

SG REVOLUTION

The future of the petrol kiosk
in Singapore with the rise of
electric vehicles

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Introduction

As part of the Singapore Green Plan 2030, the Land Transport Authority (LTA) laid out a comprehensive Electric Vehicle (EVs) push to reduce land transport emissions by 80% by 2050.¹ These initiatives include establishing 60,000 EV charging points, converting half of the bus and taxi fleets to electric by 2030, and promoting EV adoption such that all vehicles run on cleaner energy by 2040.²

As more car owners increasingly adopt EVs and the government progressively electrifies vehicle fleets, there is likely to be an over provision of petrol kiosks in the next 20 to 30 years, with many eventually being phased out as petrol becomes less mainstream for vehicular propulsion. When these stations become obsolete, tiny parcels of land will become available for new uses. But what could these plots be repurposed to when that day approaches?

And that day might possibly arrive sooner-rather-than-later. At present, all electric (non-hybrid) vehicles in Singapore comprise less than 1% of the total vehicular population as at 2022.³ Among the entire car population, EVs make up 1%.⁴ However, the rate of growth of the EV population in the last five years was exponential, increasing 103% y-o-y from a mere 349 at end-2017 to 707 by end-2018.

This annual growth rate was nearly similar in 2019 at 89% y-o-y, before the COVID-19 outbreak in 2020, when adoption faltered to around 5% y-o-y. Since recovering from the pandemic, the EV population expanded by 166% in 2021 and 145% in 2022 (Exhibit 1).

It does appear that notwithstanding any black swan event, if the pace of the last five years is maintained, the adoption of electric vehicles would double each year (at a 100% rate of growth) given the support by the government, and only be hindered by Certificate of Entitlement (COE) quotas in each upcoming year. Should this rate continue for the next five years, could the number of EVs in Singapore possibly reach half a million a couple of years prior to 2030 to form around 50% of the total vehicle population?

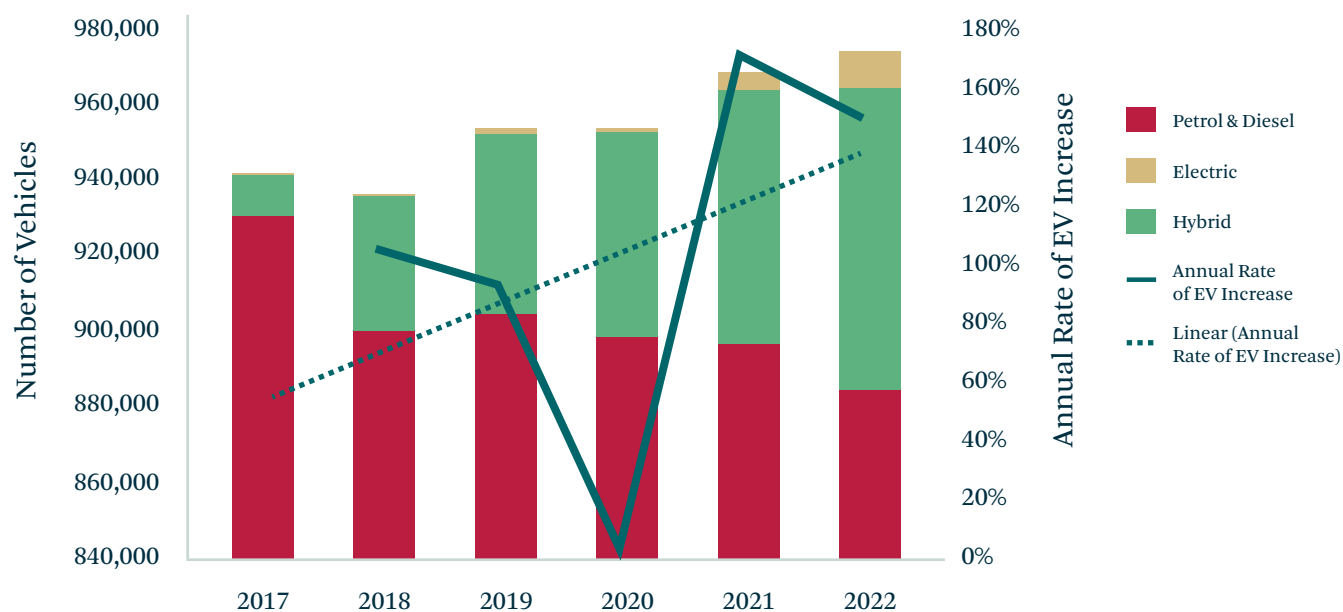
1 Our EV Vision, Land Transport Authority, n.d., https://www.lta.gov.sg/content/ltagov/en/industry_innovations/technologies/electric_vehicles/our_ev_vision.html

