

**Joint Master in EU Trade and
Climate Diplomacy**

**Singapore and the implementation of
Sustainable Development Goals**

**“The role that cities can play in
achieving SDGs: the case of Singapore.”**

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2023**

Statutory Declaration

I hereby declare that I have composed the present thesis autonomously and without use of any other than the cited sources or means. I have indicated the parts that were taken out of published or unpublished works correctly and in a verifiable manner through a quotation. I further assure that I have not presented this thesis to any other institute or university for evaluation and that it has not been published before. Furthermore, the style of referencing in this thesis is *Chicago* for both footnotes and bibliography guided by: https://www.chicagomanualofstyle.org/tools_citationguide/citation-guide-1.html#cg-book

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Abstract

With the adoption of the Sustainable Development Goals in 2015, cities around the world are creating sustainable policy plans to transition towards a future based on sustainable economic growth and social well-being. The city of Singapore, despite being an unconventional country due to its island nature and size, and its resource limitations, is no exception.

The research question of what policies and actions are being implemented by the city of Singapore aimed at achieving the Sustainable Development Goals, guides a comprehensive study of the implementation of four specific Global Goals – namely numbers 7, 11, 12, and 13 – and leads an investigation into the successes and weaknesses that enable or hinder Singapore’s achievement of Agenda 2030. The research question is further answered with a literature review of different scholars’ works, and an interview with a professional working in the field of Sustainable Development in that city-state. Also, a comparative analysis of the Singapore Green Plan with the European Green Deal, opens a discussion on whether Singapore’s sustainable policies are enough to lead the city-state toward the required transition. This paper shows how the lack of resources, and the island nature hinder certain abilities of the city-state to produce and act independently in the pursuit of its aims; hence, future research that seeks to show comparison must take these peculiarities into consideration. The stability of its government and its economy are enabling the city-state to overcome the difficulties by creating innovative projects to comply with Agenda 2030’s stipulations. Throughout this thesis, it is demonstrated how the city of Singapore can be considered a sustainable city, and how its financial stability and the will to cooperate with third parties allowed the city-state to position itself as the most sustainable cities of the ASEAN.

Keywords: Sustainable Development Goals; Singapore; Global Environmental Governance; United Nations Environmental Programme; Singapore Green Plan 2030; SDG 7; SDG 11; SDG 12; SDG 13.

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List of Acronyms

ABC Waters	Active, Beautiful, and Clean Waters
ASEAN	Association of South-East Asian Nations
EEPO	Energy Efficiency Programme Office
EMA	Energy Market Authority
ESS	Energy Storage System
EU	European Union
GEG	Global Environmental Governance
GDP	Gross Domestic Product
GWp	Gigawatt-Peak
SG	Singaporean Government
IMCCC	Inter-Ministerial Committee on Climate Change
IMC-SDG	Inter-Ministry Committee on Sustainable Development Goal
LRT	Light Rapid Transport
MDG(s)	Millennium Development Goal(s)
MRT	Mass Rapid Transport
NEA	National Environmental Agency
NGOs	Non-Governmental Organizations
OECD	Organization for Economic Co-operation and Development
SDB	Sustainable Development Blueprint
SDG(s)	Sustainable Development Goal(s)
SGD/ \$SG	Singapore Dollar
SLE	Super Low Energy
UN	United Nations
UNEP	United Nations Environmental Programme
WEF	World Economic Forum
WOG	Whole-of-Government
WON	Whole-of-Nation

INTRODUCTION

The growing role of cities in Global Environmental Governance (GEG) has received a lot of attention in recent years¹. Development and implementation of policies that result in solutions to environmental issues are becoming more and more urgent². Furthermore, as the world's population is constantly growing and urbanizing, the need of sustainable development to tackle the climate crisis is becoming more critical. Nonetheless, that is the United Nations Environmental Programme (UNEP), introduced the Sustainable Development Goals (SDGs) - 17 interconnected goals to achieve a more sustainable and equitable world by 2030³. This so-called Agenda 2030 was introduced in 2015, to transform the world by urging countries of the world to end poverty and inequality, protect the planet, and ensure that all people enjoy health, justice, and prosperity, without leaving any one behind⁴. Among the signatory parties of the United Nations, that committed to the achievement of Agenda 2030, there was the city-state of Singapore⁵.

The relationship between the SDGs and cities is of crucial importance, as the latter must of necessity be significant contributors to the transition towards a more sustainable world. Indeed, when considering the process towards a sustainable transition coordinated through Global Environmental Governance, cities must be placed at the center, as they are great contributors to environmental degradation which often reflect great social inequality. Furthermore, cities are home to more than half of the world's population, and so are responsible for most of the global greenhouse gas emissions, resource consumptions,

¹ Tristan Haß. "The Role of Cities in Global Climate Governance: the case of Berlin, Hamburg, and Munich" (Master Thesis: The International Institute for Industrial Environmental Economics, 2019), 47 <https://lup.lub.lu.se/luur/download?func=downloadFile&recordId=8997737&fileId=8997741>

² Organisation for Economic Co-operation and Development "A new Strategy for the Environment" OECD: Better Policies for Better Lives. Accessed June 8, 2023. <https://www.oecd.org/env/tools-evaluation/anewstrategyfortheenvironment.htm>

³ "The 17 Goals" United Nations. Accessed April 2, 2023. <https://sdgs.un.org/goals>

⁴ WHO. "Sustainable Development Goals" World Health Organization, 2023. Accessed May 30, 2023. <https://www.who.int/europe/about-us/our-work/sustainable-development-goals#:~:text=They%20are%20a%20call%20to,2030%20Agenda%20for%20Sustainable%20Development,ent>.

⁵ "UN announces list of countries for Working Group on Sustainable Development Goals" *International Science Council*. January 17, 2013. <https://council.science/current/news/un-announces-list-of-countries-for-working-group-on-sustainable-development-goals/>

and waste generation⁶. Cities are here to stay, and according to research, will expand⁷, hence, their contribution to finding solutions is crucial and should be placed at the center of the discussions on the implementation of Agenda 2030. Therefore, the UNEP believes that through the SDGs, the international community will understand the importance of cities in achieving a sustainable future, and will emphasize the need for cities to be inclusive, safe, resilient, and sustainable⁸, as outlined in SDG 12.

This thesis explores the role of cities, in successfully implementing the SDGs, focusing mainly on SDGs 7, 11, 12, and 13. This thesis focuses on the case of the city of Singapore and identifies the different factors that enable and hinder its progress towards comprehensive sustainable development.

The structure of this thesis is as follows: first, the literature review analyzes different texts on the sustainable policies issued and the role of cities in achieving the SDGs, with specific regard to the case study of Singapore, and its progress towards a sustainable transition. The second chapter focuses on the Sustainable Development Goals and the role of both Global Environmental Governance and cities in support of the achievement of Agenda 2030. The third chapter undertakes an empirical analysis of the Global Goals chosen, namely number 7, 11, 12, and 13, by showing their implementation within the city of Singapore, and analyzing each of them by presenting the different policies and strategies adopted. Through the detailed analysis of SDG 7, 11, 12, and 13, the fourth chapter presents a discussion on those factors that hinder or enable Singapore's sustainable development, by also presenting a comparative analysis of the sustainable policies of the city-state and the ones of the European Union. Lastly, the final chapter presents some conclusion by summarizing the key findings of the study, and makes suggestions as to possible future steps in Singapore's quest for sustainable development.

⁶ “Cities: a 'cause of and solution to' climate change” *UN News*. September 18, 2019.

<https://news.un.org/en/story/2019/09/1046662>

⁷ United Nations Human Settlements Programme (UN-Habitat). “World Cities Report 2022: Envisaging the Future of Cities” United Nations Habitat, 2022. Accessed May 31, 2023.

https://unhabitat.org/sites/default/files/2022/06/wcr_2022.pdf

⁸ Florian Koch and Sohail Ahmad. “How to Measure Progress Towards an Inclusive, Safe, Resilient and Sustainable City? Reflections on Applying the Indicators of Sustainable Development Goal 11 in Germany and India” in *Urban Transformations, Future Cities*, vol. 10. (Springer Cham, 2018): 77.

https://doi.org/10.1007/978-3-319-59324-1_5

Research Question

The sustainability of cities has become a critical issue for achieving the Sustainable Development Goals (SDGs). Therefore, this thesis investigates the sustainability of cities, specifically Singapore, and seeks to identify its policies and strategies that can or already are promoting sustainable urban development.

Hence, the research question is:

What are the policies and actions being implemented by the city of Singapore aimed at achieving the Sustainable Development Goals?

Furthermore, the thesis will explore the following sub-questions in working towards the conceptualization of the role of cities such Singapore in achieving the Global Goals:

What key factors of SDG 7, 11, 12 and 13 are essential to allow a city to be considered sustainable? And what key changes are still needed for Singapore to be an example of sustainable city?

METHODOLOGY

Scope and Limitations

The scope of this thesis is to identify the role of cities in a political global environmental agenda, through the analysis of the Sustainable Development Goals. The case study chosen for this thesis is Singapore, a city-state located at the southern tip of the Malay peninsula⁹.



Although being a well-known city, because of language barriers and access restrictions the literature availability is limited, on the contrary of what could have happen if the case study chosen was within the European Union. In fact, despite the world's knowledge of this city-state, and the numerous pieces written on the urbanization process and economic advancements of the city, that placed it to the most highly ranked cities in many fields, there is scarce empirical analysis on the policies implemented to foster the "green transition" and to comply with the 2030 Agenda's targets. Nevertheless, this study on the city of Singapore was still pursued, to see whether an economic and futuristic globally known city can also be considered an example to follow when talking of environmental matters.

This research aims to provide a preliminary analysis of Singapore's performance in converting the Global Goals' targets into national policies. In an effort to overcome

⁹The Editors of Encyclopaedia Britannica. "History of Singapore" Britannica, accessed April 2, 2023. <https://www.britannica.com/place/Singapore/History>

¹⁰ On the World Map. *Singapore location on the World Map*. On the World Map: Free Printable Maps, n.d. <https://ontheworldmap.com/singapore/singapore-location-map.html>

some of the abovementioned limitations, use was made of semi-structured interviews – based on a predetermined list of open questions that allow the interviewer to delve deeper into certain topics or responses¹¹ – as an additional means of offering a deeper insight into influential contextual factors and alternative explanations, besides being of first relevance and direct use.

An additional aspect of this thesis is choosing which of the Sustainable Development Goals should be analyzed. While looking at a broad range of initiatives that Singapore has taken to deal with sustainable development. The primary aim of this thesis is to remain firmly realistic throughout its research and conclusion; with Singapore it is evident that there are certain areas that are of secondary concern. Among the 17 SDGs the programme in Singapore focuses only on those that are deemed pertinent to the country. For instance, by conducting a quick analysis of Singapore vis-à-vis the implementation of Agenda 2030, it can be shown how some are not of primary urgency to the city-state, and so do not fall within the scope of the study of this thesis. This is the case of SDG 1 “No Poverty” as Singapore ranks second among the richest countries in the world¹², SDG 2 “Zero Hunger” as the statistics show that the burden of hunger is low in the city-state¹³; SDG 3 “Good Health and Well-being” as Singapore has one of the most successful healthcare systems¹⁴; and SDG 4 “Quality Education” as the city-state has one of the best educational systems in the world, and its pupils consistently place in the top five of countries in the Organization for Economic Co-operation and Development (OECD)'s education rankings¹⁵. Similarly, SDG 5 “Gender Equality” as in the last years more women are actively assuming leadership roles at work and more men are getting paternity leaves¹⁶; and SDG 10 “Reduced Inequalities” on which Singapore

¹¹ Coryn Barclay. “Semi-Structured Interviews” KnowHow, 2018. Accessed May 30, 2023.

https://know.fife.scot/_data/assets/pdf_file/0028/177607/KnowHow-Semistructured-interviews.pdf

¹² “The Richest Countries in the World” WordAtlas, accessed on April 2, 2023.

<https://www.worldatlas.com/gdp/the-richest-countries-in-the-world.html>

¹³ Government of Singapore. “Sustainable Development Goals- Goal 2”. Department of Statistics Singapore, 2023. Accessed May 29, 2023. <https://www.singstat.gov.sg/find-data/sdg/goal-2>

¹⁴ Brian Wang “Successful healthcare systems in Israel, Singapore and others could teach the US to lower health costs by two to four times while getting better results” *Next Big Future*. January 20, 2017.

