



*Smart Energy, Sustainable Future*

# **SINGAPORE ELECTRICITY MARKET OUTLOOK (SEMO) 2019**

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Fourth Edition

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# TABLE OF CONTENT

SECTION 1 INTRODUCTION .....	4
SECTION 2 ELECTRICITY DEMAND OUTLOOK .....	5
SECTION 3 ELECTRICITY SUPPLY OUTLOOK.....	7

## SECTION 1 INTRODUCTION

- 1.1 In Singapore's liberalised market environment, power generation investments are commercially driven. Prices in the electricity market send signals to investors to make investment decisions with respect to the timing of new plantings, as well as the amount of capacity and the type of technology. For such a market-based approach to work well, it is important that there should be sufficient and reliable information for investors to make investment decisions. This is especially so for the power sector, considering the high capital cost and significant lead time required for power generation planting.
- 1.2 The Energy Market Authority (EMA) continually seeks to work with the industry to ensure a conducive environment for power generation investments. A public consultation paper was launched in October 2015 to seek feedback on initiatives and enhancements to prepare for future power generation investments in Singapore. This led to the publication of the EMA's Final Determination paper "Preparing for Future Power Generation Investments in Singapore" (29 July 2016)<sup>1</sup>, where EMA indicated that it will release an annual information package to improve visibility on the longer term outlook of the energy landscape in Singapore.
- 1.3 In this fourth edition, the EMA continues to provide the projected demand and supply conditions<sup>2</sup> in Singapore, complementing existing publications such as the Singapore Energy Statistics.
- 1.4 The EMA welcomes feedback on information that may be useful to include for future editions to enhance visibility on the longer-term outlook of the energy landscape in Singapore, and to support future power generation investments.

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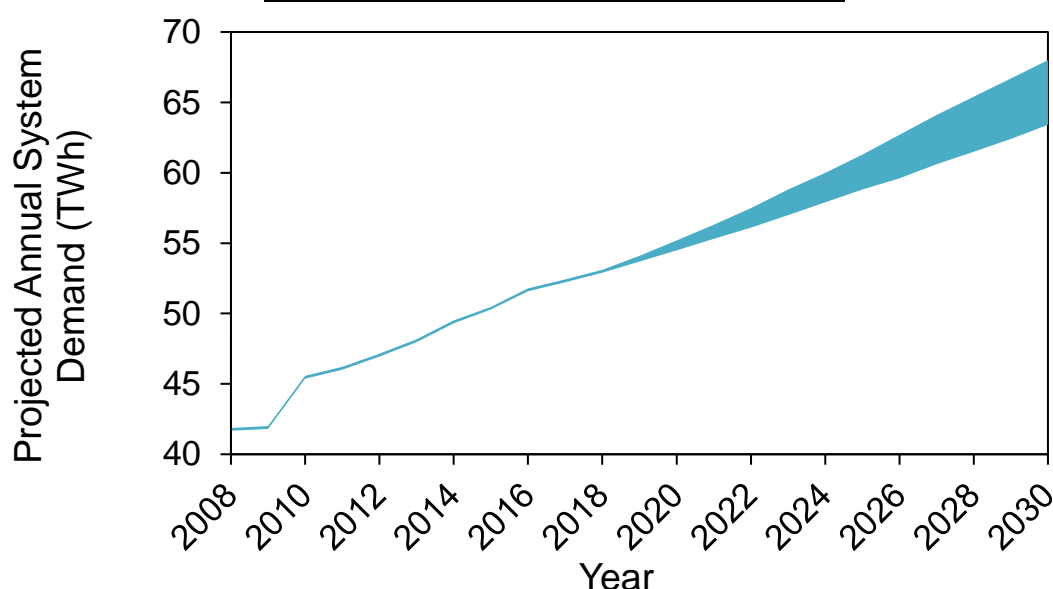
<sup>1</sup> More information on the initiatives can be found in the Final Determination paper "Preparing for Future Power Generation Investments in Singapore", published on 29 July 2016 [https://www.ema.gov.sg/cmsmedia/Determination\\_Paper\\_%20Preparing\\_for\\_Future\\_Power\\_Generation\\_Investments\\_Final\\_29\\_Jul.pdf](https://www.ema.gov.sg/cmsmedia/Determination_Paper_%20Preparing_for_Future_Power_Generation_Investments_Final_29_Jul.pdf)

<sup>2</sup> The projections are indicative and non-binding, and are dependent on factors such as prevailing assumptions and projections, policy considerations and the broader macroeconomic climate.

