

Promoting Services Trade in ASEAN

SECOND PHASE (SOCIAL SERVICES)

Trade in Environmental Services

PAPER 3

MARCH

2021



ASEAN-JAPAN
CENTRE

国際機関 日本アセアンセンター

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Second Phase (Social Services)
Paper 3 / March 2021 / Trade in Environmental Services

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NOTES

The terms “country” and “economy” as used in this study also refer, as appropriate, to territories or areas. The designations employed and the presentation of the material do not imply any opinion whatsoever on the part of the ASEAN-Japan Centre concerning the legal status of any country, territory, city or area or its authorities, or concerning the delimitation of its frontiers or boundaries.

The tables use the following symbols:

- Two dots (..) indicate that data are not available or are not separately reported.
- A dash (-) indicates that the item equals zero or its value is negligible.
- Use of an en dash (–) between dates representing years, e.g., 2015–2016, signifies the full period involved, including the beginning and end years.
- Reference to “dollars” (\$) means United States dollars, unless otherwise indicated.

List of papers under the project on promoting services trade in ASEAN by the ASEAN-Japan Centre

The current paper is the third of a three-paper series of social services under the second phase of the project on promoting services trade. The other papers under this project are listed below:

First Phase

Paper 1. Trade in Professional Services (February 2017)

Paper 2. Trade in Research & Development Services (February 2017)

Paper 3. Trade in Telecommunication Services (March 2017)

Paper 4. Trade in Computer and Related Services (March 2017)

Paper 5. Trade in Courier Services (January 2018)

Paper 6. Trade in Maritime, Air, Rail and Road Transport Services (February 2018)

Paper 7. Trade in Tourism Services (March 2018)

Second Phase: Social Services

Paper 1. Trade in Health Related and Social Services (February 2020)

Paper 2. Trade in Education Services (March 2020)

Paper 3. Trade in Environmental Services

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CONTENTS

Introduction	1
I. Current state of environmental services at the country level	4
1. Sewage Services.....	9
2. Refuse Disposal Services.....	17
3. Sanitation and Similar Services.....	22
4. Other Environmental Services	25
II. Ascendancy of environmental services	27
1. Mode 1: Cross-Border Supply	27
2. Mode 2: Consumption Abroad	27
3. Mode 3: Commercial Presence	34
4. Mode 4: Presence of Natural Persons.....	38
III. Trade agreements and regulations among and in the ASEAN Member States	38
Implications of Shifting from Positive Listing to Negative Listing — from AFAS to ATISA.....	42
IV. Impacts of liberalisation and deregulation of environmental services on economy	43
V. Policy suggestions	48
General Policy Recommendations.....	48
Workable Policy Recommendations.....	49
Conclusion: What is next?	51
REFERENCES	53
APPENDIX	57
APPENDIX A. Selected FDI Cases in Environmental Services in ASEAN, 2003–2009.....	57
APPENDIX B. Specific Commitment Tables for Environmental Services under the AFAS 10 th package	59
APPENDIX C. Negative List Commitments under the Comprehensive and Progressive Trans-Pacific Partnership (CPTPP) for Environmental Services.....	66

INTRODUCTION

Environment constitutes one of the three dimensions of sustainable development: economic sustainability, social sustainability and environmental sustainability. The importance of environmental protection, including the mitigation of and adaptation to climate change, was highlighted in the United Nations 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDGs) and in the Paris Agreement on climate change, which entered into force in 2016.

Trade in environmental goods and services is an important enabler to achieve sustainable development. The market for environmental services is substantial and growing. Liberalisation of trade in environmental services could bring more new market opportunities to the private sector and contribute to improving the quality of goods and services and promoting efficient and cost-effective environmental technologies.

ASEAN faces pressing environmental challenges due to rapid population growth and urbanisation, including urban waste and wastewater management, air pollution and climate change mitigation, to name a few. It is essential for ASEAN governments to promote public-private partnership (PPP) and cooperation with international partners to enhance environmental infrastructure. To this end, ASEAN and Japan are working closely to develop environmental infrastructure, such as waste management and recycling systems, under the ASEAN-Japan Environmental Cooperation Initiative. Liberalisation of trade in environmental services could also present opportunities in ASEAN to accelerate such partnership and increase foreign direct investment (FDI) in this area.

This paper contributes to the debate in ASEAN to further liberalise trade in environmental services by reviewing the current state of trade in environmental services in the region and analysing the possible impacts of trade liberalisation on the economy and on the quality of environmental services. It calls for policy recommendations for ASEAN to strengthen environmental relations with Japan and to increase trade in this service sector.

Scope of the Study

The first step of the study is to define “environmental services”. Given the cross-cutting nature of the environment itself, clearly defining environmental services and classifying related services in one category is challenging.

Expanding the definition to include climate change-related services would require covering services contributing to mitigation and adaptation (figure 1). Mitigation refers to “a human intervention to reduce the sources or enhance the sinks of greenhouse gases”, while adaptation refers to “adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities”.¹ This coverage would be too wide to grasp the development and liberalisation of environmental services.