<https://www.nextbigfuture.com/2017/01/other-more-successful-healthcare.html>

¹⁵ Ashmitaa Thiruselvam “Singapore has among the world's best education systems, so what can Australia learn from it?”. *News*. October 20, 2022. <https://www.abc.net.au/news/2022-10-21/how-australia-can-compare-to-singapore-education/101511316>

¹⁶ Michelle Tay. “Commentary: Singapore women have more equal opportunities, but some way to go for equitable outcomes” *Cna*. March 8, 2023.

<https://www.channelnewsasia.com/commentary/international-womens-day-gender-equality-equity-flexible-work-mothers-parenting-3330931>

is continuously working on although it is not fully applicable to the city-state due to its limited land and resources¹⁷. Regarding SDG 6 “Clean Water and Sanitation” despite its restricted water sources, all citizens have access to clear drinkable water and proper sanitation¹⁸; concerning SDG 8 “Decent Work and Economic Growth” fundamental labor rights are effectively guaranteed and the unemployment rate is decreasing¹⁹. Turning to SDG 9 “Industry, Innovation, and Infrastructure” as according to the statistics in wealthy nations like Singapore, this appears to have already been achieved²⁰; SDG 14 “Life Below Water” as the city-state is actively adopting marine-related framework for the protection of the ocean and marine areas²¹; SDG 15 “Life on Land” is mostly not applicable to Singapore as it does not have mountains, or a forestry sector²²; SDG 16 “Peace, Justice and Strong Institutions” as the statistics regarding the city-state do present low rate of breaches of this Goal²³; and SDG 17 “Partnerships for the Goals” it is shown by the logic and will be shown by the findings of this thesis, this is being highly applied in Singapore.

On the other hand, there are other SDGs that are related to climate change and are therefore deemed relevant because of the emissions and advancing consequences of global warming and biodiversity degradation. This matters especially because Singapore is an island and could be affected by the sea-level rise and increase of monsoons. Consequently, this thesis focuses on SDG 7, 11, 12, and 13, which deal respectively with “Affordable and Clean Energy”, “Sustainable Cities and Communities”, “Responsible Consumption and Production”, and “Climate Action” as those are the areas that most matter in the current green transition for Singapore, as it has been proved before. Hence, when in this thesis the researcher will talk about Sustainable Development Goals, she will refer to the latter four, and not to all 17 Goals.

¹⁷ Government of Singapore. “Sustainable Development Goals- Goal 10”. Department of Statistics Singapore, 2023. Accessed May 29, 2023. <https://www.singstat.gov.sg/find-data/sdg/goal-10>

¹⁸ Jeffrey D. Sachs et al. *From Crisis to Sustainable Development: the SDGs as Roadmap to 2030 and Beyond. Sustainable Development Report 2022*. (Cambridge: Cambridge University Press, 2022): 389
<https://s3.amazonaws.com/sustainabledevelopment.report/2022/2022-sustainable-development-report.pdf>

¹⁹ *Ibid*, 389.

²⁰ Quek Leng Chuang. “Sustainable Development Goals 9: Industry, Innovation and Infrastructure”. *ESA Reimagining Sustainability*. April 15, 2020. <https://www.env-solutions.com/blogs/sdg-9-industry-innovation-infrastructure/>

²¹ Government of Singapore. “Sustainable Development Goals- Goal 14”. Department of Statistics Singapore, 2023. Accessed May 29, 2023. <https://www.singstat.gov.sg/find-data/sdg/goal-14>

²² *Ibid*, Goal 15.

²³ *Ibid*, Goal 16.

To get a better insight of the topic, an expert was interviewed. However, having a dialogue with professionals working with the Singapore's government has been quite challenging, both for the time zone difference, and as many companies refused to share information with external parties. However, one professional working in the field of Sustainable Development Goals agreed on being interviewed. Ergo, the number of interviews is limited to one, nonetheless it gave noteworthy insights on the topic.

Lastly, the data and information utilized for this thesis exclusively pertain to research gathered up until June 11, 2023, thereby excluding any subsequent occurrences or updates.

CHAPTER 1

Literature Review

To conduct a study for this thesis numerous sources have been used and analyzed. The urgency of addressing the climate crisis and shifting cities towards sustainable development has recently gained increased attention, leading to a growth in related publications.

To discuss the issue of the implementation of Sustainable Development Goals in the city of Singapore it is first necessary to explore how the discussion has changed over time to include new challenges and concepts. Therefore, an analysis of the transition of the city of Singapore from a developing nation to a prosperous and futuristic city-state will be presented, followed by an explanation of how it can be considered an example as regards the implementation of the Global Goals.

Therefore, this chapter will conduct a literature review of various scholars' articles that give concrete proofs of statements and assumptions about the city of Singapore, and its remarkable rapid development.

The progress of Singapore

Singapore has a narrative of continuous progress²⁴; as explained by Richardson, Singapore gained its independence only in 1965, and by being disconnected from its economic hinterland, namely Malaysia, needed to act fast, with a process that is now recalled as “survival”²⁵. Ghesquiere describes the first great development of Singapore as responsive to the needed change its economic situation to then be able to further develop in other fields²⁶. Its rapid development forced Singapore to introduce strict rules, which are mostly still in place. Among these is its strict immigrant rules to prevent the threat of a declining economy and reduce the future burden on Singaporeans²⁷. This allowed

²⁴ J. Richardson and E. Ong. “The Improbable Resilience of Singapore”. *Solutions*. Vol 5, No. 3 (2012): 4. https://discover.pbcgov.org/coextension/4h/pdf/sustainable/SF_Resilience_of_Singapore_Reading_2012.pdf

²⁵ *Ibid*, 4.

²⁶ *Ibid*, 4.

²⁷ *Ibid*, 10

Singapore to develop its economic and social areas and ensure the maximum compliance with crucial sectors of the current Global Goals²⁸.

Moreover, to further analyze the situation of Singapore, and to support the decision to choose it as the case study for this thesis, it must be specified that Singapore is exceptional as a city-state in a world of nation-states²⁹, it is an island, and it is member of the Association of the South-East Asian Nations (ASEAN)³⁰. Unlike the European Union – one-of-a-kind alliance that encompasses 27 nations in both economic and political spheres³¹ – ASEAN is less integrated and works on a voluntary agreements and cooperation basis among its members. Therefore, as explained in Ong’s article, all SDG’s related policies are independently adopted and implemented by the Singaporean Government (SG), and are often different from those in other ASEAN nations³².

The case of Singapore demonstrates the important place of small states – and especially cities – in the international community, as they demonstrate exemplary achievements³³. As stressed by Henderson, Singapore’s accomplishments placed the city in a central position to be looked at by neighboring countries for advice and inspiration about a range of governance questions³⁴. In fact, Singapore has presented itself as a model sustainable city and has exported its knowledge to China, where now the new Eco-City of Tianjin is being developed³⁵.

²⁸ “Towards a Sustainable and Resilient Singapore” Ministry of Foreign Affairs. Accessed May 3, 2023. https://sustainabledevelopment.un.org/content/documents/19439Singapores_Voluntary_National_Review_Report_v2.pdf

²⁹ Kwa Chong Guan. "5. Relating to the World: Images, Metaphors, and Analogies" In *Singapore in the New Millennium: Challenges Facing the City-State* ed. Derek da Cunha. (Singapore: ISEAS Publishing, 2002). <https://doi.org/10.1355/9789812305060-007>

³⁰ “ASEAN” Ministry of Foreign Affairs Singapore, accessed April 2, 2023.

<https://www.mfa.gov.sg/SINGAPORES-FOREIGN-POLICY/International-Organisations/ASEAN>

³¹ “The European Union what is it and what it does” European Commission. Accessed April 2, 2023.

<https://op.europa.eu/webpub/com/eu-what-it-is/en/>

³² Burton Ong, Lye Lin-Heng, and Dr. Joseph Chun. “Biological diversity conservation laws in South East Asia and Singapore: a regional approach in pursuit of the United Nations’ Sustainable Development Goals?” *Asia Pacific Journal of Environmental Law*, Vol 19, 1. (2016): 105.

<https://www.elgaronline.com/view/journals/apjel/19-1/apjel.2016.01.05.xml>

³³Joan C. Henderson. “Planning for Success: Singapore, the Model City-State?” *Journal of International Affairs* 65, no. 2 (2012): 69. <http://www.jstor.org/stable/24388219>.

³⁴*Ibid*, 79.

³⁵ *Ibid*, 73.

A review on Singapore's relation to Sustainable Development Goals

Now that the reason of the choice of Singapore as the case study of this thesis has been justified and reviewed, the findings on its Sustainable Development Goals' achievements are analyzed with due consideration of academics' concerning same.

As above explained in the "scope and limitation" section, this thesis will focus only on specific SDGs, namely numbers 7, 11, 12, and 13; therefore, the literature review will focus only on those articles that discuss their implementation.

The opinions on the position of Singapore in successfully carrying out or not the SDGs are discordant. On one side there are scholars, as is the case of Weida, who believe that Singapore's policies have been purposefully designed to create a "clean and green" city amidst attempting to create higher standards of living³⁶. However, no actual action is being taken and in fact, environmental degradation continues to persist and often the impacts of the policies are the cause of stratification and inequality, as those structurally less responsible and involved are made to share the burden and cost put forth by the environmental discourse in Singapore³⁷. The Young People's Action Party group of climate activists, defined Singapore as an "alternative energy-disadvantaged" country due to its unique geographical constraints. It asserts that this causes an impossibility for the country to produce high amounts of renewable energy, and still be strictly dependent on fossil fuels³⁸, therefore, slowing down the transition to green energy.

However, besides being an energy-disadvantaged country, Singapore had stated since the United Nation Climate Change Conference in Durban in 2011, that is committed to reduce its emissions while ensuring that the city will continue to grow and prosper³⁹. The Inter-Ministerial Committee on Climate Change (IMCCC) is determined to helping Singapore in its green transition, however, it does not deny that because of the peculiar position and dimension of the city-state it will be more challenging than usual⁴⁰.

³⁶ Lim Weida. "Climate Change Policies in Singapore: Whose "Environments" Are We Talking About?" *Environmental Justice*, Vol 2, 2. (2009): 79. <https://www.liebertpub.com/doi/epdf/10.1089/env.2009.0017>

³⁷ *Ibid*, 79.

³⁸ Young PAP. *Singapore: A Green Hub* (Paper for Climate Change, 2020): 4. <http://pap-dr-wp.s3.amazonaws.com/2020/03/Young-PAP-Paper-for-Climate-Change-Singapore-A-Green-Hub.pdf>

³⁹ National Climate Change Secretariat; Prime Minister's Office and Republic of Singapore "Climate Change & Singapore: Challenges. Opportunities. Partnerships" *National Climate Change Strategy* (2012): 4. <https://www.nccs.gov.sg/files/docs/default-source/default-document-library/national-climate-change-strategy.pdf>

⁴⁰ National Climate Change Secretariat; Prime Minister's Office and Republic of Singapore "Climate Change & Singapore: Challenges. Opportunities. Partnerships" *National Climate Change Strategy* (2012): 131.

Nonetheless, Singapore will invest, due to its great economic possibilities and advancement, in new capabilities in climate science to achieve a deeper understanding of the city's vulnerabilities and develop appropriate adaptation solutions to protect it against the risks posed by climate change⁴¹.

The findings of the interview

Despite being a well-known city, there is an inadequacy of literature as regards Singapore's relation to Sustainable Development Goals. Fortunately, through this interview, this thesis gained more knowledge on the matter.

The first interview was conducted with a professional working in Singapore for a company that deals with Singapore's Carbon Pricing in strict relation with the Ministry of the Environment of Singapore. According to the information received, when considering Singapore and Sustainable Development Goals, one immediately thinks of Singapore's capacity-building government. The Government's approach to such matters has always been considered aggressive, and economically centered. In fact, in the case of Sustainable Development Goals, Singapore asked for support and innovation for a green transition firstly to banks, involving new start-ups to finance new projects. This is always done in an "economically-aggressive" way. The SG's approach is based on the idea that they not only want to transform Singapore and have the capabilities to do so, but also to raise SG's economic stability, so again, the green transition is seen as an economic opportunity. In simple words, it can be said that one of the main strategies of Singapore to tackle the problem of Co2 emissions, is to raise the taxes on emissions in order to get greener but at the same time richer. Indeed, Singapore wants to keep its good economic position within the Southeast Asia area while reaching its environmental goals.

