policy changes. What then is the best way to protect consumers and market participants while bolstering energy security?

Mr Ngiam shared that the existing market design worked well in normal times but not when stressed under external shocks. The energy transition from a homogenous to diverse power system was already taking place regardless of the current energy crisis, driven by global forces and the pressure to meet climate change goals. This was different from the past when a single stable framework was applied to the entire power system.

Mr Ngiam reiterated that a market allowing prices to rise and fall based on supply and demand would not react well to external shocks. As a result, Singapore could look at putting more guardrails in place to stabilise the market, and this could include the encouragement of long-term gas contracting by consumers and power companies.

He stressed that EMA is concerned about the issue of stranded assets as this would affect cost competitiveness for consumers. For example, electricity imports would affect our domestic gas plants, but EMA would stage the deployment of imports carefully so that the gas plants could be repurposed as backups for the system.

### ***Partnerships with developing countries***

A participant cited the 2018 Laos dam collapse that had led to the deaths and displacement of people in the country and asked how Singaporean entities would manage the social impact and risks of their activities in the region.

Ms Lim shared the example of incineration plants in the Philippines 20 years ago and how they were banned because they emitted harmful cancer-causing gases. Now, WTE plants have advanced pollution control and gas treatment, such that the energy generated is generally healthy and safe. In the same way, it is vital that Singaporean entities adopt technical standards, quality codes, rigorous environmental impact and risk assessment, verification, and monitoring and validation in all their activities, she said. This would help avoid the risks mentioned.

### ***Regulatory challenges regarding the ASEAN power grid***

A participant asked about the regulatory challenges facing the ASEAN power grid and the private sector's role in making it happen for the long-term success of the region's electricity trade.

Ms Lim said it took decades to secure the first 100 megawatts of power to Singapore through the ASEAN power grid. ASEAN is not homogenous and the electric power systems and

regulatory frameworks are different across members states. As a result, there are political, regulatory and legal challenges to overcome for greater cooperation to take place. Ms Lim also emphasised the need to work closely with private and public sector stakeholders across the regulatory frameworks of each member state, to create long-term value for partners rather than engage in purely transactional relationships.

Mr Ngiam also highlighted the problem of carbon protectionism. In order to meet their net-zero targets, countries might prioritise their clean energy for domestic needs. There is thus a need for countries to come together to help one another in meeting their decarbonisation goals, have their incentives aligned, and in doing so, realise wider benefits for the entire region.

### ***Private sector adoption of green energy***

Lastly, in the context of inflation and the energy crisis, a participant asked the panellists how they saw the price-parity issue playing out over the next few years.

Mr Ngiam said that as clean technologies developed over the years, prices had come down significantly. Even though the government provided no subsidies or tariffs, solar power deployment had taken off. The same could be said for other renewable energy resources. This is a positive trend as the world grapples with the energy transition.

Ms Lim suggested that service providers develop innovative business models to help commercial and industrial customers work through the energy transition. When this happens, the concept of a green premium for renewable power will no longer be a problem.

### **Conclusion**

The dialogue on energy was a comprehensive session that touched on short-term issues of the energy crisis, to the long-term issues of the transition to renewable energy resources and Singapore's net-zero carbon emissions goals. As Singapore weathers a more turbulent and unpredictable world, it is well placed to reap the rewards of several forward-thinking policies to ensure its long-term resilience and even that of the region.

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