Therefore, the definition of environmental services should cover only the non-goods sector. One of the most widely used service classifications is the World Trade Organization (WTO) Services Sectoral Classification List (MTN.GNS/W/120, dated 10 July 1991, hereinafter referred to as “W/120”). W/120 is used for scheduling purposes under the General Agreement on Trade in Services (GATS). The ASEAN Framework Agreement on Services (AFAS) also follows W/120 classification. Countries may also introduce specific commitments or conditions depending on existing laws or regulation. W/120 includes the following four categories under “environmental services”:

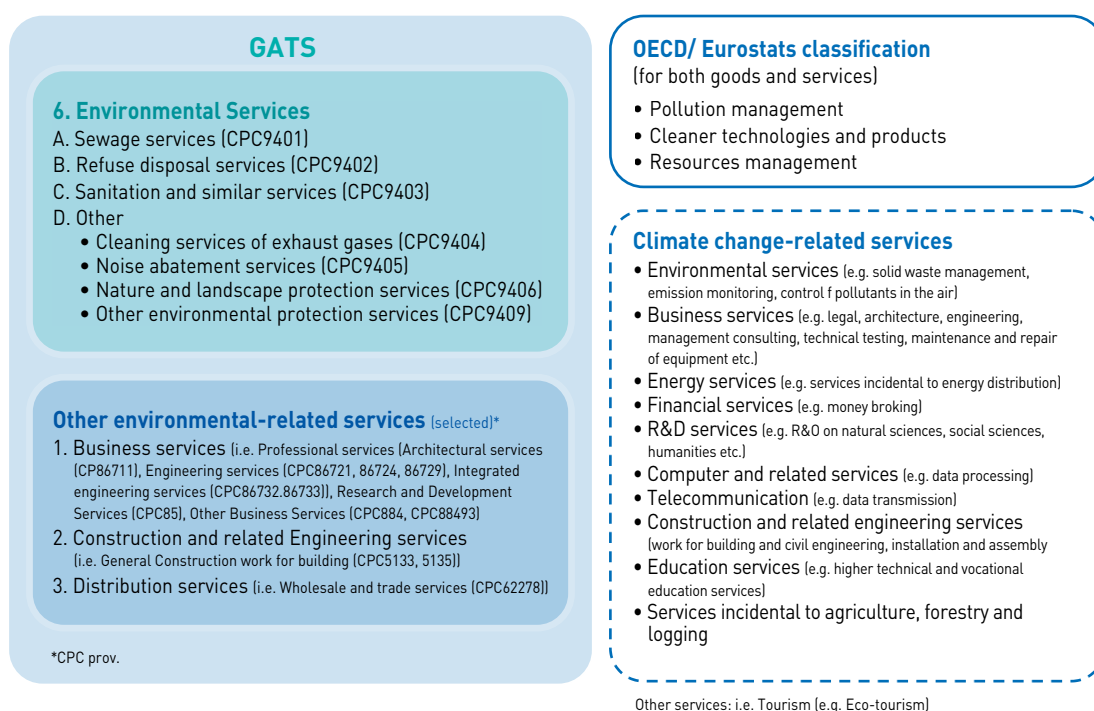
¹ United Nations Framework Convention on Climate Change glossary.

- a. Sewage services
- b. Refuse disposal services
- c. Sanitation and similar services
- d. Other environmental services (e.g., cleaning of exhaust gases, noise abatement and nature and landscape protection).

Under W/120, environmental services are narrowly defined, focusing mainly on sewage and waste management or on full or partial public infrastructure (UNEP et al., 2012). Other environmental-related services, such as engineering design and environmental consultancy, are not classified as environmental services but are contained in other relevant sectors such as professional services. While the classification of environmental services used herein is based on W/120, note that countries may otherwise introduce specific commitments or conditions depending on existing laws or regulations (comments from a Philippine services trade officer in the Services Forum 2020).

The Organisation for Economic Co-operation and Development (OECD) and the Statistics Division of the European Union (Eurostat) also developed a classification that separates environmental goods and services into three broad categories—pollution management, cleaner technologies and products and resource management—providing wider interpretation of environmental services than W/120. OECD also published a report on trade in climate change-related services (Steenblik and Geloso Grosso, 2011) that highlights 10 sectors (i.e., environmental; business; research and development; computer and related; financial; education; energy; telecommunication; services incidental to agriculture, forestry and logging and construction and related engineering) as the services related to climate change. Figure 1 shows the different classifications.

Figure 1. Classification of environmental-related services



The 2010 Extended Balance of Payments Services Classification (UN Statistics Division, 2010; hereinafter EBOPS 2010²) describes the service categories in relation to balance of payment. The most relevant service category under EBOPS 2010 is “waste treatment and de-pollution (10.3.2.1)”, which is part of “technical, trade-related and other business services (10.3)” under “other business services (10)” (see table 1). However narrowly defined the environmental services are, balance of payment statistics provide cross-border trade (Mode 1) and consumption abroad (Mode 2).

Table 1. EBOPS 2010 classification related to environmental services

10. Other business services
10.1 Research and development services
10.2 Professional and management consulting services
10.3 Technical, trade-related and other business services
10.3.1 Architectural, engineering, scientific and other technical services
10.3.2 Waste treatment and de-pollution, agricultural and mining services
10.3.2.1 Waste treatment and de-pollution
10.3.2.2 Services incidental to agriculture, forestry and fishing
10.3.2.3 Services incidental to mining and oil and gas extraction
10.3.3 Operating leasing services
10.3.4 Trade-related services
10.3.5 Other business services

Source: EBOPS 2010, Annex I, https://unstats.un.org/unsd/tradeserv/db/docs/msits2010_english.pdf.

“Waste treatment and de-pollution” includes various items classified as environmental services under W/120 and its corresponding central product classification (CPC).³ Table 2 shows that sewage, refuse disposal and sanitation and similar services are all part of “waste treatment and de-pollution”. Because “waste treatment and de-pollution” do not differentiate among these services, capturing the volume of trade in environmental services by its subcategories as set out in W/120 is not possible.

Given that no single classification comprehensively defines environmental services, this paper will use the W/120 classification to analyse trade in environmental services in ASEAN. While W/120 is arguably outdated and does not fully reflect aspects of climate change mitigation and adoption, it is still useful, especially when analysing the current status of trade liberalisation in ASEAN, because AFAS negotiation was based on W/120 classification.

² UN Statistic Division, “Extended Balance of Payments Services Classification (EBOPS2010)”, https://unstats.un.org/unsd/tradeserv/db/docs/msits2010_english.pdf.