The approach of capacity-building that Singapore has toward the Sustainable Development Goals can be considered a multi-faceted one. This is grounded in the stability of the SG, and its trustworthy commitment when something is said to be done. For instance, the Singaporean banks have been pressurized to invest in certain green projects, many start-ups have been contacted and engaged in the system to sensitize the

<https://www.nccs.gov.sg/files/docs/default-source/default-document-library/national-climate-change-strategy.pdf>

⁴¹ *Ibid*, 5.

population on the SDGs, and the Sovereign Wealth Funds of Singapore moved billions of Singapore's dollars (SGD/\$SG) to greener investments.

According to the interviewee another pragmatic aspect is the fiscal imposition established a few years ago on the companies' emissions. By implementing this system, taxes would only cover 80% of the emissions released from the SG soil, while the remaining emissions would require direct payment from the emitter. Through this fiscal imposition, the SG tried to incentivize the optimization of the green transition and lowering of emissions. However, currently, the taxation is very low, amounting to around 5 \$SG per 1 ton of Co2, which for huge Singaporean companies is nothing, so they do not mind paying it. Nevertheless, according to the interviewee, with the SG budget 2022, reinforced also in the budget 2023 in a meeting occurred in March 2023, the SG introduced a new plan, which will gradually raise the cost per ton of Co2 to comply with the stipulations of SDGs and the Paris Agreement, and with the main goal of reaching by 2030 the sum will varies around 50 to 80 \$SG per 1 ton of Co2. However, compared to the European standards, this seems little but still shows the commitment of Singapore.

Another appealing project that only a few other countries in the world are testing out, while Singapore has already started, helps emitter companies that are already paying the abovementioned tax, to save 5% of payments on their emissions if they can prove that they are investing in an environmental project anywhere in the world. This plan must be approved by the SG applying certain indicators, which according to the interviewee, are currently being adjusted by a committee. Through this project, Singapore wants to encourage big emitter companies to think green.

According to the interviewee, it is also important to have a macro-vision of Singapore when considering Carbon Emissions. In fact, it is believed that it would be impossible for the city-state to attain carbon neutrality, as Singapore by being an island has a limit in its quest of decreasing Co2 emissions to ensure the wellbeing of the territory as it is too small to diversify its emissions as it would like to. Therefore, SG relies on third countries, as by green investing in their territories, SG can benefit from that Co2 that the third country is saving. This system is explained in Article 6 of the Paris Agreement, which allows rich countries to emit more while still declaring the country net-zero only if they

are investing in green projects in third countries⁴². According to the interviewee, in applying this Article, Singapore is avant-garde, in fact, they are not just providing economic support to those countries that are willing to cooperate with them in this “Co2 emission interchange” but it also wants that SG’s companies save 5% on taxation and still invest privately in green projects abroad. So, it can be said that there is this new approach of creating small outcomes, where Singapore not only has the incentive of improving its energy sufficiency and a green transition, but also pushes the neighboring countries to be better by investing in third parties’ territories. In keeping with this, Singapore is entering into bilateral agreements, as only a few other countries in the world have done, for instance Switzerland, to develop these green projects in those third countries that are willing to receive SG’s economic help.

Another important aspect to cover, according to the interviewee, is the concept of fueling renewables. Singapore in being an island has a lot of restrictions in terms of which renewable energies it can produce. Therefore, now they are creating new projects to increase infrastructure to import renewable energy produced in the neighboring countries. This system could allow the whole of Southeast Asia to have better energy connections, and improve the situation not only in Singapore, but also in all the other ASEAN countries. Through these initiatives the idea of promoting Sustainable Development transition through economic collaboration, the city-state can contribute to the development of environmental projects in neighboring countries, creating a system for intra-regional support between Southeast Asian nations.

As a final remark, the interviewee pointed out that Europe is leading the way when thinking of Sustainable Development Goals, but Singapore can move rapidly and concretely, so even if in a completely different way, SG can create smart and efficient ways toward the green transition through international cooperation, even though being a small island with limitations. Furthermore, according to the interviewee, it can be said that Singapore has been promoting green technologies for many years, before the climate issue was considered urgent, so, SG knows what the problem is and how to tackle it.

⁴² United Nations Framework Convention on Climate Change. “Paris Agreement- Article 6” UNFCCC. Accessed June 8, 2023.

https://unfccc.int/files/meetings/paris_nov_2015/application/pdf/paris_agreement_english_.pdf

CHAPTER 2

Sustainable Development Goals (SDGs)

The framework for achieving a better, more sustainable future for the benefit of all individuals is found in the Sustainable Development Goals – 17 Global Goals that address the current global challenges from climate change to gender inequality, to peace and justice⁴³.

In a moment of history, where the excess of the power of governments brought destabilization and destruction of the planet earth⁴⁴, the United Nations developed a remarkable plan, that was launched in September 2015: the so-called Sustainable Development Goals (SDGs). The SDGs were preceded by the Millennium Development Goals (MDGs), which aimed inter-alia at ending poverty, hunger, disease, illiteracy, environmental degradation, and discrimination against women⁴⁵. For instance, the MDGs had as their first target to halve the number of people living with less than \$1.25 a day⁴⁶, and it was remarkably achieved before time despite the lack of any legally binding enforcement mechanisms. Following the success of the MDGs, the United Nations, noting the rapid economic development of countries, and examining the environmental situation, started to develop new Global Goals.

The Rio+20 Summit in 2012 was the first concrete step towards the implementation of a programme for sustainable development⁴⁷. This time global challenges were many, therefore the SDGs were meant to be more ambitious than the MDGs. Indeed, at the United Nation Conference on Sustainable Development in Rio, Member States decided to develop the MDGs, and identified 19 areas ranging from poverty to food, to health, to the environment, which were in the following years restricted

⁴³ “Take Actions for the Sustainable Development Goals” United Nations Sustainable Development Goals. Accessed April 19, 2023. <https://www.un.org/sustainabledevelopment/sustainable-development-goals/>

⁴⁴ Arran Gare. “Global Climate Destabilization and the Crisis of Civilization” in *Chromatikon VI. Annales de la philosophie en procès — Yearbook of Philosophy in Process*, ed. Michel Weber et Ronny Desmet (2010): 11. https://www.researchgate.net/publication/271169336_Global_Climate_Destabilization_and_the_Crisis_of_Civilization

⁴⁵ Owen Gaffney. “Sustainable Development goals: Improving human and planetary wellbeing” *Global Change 82* (2014):20. <http://www.igbp.net/download/18.62dc35801456272b46d51/1399290813740/NL82-SDGs.pdf>

⁴⁶ “Goal 1: Eradicate Extreme Poverty & Hunger”. UN Website. Accessed June 8, 2023. <https://www.un.org/millenniumgoals/poverty.shtml#:~:text=GOAL%201%3A&text=More%20than%201%20billion%20people,less%20than%20%241.25%20a%20day.>

⁴⁷ “United Nations Conference on Sustainable Development, 20-22 June 2012, Rio de Janeiro” United Nations. Accessed April 19, 2023. <https://www.un.org/en/conferences/environment/rio2012>

to 17, launching the first project to create a set of Sustainable Development Goals⁴⁸. The 17 Global Goals, also known as Agenda 2030 or SDGs, were only approved later in September 2015 by 193 UN Member States⁴⁹, after years of negotiations. The framework includes 17 objectives aimed at tackling the major problems impacting the world's population in the twenty-first century: environmental sustainability, social inclusion, economic development, peace, justice, good governance, and cooperation. Each objective contains several targets that help to clarify it, there are 169 targets in total⁵⁰.

Global Environmental Governance for the coordination of Agenda 2030

The Sustainable Development Goals have been agreed upon in 2015 at a global level in the UN convention, and once back in their home countries the respective governments had to transform what was agreed into local legislation. The goals and tenets of the UN Charter, which include utmost regard for international law, serve as the foundation for the 2030 Agenda. The UN is working to support implementation of the SDGs within nations, from both regional and global levels, while respecting differing national realities, capacities, and levels of development⁵¹.

The ambitious SDGs require a revitalized Global Partnership to ensure their implementation – as stipulated in SDG 17. All 193 signatory countries are committed to this. The idea of partnership among the nations was based on a spirit of global solidarity, considered the right approach to allow an intensive global engagement in support of the implementation of all the Goals and related targets, bringing together governments, the private sector, civil society, the UN system, and other external actors and mobilizing all available resources⁵². Even though the UN acknowledged that each country has a primary obligation for its economic and social development, it was recognized that there is still the need for cooperation among the nations to ensure the successful achievement of the

⁴⁸ “United Nations Conference on Sustainable Development, 20-22 June 2012, Rio de Janeiro” United Nations. Accessed April 19, 2023. <https://www.un.org/en/conferences/environment/rio2012>

⁴⁹ Massimo Gigliotti, Guido Schmidt-Traub, Simone Bastianoni. “The Sustainable Development Goals” *Encyclopedia of Ecology* Vol 4 (2019): 426. <https://www.sciencedirect.com/science/article/abs/pii/B9780124095489109868>

⁵⁰ *Ibid.*, 426.

⁵¹ “Transforming our world: the 2030 Agenda for Sustainable Development” United Nations, 2015. Accessed April 19, 2023.

<https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf>

⁵² *Ibid.*

SDGs⁵³. And this is where the concept of Global Environmental Governance comes into place.

By definition, Global Environmental Governance (GEG) is the sum of organizations, policy instruments, financing mechanisms, rules, procedures, and norms that regulate the processes of global environmental protection⁵⁴. And within a UN context, this same role is covered by the United Nations Environmental Programme (UNEP), which is recognized by the UN Member States as the leading global environmental authority that sets the environmental agenda, and that promotes the coherent implementation of the environmental dimension of the SDGs⁵⁵.

However, it is important to point out that while UNEP is a key actor in promoting the SDGs and addressing the environmental challenges, it does not have legislative powers or mandates to control the implementation of the 2030 Agenda. Indeed, it offers advice and technical help, facilitates partnerships and collaborations, and keeps track of the SDGs' development. However, each nation's government and citizens are ultimately responsible for carrying out the SDGs and ensuring their successful implementation⁵⁶.

The role of cities in achieving the SDGs

Although UNEP has played an important part in facilitating the process of introducing the SDGs into national systems by providing expertise, convening actors, and sharing information and knowledge⁵⁷; as previously stated, it is the role of the national governments to implement the SDGs through appropriate national and local policies. As

⁵³ OOH. "The achievement of Sustainable Development Goals globally depends on regional cooperation, experts say at Boao Forum for Asia". UN Department of Economic and Social Affairs. Accessed June 8, 2023. <https://www.un.org/ru/desa/achievement-sustainable-development-goals-globally-depends-regional-cooperation>

⁵⁴ A. Najam, M. Papa, & N. Taiyab. *Global Environmental Governance: A Reform Agenda*. (IISD. Canada, 2006) https://www.researchgate.net/publication/313711276_Global_environmental_governance_a_reform_agenda

⁵⁵ Thomas F. McInerney. "UNEP, International Environmental Governance, and the 2030 Sustainable Development Agenda" *United Nations* (2017): 6. https://wedocs.unep.org/bitstream/handle/20.500.11822/21247/UNEP_IEG_2030SDA.pdf?sequence=1&isAllowed=y

⁵⁶ "Transforming our world: the 2030 Agenda for Sustainable Development" United Nations. (2015) Accessed April 19, 2023. <https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf>

⁵⁷ Thomas F. McInerney. "UNEP, International Environmental Governance, and the 2030 Sustainable Development Agenda" *United Nations* (2017): 9. https://wedocs.unep.org/bitstream/handle/20.500.11822/21247/UNEP_IEG_2030SDA.pdf?sequence=1&isAllowed=y

a result, the role of cities, as including those where government headquarters are located, i.e., where policies are developed, might be regarded crucial to achieving the SDGs.