2 Ibid

3 Motor Vehicle Population by Type of Fuel Used, Land Transport Authority, October 2022, https://www.lta.gov.sg/content/dam/ltagov/who_we_are/statistics_and_publications/statistics/pdf/M09-Vehs_by_Fuel_Type.pdf

4 Ibid

Exhibit 1: Vehicle Population in Singapore



Source: LTA, Knight Frank Research



At any rate, the rise of EVs in Singapore in the pandemic era has started the transition from novelty to the mainstream.

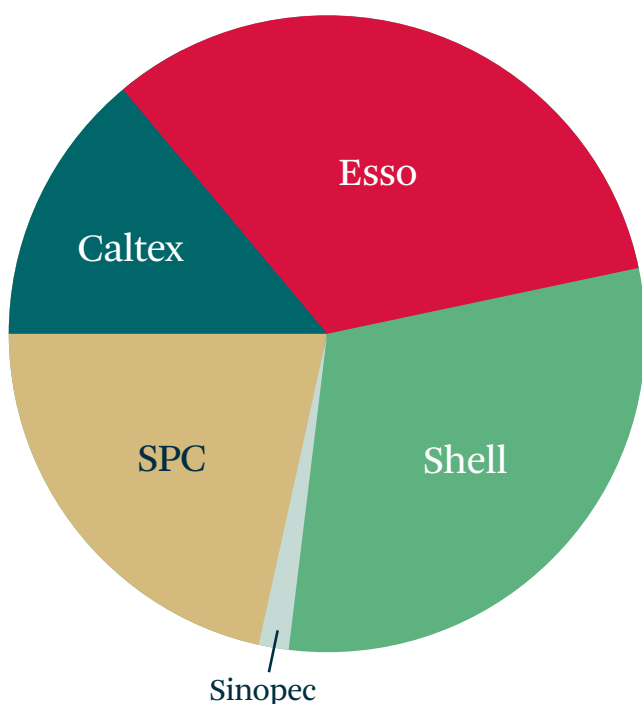
Electric car maker, Tesla leased a building at Toa Payoh Lorong 8 to house its showroom, corporate office and service centre.⁵ And right in the throes of the pandemic, Hyundai announced the development of an electric vehicle manufacturing plant in Singapore and started operations in the first half of 2023.⁶ At a cost of around S\$400 million, Hyundai Motor Group Innovation Centre is expected to produce 30,000 vehicles per annum by 2025, with 5,000 to 6,000 of the EVs to be sold locally.⁷

5 Tan, J., 2021, Tesla setting up shop at Toa Payoh Lorong 8 property with lease term of up to 20 years, The Business Times, 29 July
6 Lim, J., 2020, Construction of Hyundai's electric car manufacturing plant in Singapore begins, Today, 13 October; and Tan, C., 2023, Hyundai to roll out first S'pore-assembled cars in first half of 2023, The Straits Times, 5 April
7 Ibid

Petrol Stations in Singapore



Exhibit 2: Distribution of Petrol Stations in Singapore by Operator



Source: Sgcarmart, various sources, Knight Frank Research

Based on information from Sgcarmart, petrol station websites and other sources, it is estimated that there is a total of just over 180 petrol stations in Singapore in 2022, with about 56% on private land, and the other 44% tendered out by various government agencies over time with various lease tenures ranging from 10 to 99 years. The majority of land awarded by government agencies for petrol station use typically have 30-year tenures.