³ The WTO used provisional CPC for the Services Sectoral Classification List by (W/120) in 1991. CPC has changed since then, and CPC version 2.1 was released in 2015.

Table 2. EBOPS 2010 and corresponding CPC 2.1

EBOPS 2010	CPC 2.1
10.3.2.1 Waste treatment and de- pollution	849 Materials recovery (recycling) services, on a fee or contract basis
	941 Sewerage, sewage treatment and septic tank cleaning services
	942 Waste collection services
	943 Waste treatment and disposal services
	944 Remediating services
	945 Sanitation and similar services
	949 Other environmental protection services n.e.c.

CPC used for W/120 and GATS classification

Source: AJC, based on EBOPS 2010 to CPC 2.0, <https://unstats.un.org/unsd/tradeserv/TFSITS/msits2010/docs/EBOPS%202010%20-%20CPC%202.0.pdf>, and UNDESA (2015) Central Product Classification (CPC) Version 2.1, Statistical Papers Series M No. 77, Ver.2.1., <https://unstats.un.org/unsd/classifications/unsdclassifications/cpcv21.pdf>.

Constraint of the Study

The main constraint of the study is the scarcity of data on trade in environmental services. The imprecise definition of environmental services and the seeming lack of value placed on international access to such services prevent countries and international organisations from developing a systematic approach to collecting such data. For example, no international organisation, including the United Nations (UN), WTO, the World Bank, the International Monetary Fund and OECD, has a category named “environmental services” in its database on balance of payments or international trade. Thus, capturing the trade volume of environmental services using existing databases is difficult. In this report, current available data on the most relevant services (waste treatment and de-pollution) will be used to analyse the status of environmental services in ASEAN.

Furthermore, to partially ease this constraint, the ASEAN-Japan Centre conducted the Services Trade Online Forum on Environmental Services on 24–25 February 2021 to collect country-specific data, feedback and comments from ASEAN member state representatives on the current state of environmental services and investments for this paper.

I. CURRENT STATE OF ENVIRONMENTAL SERVICES AT THE COUNTRY LEVEL

Governments have historically and primarily provided environmental services under natural monopolies because of their characteristic as public services. However, as private participation in these types of services becomes possible and increases, the nature of this industry has changed in many ASEAN countries. Two types of factors explain increases in environmental services: supply and demand factors.

Increasing Supply of Environmental Services

The supply of and demand for environmental services have been regarded as directly proportionate to income levels (WTO, 2010; United States International Trade Commission in APEC Group on Services, 2010). This is evident among developed countries, mainly Japan, European Union (EU) countries, and the United States, which dominate the suppliers and consumers of environmental services (WTO, 2010). In Asia, regional environmental cooperation initiatives have initiated comprehensive national policies

and frameworks for environmental services, such as the Regional 3R (Reduce, Reuse, Recycle) Forum in Asia and the Pacific and the ASEAN-Japan Dialogue on Environmental Cooperation.

Firms and providers of these services are increasing in number and in their ability to produce services. There are several reasons for this advance. First, governments have opened markets for environmental services, permitting private operators to operate either under contract with the public sector or in a stand-alone capacity as independent suppliers of certain services. An increasing number of small and medium-sized enterprises supply directly to consumers and provide environmental consultancy services to other companies.

Second, increasing trade in environmental goods, which are more diversified and technologically advanced, is also increasing services associated with this type of equipment and goods. Examples include sewage treatment, waste management, refuse disposal, noise abatement and air pollution abatement.

Third, increasing environmental standards internationally have produced a wide and growing supply of environmental services. For instance, private polluters are required to treat their wastes and discharges, often through private service providers. Firms and providers also increase production for many other reasons. Technological advancement reaches many sectors including environmental services.

Increasing Demand for Environmental Services

In the environmental services sector, even though supply has been rising, the level remains insufficient to meet the increasing demand. Global demand for environmental services has grown rapidly in recent years not only for the products included in this study, but also for climate change mitigation and adaptation services, as the world shifts towards sustainable development. The market in environmental goods and services was estimated at \$866 billion in 2011 and is expected to rise to \$1.9 trillion by 2020.⁴

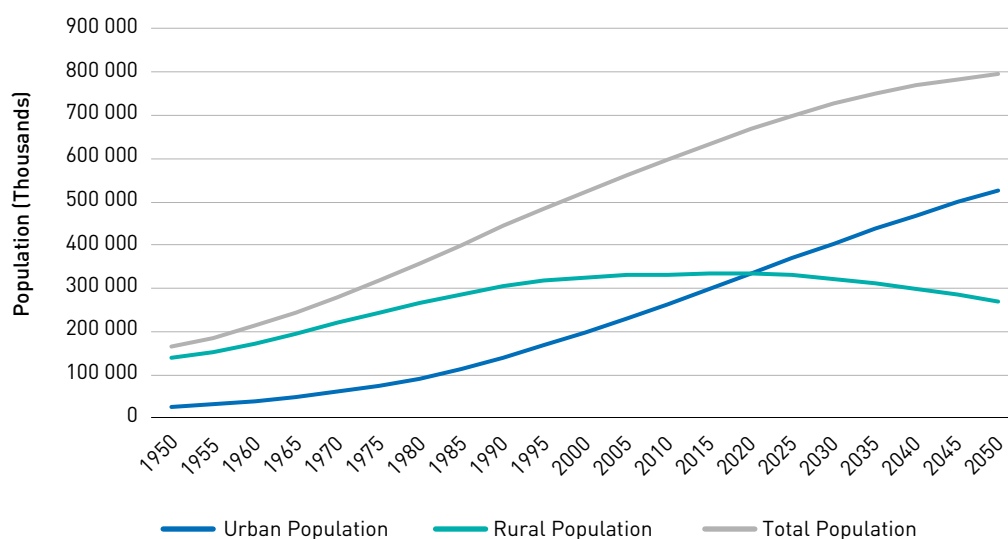
International trade liberalisation facilitates the diffusion of environmental goods and services. For example, global exports in environmental goods have nearly tripled from roughly \$231 billion in 2001 to \$656 billion in 2012 (Environmental Business International, 2012). Increasing trade in environmental goods complements the increase in trade in environmental services and vice versa (Jacob and Møller, 2017). As far as FDI is concerned, the global value in only three sectors—alternative energies, recycling and environmental technology manufacturing—reached roughly \$100 billion by the end of 2009, 10 times more than in the beginning of 2000 (UNCTAD 2010, pp. 111–112).