The increasing role played by cities in Global Environmental Governance has received a lot of attention⁵⁸. Finding innovative ways to collaborate in the sharing of resources and technologies is becoming necessary to tackle the growing pressure to implement new policies that can result in solutions to environmental challenges that are more global in scope. The SDGs present an example of how cities can develop networks, especially in the area of climate change. Due to their close relationship with the rest of society, cities have been recognized as a level of government that may be more able to address environmental challenges rapidly and effectively on a global scale⁵⁹. Furthermore, cities are here to stay, and as said by Sylvester “cities are the front edge of dealing with crises”⁶⁰, so it is important to emphasize their role in the international agenda.

⁵⁸ Deborah Sherwood. “The role of cities in global environmental governance: Rethinking the expectations” (Master Thesis: Erasmus University Rotterdam, 2017), 1.
<https://thesis.eur.nl/pub/41459/Sherwood-Deborah.pdf>.

⁵⁹ “68% of the world population projected to live in urban areas by 2050, says UN” United Nations, 2018. Accessed April 19, 2023. <https://www.un.org/development/desa/en/news/population/2018-revision-of-world-urbanization-prospects.html>

⁶⁰ Andre Mayer. “Cities want more of a say in fighting climate change” *CBC News*, 2021.
<https://www.cbc.ca/news/science/what-on-earth-cities-climate-change-1.6219729>

CHAPTER 3

The case of Singapore

Given its recent rapid development, Singapore is considered a relatively young metropolis. As has been shown in the literature review, the city-state located on the southern tip of the Malayan peninsula between Indonesia and Malaysia⁶¹, gained its independence on August 11, 1965⁶².

To fully understand how Singapore positioned itself resulting in it gaining such global recognition as a successful city-state, and why it has been chosen as a case study for this dissertation, it is crucial to analyze the steps it took differently from the others. But most importantly, how Singapore is addressing its weakness, also due to its island nature, and how it has been able to meet the constantly rising demand to conform with the SDGs.

Background and context

Prior to delving into the depths of this thesis, it is crucial to address the fundamental question of what Singapore is and where it is situated; indeed, this will help in understanding certain decisions and legislative measures that guided the SDGs adoption in Singapore.



⁶¹ Rogelio López Díaz; Godwin Kavaarpuo; Nawwar Harfoush. “Case Study: Singapore” *Sustainable Urban Logistics*. (2013): 6

https://www.academia.edu/4389917/Case_Study_Singapore_Sustainable_Urban_Logistics_MSc_Aime_n_Remida

⁶² “A Guide to the United States’ History of Recognition, Diplomatic, and Consular Relations, by Country, since 1776: Singapore” Office of the Historians, accessed April 20, 2023.

<https://history.state.gov/countries/singapore>

⁶³ Maps of World. *Map of Singapore which lies in the Continent of Asia*. 2020.

<https://www.mapsofworld.com/answers/geography/what-are-the-key-facts-of-singapore/#>

Singapore, with its current population of 5.64 millions of citizens⁶⁴, is an odd country, primarily because as said by Kwa, it is a city-state in a world of nation-states⁶⁵. On a conventional map, Singapore comprises 60 islands located in Southeast Asia; it is located at the southernmost point of the Malay peninsula and borders on the north by Malaysia and on the south by the Singapore Strait dividing it from Indonesia⁶⁶. But conceptually, where is Singapore? Where can it be located socially and environmentally speaking? Is it an Asian-type country, or is it more “Western” as its not-to-distant neighbor Australia? The first answer to these questions can be the exceptionalism of Singapore.

The peculiarity of Singapore lies in the ability of the government to implement a governance model that balances freedom and authority, which was also at the base of the country’s founding in 1965⁶⁷. Singapore is recognized as a model of an efficient government as it has been able to implement a wide range of public services ensuring social stability, economic growth, and national security while raising the Singaporeans’ living standards through improvements in education, public housing, and healthcare⁶⁸. This while emphasizing the importance of law and order. Indeed, Singapore is known for its strict laws and regulations, which sometimes prioritized economic growth over individual freedoms, such as the freedom of speech⁶⁹. Despite this being different from the European standards, the stabilization of the political system, always ruled by the People’s Action Party, gave Singapore the ability to implement a constitutional and legal framework that are the basis of the economic power it is today⁷⁰.

⁶⁴ Government of Singapore. “Population and Population Structure” Department of Statistics Singapore, 2022. Accessed May 30, 2023. <https://www.singstat.gov.sg/find-data/search-by-theme/population/population-and-population-structure/latest-data>

⁶⁵ Kwa Chong Guan. "5. Relating to the World: Images, Metaphors, and Analogies" In *Singapore in the New Millennium: Challenges Facing the City-State* ed. Derek da Cunha. (Singapore: ISEAS Publishing, 2002). <https://doi.org/10.1355/9789812305060-007>

⁶⁶ “Singapore Map and Satellite Image” Geology. Accessed May 3, 2023. <https://geology.com/world/singapore-satellite-image.shtml>

⁶⁷ Todd Myers. “Justifying Liberalism in Singapore” *AIER: American Institute for Economic Research*. April 19, 2022. <https://www.aier.org/article/justifying-liberalism-in-singapore/>

⁶⁸ Tham Yuen-C. “Singapore 3rd in global ranking on government effectiveness” *The Straits Times*. April 28, 2022. <https://www.straitstimes.com/singapore/politics/singapore-3rd-in-global-ranking-on-government-effectiveness>

⁶⁹ Melanie, Chew. “Human Rights in Singapore: Perceptions and Problems.” *Asian Survey* 34, no. 11 (1994): 935. <https://doi.org/10.2307/2645345>.

⁷⁰ Eugene K. B. Tan. “Law and Values in Governance: The Singapore Way” *Hong Kong Law Journal*. 30, (1), (2000): 93. <https://core.ac.uk/download/pdf/13248974.pdf>

Sustainable development initiatives and outcomes

When considering Singapore and the achievement of the SDGs, it can be said that its uniqueness lies between SG's localized past and its globalized future. Indeed, even if it has known independence for less than 60 years, Singapore is considered one of the most advanced nations on earth⁷¹.

As stated by Prime Minister Loong, sustainable development has always been integral to the Singapore's story⁷². Before it was a "trend" to be green and sustainably aware, Singapore designed its city and its policies with long-term sustainability in mind⁷³. This was driven by the necessities of the small city-state due to its location and sensitivity to climate change. In fact, by being a tropical island it is vulnerable to weather patterns and the consequences of global warming, such as sea-level rise. Furthermore, since Singapore gained independence, it has concentrated its efforts on developing education, security, and healthcare while bearing in mind the need to prudently use its resources, energy, water, and food sources⁷⁴. By investing in education, future generations have been able to contribute smartly to get both economic growth and better living conditions. However, in pursuing this economic development, the Singapore Government has always been careful to not disrupt the natural environment⁷⁵, again for the abovementioned reasons.

Furthermore, with the highest annual Gross Domestic Product (GDP) per capita among the Association of South-East Asian Nations (ASEAN) countries and cities⁷⁶, and being the most urbanized and industrialized, the city-state can base its national strategy on a robust and reliable economy. Indeed, it has a distinct national policy framework that maintains a balance between the policy objectives of economic competitiveness, energy security, and environmental sustainability⁷⁷. Hence, to implement integrated and

⁷¹Neesha Kanaga. "15 Landmarks in Singapore You Shouldn't Miss". *Tiqets Blog*, 2022. Accessed May 3, 2023. <https://www.tiqets.com/blog/landmarks-in-singapore/>

⁷² "Towards a Sustainable and Resilient Singapore" Ministry of Foreign Affairs. Accessed May 3, 2023. P.2 https://sustainabledevelopment.un.org/content/documents/19439Singapores_Voluntary_National_Review_Report_v2.pdf

⁷³ *Ibid*, 2.

⁷⁴ "Towards a Sustainable and Resilient Singapore" Ministry of Foreign Affairs. Accessed May 3, 2023. P.2 https://sustainabledevelopment.un.org/content/documents/19439Singapores_Voluntary_National_Review_Report_v2.pdf

⁷⁵ *Ibid*, 3.

⁷⁶ Singapore Economic Development Board. "An economic powerhouse" EDB Singapore, 2023. Accessed May 22, 2023. <https://www.edb.gov.sg/en/why-singapore/an-economic-powerhouse.html>

⁷⁷ Loi Tian Sheng Allan, Jaqueline Tao Yujia and Yuen Kah Hung "Singapore Country Report", in *Energy Outlook and Energy Saving Potential in East Asia* ed. Kimura, S. and H. Phoumin (ERIA Research

sustainable policies, in compliance with the SDGs, Singapore developed a “Whole-of-Government” (WOG) approach⁷⁸, which requires the sharing of information among agencies to speed up risk assessment and identify opportunities. Furthermore, to ensure greater congruence, the SG established the Inter-Ministry Committee on SDGs (IMC-SDG) to formulate a national strategy that would comply with Sustainable Development needs and identify possible shortcomings based on the SDG indicators⁷⁹.

Since its independence, the Government of Singapore has shown its commitment to building a sustainable and resilient future for the generations to come⁸⁰, starting with its economic growth. Nonetheless, now with Agenda 2030, Singapore is once again in support of the sustainable trajectory. Although, there is no right model of sustainable development that works for all cities, Singapore, despite being a young nation, managed to make much progress on the 17 Global Goals⁸¹. This thesis aims to analyze and show how this system chosen by the city of Singapore can be considered successful, or in need of adjustments. But it is crucial that each country adopts solutions to fit their specific circumstance and priorities, which for this thesis in relation to the city-state are SDGs 7, 11, 12, and 13. The Singapore Green Plan 2030 – the most recognized SDG’s related national strategy – foster projects that cover areas that varies from circular economy to greening urbanization, to sustainable transport and resilient future⁸², which are analyzed in the following sections.

SDG 7 Affordable and Clean Energy

The Sustainable Development Goal 7 on “Affordable and Clean Energy” has as its main goal to *ensure access to affordable, reliable, sustainable, and modern energy for all*⁸³.

Project Report 2014-33, Jakarta: ERIA 2015): 223.

https://www.eria.org/RPR_FY2014_No.33_Chapter_15.pdf

⁷⁸ “Towards a Sustainable and Resilient Singapore” Ministry of Foreign Affairs. Accessed May 3, 2023. P.3 https://sustainabledevelopment.un.org/content/documents/19439Singapores_Voluntary_National_Review_Report_v2.pdf

⁷⁹ Estee Tan and Grace Yaw. “Singapore’s Monitoring of Sustainable Development Goals Implementation” *Statistics Singapore Newsletter* Issue 2, (2021): 14. <https://www.singstat.gov.sg/-/media/files/publications/reference/ssn221-pg14-15.pdf>

⁸⁰ Estee Tan and Grace Yaw. “Singapore’s Monitoring of Sustainable Development Goals Implementation” *Statistics Singapore Newsletter* Issue 2, (2021): 2. <https://www.singstat.gov.sg/-/media/files/publications/reference/ssn221-pg14-15.pdf>

⁸¹ “Towards a Sustainable and Resilient Singapore” Ministry of Foreign Affairs. Accessed May 3, 2023. P.2 https://sustainabledevelopment.un.org/content/documents/19439Singapores_Voluntary_National_Review_Report_v2.pdf

⁸² “A City of Possibilities” SG Green Plan. Accessed May 8, 2023. <https://www.greenplan.gov.sg>

⁸³ “Goal 7” United Nations. Accessed May 5, 2023. <https://sdgs.un.org/goals/goal7>

In a city like Singapore where there are limited natural resources, and therefore a high dependency on imports of oil, natural gas, and coal from other countries, the possibility to change the system through sustainable solutions has become a priority⁸⁴. Despite the hurdles, Singapore tackled the challenge of ensuring that the population would have access to reliable and environmentally sustainable energy. In 2015, Singapore adhered to the Paris Agreement requirements, and committed to sustainable energy with the aim of reducing greenhouse gas emissions⁸⁵. For this transition to work, the Government has created policies that are meant to foster the use of renewable energy and innovation in energy technology, as Singapore wants to use energy efficiency as its key strategy to reduce carbon emissions and mitigate climate change⁸⁶. Among those policies, the most recognized initiative is the inter-agency Energy Efficiency Programme Office (EEPO), led by the National Environmental Agency (NEA) and the Energy Market Authority (EMA), which aims at promoting and facilitating the transition to more efficient use of energy within the city of Singapore, also by sponsoring renewable energy⁸⁷.