Based on over 50 tenders by the Housing Development Board (HDB) for petrol station use from 1992 to 2020, these land sites together had an average land area of about 22,000 sf. While 22,000 sf is not very substantial, spread over 180 stations all over Singapore, this represents about four million sf of land. And even if only half of the petrol stations in Singapore's future become obsolete by the time more than half the vehicle population in Singapore turn electric, this would mean that some two million sf of space could potentially be primed for repurposing.

According to the Boston Consulting Group (BCG), 25% of fuel retail outlets worldwide will struggle and be at risk of closure by 2035 even in the conservative scenario where fossil fuels remain dominant.⁸

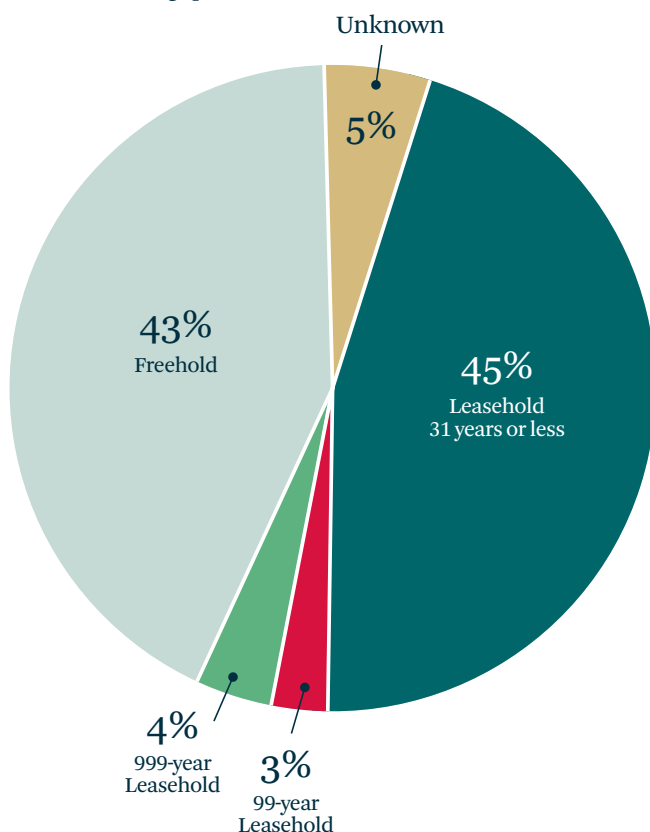
What more in Singapore where the government has set targets for low emission vehicles by 2030 and 2040.⁹ The same BCG study also highlighted that up to 80% of petrol stations might be unprofitable in geographies where EVs become the mainstream mode of vehicular transport.¹⁰

Most of the petrol stations in Singapore are divided into plots with tenures of 31-years or less (45%) and freehold (43%), together with a few that have 99-year and 999-year leasehold tenures. The tenure of around 5% of the petrol stations in Singapore are unknown at the time of writing (Exhibit 3).

Among the petrol stations on privately held land, a majority of 77% or around 80 petrol stations are located on freehold parcels. Land plot sizes averaging 22,000 sf are relatively small with limited development potential from an economic perspective unless amalgamated with other surrounding plots.