Demand for environmental services in ASEAN is also growing due to rapid economic and population growth and urbanisation in the region. According to the ASEAN Secretariat, the urban population of ASEAN member states (AMS) has been growing at an annual rate of 2.7 per cent over the last two decades, which is twice the rate of overall population growth. In 2015, the population in megacities and smaller urban areas accounted for 47 per cent of the total population in ASEAN and is expected to reach 63 per cent by 2050 (figure 2). Brunei Darussalam, Malaysia, and Singapore are already highly urbanised with more than 75 per cent of the population living in urban areas (ASEAN Secretariat, 2017).

A positive correlation exists between per capita income and the amount and type of waste: the higher purchasing power and consumption are, the more waste is produced as a by-product (WTO, 2010). Rapid urbanisation in ASEAN puts significant pressure on urban solid waste and wastewater management. Data for municipal solid waste in ASEAN shows that the amount of solid waste is increasing rapidly and is projected to increase two- to fourfold in volume by 2030 (table 3).

⁴ The market includes goods and services related to clean technology, energy and energy efficiency, pollution control, water and wastewater among others (ITC, 2014).

Figure 2. Projection of urban and rural population in ASEAN (1950–2050)



Source: United Nations World Urbanization Prospects 2018, <https://population.un.org/wup/Download/>.

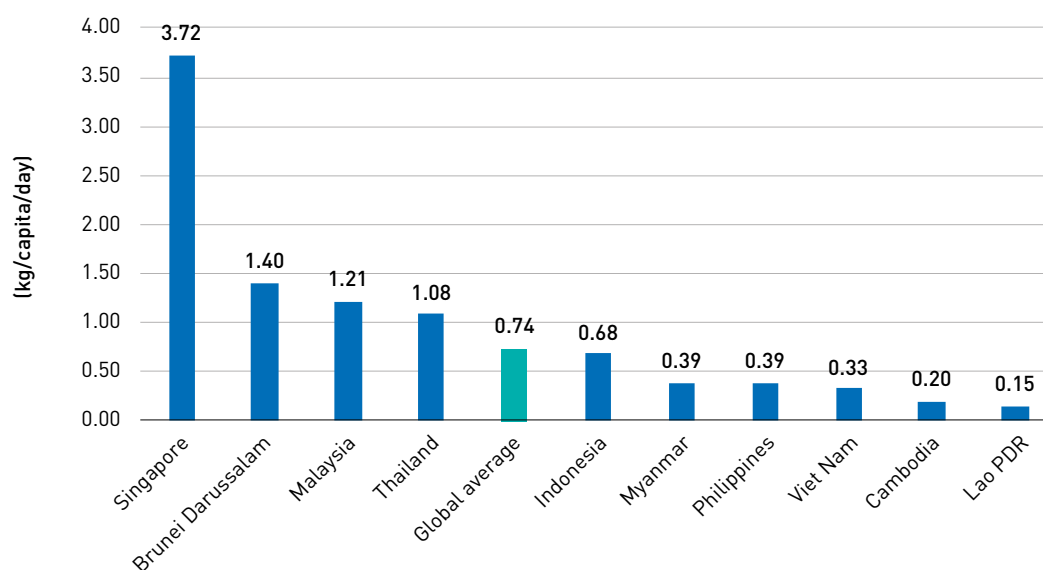
Table 3. Municipal solid waste (MSW) generation in ASEAN, 2016 and 2030

Country (Year of available data)	2016 Adjusted			2030 Projection		
	Total Population	MSW Generation Per Capita (kg/capita/day)	Total MSW Generation (tonnes/year)	Total Population	MSW Generation Per Capita (kg/capita/day)	Total MSW Generation (tonnes/year)
Brunei Darussalam (2016)	423 196	1.40	216 253	490 000	1.47	262 788
Cambodia (2014)	15 762 000	0.20	1 159 859	18 798 000	0.25	1 702 523
Indonesia (2016)	261 115 000	0.68	65 200 000	295 595 000	0.82	87 958 248
Lao PDR(2015)	6 758 000	0.15	364 463	8 049 000	0.18	522 053
Malaysia (2014)	31 187 000	1.21	13 723 342	36 815 000	1.36	18 235 817
Myanmar (2000)	52 885 000	0.39	7 451 835	58 916 000	0.43	9 315 917
Philippines (2016)	103 320 000	0.39	14 631 923	125 372 000	0.44	20 039 044
Singapore (2017)	5 622 000	3.72	7 629 509	6 342 000	4.01	9 284 685
Thailand (2015)	68 864 000	1.08	27 268 302	69 626 000	1.28	32 484 794
Viet Nam (2010)	94 569 000	0.33	11 562 740	106 284 000	0.41	15 922 186

Source: Kaza et al. (2018).

Among the 10 AMS, Singapore produces the largest amount of waste per capita per day, followed by Brunei Darussalam, Malaysia and Thailand. Cambodia, Lao PDR, Myanmar and Viet Nam (or the so-called CLMV countries) and the Philippines have relatively less waste generation per capita per day (figure 3).