## SECTION 2 ELECTRICITY DEMAND OUTLOOK

- 2.1 Singapore's system demand<sup>3</sup> has increased from about 42 TWh in 2008 to about 53 TWh in 2018 at a compound annual growth rate (CAGR)<sup>4</sup> of 2.4%. System peak demand grew from 6,073 MW to 7,370 MW over the same period at a CAGR of 2.0%.
- 2.2 Over the next 10 years, from 2020 to 2030, the annual system demand and system peak demand are projected to grow at a CAGR of 1.5-2.1% (see [Figures 1 and 2](#)). This takes into account various factors, including changes to population, temperature<sup>5</sup>, and projected Gross Domestic Product (GDP) growth rates.

Figure 1: Projected Annual System Demand



Year	Projected Annual System Demand (GWh)
2020	54,500 – 55,200
2021	55,300 – 56,300
2022	56,100 – 57,500
2023	57,000 – 58,800
2024	57,900 – 60,000
2025	58,800 – 61,300
2026	59,600 – 62,700
2027	60,600 – 64,100

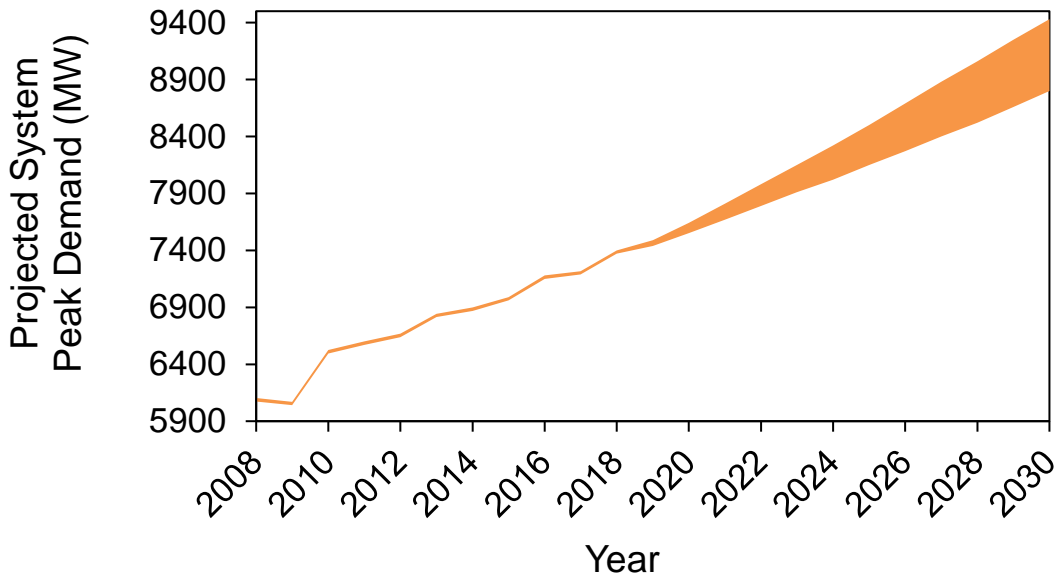
<sup>3</sup> System demand refers to gross electricity generation, including autoproducers with their own generation and consumers with solar generation, required to meet electricity consumed by all consumers. Autoproducers are enterprises that produce electricity but for whom the production is not their principal activity.

<sup>4</sup> The CAGR is calculated using 2008 figures as the base year.

<sup>5</sup> For instance, higher temperatures may lead to increased electricity demand due to air-conditioning.