With the above describing the nature of petrol stations and the land that these sit on throughout Singapore, what options could private landowners and the government possibly consider when EVs become the leading mode of transport on Singapore roads? The existing convention is to determine the highest-and-best use based on pure financial returns that are dependent on the allowable use and development intensity. However, the traditional assessment of value expressed only in financial terms should now consider social and environmental capital, especially in the age of ESG (Environmental, Social and Governance).¹¹ For example, the Five Capitals framework for sustainability recognises natural capital as the basic for all other capitals, including human and social capital that manufactured capital and financial capital are based on.¹²

Exhibit 3: Estimated breakdown of land tenures of petrol stations in Singapore



Source: URA Space, HDB, various sources

8 Rubeis, M., Groves, S., Portera, T., Bonaccorsi, G., 2019, Is There a Future for Service Stations?, Boston Consulting Group, 12 July, <https://www.bcg.com/publications/2019/service-stations-future>
9 Teo, G., 2020, MOT may review 2040 target for all vehicles in Singapore to be low emission: Ong Ye Kung, Channel News Asia, 12 December, <https://www.channelnewsasia.com/singapore/singapore-2040-target-internal-combustion-engine-474171>
10 Rubeis, Groves, etc, Is There a Future for Service Stations?
11 Gray, R., 1992, Accounting and environmentalism: an exploration of the challenge of gently accounting for accountability, transparency and sustainability, Accounting, Organizations and Society
12 Forum for the Future, n.d., The Five Capitals – a framework for sustainability, <https://www.forumforthefuture.org/the-five-capitals>

Charging Stations and Battery Swap Stations



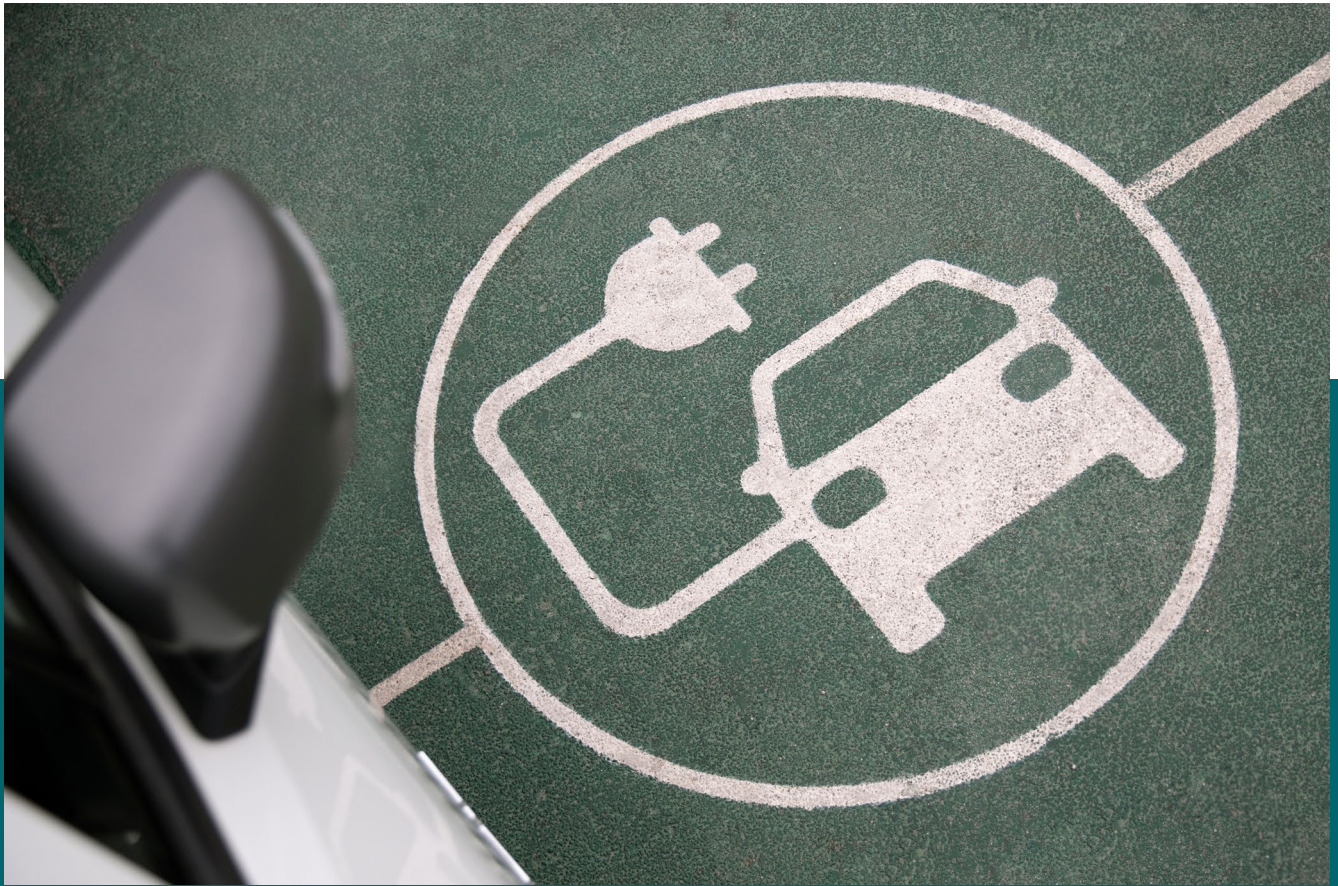
The most obvious replacement to the petrol station would be charging stations, where the function remains relatively the same – to fuel motorised vehicles in a purpose-built facility. Depending on factors such as car model and battery capacity, a fast charge would take about 30 minutes, while slow chargers can take four hours or more. Public and private car parks possess the potential to, and several are already in the process of, installing/accommodating charging stations.