Figure 3. Waste generation rates of ASEAN countries (2016)



Source: Kaza et al. (2018).

To address the increasing volume and the composition of solid waste, ASEAN countries have been upgrading their waste management systems. However, various technology, infrastructure, financing, policy and stakeholder participation issues have challenged these efforts (UNEP, 2017).

Traditionally, municipal governments supply these environmental services, such as solid waste and wastewater management. FDI has been limited due to the heavy dependence on the infrastructure and public nature of these services. However, large infrastructure such as waste management plants are increasingly built and operated in partnership with the private sector. Each ASEAN member state promulgates laws and regulations to deal with increasing demand for environmental services (table 4).

International development goals such as the SDGs also raised the awareness of policymakers and businesses globally, opening new opportunities for investment to sectors traditionally considered to be public services.

Table 4. Institutions and laws related to environment services in ASEAN countries

ASEAN country	Institutions	Laws
Brunei Darussalam	Department of Environment, Parks and Recreation Ministry of Development (Public Works Department) Fire Services and Rescue Department Police Department	Environmental Protection and Management Order 2016 Environmental Impact Assessment Order 2011 (Draft) Hazardous Waste (Control of Export and Transit) Order 2013 Water Supply Act 2014 Pollution Control Guidelines for Industrial Development in Brunei Darussalam 2013
Cambodia	Ministry of Environment Ministry of Health Ministry of Rural Development Ministry of Public Works and Transport (Department of Sub-National Public Infrastructure and Engineering)	Law on Environmental Protection and Natural Resources Management (1996) Sub-Decree on Solid Waste Management (1999) Sub-Decree on Environmental Impact Assessment (1999) 2003 Water and Sanitation Law 2004 National Water Resource Policy
Indonesia	Ministry of Environment and Forestry Regional Environmental Management Agency Ministry of Public Works	Law No. 32 of 2009 on Environmental Protection and Management Law No. 18/2008 for Municipal Solid Waste Various regulations of the Ministry of Environment
Lao PDR	Ministry of Public Works and Transport (Department of Housing and Urban Planning, Water Supply Division) Ministry of Natural Resource and Environment City-level Vientiane Urban Development Administration Authority	Decision No. 37/PM of 1999
Malaysia	Ministry of Natural Resources and Environment (Department of Environment) Ministry of Housing and Local Government Ministry of Energy, Green Technology, and Water (Sewerage Services Department) National Solid Waste Management Department National Water Services Commission (SPAN)	Environmental Quality Act 1974 Solid Waste and Public Cleansing Management Act of 2007 Water Service Industry Act 2006 (655) Suruhanjaya Perkhidmatan Air Negara Act 2006 (Act 654)
Myanmar	Ministry of Natural Resources and Environmental Conservation (Environmental Conservation Department, Pollution Control Division) Ministry of Industry City Development Committees (Water and Sanitation Departments, Pollution Control and Cleaning Departments)	Environmental Conservation Law (2012) Private Industrial Enterprise Law (Law No. 22, 1990) Water and Air Pollution Control Plan (Directive No. 3 of 1995, Ministry of Industry No. 1)
Philippines	Department of Environment and Natural Resources (DENR), Provincial Environment and Natural Resources (PENRO) and City Environment and Natural Resources (CENRO) Metropolitan Waterworks and Sewerage System (MWSS), Local Water Utilities Administration (LWUA), Maynilad Water Services and Manila Water National Solid Waste Management Commission Department of Health National Economic Development Authority Department of Public Works and Highways Department of Interior and Local Government Local Government Units (Cities/Municipalities and Barangays)	Philippine Environment Code Presidential Decree No. 1152 (1977) Ecological Solid Waste Management Act 2000 (RA 9003) Toxic Substances and Hazardous Waste Control Act 1990 (RA 6969) Clean Water Act 2004 (RA 9275) Department Administrative Order No. 10 (2005) Presidential Decree No. 856 (1975) Code on Sanitation and Implementing Rules and Regulations Clean Air Act 1999 (RA 8749) DENR Administrative Order 2019-21: Guidelines Governing Waste-to-Energy for the Integrated Management of Municipal Waste
Singapore	Ministry of Sustainability and the Environment (Public Utilities Board, National Environment Agency)	Environmental Public Health Act 2002 Sewerage and Drainage Act 2001 Environmental Protection and Management Act 2002

.../

Table 4. Institutions and laws related to environment services in ASEAN countries (Concluded)

ASEAN country	Institutions	Laws
Thailand	Ministry of Natural Resources and Environment (Wastewater Management Authority) Provincial Offices for Natural Resources and Environment Department of Industrial Works National Environmental Board Ministry of Industry Ministry of Health	Enhancement and Conservation of National Environment Quality Act B.E.2535 Public Health Act B.E. 2535 Hazardous Substances Act B.E.2535
Viet Nam	Ministry of Natural Resources and Environment Viet Nam Environment Administration (and Provincial Departments) Ministry of Construction (and Provincial Departments) Ministry of Health Ministry of Science and Technology Provincial People's Committees	Resolution 41-NQ/TW (2004) Environment Protection Law No. 52/2005/QH11 (2005) Decree No. 189/2007/ND-CP (2007) Decision No. 1030/QĐ-TTg (2009) Environment Protection Law No. 55/2014/QH13 (2014) Decree No. 80/2014/ND-CP on Drainage, Sewage and Wastewater Treatment Decree No. 59/2007/ND-CP of the Government on Management of Solid Wastes Decree on Environment Industry Development (2015)

Source: APEC Policy Support Unit (2016) and feedback from ASEAN member states. Updated information received from individual member states.