2028	61,500 – 65,400
2029	62,400 – 66,700
2030	63,400 – 68,000

Figure 2: Projected System Peak Demand

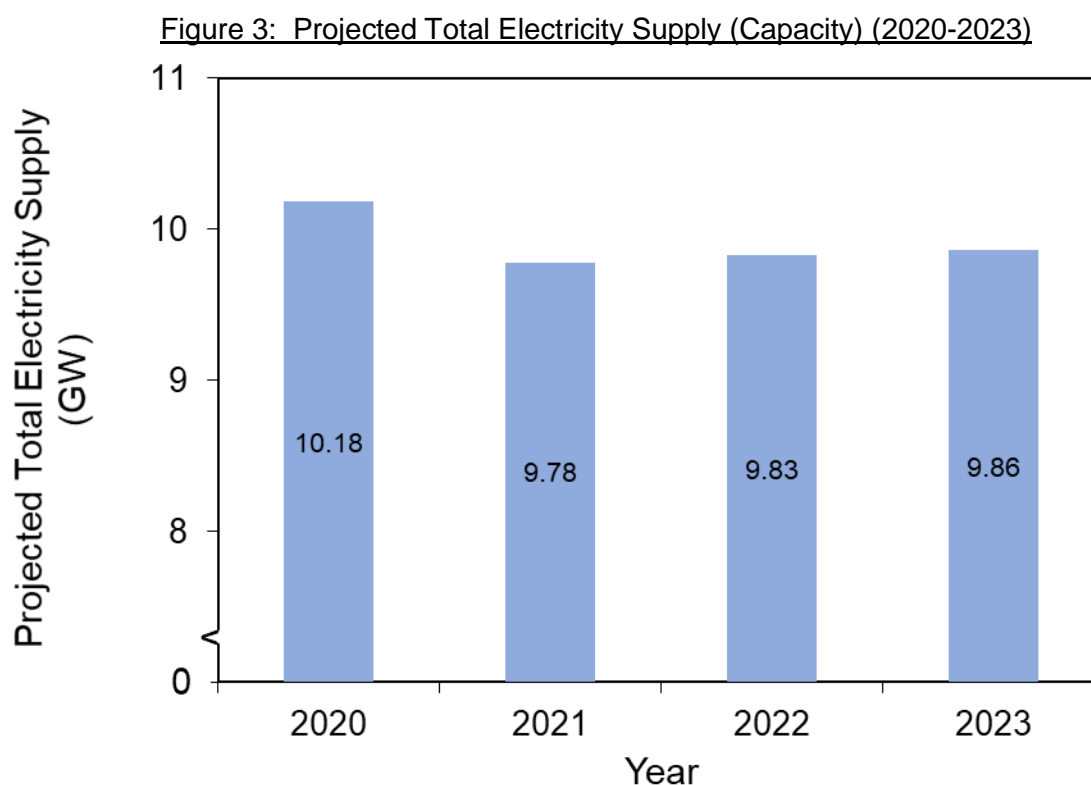


Year	Projected System Peak Demand (MW)
2020	7,550 – 7,640
2021	7,670 – 7,810
2022	7,790 – 7,980
2023	7,910 – 8,150
2024	8,020 – 8,320
2025	8,150 – 8,500
2026	8,270 – 8,690
2027	8,400 – 8,880
2028	8,520 – 9,060
2029	8,660 – 9,250
2030	8,800 – 9,430

2.3 In addition to the projections in Figure 1 and Figure 2, we have seen growth in new and emerging electricity-intensive sectors such as data centres around the world and in Singapore. Power requirements of these sectors are much larger and can ramp up very quickly. The government is monitoring these new electricity-intensive sectors to better understand their power requirements and expected growth to subsequently include these considerations into SEMO and when planning for future energy infrastructure.

## SECTION 3 ELECTRICITY SUPPLY OUTLOOK

3.1 Based on the submissions received from generation licensees on their indicative generation plans for the next 4 years<sup>6</sup> and projected growth of solar installed capacity in Singapore<sup>7</sup>, the projected total electricity supply over the next 4 years is indicated in Figure 3.