Therefore, having a purpose-built charging station in place of a traditional petrol station would be impractical given the time needed for charging, even if the facility is equipped with other amenities to occupy users while their vehicles are being recharged. It is not likely that charging stations at petrol stations will be able to compete with HDB, private condominium car parks and landed homes, with the latter two affording more convenience when measured against existing charging times.

Perhaps a better option would be EV battery swapping stations. While not mainstream yet, Chinese electric carmaker NIO developed NIO Power Swap where an automated station would swap a used EV battery with one that is fully charged in less than five minutes.¹³ Given the time taken to “fuel” or “recharge” an EV, this would be akin to pumping a full tank in a traditional internal combustion engine car. With this concept, NIO sells the EV but leases the battery with a subscription.¹⁴

13 NIO Power Swap, n.d., <https://www.nio.com/nio-power>

14 Murray, A., 2022, Will swapping out electric car batteries catch on?, BBC News, 17 May, <https://www.bbc.com/news/business-61310513>



However, for this to have any chance of widespread adoption, such a system would have to work on almost all makes of EVs with batteries standardised instead of just one make with one battery swap provider. Currently, other EV makers are also employing battery swapping models.¹⁵

After all, the concept of battery swapping is already being tried on delivery vehicles in Singapore. Cycle & Carriage Singapore (C&C) is partnering with online food delivery service Foodpanda to trial electric motorcycles from Gogoro, a Taiwanese firm that pioneered battery swapping for two-wheelers.¹⁶ These electric scooters have no charging downtime due to removable battery packs that riders can replace with charged batteries in around six seconds.¹⁷



¹⁵ Ibid

¹⁶ Leow, J.L., 2023, Electric scooter trial with Foodpanda is proof that C&C is running 'Scared', The Business Times, 23 March

¹⁷ Ibid

Amalgamate with Surrounding Sites

The next most obvious option would be to amalgamate with surrounding sites. According to the Singapore Land Authority (SLA), plots that are incapable of independent development due to the small land size or irregularity in the land shape, can be sold as a remnant land.¹⁸