1. Sewage Services⁵

In ASEAN, the primary means of wastewater disposal in most households is the septic tank, where the effluent flows in open stormwater drains in streets and discharges directly into rivers without being treated (ADB, 2014). While most wastewater treatment systems in ASEAN countries are centralised, the primary challenge for most countries in this region is the lack of a comprehensive national urban sanitation policy, which results in inefficient service delivery. Furthermore, separating water supply, sanitation, and sewerage services make maintaining the standard and quality of water sanitation difficult.

Wastewater is a major source of greenhouse gas emissions by generating methane. Sewage services are a subsector that, together with landfills, constitute part of waste management. Wastewater's contribution to climate change mitigation is small compared with other industries and largely limited to methane capture and usage, accounting for only 3–7 per cent of all emissions according to United Nations World Water Development Report 2020. While the public sector dominates this subsector, transnational corporations like Veolia (France), Sita (France), Waste Management Inc. (United States) and Allied Waste (United States) and small companies invest in waste management including sewage (WTO, 2010). This is an area in which both the public and the private sectors are involved in providing services (see box 1 for a Japanese example).

⁵ Defined as "sewage removal, treatment and disposal services. Equipment used are waste pipes, sewers or drains, cesspools or septic tanks and processes utilized may be dilution, screening and filtering, sedimentation, chemical precipitation, etc." (CPC9401).

Box 1. Japanese public and private sectors promoting environmental services

Japan has been a strong supporter of ASEAN efforts to provide environmental services such as solid waste and wastewater management through official development assistance (ODA) including that provided by the Japan International Corporation Agency (JICA). In addition to these efforts, interest is increasing in Japan to export high-quality environmental services to ASEAN, by creating an attractive export package from the private sector of environmental goods and infrastructure management services to supply the growing demand for environmental services in ASEAN.

The following lists past and current JICA technical assistance projects on environment services in selected ASEAN countries:

- Capacity Development Project on Water Quality Management Project (Phase 2) in the Philippines (2006–2011)
- Project on Capacity Building for Urban Water Supply System (Phase 3) in Cambodia (2012–2017)
- Capacity Development Project for Improvement of Management Ability of Water Supply Authorities in Lao PDR (2012–2017)
- Project for Improvement of Management Capacity of Water Supply Sector (MaWaSU 2) (2018–2023)
- Project on Rural Water Supply Technology in the Central Dry Zone in Myanmar (2006–2009)

Brunei Darussalam. The Public Works Department of the Ministry of Development is responsible for operating a clean and safe sewage system in the country.⁶ The key regulatory framework to manage the water system includes the Water Supply Act (Akta Bekalan Air) c.121.⁷ According to the Public Works Department, a total of 17 sewage treatment plants are in operation in Brunei Darussalam, with 45 major sewage pumping stations, 148 subsidiary sewage pumping stations and with total sewer lines reaching 739 km (table 5).

Table 5. Sewage infrastructure in Brunei Darussalam (undated)

District	No. of sewage treatment plants	No. of major sewerage pumping stations	No. of subsidiary sewerage pumping stations	Sewer lines (km)
Brunei Muara	9	29	122	550.07
Tutong	4	1	16	48.1
Belait	3	15	6	140.5
Temburong	1	-	4	0.7
Total	17	45	148	739.37

Source: Public Works Department, Brunei Darussalam, <http://www.mod.gov.bn/pwd/SitePages/Sewerage%20Assets.aspx>.

⁶ Public Works Department, Ministry of Development, Brunei Darussalam, <http://www.mod.gov.bn/pwd/SitePages/SERVICES.aspx>.

⁷ Department of Environment, Parks and Recreation, Ministry of Development, Brunei Darussalam, <http://www.env.gov.bn/SitePages/Environmental%20Acts%20and%20Guidelines.aspx>.

Cambodia. The Ministry of Environment, the Ministry of Health, the Ministry of Rural Development and the Ministry of Public Works and Transport all participate in managing the national wastewater treatment system in Cambodia (table 4). The Law on Environmental Protection and Natural Resources Management (1996) underlies the implementation and regulation of environmental quality services on water pollution.

The Department of Sub-National Public Infrastructure and Engineering of the Ministry of Public Works and Transport oversees the sewage system in the country. Cambodia faces various challenges such as sewage and draining flooding during the rainy season, lack of a sewerage sector master plan and inadequate human and financial resources. Moreover, no certified enforcement agency is responsible for the decentralised water treatment system. The Government of Cambodia has adopted the Millennium Development Goals target for water supply and sanitation, specifying that by 2015 80 per cent of the urban population and 50 per cent of the rural population will have access to safe water and that 74 per cent of the urban population and 30 per cent of the rural population will have access to improved sanitation.⁸ To realise these targets, Cambodia is currently working with various international partners, including the Asian Development Bank (ADB), EU and JICA to develop a wastewater treatment system to accommodate the growing need for wastewater treatment. Specifically, Cambodia has received funding loans from ADB for four water sanitation projects from 2018 to 2022.

Indonesia. District and local governments mainly regulate sewage service and wastewater management. In the beginning of 2000, the central government accelerated reforms to improve water supply and sanitation in the country, including

- Establishing the Acceleration of Urban Sanitation Development Program to assist local governments in preparing a City Sanitation Strategy, comprehensive citywide sanitation planning
- Including sanitation targets in the 2010–2014 and 2015–2019 Medium-Term Development Plans
- Constructing a decentralised wastewater treatment system countrywide
- Expanding the coverage of centralised sewerage systems
- Increasing national government expenditure on sanitation⁹
- Increasing membership of the Association of Cities and Districts Concerned about Sanitation in Indonesia, established in 2011 (World Bank, 2013a).

Despite the accelerating reforms, only 115 million litres of urban wastewater is reportedly treated per day, or approximately 1 per cent of the total urban wastewater produced (World Bank, 2013a). Furthermore, while more than 60 per cent of the urban population has flush toilets discharging to septic tanks, only 4 per cent of septage is treated despite the construction of almost 150 septage treatment plants during the past 20 years (World Bank, 2013a).