However, Singapore, as aforementioned, is an island and because of its geographical location has limited alternatives for renewable energy – there are no hydro resources, the wind range is too low so not usable, and the geothermal energy is not economically viable⁸⁸. Also, according to the United Nations Framework Convention on Climate Change, Singapore is an alternative energy-disadvantaged country, and making solar energy is the island’s best bet⁸⁹. Hence, the remaining source of renewable energy in Singapore is solar.

⁸⁴ Jeremy N. Rauch. “The Singapore Way: Planning for a Sustainable Future” *NYU Stern Urban Systems*. (2015): 12.

https://www.academia.edu/12387333/The_Singapore_Way_Planning_for_a_Sustainable_Future

⁸⁵ “Towards a Sustainable and Resilient Singapore” Ministry of Foreign Affairs. Accessed May 3, 2023. P.25 https://sustainabledevelopment.un.org/content/documents/19439Singapores_Voluntary_National_Review_Report_v2.pdf

⁸⁶ Jeremy N. Rauch. “The Singapore Way: Planning for a Sustainable Future” *NYU Stern Urban Systems*. (2015): 14.

https://www.academia.edu/12387333/The_Singapore_Way_Planning_for_a_Sustainable_Future

⁸⁷ Loi Tian Sheng Allan, Jaqueline Tao Yujia and Yuen Kah Hung “Singapore Country Report”, in *Energy Outlook and Energy Saving Potential in East Asia* ed. Kimura, S. and H. Phoumin (ERIA Research Project Report 2014-33, Jakarta: ERIA 2015): 223.

https://www.eria.org/RPR_FY2014_No.33_Chapter_15.pdf

⁸⁸ Government of Singapore “Overview: Facilitating the Deployment of Renewable Energy in Singapore” Energy Market Authority, 2023. Accessed May 5, 2023.

https://www.ema.gov.sg/Renewable_Energy_Overview.aspx

⁸⁹ Peter Govindasamy. “Singapore’s diversification challenges as an alternative energy disadvantaged city-state: The complementary role of the UNFCCC: Governance of the impact of implementation of

Solar energy has the greatest potential in the city-state's renewable transition because it is the most viable, both in terms of availability and commercial possibility; consequently, solar power has been implemented in many commercial buildings⁹⁰. Indeed, by being in the tropical sun belt, Singapore enjoys an average annual solar irradiance of 1,580 KWH/m²/year⁹¹. Furthermore, over the next years, SG is aiming to increase solar deployment to 1.5 gigawatt-peak (GWp) by 2025, and at least 2 GWp by 2030⁹².

To enhance Singapore's utilization of this sole source of renewable energy, and help the island to be compliant to the requirements of Agenda 2030, several strategies have been implemented. Among these, the Singapore Green Plan 2030 is the major guidance for all plans regarding the sustainable transition of the city-state. One of the five pillars in the Singapore's roadmap for achieving environmental sustainability is Energy Reset which aims at boosting fuel efficiency, aiding the transition to a cleaner energy mix, and taking advantage of the low-carbon potential of imported clean electricity⁹³. Focusing on solar energy, in its transition toward a green and low-carbon future, the Singapore Government intends to increase solar deployment, and to achieve this it has planned to install more solar PV systems on the rooftops of community buildings in central business districts, and the airport⁹⁴.

Furthermore, in Singapore's strategies a plan for the deployment of energy storage is considered crucial taking into account the limitations of the city-state. Hence, the Energy Market Authority (EMA) introduced the Energy Storage System (ESS) a game-changing technology that aims at storing renewable energy for later use⁹⁵. Through this

response measures". *UNFCCC*. Accessed May 5, 2023.

<https://unfccc.int/sites/default/files/resource/Singapore.pdf>

⁹⁰ Jeremy N. Rauch. "The Singapore Way: Planning for a Sustainable Future" *NYU Stern Urban Systems*. (2015): 13.

https://www.academia.edu/12387333/The_Singapore_Way_Planning_for_a_Sustainable_Future

⁹¹ Government of Singapore "Overview: Facilitating the Deployment of Renewable Energy in Singapore" Energy Market Authority, 2023. Accessed May 5, 2023.

https://www.ema.gov.sg/Renewable_Energy_Overview.aspx

⁹² Government of Singapore. "Solar" Energy Market Authority, 2023. Accessed May 5, 2023.

<https://www.ema.gov.sg/energy-supply-switch-solar.aspx>

⁹³ Rachel Cheang. "What's missing from the Singapore Green Plan Energy Reset pillar?" *Energy CoLab*. February 17, 2022. <https://medium.com/energy-colab/whats-missing-from-the-singapore-green-plan-2030-energy-reset-pillar-2f40d7ec6b8b>

⁹⁴ Geena Peh. "Overview and Impact of Singapore's Green Plan 2030". *Jones Day*. August, 2022.

<https://www.jonesday.com/en/insights/2022/08/overview-and-impact-of-singapores-green-plan-2030>

⁹⁵ Government of Singapore. "Energy Storage System" Energy Market Authority, 2023. Accessed May 5, 2023. https://www.ema.gov.sg/Energy_Storage_Programme.aspx

system, EMA deduces that by actively controlling imbalances between power supply and demand, the ESS will solve the solar intermittency and improve grid resilience.

Lastly, another solution found by the Singapore Government to enhance the use of renewable energy on the island, which was pointed out during the interview, and encompasses in the Singapore Green Plan 2030, is the wish and willingness of the Government to cooperate with third parties. Singapore is working on several low-carbon import schemes and making agreements for clean energy imports. This is the case of the 4200km underwater cable between Darwin, Australia, and Singapore that from 2027 will provide the island with enough solar power to meet about 15% of its energy demand⁹⁶. Similarly, imports will come from an Indonesian solar facility in Palau Bulan, which will supply 100 megawatts of clean electricity⁹⁷.

SDG 11 Sustainable Cities and Communities

When talking of renewable energies, cities and their architectural structure play a crucial role. Thus, this thesis focuses on the Sustainable Development Goal 11 of “Sustainable Cities and Communities” which aims at *making cities and human settlements inclusive, safe, resilient, and sustainable*⁹⁸. When analyzing the possibility for a city to be sustainable, it is useful to recall the definition of the Brundtland Commission as it states that “sustainable development is a development that meets the needs of the present without compromising the ability of future generations to meet their own needs”⁹⁹. Hence, in establishing a framework for the ensuing discussions, it is important to define that a sustainable city must exhibit the following three principal characteristics: city-wide access to public transportation, sustainable architecture, and green spaces¹⁰⁰, that promote the well-being of the current population without imposing the burden of those actions on future generations.

⁹⁶Eric Koons. “Energy Transition in Singapore: A Renewable Energy Leader in Asia” *EnergyTrackerAsia*. February 14, 2022. <https://energytracker.asia/energy-transition-in-singapore/>

⁹⁷ *Ibid.*

⁹⁸ “Goal 11” United Nations. Accessed May 5, 2023. <https://sdgs.un.org/goals/goal11>

⁹⁹ Marc A. Rosen. “The Future of Sustainable Development: Welcome to the European Journal of Sustainable Development Research” *European Journal of Sustainable Development Research*, 1:1 (2017): 1. <http://dx.doi.org/10.20897/ejosdr.201701>

¹⁰⁰ “Transforming our world: the 2030 Agenda for Sustainable Development” United Nations, 2015. Accessed May 5, 2023.

<https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf>

Due to Singapore's constant success in maintaining remarkable levels of traffic through its efficient operation while ensuring a smooth traffic flow on its urban streets, its municipal transportation system has been recognized as a global landmark¹⁰¹. Furthermore, when considering sustainable urban transport, Singapore had had remarkable success in shaping its public transit system into a modern and high-quality operation. To do that the city-state used two main strategies: improving the quality of public transport and imposing a law on the number of cars allowed in the city.

For public transportation, Mass Rapid Transport (MRT) and Light Rapid Transit (LRT) are the two main systems being used, namely the metro line, and buses. The main vision behind the Land Transport Master Plan was to develop a more people-centered transportation system¹⁰², by offering commuters high-quality services in an affordable and environmentally friendly way. According to surveys undertaken in the city, the MRT and LRT represent a modern and high-level public facility also by providing comfort, through the installation of air-conditioning, and reliability according to schedules¹⁰³. Nonetheless, customer satisfaction keeps improving over time, and with the Singapore Green Plan 2030, the Ministry of Transport is planning on making MRTs and LRTs more inclusive and greener.

Because Singapore is listed among the world's largest Co2 emitters per capita¹⁰⁴, the Government already planned to reduce by 16% its emission by 2020, and reach net-zero emissions by 2050¹⁰⁵. To accomplish this objective, another strategy is the limit on the number of cars in the city. In 2017, SG announced that it would freeze the number of private cars on its roads from 2018 to encourage the use of public transport¹⁰⁶. This had a double effect on the city: a decrease in Co2 emissions related to burnt fossil fuels of

¹⁰¹ Md. Habibur Rahman and Hoong Chor Chin. "Sustainable Urban Transport in Singapore: A Balanced Scorecard" *OIDA International Journal of Sustainable Development*, Vol 2, No. 10. (2011): 19. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1977137

¹⁰² Md. Habibur Rahman and Hoong Chor Chin. "Sustainable Urban Transport in Singapore: A Balanced Scorecard" *OIDA International Journal of Sustainable Development*, Vol 2, No. 10. (2011): 33. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1977137

¹⁰³ *Ibid*, 23.

¹⁰⁴ *Ibid*, 25.

¹⁰⁵ Geena Peh. "Overview and Impact of Singapore's Green Plan 2030". *Jones Day*. August, 2022. <https://www.jonesday.com/en/insights/2022/08/overview-and-impact-of-singapores-green-plan-2030>

¹⁰⁶ Agence France-Presse. "Singapore: no more cars allowed on the road, government says". *The Guardian*. October 24, 2017. <https://www.theguardian.com/world/2017/oct/24/singapore-no-more-cars-allowed-on-the-road-government-says>

cars, as more citizens were stimulated to use public transport; safer streets as the number of cars decreased and so did the number of incidents.

The second and third key characteristics of a sustainable city are sustainable architecture and available green spaces. And here it can be said that Singapore is indeed considered a world leader in urban greening¹⁰⁷. Already a few years after gaining its independence the plan was to make Singapore a garden city; the idea was to build a city that would have parks and water catchments inside the city and harmful industrial uses outside, separated by housing and transportation¹⁰⁸. This key concept found its concrete reflection later in 2015, when the SDGs mentioned improving city vegetation supporting sustainable and equitable future growth¹⁰⁹. Singapore has since increased its commitment to the old urban designs with the underlying concept of integrating the human environment into its natural environment. This is also included in the Singapore Green Plan 2030, where the Government is aiming at transforming Singapore into “a city in nature”¹¹⁰. To do so the plan focuses on expanding the Nature Park Network, which already accounts for 300 km of Park Connectors found throughout the island¹¹¹, intensify and restore nature in gardens and parks within the city, and enhance veterinary care and animal management by strengthening connectivity between Singapore’s green spaces and increase animal awareness¹¹².

Lastly, among the five key pillars of the Singapore Green Plan 2030, there is an embedded commitment to promoting greener infrastructure and building by improving the energy efficiency of water treatment facilities, and raising the sustainability standards for the city structures. Followed by implementing sustainable towns and districts with the aim of introducing smart LED lighting, solar panels on rooftops, and transform multi-

¹⁰⁷ Beverley Anne Tan, Leon Yan-Feng Gaw, Mahyar Masoudi and Daniel Rex Richards. “Nature-Based Solutions for Urban Sustainability: An Ecosystem Services Assessment of Plans for Singapore’s First “Forest Town”” *Frontiers in Environmental Science*, vol. 9 (2021): 2.

<https://doi.org/10.3389/fenvs.2021.610155>

¹⁰⁸ Beverley Anne Tan, Leon Yan-Feng Gaw, Mahyar Masoudi and Daniel Rex Richards. “Nature-Based Solutions for Urban Sustainability: An Ecosystem Services Assessment of Plans for Singapore’s First “Forest Town”” *Frontiers in Environmental Science*, vol. 9 (2021): 3.