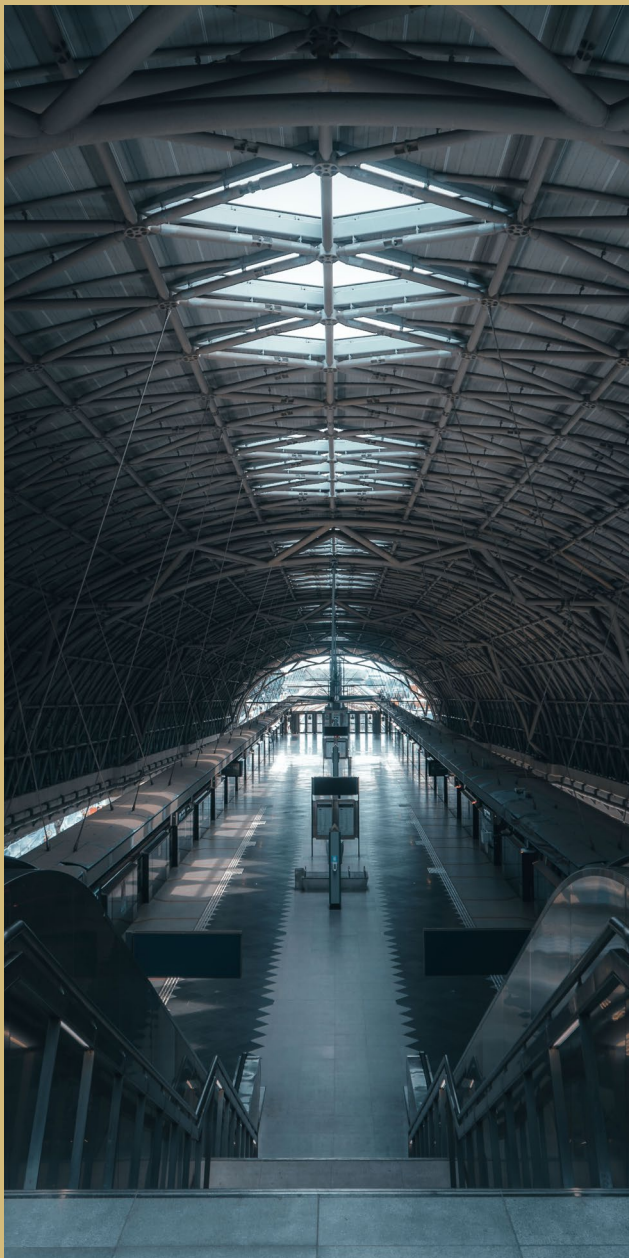
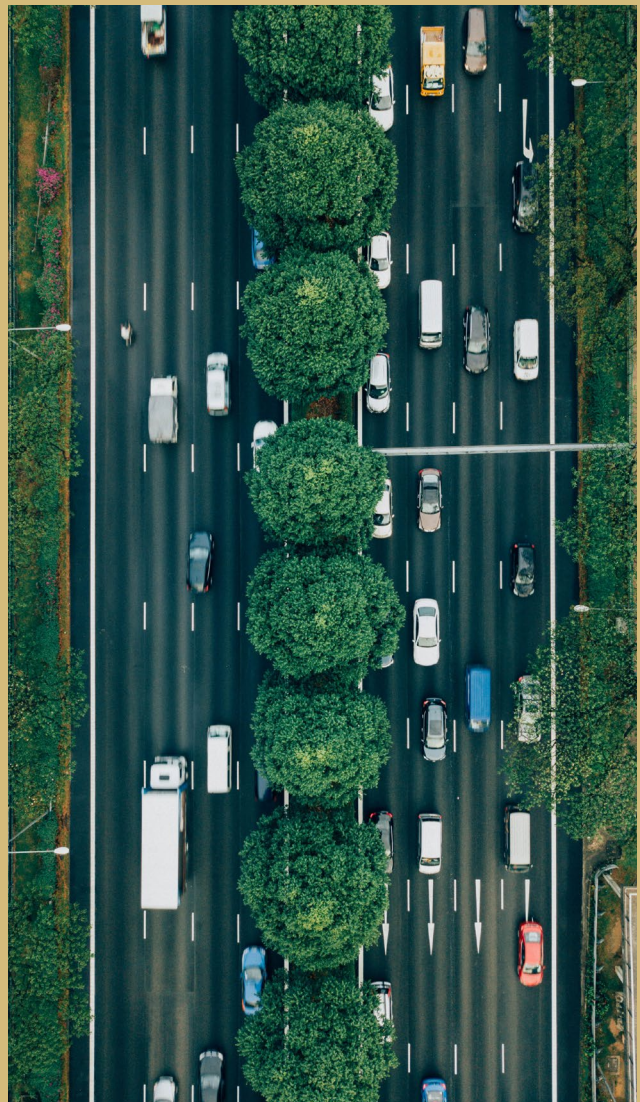
Under suitable circumstances, the government may encourage or require owners/developers to purchase a remnant land parcel, combining this with private land as the amalgamation can enhance the practical use and economic value of the private land and the neighbourhood. The tenure of the remnant land will then tie in with the adjoining private land.¹⁹