Lao PDR. The Department of Housing and Urban Planning, Water Supply Division, under the Ministry of Public Works and Transport, primarily manages wastewater management in Lao PDR. Other ministries involved include the Ministry of Natural Resource and Environment and the city-level Vientiane Urban Development Administration Authority (table 4).

⁸ Mr. Meng Kro, Cambodia representative for the JICA Environmental Protection Project. Presentation in the Asia Wastewater Management Seminar on 21 November 2017, organised by the United Nations Industrial Development Organization Investment and Technology Promotion Office in Tokyo, Japan Management Association and the Society of Chemical Engineers in Japan.

⁹ National government expenditure on sanitation increased eightfold between 2006 and 2012, from IDR540–IDR4, 200 billion (World Bank, 2013a).

Decision No. 37/PM of 1999 spearheaded the comprehensive national policy on the water supply and wastewater management system. Wastewater handling in most urban areas primarily comprises onsite disposal without treatment, and untreated wastewater is usually emptied into public drains or natural bodies of water. The decentralised wastewater treatment system (DEWATS) was recently introduced in the country and is increasing in use as the government encourages decentralisation of water sanitation at the community level.

Challenges related to urban water supply and wastewater treatment include an inadequate legal framework and unclear institutional responsibilities, lack of capacity of public institutions to manage the wastewater sector financially and in terms of technology, lack of sufficient toilets, flooding and others. The water sanitation sector depends heavily on donor funding and has not seen an increase in private sector participation because consumers, especially low-income households, are unwilling or unable to pay the cost. PPPs on wastewater treatment have started, such as the partnership with the Bremen Overseas Research & Development Association from 2013 to 2015 providing national- and local-level technical assistance in management, operations and maintenance in the implementation of DEWATS.

Malaysia. The National Water Services Commission, or SPAN, is the central authority in Malaysia that oversees and regulates water supply and sewerage services (table 4). The main function of SPAN is to implement and enforce the laws related to water supply and sewerage services and to formulate and implement policies to improve overall water supply and sewerage services. SPAN covers the services in Peninsular Malaysia and the Federal Territories of Putrajaya and Labuan. The Suruhanjaya Perkhidmatan Air Negara Act 2006 (Act 654) and the Water Services Industry Act 2006 (Act 655) mandates the provision of water supply and wastewater industries (Academy of Science Malaysia, 2015). The 2015 study on water supply and wastewater management in Malaysia found that no clear policy actions have addressed sewerage services. However, Section 15(a) of the National Water Services Commission Act mentioned a national policy objective for the sewerage industry. Indah Water Konsortium prepared a National Sewerage Policy draft in 2010, but it has yet to be approved by the relevant authorities for implementation (Academy of Science Malaysia, 2015).

Sewerage system facilities in Peninsular Malaysia and the Federal Territory of Labuan consist of public and private sewage treatment plants, communal septic tanks, individual septic tanks and traditional systems such as pour flush. Table 6 presents the number of facilities and population equivalent for each type of system (SPAN, 2018).

Table 6. Sewerage facilities in Malaysia, 2017–2018

Sewerage facilities	2017		2018	
	Quantity	Population equivalent	Quantity	Population equivalent
Public sewage treatment plant (a+b)	6 871	25 258 155	6 932	26 128 858
a. Multipoint plant	6 770	17 125 895	6 830	17 513 195
b. Regional plant	101	8 132 260	102	8 615 663
Private sewage treatment plant	3 603	3 373 471	3 841	4 010 610
Communal septic tank	4 359	531 127	4 231	515 527
Individual septic tank	1 354 986	6 934 008	1 357 553	6 998 919
Traditional system	1 171 555	5 857 775	1 185 032	5 925 160
Network pumping station	1 183	-	1 237	-
Length of sewer network (km)	20 100	-	20 225	-

Source: SPAN (2018).

Myanmar. The Ministry of Industry, which has jurisdiction over the industrial zones in Yangon and Mandalay, is responsible for the development of industrial wastewater treatment facilities by the factories within the industrial zones (table 4). The Ministry of Industry also issues operational licences for the factories and thus plays a strong role in regulating wastewater treatment of the factories in the industrial zones. Locally, major cities such as Yangon, Nay Pyi Daw and Mandalay have their respective City Development Committees. Under these committees are the water and sanitation departments and pollution control and cleaning departments that work together to manage industrial wastewater (table 4).

The implementation of the “Environmental Conservation Law” in Myanmar in 2012 created momentum for setting national standards for wastewater treatment. Its Chapter 7 on environmental protection mandates that business operators, as polluters, install equipment to monitor, control and treat their wastes, and that related organisations and entities within the industrial zone provide financial support for environmental protection. Other laws related to the regulation and management of wastewater treatment include the Private Industrial Enterprise Law (Law No. 22, 1990) and the Water and Air Pollution Control Plan (Directive No. 3 of 1995, Ministry of Industry No. 1) (table 4).

In 2018, the Myanmar Presidential Office issued the Project Bank Notification, which lists infrastructure-related projects intended to attract investment through PPP. Despite the law mandating that businesses in the industrial zone manage their own wastes, funding, installation space and human resource challenges hinder business operators from introducing wastewater treatment equipment. The potential market for industrial wastewater monitoring treatment is estimated at around JPY18 billion (\$0.2 billion) and JPY400 billion (\$4 billion) for wastewater treatment equipment (METI, 2019). Because few companies have the capacity to engage in core processes, and few experts dabble in the area, opportunities for international wastewater companies are very promising.

Given the investment climate in Myanmar, service contract (e.g., lease contract, in-house leasing) seems to be the most viable instrument as it does not require an initial cost for capital investment for local companies that lack significant funding. Another option to explore is a combination of sales contracts, maintenance contracts and operation and maintenance.