	Projected Total Electricity Supply (Capacity) (MW) <sup>8</sup>	Change(s) in Capacity (MW) compared to previous year
2020	10,180	- 720 <sup>9</sup>
2021	9,780	- 400
2022	9,830	50
2023	9,860	30

<sup>6</sup> The Final Determination paper on “Preparing for Future Power Generation Investments in Singapore” stated that generation licensees are required to inform EMA of their indicative generation plans with at least a 4-year notice period.

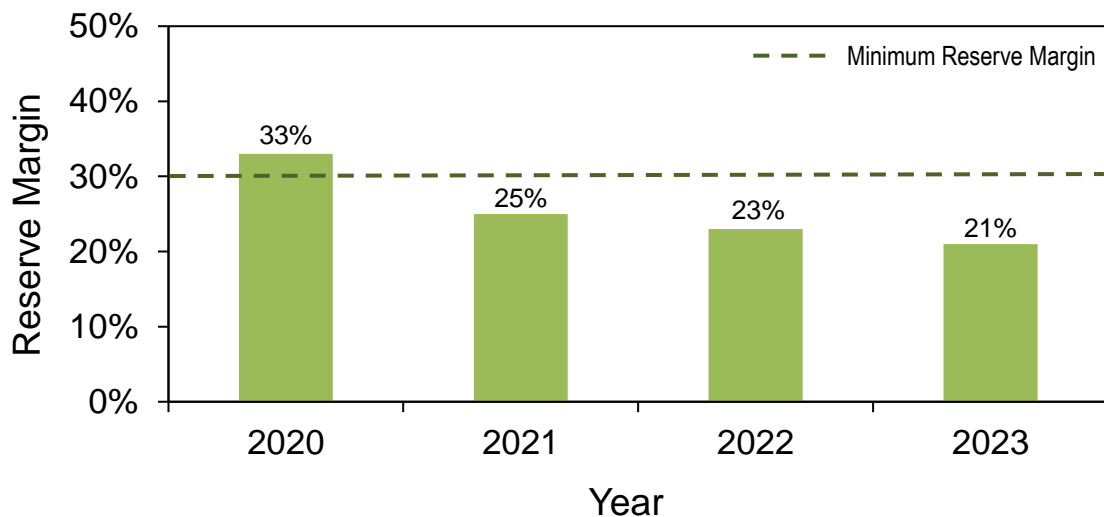
<sup>7</sup> Solar is assumed to have a growth rate of about 100 MWac per year. With a solar PV effective capacity of 27%, this means that 100 MWac of solar provides about 27 MWac of effective supply during peak periods. More details are available [on EMA’s website](#).

<sup>8</sup> This is based on the projected total electricity supply (capacity) as at end of the calendar year. The projections have been rounded off.

<sup>9</sup> The projected total electricity supply (capacity) by end 2019 is 10,900MW.

- 3.2 About 1,250MW of generation capacity has been retired from the system this year. Generation licensees have also indicated retirement or mothballing plans for about 2,800 MW of generation capacity<sup>10</sup> up till 2021. While the lifting of transmission constraints between Jurong Island and the Singapore mainland will supply more generation capacity to the mainland grid, we observe that the reserve margin over the next 4 years will dip below 30%<sup>11</sup> (See [Figure 4](#)).
- 3.3 The reserve margin (see formula in [Figure 5](#)) is calculated based on the upper bound of the projected system peak demand (shown in [Figure 2](#)) and the indicative retirement or mothballing plans of generation licensees that are subject to EMA's approval. Assuming these projections materialise, new generation plantings would be needed to meet the reserve margin.

[Figure 4: Projected Reserve Margins \(2020-2023\)](#)



[Figure 5: Reserve Margin Formula](#)

$$\text{Reserve Margin} = \frac{\text{Total Electricity Supply (Capacity)} - \text{System Peak Demand}}{\text{System Peak Demand}} \times 100\%$$

<sup>10</sup> There are 9 indicative plants retiring or mothballing, which include combined-cycle gas turbine (CCGT) and steam plants.

<sup>11</sup> In Singapore, the minimum reserve margin has been set at 30% to ensure system security. The reserve margin is a system-wide indicator.