<https://doi.org/10.3389/fenvs.2021.610155>

¹⁰⁹ *Ibid*, 2.

¹¹⁰ “City in Nature” Singapore Green Plan, 2023. Accessed May 5, 2023.

<https://www.greenplan.gov.sg/key-focus-areas/city-in-nature/>

¹¹¹ Singapore Government “Our Green Spaces” *National Parks*, Issue 32, Vol. 1. (2017).

<https://www.nparks.gov.sg/nparksbuzz/issue-32-vol-1-2017/main-feature/our-green-spaces#:~:text=Our%20little%20red%20dot%20is,treasure%20trove%20of%20green%20spaces.>

¹¹² “City in Nature” Singapore Green Plan, 2023. Accessed May 5, 2023.

<https://www.greenplan.gov.sg/key-focus-areas/city-in-nature/>

storey car parks into urban farms and community gardens¹¹³. This will be supported by the “80-80-80 in 2030” policy that strives to increase by 80% the energy efficiency of green structures, make 80% of the new constructions Super Low Energy (SLE) structures, and boost the sustainability standard of all buildings by 80%¹¹⁴.

SDG 12 Responsible Consumption and production

One of the most important environmental and developmental issues is waste¹¹⁵, and because it is a result of human activity is incredibly challenging to avoid. Due to changes in consumption patterns, humans now produce more trash than ever before, and the city of Singapore is no exception. Consequently, over the years the city-states faced the problem by introducing new solutions. The Sustainable Development Goal 12 on “Responsible Consumption and Production” which aims at *ensuring sustainable consumption and production patterns*¹¹⁶, brought into focus the issues linked to waste and the importance of carefully using the available resources.

In a small city as Singapore, the lack of resources is a critical issue, but so is the awareness of the need to balance economic development and environmental sustainability¹¹⁷. To overcome these challenges, Singapore must adopt a circular economy approach – considered as an economic system focused on the recycling and regeneration of materials or goods, particularly as a means of ensuring a sustainable or ecologically friendly production¹¹⁸. The Singapore Green Plan 2030 proposed a strategy to reduce carbon emissions while embracing sustainability by consuming less and recycling more, with the vision of becoming a Zero Waste Nation powered by a circular economy with the motto of “reduce, reuse and recycle” as a norm of all citizens and business¹¹⁹.

¹¹³ Rachel Cheang. “What’s missing from the Singapore Green Plan Energy Reset pillar?” *Energy CoLab*. February 17, 2022. <https://medium.com/energy-colab/whats-missing-from-the-singapore-green-plan-2030-energy-reset-pillar-2f40d7ec6b8b>

¹¹⁴ *Ibid.*

¹¹⁵ Jutta Gutberlet. “Waste in the City: Challenges and Opportunities for Urban Agglomerations” in *Urban Agglomeration*. Ed. Mustafa Ergen. (InTech Open, 2017) <https://www.intechopen.com/chapters/57824>

¹¹⁶ “Goal 12” United Nations. Accessed May 5, 2023. <https://sdgs.un.org/goals/goal12>

¹¹⁷ “Circular Economy” Open Government Products, 2023. Accessed May 5, 2023. <https://www.towardszerowaste.gov.sg/circular-economy/>

¹¹⁸ MacMillan Education. “Circular Economy” MacMillan Dictionary, 2023. Accessed May 30, 2023. <https://www.macmillandictionary.com/dictionary/british/circular-economy#:~:text=an%20economy%20that%20reuses%20and,for%20as%20long%20as%20possible>

¹¹⁹ “Sustainable Living” Singapore Green Plan, 2023. Accessed May 5, 2023. <https://www.greenplan.gov.sg/key-focus-areas/sustainable-living/>

The Ministry of the Environment ratified a new system to ensure better waste management, since it was for many years one of the most pressing issues concerning the city-state. Since 1973, Singapore used the incineration plant system and established, to then close them, a series of landfills located away from residential areas¹²⁰. But ultimately, the goal was to comply with a circular economy system, so the need for landfills decreased. Over the years, the system has been updated and is now working on a waste-to-energy incineration plants system, through which Singapore retrieves 962 million kWh of electricity, which accounts for almost 3% of Singapore's total electricity needs¹²¹. To foster sustainability through waste, the National Environmental Agency (NEA) of the city-state designed and created the first landfill area that is now an ecotourism attraction¹²². This is the Semakau Landfill, located about 8km south of Singapore¹²³, where the waste following the incineration process, in the form of ashes, is transported to the island by barge ships and unloaded by excavators in prescribed locations where, with specific machines, they are levelled and covered with soil¹²⁴. Its design ensures that the waste does not leak into the ocean and that it can run sustainably and environmentally. In fact, the waste helps in eventually turning the space into a lush area of greenery, as grass and plants thrive there attracting a variety of birds and insects¹²⁵.

Another example of circularity in Singapore is the water collection. At the beginning of its independence, the waterways of Singapore were severely polluted, and this forced the city to be dependent on Malaysia for its clean water supply¹²⁶. However, one of the main objectives of the Singaporean Government was to stop this dependency.

¹²⁰ Jeremy N. Rauch. "The Singapore Way: Planning for a Sustainable Future" *NYU Stern Urban Systems*. (2015): 6.

https://www.academia.edu/12387333/The_Singapore_Way_Planning_for_a_Sustainable_Future

¹²¹ Jeremy N. Rauch. "The Singapore Way: Planning for a Sustainable Future" *NYU Stern Urban Systems*. (2015): 6.

https://www.academia.edu/12387333/The_Singapore_Way_Planning_for_a_Sustainable_Future

¹²² Zia Ul Haq. "Semakau Island, the Green Landfill in Singapore" *Green Network*. May 19, 2021.

[https://greennetwork.asia/news/semakau-island-the-green-landfill-in-singapore/#:~:text=Semakau%20Island%20is%20the%20only,Agency%20of%20Singapore%20\(NEA\).](https://greennetwork.asia/news/semakau-island-the-green-landfill-in-singapore/#:~:text=Semakau%20Island%20is%20the%20only,Agency%20of%20Singapore%20(NEA).)

¹²³ National Environmental Agency. "Semakau Landfill". National Environmental Agency, 2023.

Accessed June 5, 2023. <https://www.nea.gov.sg/our-services/waste-management/waste-management-infrastructure/semakau-landfill>

¹²⁴ Zia Ul Haq. "Semakau Island, the Green Landfill in Singapore" *Green Network*. May 19, 2021.

[https://greennetwork.asia/news/semakau-island-the-green-landfill-in-singapore/#:~:text=Semakau%20Island%20is%20the%20only,Agency%20of%20Singapore%20\(NEA\).](https://greennetwork.asia/news/semakau-island-the-green-landfill-in-singapore/#:~:text=Semakau%20Island%20is%20the%20only,Agency%20of%20Singapore%20(NEA).)

¹²⁵ *Ibid.*

¹²⁶ Jeremy N. Rauch. "The Singapore Way: Planning for a Sustainable Future" *NYU Stern Urban Systems*. (2015): 9.

https://www.academia.edu/12387333/The_Singapore_Way_Planning_for_a_Sustainable_Future

Hence, together with the Ministry of the Environment, Singapore was able to quickly have clean waterways which caused lands to grow in value, leading to the flourishing of business activities¹²⁷. However, the idea of creating a sustainable source of water within the city-state was always a priority. Especially in the last few decades, the NEA committed its research to ensure the maximization of water catchment within the city, considering that the average annual rainfall in Singapore is 2400 millimeters¹²⁸. Through the Active, Beautiful, Clean Waters (ABC Waters) Programme, the Government fostered sustainable approaches to water recycling, by integrating the environment to the community systems¹²⁹. This was the case with the man-made Supertree Groves at the Gardens by the Bay, a project initiated to showcase sustainable practices. The structure of each Supertree is intended to perform as a normal tree, they have photovoltaic cells to echo photosynthesis and contribute energy to run the park, they generate solar power, and they collect water from rains and channel it throughout the park and the city where needed¹³⁰. Another project funded by the Ministry of the Environment is NEWater, a system that collects the wastewater and through a three-stage process purifies it and allows it to be drinkable again¹³¹. Thanks to this water circularity management, Singapore can harvest its stormwater and wastewater from housing, and reuse it, and proves once more the city-state can maximize the reuse of resources.

SDG 13 Climate Action

It can be said that the Sustainable Development Goal 13 on “Climate Action”, encompasses in its targets all the climate-related goals of Agenda 2030, with the aim of *taking urgent action to combat climate change and its impacts*¹³². Because of the increasing urgency of tackling climate change, it can be said that all countries in the world, Singapore

¹²⁷ Jeremy N. Rauch. “The Singapore Way: Planning for a Sustainable Future” *NYU Stern Urban Systems*. (2015): 10.

¹²⁸ “Rainwater harvesting in Singapore” Centre for Science and Environment. Accessed May 8, 2023.

<http://www.rainwaterharvesting.org/international/singapore.htm>

¹²⁹ Teck Heng Neo, Dong Xu, Harsha Fowdar, David T. McCarthy, Enid Yingru Chen, Theresa Marie Lee, Geok Suat Ong, Fang Yee Lim, Say Leong Ong, and Jiangyong Hu. "Evaluation of Active, Beautiful, Clean Waters Design Features in Tropical Urban Cities: A Case Study in Singapore" *Water* 14, no. 3. (2022). <https://doi.org/10.3390/w14030468>

¹³⁰ Loz Blain. “In pictures: Singapore’s surreal Supertree Grove and Cloud Forest”. *New Atlas*. August 14, 2014. <https://newatlas.com/singapore-gardens-by-the-bay-supertree-cloud-forest/33590/>

¹³¹ Kresentia Madina. “NEWater: Singapore’s Recycled Water”. *Green Network*. July 26, 2022 <https://greennetwork.asia/news/newater-singapores-recycled-water/>

¹³² “Goal 13” United Nations. Accessed May 8, 2023. <https://sdgs.un.org/goals/goal13>

included, are implementing new projects and actions to mitigate the related negative effects. This is why, all 193 UN Member States agreed upon the Sustainable Development Goals to be achieved by 2030¹³³, and to the Paris Agreement which saw 195 out of the 198 agreeing on the binding international treaty on climate change¹³⁴. Singapore is a signatory to both agreements and has shown its commitment to tackling climate change, as detailed below.

The National Environmental Agency (NEA) of Singapore is conscious of the threat that climate change can be to cities, especially those located in coastal areas as the city-state, as they are more vulnerable to sea-level rise and storm surge¹³⁵. Furthermore, the NEA, besides being cognizant and exposed to climate and environmental change, and by knowing that cities are centers of growth and innovative climate solutions, issued the Singapore Green Plan 2030 in February 2021, which is a nationwide initiative to advance Singapore's national Sustainable Development Goals implementation¹³⁶. Through this plan, the Government of the city-state has committed to mitigating the climate crisis. Indeed, the Green Plan outlines specific goals, from circular economy to more nature in the city, enhancing Singapore's adherence to the Paris Agreement and the UN's 2030 SDGs and ensuring the city-state's long-term goal of achieving net zero emissions by 2050¹³⁷.

Secondly, it must be pointed out that the Government of Singapore in addressing the climate crisis is adopting a "Whole-of-Government" approach¹³⁸ rather than a "Whole-of-Society" approach, which encourages the government to take the lead in formulating and executing national plans to combat the challenges to national security presented by climate change. By having a stable government, and by having a "Whole-

¹³³ "Themes" WTO, 2023. Accessed May 8, 2023.

<https://www.who.int/data/gho/data/themes/sustainable-development-goals#:~:text=The%20United%20Nations%20Sustainable%20Development,achieve%20by%20the%20year%202030>

¹³⁴ "Paris Agreement - Status of Ratification" United Nations Climate Change. Accessed May 8, 2023.