¹⁸ SLA, n.d., Sale of Remnant Land, <https://www.sla.gov.sg/state-land-n-property/land-sales-and-lease-management/sale-of-remnant-land>
¹⁹ Ibid

As the parcels that petrol stations typically occupy are relatively small, these could be gazetted as remnant land once the lease is nearing expiry and when the function as a petrol station becomes obsolete, combined with other adjacent plots and sold off through a tender exercise to interested parties.

For example, the petrol station located at Ang Mo Kio Avenue 3 where the tenure expired in May 2023. The government through HDB could gazette the site of the petrol station as remnant land and blend it together with some



of the low-rise factories in the area that may become defunct sometime in the future, before listing the amalgamated plot for tender. With the upcoming Cross Island Line and the nearby Tavistock MRT station becoming operational in 2030, the amalgamated site could be well utilised, enhancing the economic and human value around the neighbourhood.

Another example could be the petrol station at 355 Commonwealth Avenue, due to expire in 2025. Situated at the junction of Commonwealth Avenue and Stirling Road, the petrol station is in one of the oldest HDB estates in Singapore and could be merged with older HDB blocks in the immediate vicinity once these become obsolete.

Social Value

The above suggestions either attempt to replace the purpose-built petrol station with another that serves the same function catering to EVs, or else enhance the precinct through conventional repurposing and redevelopment. And chances are, the repurposing and subsequent redevelopment might still be based on highest-and-best economic use, i.e. financial returns.

However, with over 180 sites spread throughout the island, there are possibilities as well as opportunities for some sites to be repurposed with uses that might not yield the highest economic value, but instead provide the locational reach where the land use can focus on social and human values.

This could take the form of seniors' activity centres, community centres or assistance centres, for those who are vulnerable in society to seek help. For example, foreign labourers, underprivileged families, and foreign domestic helpers. Alternatively, it could be repurposed as public recreational space that includes biophilic conversion complementing the surrounding natural environment to park space, bicycle stations, etc.





Flex Space: Invasion of the Pods

Some of these petrol stations might be residing on land that is larger than 22,000 sf with more latitude for greater development diversity... and pods would provide one of the most flexible platforms with which to harness dynamic repurposing that supplements market imbalances from time to time.

It would not take much to marry the flexibility of the modern technological era with real estate concepts of co-working, co-living and other human activities. Shipping containers or double decker buses as well as other portable structures can be quickly repurposed as pods for a variety of human, commercial and accommodation needs without consuming much more natural material from the environment. These can be installed on land formerly occupied by petrol stations. Although each parcel will not likely have enough space to generate a critical mass

of commercial or human activity, the diverse locations spread throughout all of Singapore can lead to a variety of uses made proliferate across different neighbourhoods along heavily trafficked main roads. And there is precedent for this...