<https://unfccc.int/process/the-paris-agreement/status-of-ratification>

¹³⁵ Organization for Economic Co-operation and Development "Cities and Climate Change". OECD Publishing. (2014): 4. <https://www.oecd.org/env/cc/Cities-and-climate-change-2014-Policy-Perspectives-Final-web.pdf>

¹³⁶ "A City of Possibilities" SG Green Plan. Accessed May 8, 2023. <https://www.greenplan.gov.sg>

¹³⁷ *Ibid.*

¹³⁸ Md Saidul Islam and Quek Ri An. "Climate Change and Urban Resilience: The Singapore Story" In *Globalization, Development and Security in Asia* (2014): 210 https://www.researchgate.net/profile/Md-Islam-67/publication/285084218_Climate_Change_and_Urban_Resilience_The_Singapore_Story/links/56935d2008aec14fa55dff86/Climate-Change-and-Urban-Resilience-The-Singapore-Story.pdf

of-Government” approach to crises, the response to challenges is often very resilient and rapid. This is also due to the economic stability and fast growth of the city-state, which helps facilitate continuous process of innovation.

A second strategy adopted by Singapore, is the Sustainable Development Blueprint (SDB), a document that analyses all the national strategies needed for dealing with the environmental challenges and sustainable development up to 2030¹³⁹. As stated in the SDB, the city-state must successfully manage and overcome the risks posed by climate change through a well-coordinated strategy self-titled as “The Singapore Way”¹⁴⁰. This integrated approach presents a series of strategies for boosting energy efficiency, enhancing urban development, and fostering community action with the end goal of “making Singapore a livable and lively city-state, one that Singaporeans love and are proud to call home”¹⁴¹.

Another characteristic of the climate action enhanced by the city of Singapore, is the will to engage the youth into policy creation. Through various initiatives, such as the “Green Singapore 2050”, the Singapore Environment Council – an organization that joins together NGOs and Singapore’s authorities – has been able to include youths to voice their environmental concerns and propose innovative solutions¹⁴². The Singapore Environment Council initiatives are driven by the outcome of the Rio+20 conference of 2012 where, the concept of allowing citizens to write *A Future We Want*, acknowledged that participation in decision-making, the ability to impact one’s life and future, and the ability to voice one’s concerns, are essential for holistic sustainable development¹⁴³.

¹³⁹ Md Saidul Islam and Quek Ri An. “Climate Change and Urban Resilience: The Singapore Story” In *Globalization, Development and Security in Asia* (2014): 212 https://www.researchgate.net/profile/Md-Islam-67/publication/285084218_Climate_Change_and_Urban_Resilience_The_Singapore_Story/links/56935d2008aec14fa55dff86/Climate-Change-and-Urban-Resilience-The-Singapore-Story.pdf

¹⁴⁰ *Ibid*, 212.

¹⁴¹ Inter-Ministerial Committee on Sustainable Development. *A Lively & Liveable Singapore: Strategies for Sustainable Growth - Ministry of the Environment and Water Resources and Ministry of National Development*. (Ministry of the Environment and Water Resources / Ministry of National Development. Singapore, Singapore, 2009). <https://sustainabledevelopment.un.org/index.php?page=view&type=400&nr=706&menu=1515>

¹⁴² Md Saidul Islam and Quek Ri An. “Climate Change and Urban Resilience: The Singapore Story” In *Globalization, Development and Security in Asia* (2014): 212. https://www.researchgate.net/profile/Md-Islam-67/publication/285084218_Climate_Change_and_Urban_Resilience_The_Singapore_Story/links/56935d2008aec14fa55dff86/Climate-Change-and-Urban-Resilience-The-Singapore-Story.pdf

¹⁴³ *Ibid*, 215.

CHAPTER 4

Discussion and Analysis

Through an in-depth analysis of each Sustainable Development Goal applied to the case study of Singapore, this research made it possible to observe how the city-state handles the need to balance the use of limited, and in some case the lack of resources, with the need to find sustainable innovative solutions to mitigate both the climate crisis and the need for more resilient economic and social growth.

To further analyze these outcomes, this chapter focuses on the strengths and weaknesses resulting from the application of or disinterest in certain policies, and compares the finding of Singapore with those of the European Union – ranked as the global leader in the fight against climate change¹⁴⁴.

Overview of sustainable development initiatives in the case study

It can be stated that the case study chosen represents both an example of a “place at risk” and a “place of advantage”. As has been mentioned, Singapore is an island, a city-state, and a densely populated small area that, since its independence in 1965, has been striving for its economic growth and innovative development¹⁴⁵. Indeed, this brief description is cardinal when reviewing the initiatives proposed by the city-state in relation to the Sustainable Development of the city. Its location, next to its history, reveals important points that explain the reasoning behind the initiatives undertaken by the Singapore Government. Similarly, through the insights of the interview, the peculiarity of the approach of Singapore to Agenda 2030, arises as a topic where the government is fully committed, and because its economic power is its most effective source, it seeks to steer its policies toward something that can be solved with financial aid.

Indeed, if on the one hand the Government of Singapore presented the Green Plan 2030, which shows its adherence to the Paris Agreement and the Sustainable

¹⁴⁴Evelyn Astuccia. “Can the EU Lead the Way in the Fight Against Climate Change?” *Eyes on Europe*. December 3, 2019. <https://www.eyes-on-europe.eu/can-the-eu-lead-the-way-in-the-fight-against-climate-change/>

¹⁴⁵Yelena Kempton, Luca Salvati, and Ioannis Vardopoulos. “Long-term planning and development for urban and regional inclusion, safety, resilience, and sustainability. Insights from Singapore” *Region and Periphery*, Issue 10 (2022). https://www.researchgate.net/profile/Ioannis-Vardopoulos/publication/366793141_Long-term_planning_and_development_for_urban_and_regional_inclusion_safety_resilience_and_sustainability_Insights_from_Singapore/links/63b2cb96a03100368a481885/Long-term-planning-and-development-for-urban-and-regional-inclusion-safety-resilience-and-sustainability-Insights-from-Singapore.pdf

Development Goals - which in the areas of the SDGs 7, 11, 12, and 13, was adapted into national policies such as the “80-80-80 in 2030” policy, the “Energy Efficiency Programme Office (EPPO)”, the “Zero Waste Nation” based on a circular economy policy idea, the “ABC Waters” programme – to prove a commitment of Singapore to tackle the issues related to climate change, and a smart use its great economic power to finance sustainable projects and innovations. On the other hand, because Singapore is an island, and so is more vulnerable to consequences of climate change such as sea-level rise, and as it lacks resources both of goods, water, and energy, finds it challenging to comply with certain requirements that would ensure an overall successful outcome for the city as regards the implementation of Agenda 2030.

By looking at all the initiatives there are two cross-cutting themes: the concept of preserving for an impending future that could potentially deteriorate; and the constant will of creating an assertive “capacity-building” approach. According to the Ministry of Foreign Affairs, “Sustainable development is not a solo mission, it is a collective goal as we have much to learn from each other’s experiences¹⁴⁶”, therefore, the ongoing process of strengthening the abilities and infrastructures of the city-state to be ready for an unknown future can be considered the policy coherence that binds all the initiatives.

Factors that enable or hinder Singapore’s achievement of the SDGs

The prevailing perception envisions Singapore as highly futuristic and exceptionally developed, earning it the credit of one of the most livable cities, boasting one of the highest levels of human capital development in the world¹⁴⁷. However, beneath this façade of a futuristic city lies all the challenges to Singapore’s pursuit of sustainable development and achievement of a net-zero economy – namely a situation where the amount of greenhouse gases (GHGs) released into the earth’s atmosphere is balanced by the amount of GHGs removed¹⁴⁸.

¹⁴⁶ “Towards a Sustainable and Resilient Singapore” Ministry of Foreign Affairs. Accessed May 3, 2023. [P.2https://sustainabledevelopment.un.org/content/documents/19439Singapore_Voluntary_National_Review_Report_v2.pdf](https://sustainabledevelopment.un.org/content/documents/19439Singapore_Voluntary_National_Review_Report_v2.pdf)

¹⁴⁷ The World Bank Group “The World Bank In Singapore”. The World Bank, 2019. Accessed May 20, 2023. <https://www.worldbank.org/en/country/singapore/overview>

¹⁴⁸ McKinsey & Company. “What is net zero?” *McKinsey & Company*. November 28, 2022. <https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-net-zero>

It is by now acknowledged that the factor that enables the city-state's sustainable development encompasses its strong financial support and economic basis; conversely, the obstacles that limit this transformation are resource limitations and the city-state's location.

Despite the abovementioned, Singapore proved that the economic competitiveness and the challenges to becoming sustainable are not incompatible goals. Hence, according to the 2018 Sustainable Cities Index, Singapore is recognized as the fourth most sustainable city in the world and the most sustainable city in Asia¹⁴⁹. Therefore, it is important to recognize that Singapore serves as an example of a sustainable metropolis for the ASEAN region. The city-state's achievements are exemplary, and countries and cities within the region and beyond have looked to it for guidance and inspiration on a variety of governance questions. This has been made possible through the Singapore Cooperation Programme, where the city-state has been sharing its sustainable development experience with fellow developing countries¹⁵⁰. Today Singapore is a livable and sustainable city with beautiful green spaces and a clean environment to live in.

Furthermore, despite its lack of resources, Singapore has been ranked by the World Economic Forum (WEF) as first in Asia and twenty-first globally for sustainable development, specifically linked with the advancements in its energy transition¹⁵¹. The score was based on three main factors: economic development and growth, environmental sustainability, and energy security and access. Today, 95% of Singapore's electricity is produced by natural gas, making its carbon footprint one of the lowest amongst the ASEAN¹⁵².

¹⁴⁹ "Towards Singapore's Sustainability - Key Tenets of Our Approach to Sustainable Development" Cirsd. Accessed May 22, 2023. <https://www.cirsd.org/en/horizons/horizons-summer-2019-issue-no-14/towards-singapores-sustainability-key-tenets-of-our-approach-to-sustainable-development#:~:text=Today%2C%20Singapore%20is%20a%20liveable,the%202018%20Sustainable%20Cities%20Index>.

¹⁵⁰ *Ibid.*

¹⁵¹ Eric Koons. "Energy Transition in Singapore: A Renewable Energy Leader in Asia" *EnergyTrakerAsia*. February 14, 2022. <https://energytracker.asia/energy-transition-in-singapore/>

¹⁵² "Towards Singapore's Sustainability - Key Tenets of Our Approach to Sustainable Development" Cirsd. Accessed May 22, 2023. <https://www.cirsd.org/en/horizons/horizons-summer-2019-issue-no-14/towards-singapores-sustainability-key-tenets-of-our-approach-to-sustainable-development#:~:text=Today%2C%20Singapore%20is%20a%20liveable,the%202018%20Sustainable%20Cities%20Index>.

Further, Singapore is widely recognized as a “City in a Garden”, and this is because the city-state’s continuous development has been based on sustainable development. The Singaporean Government tried to balance the pursuit of economic progress while not compromising the standard of the city’s environment. With 72 hectares of rooftop gardens and green walls, and a nearly 50% green cover¹⁵³, Singapore is a world leader in urban greening.

Another aspect that must be analyzed when considering the limitations and facilitations of Singapore’s sustainable development, is the city-state “Whole-of-Government” (WOG) approach: a state-driven method that involves several government departments and agencies to achieve a relevant solution when a challenging situation arises¹⁵⁴. Regarding the latter point, there are two discording opinions. One argument is, that by applying the WOG, the government has been able to formulate and implement strategies of resilience both against conventional and non-conventional threats which could have endangered Singapore’s national security¹⁵⁵. Furthermore, by being in control, the government has a direct approach in responding to possible jeopardies, thus the response is rapid and decisive. It has also been confirmed by the interviewee, that by being one of the most politically stable nations¹⁵⁶, the Singaporean Government is able to act quickly, especially when it has made a commitment to addressing any difficulty. On the other hand, the WOG approach is considered by some as outdated, as the need for a top-down government direct approach in responding to threats was necessary for those threats faced during the Cold War period¹⁵⁷. However, because today threats are more

¹⁵³ “Towards Singapore’s Sustainability - Key Tenets of Our Approach to Sustainable Development” Cirsd. Accessed May 22, 2023. <https://www.cirsd.org/en/horizons/horizons-summer-2019-issue-no-14/towards-singapores-sustainability-key-tenets-of-our-approach-to-sustainable-development#:~:text=Today%2C%20Singapore%20is%20a%20liveable,the%202018%20Sustainable%20Cities%20Index.>

¹⁵⁴Yasmine Yahya. “Public service to go from 'whole-of-Government' to 'whole-of-nation’”. *The Straits Times*. May 9, 2018. <https://www.straitstimes.com/politics/public-service-to-go-from-whole-of-government-to-whole-of-nation>

¹⁵⁵Md Saidul Islam and Quek Ri An. “Climate Change and Urban Resilience: The Singapore Story” In *Globalization, Development and Security in Asia* (2014): 210. https://www.researchgate.net/profile/Md-Islam-67/publication/285084218_Climate_Change_and_Urban_Resilience_The_Singapore_Story/links/56935d2008aec14fa55dff86/Climate-Change-and-Urban-Resilience-The-Singapore-Story.pdf

¹⁵⁶ Singapore Economic Development Board. “An economic powerhouse” EDB Singapore, 2023. Accessed May 22, 2023. <https://www.edb.gov.sg/en/why-singapore/an-economic-powerhouse.html>

¹⁵⁷Md Saidul Islam and Quek Ri An. “Climate Change and Urban Resilience: The Singapore Story” In *Globalization, Development and Security in Asia* (2014): 210. https://www.researchgate.net/profile/Md-Islam-67/publication/285084218_Climate_Change_and_Urban_Resilience_The_Singapore_Story/links/56935d2008aec14fa55dff86/Climate-Change-and-Urban-Resilience-The-Singapore-Story.pdf

unpredictable, and of lower intensity, there is a need for a shift to a more inclusive strategy. To do that a “Whole-of-Nation” (WON) approach is needed. Indeed, with a WON there would be a wider participatory process that would help in the creation of innovations and strategies, by including not only government-linked partners, but also different segments of society¹⁵⁸.

Lastly, an important aspect that helped Singapore to successfully set itself on the green path for sustainable development is international cooperation, also supported by Goal 17. Indeed, the development and implementation of Singaporean policy are supported through cooperative multi-stakeholder partnerships. This because the city-state is aware that it will not be able to successfully combat climate change and foster sustainability if working alone¹⁵⁹. Cognizant of this, in 2018 Singapore proclaimed the Year of Climate Action to raise awareness and promote cooperative efforts for climate mitigation, and through different initiatives, the city-state has been able to carry out 340,000 climate action commitments, and to host more than 800 events¹⁶⁰. These local initiatives demonstrated the growing national concern for environmental sustainability, despite the challenges.

Comparison of sustainable development policies approaches: Singapore Green Plan vs European Green Deal

When considering policies that encompasses the whole sustainable development of Singapore, it can be said that the Singapore Green Plan 2030 represents a strategic shift that is focused on moving the city-state’s sustainability agenda forward¹⁶¹. Similarly, for any city or country within the European Union – there is the European Green Deal, a set of policy initiatives intended to increase resource efficiency through the transition to

¹⁵⁸ Yasmine Yahya. “Public service to go from 'whole-of-Government' to 'whole-of-nation'”. *The Straits Times*. May 9, 2018. <https://www.straitstimes.com/politics/public-service-to-go-from-whole-of-government-to-whole-of-nation>

¹⁵⁹ “Towards Singapore’s Sustainability - Key Tenets of Our Approach to Sustainable Development” Cirsd. Accessed May 22, 2023. <https://www.cirsd.org/en/horizons/horizons-summer-2019-issue-no-14/towards-singapores-sustainability-key-tenets-of-our-approach-to-sustainable-development#:~:text=Today%2C%20Singapore%20is%20a%20liveable,the%202018%20Sustainable%20Cities%20Index.>

¹⁶⁰ *Ibid.*

¹⁶¹ K. Chng,, & K. W. Ong, “The Singapore Green Plan 2030: Analysing its implications on law and the legal industry in Singapore”. *Environmental Law Review*, 23(4), (2021):336. <https://doi.org/10.1177/14614529211052597>

a clean, circular economy, stop climate change, stop the loss of biodiversity, and reduce pollution¹⁶².

The areas covered by both Plans are similar: the creation of resilient communities, the creation of a circular and a greener economy. However, there is a substantial difference that might be the root of the challenges Singapore’s sustainable development strategy faces: it is not a “just transition for all”. Indeed, the European Green Deal emphasizes the importance of being a fair and equitable change for all, while the Singapore Green Plan only highlights the idea of cooperation. Consequently, Singapore’s advanced architectural and innovative expertise, does not exclude the possibility that when acting it may inadvertently disregard some of the vulnerabilities of its population and the geographical area in which it is located.

This is why the city of Singapore is considered what Trencher defines as a “smart city 2.0”¹⁶³, namely a decentralized approach that places innovative technologies at the center when addressing social problems, residential needs. In simpler terms, the unbalanced relationship between advanced technologies and sometimes unaddressed human rights, creates discrepancies in the conception of Singapore as an exemplary city in sustainable development, as the SDGs require both an economic and socially sustainable transition. This could be solved by changing the “Whole-of-Government” approach to a “Whole-of-Nation” approach, so that all levels of society would have the opportunity to express their view and be attentively listened to.

Furthermore, when comparing the European Green Deal with the Singapore Green Plan, another aspect that must be analyzed is the dichotomy between policy advancement and the promptness of policy formulation. The European Union could be linked to policy advancement, while Singapore is to the promptness of policy formulation. The rationale behind this can be easily explained by the idea that Singapore is a city-state, so it operates alone and so it is enabled to establish and implement regulation more swiftly;

¹⁶² Tibor Sztaricskai. “The EU Green Deal – a roadmap to sustainable economies” Switch 2 Green. Accessed May 22, 2023. <https://www.switchtogreen.eu/the-eu-green-deal-promoting-a-green-notable-circular-economy/>

¹⁶³Gregory Trencher “Towards the smart city 2.0: Empirical evidence of using smartness as a tool for tackling social challenges” *Technological Forecasting and Social Change*, Vol. 142 (2019):117. <https://www.sciencedirect.com/science/article/abs/pii/S0040162517314427>

conversely, the European Union, composed of 27 distinct Member States¹⁶⁴, faces lengthier timelines in policy formulation but benefit from a broader range of knowledge and perspectives. As it has been emphasized by the interview, the strength of Singapore relies upon the stability of its Government, the fastness with which the city-state moves, also due to its financial possibilities.

Lastly, when comparing the European Green Deal to the Singapore Green Plan it is crucial to analyze the geographical context on which they are imposed. The first seeks to lead its 27 Member States, scattered across a continent with numerous resources, to a sustainable and climate-neutral future¹⁶⁵; while the second focuses specifically on the environmental concerns and ambitions of the city-state, which has limited land and resources.

Therefore, based on the three main aspects analyzed, it can be said that each Plan is tailored to the area's scope, geographical context, and level of integration needed among the participating entities. As emphasized above, both Plans highlight the need to mitigate climate change and increase global efforts towards sustainable development. However, based on the three aforementioned factors, they differ in the strategies they employ to address environmental challenges, as each reflects and operates in their specific circumstances by taking in account their objectives realities.

Therefore, if a change would need to be made for the Singapore Green Plan 2030 to be considered up to the European Green Deal's standards, is the need to be just for all.

¹⁶⁴ Michael Kolocek. "The human right to housing in the 27 member states of the European Union." *European Journal of Homelessness* 7.1 (2013): 136. <https://www.feantsaresearch.org/download/feantsa-ejh-7-1-final1363127272519427220.pdf#page=135>

¹⁶⁵ Grégory Claeys, Simone Tagliapietra and Georg Zachmann. *How to make the European Green Deal work*. Vol. 5. (Brussels, Belgium: Bruegel, 2019), 1. <https://www.jstor.org/stable/pdf/resrep28626.pdf>

CONCLUSION

Summary of findings

This thesis started from the premise that cities play a crucial role in Global Environmental Governance, and consequently in achieving Sustainable Development Goals by 2030. The case of Singapore, chosen for this thesis, is no exception. Scholars have highlighted the fast process of innovation that the city-state has been able to show since its independence. Similarly, with the findings of the interview, it has been made clear that the capacity-building approach, the stability of the Government of Singapore, and the will to cooperate with external parties, despite the lack of resources and geographical land space, will improve the adherence to those SDGs where Singapore might lack current successes.

As it was explained throughout the thesis, the city-state is both a place of risks and advantages, but through the power of cooperation, and due to the great financial assistance that the Government provides when necessary, the island has been able to overcome most of the challenges related to the SDGs application, and thereby positioning itself as the most sustainable city in Asia, and fourth in the world, according to the 2018 Sustainable Cities Index¹⁶⁶.

Hence, when answering the research question ***what are the policies and actions being implemented by the city of Singapore aimed at achieving the Sustainable Development Goals?*** and the sub-questions of *what key factors of SDG 7, 11, 12, and 13 are essential to allow a city to be considered sustainable? And what key changes are still needed for Singapore to be an example of a sustainable city?* It can be said that Singapore despite the factors that hinder the complete sustainable transition, and the lack of resources that impede certain SDGs to be achieved internally, has been able to work towards the Agenda 2030 of which it is a signatory party, by implementing national policies that comply with the requirements of the Global Goals.

This research showed how the Government of Singapore and its Ministry of the Environment are actively working for the successful achievement of the SDGs.

¹⁶⁶ “Towards Singapore’s Sustainability - Key Tenets of Our Approach to Sustainable Development” Cirsd. Accessed May 30, 2023. <https://www.cirsd.org/en/horizons/horizons-summer-2019-issue-no-14/towards-singapores-sustainability-key-tenets-of-our-approach-to-sustainable-development#:~:text=Today%2C%20Singapore%20is%20a%20liveable,the%202018%20Sustainable%20Cities%20Index.>

Consequently, it was possible to observe the strengths and weakness of the chosen Global Goals – SDG 7, 11, 12, and 13 – resulting from both steady sustainable policies that are guiding citizens, companies, and businesses through their choices, and the promptness of the Government of Singapore to address and overcome challenges. Furthermore, by leveraging Article 6 of the Paris Agreement and Goal 17 of the SDGs, the city-state made cooperation and partnerships fundamental to its sustainable transition. By being guided by the Singapore Green Plan 2030, which addresses different areas needed to move the city-state’s sustainability agenda forward¹⁶⁷, the Government has been able to show its commitment and actively engage with innovative projects for the mitigation of climate change and the achievement of Agenda 2030.

Recommendations for future research

Shifting to sustainable cities it is not an easy or fast process, and especially in islands where the resources are limited, it might be difficult to establish strict policies. However, as the urgency of the situation began to rise in the 21st century, Singapore took the opportunity to seek, once again, leadership among the ASEAN, and to prove how its economic power can be useful in this transition as well, and how economy and sustainability are not incompatible.

A promising Goal that Singapore may aid greatly is number 17 “Partnership for the Goals”. Indeed, when considering the case of Singapore, it is crucial to note that no one country can address the new and pressing challenges alone. Hence, as the city-state has shown by example, international partnerships are key to sustainable development. Therefore, the ambitious agenda 2030 by requiring a revitalized Global Partnership to ensure its implementation, and the full commitment of all signatories’ countries to mobilize all available resources, could lead to great progress also in those countries where the SDGs are more challenging to be implemented, as has been done by the city of Singapore. Nonetheless, the Government of Singapore has already shown that much of its strategic approach to reach a sustainable agenda by 2030 is based on cooperation with third countries.

¹⁶⁷ K. Chng,, & K. W. Ong, “The Singapore Green Plan 2030: Analysing its implications on law and the legal industry in Singapore”. *Environmental Law Review*, 23(4), (2021):336.
<https://doi.org/10.1177/14614529211052597>

Lastly, future research should focus on how the United Nations Environmental Programme (UNEP) – considered as the motor of the Global Environmental Governance – can ensure that the Agenda 2030 is truly leaving no one behind, as the SDGs slogan says, and guarantee that it is fitted to different cities, in terms of resources available, geographical area, and population size, among other things depending on the specific circumstances of each city. It is also important that the sustainable policies plans implemented in different countries are respectful of the concept of a just transition, that can be looked at as an innovative approach to a sustainable future that addresses both the economic growth and social wellbeing.

Therefore, starting a strengthening process for the Goal 17, and by acting cooperatively on global crisis, as required by Goal 13, would help to prevent ‘leavings behind’ in weak or limited-resources countries.

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