A high-end boutique hotel called “The Garden Pod” opened in September 2022 at Gardens by the Bay.²⁰ These hotel suites are made up of shipping containers, and are also equipped with rooftop photovoltaic panels that power up to 80% of the suites’ energy requirements.²¹

²⁰ Wong, S., 2022, Shipping containers get new lease of life as hotel suites in Singapore, The Straits Times, 2 September, <https://www.straitstimes.com/singapore/garden-pods-opening-expands-efforts-here-to-build-hotels-with-repurposed-materials>

²¹ Ibid



In addition to Gardens by the Bay, this concept had already proved successful at one-north and Haw Par Villa.²² In similar fashion, 20 double decker buses will be transformed into a resort, tentatively called The Bus Resort, at Changi Village by 2023.²³ Another such example for hospitality use is Tiny Away Escape @ Lazarus Island, run by Sentosa Development Corporation (SDC). Five smallish houses between 150 sf to 170 sf, will be launched in May 2023 for visitors on Lazarus Island as a low-carbon footprint, low-intensity leisure offering for the growing popularity of sustainable travel among travellers.²⁴

The flexibility of pods can also be applied to office space. An example is the community law centre at Tian De Temple in Hougang run by Pro Bono SG. This free legal clinic opened in January 2023 and operates from a container office on the temple grounds.²⁵ It was also recently reported that a site at 30 Cosford Road in Changi will be transformed into a food and beverage (F&B) container park, spanning 38,000 sf with 13 containers for F&B operators to rent.²⁶ This S\$3 million project by Tee Tree Investments will have capacity for 340 people in indoor and outdoor areas, and is expected to be ready later in 2023.²⁷ Other uses include gyms²⁸, self study facilities²⁹, possibly self storage spaces, e-commerce collection points, and even small cafes or pubs³⁰. This list is only limited by one's imagination.



Might these concepts not also be applied on land vacated by petrol stations in the future, especially in locations that are close to tourist attractions, places of natural beauty, employment centres, residential precincts, etc? Defunct petrol stations of the future would offer a myriad of sites that factor in flexibility as Singapore works its way towards rethinking, redesigning, reducing, reusing and recycling for a circular economy.

22 Ibid

23 Abdullah, Z., 2022, New resort at Changi Village to be built out of old buses, The Straits Times, 28 Aug, <https://www.straitstimes.com/singapore/consumer/new-resort-at-changi-village-to-be-built-from-old-buses>

24 lau, J., 2023, From houses on stilts to eco-houses, The Straits Times, 18 March

25 lau, J., 2023, First community law centre opens in Hougang, The Straits Times, 31 Jan, <https://www.straitstimes.com/singapore/first-community-law-centre-opens-in-hougang>

26 Zhuang, S., 2023, Gourmet food with live music: Site near Changi Airport being redeveloped into F&B container park, The Straits Times, 13 Apr

27 Ibid

28 Lim, M., 2019, 24/7 automated container gyms in S'pore let you workout from S\$2.50 per pax, Mothership, 12 Jul, <https://mothership.sg/2019/07/singapore-first-24-hour-automated-container-gym/>

29 Kwa, A., 2022, Pods with air-con for work & study installed at HDB void decks in Boon Lay & Jurong West, Mothership, 12 Sep, <https://mothership.sg/2022/09/air-conditioned-work-study-pods-void-deck/>

30 The Container Factory, n.d., Restaurants & Bars, <http://www.thecontainerfactory.com/restaurants-bars.html>



Conclusion

Despite being small in size, the reuse of petrol stations offers the Singapore of the future a proliferation of sites with variety and the promise of creative readaptation. These range from the development of charging infrastructure for EVs, amalgamation and reuse, repurposing for social or human needs, or the use of flexible structures. And as part of readaptation, having a format such as containers or pods where the real estate can be quickly converted to meet the needs of new human demands with the minimum of material consumption (that typically occurs when physical property is redeveloped through the construction process) would be the icing on the cake in the sustainability era.

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