Philippines. Many institutions are involved at the national level to manage the sewage system, including the National Economic Development Authority, which sets policies for the sector through its water resources sub-committee; the Department of Public Works and Highways, which is responsible for implementing the Sewerage and Septage Management Programme and the Department of Environment and Natural Resources (DENR), which regulates effluent standards for wastewater quality (table 4). In 2004, the Clean Water Act (Republic Act 9275) was enacted and its implementing rules and regulations were prepared in 2005. The Clean Water Act provided the regulatory framework for the Sewerage and Septage Management Programme led by the Department of Public Works and Highways (table 4).

The Metropolitan Waterworks and Sewerage Systems (MWSS) operates the sewage system in Metro Manila and parts of Cavite and Rizal. MWSS was established in 1971 as a public entity, but was privatised in 1997, following the enactment of the Water Crisis Act of 1995, to improve its operational effectiveness and efficiency. In August 1997, the Philippine government granted a 25-year concession to two private consortia comprising local and international partners; for Manila Water Company, Inc. (for the East Zone) and Maynilad Water Services, Inc. (for the West Zone), concession is extended until 2037.¹⁰ Manila Water Company and Maynilad are accelerating coverage and are currently

¹⁰ Summary of the information obtained at the MWSS website, <http://mwss.gov.ph/>.

targeting full coverage of urban sanitation by the end of the concession period. In 2017, Maynilad served more than 1.5 million people, and the total volume of wastewater treated since 2007 reached 518 million litres (table 7).¹¹

Table 7. Wastewater treated by Maynilad Water Services Inc., 2007–2017

	2007	2009	2011	2013	2015	2017
Population served (sewerage)	530 228	568 929	623 738	823 369	1 288 871	1 455 920
Volume of wastewater treated, million litres, cumulative since 2007	45 967	132 735	216 422	298 423	400 250	517 721

Source: Maynilad website, <https://www.mayniladwater.com.ph/our-company/>.

While some progress has occurred in the Metro Manila area, a significant gap exists between services in other areas and the overall country coverage for sewerage (only about 4 per cent) (World Bank, 2013c).

Singapore. The Ministry of Sustainability and the Environment is the primary governmental agency that deals with environmental matters, together with its two statutory boards: the Public Utilities Board (PUB) and the National Environment Agency (table 4) (APEC Policy Support Unit, 2016). PUB is the national water agency that manages Singapore’s water supply, water catchment and used water in an integrated way. According to PUB, about 600 million cubic metres of used water are treated each year, in four water reclamation plants in Changi, Ulu Padan, Jurong and Kranji.

Singapore has invested heavily in research and technology to ensure water security, given its geographical challenges and heavy dependence on imported water. Since 2001, PUB has outsourced \$3 billion worth of water infrastructure projects, such as the Deep Tunnel Sewerage System, Marina Barrage (desalination and rainfall storage), NEWater (recycled water) facilities and desalination plants, to the private sector. As a result, Singapore has achieved world-class capability in total water management, with a robust water ecosystem comprising 180 water companies and 26 research centers in 2016. With its strategic location in Asia, Singapore is positioning itself as the “Global Hydrohub” and attracting investment from major global companies such as GE, Veolia and Toray. The number of water companies in Singapore has reportedly tripled between 2006 and 2016 (Research, Innovation and Enterprise Secretariat, Singapore, 2016).

Thailand. At least four ministries and agencies are involved in wastewater management in Thailand: the Ministry of Industry, the Wastewater Management Authority under the Ministry of Natural Resources and Environment, the Ministry of Public Health, the National Environmental Board and local authorities.

The Ministry of Industry is responsible for industrial wastewater management as stipulated by the Factory Act of 1992, including collecting, conveying and treating wastewater and setting and adhering to the wastewater quality effluent standard. The Wastewater Management Authority is responsible for national community wastewater policymaking and provides technical advice to local authorities. The Ministry of Public Health is responsible for human excreta collection, transportation and treatment, as stipulated under the Public Health Act of 1992.¹² At the country level, the United

¹¹ Maynilad website, <http://www.mayniladwater.com.ph/company-milestones.php>.

¹² http://www.ais.unwater.org/ais/pluginfile.php/501/mod_page/content/87/report_thailand.pdf.

Nations Economic and Social Commission for Asia and the Pacific has already identified six problems in the area of wastewater management:

- No mechanism in terms of law enforcement to monitor and drive wastewater management
- Lack of law enforcement in stipulation of wastewater treatment tariff
- Insufficient or lacking budget
- Lack of continuous maintenance of wastewater collection and treatment system
- Lack of staff to monitor the wastewater treatment system
- Lack of information system on wastewater treatment works such as pipeline connection from households.¹³

Local authorities, such as municipality, district administration and provincial administration, which belong to the Ministry of Interior, are the main players for community wastewater management. Local authorities are also responsible for construction of sewerage systems and community wastewater treatment plants. As of 2016, Thailand has 101 wastewater treatment plants. The Bangkok area has eight wastewater treatment plants, administrated by the Bangkok Metropolitan Administration. Local authorities manage 78 plants, and the Wastewater Management Authority manages 15 plants.¹⁴ The total wastewater volume produced in Thailand is around 9.6 million cubic metres per day, and 101 wastewater treatment plants have the capacity to treat around 3.2 million cubic metres per day or 34 per cent of daily wastewater.¹⁵

Viet Nam. The World Bank Viet Nam Urban Wastewater Review (2013b) found that out of Viet Nam's urban population of 25 million, 55 per cent has access to septic tanks with sewerage, 22 per cent has septic tanks with no sewerage and 5 per cent has no septic tank and uses direct sewerage. Only 10 per cent of wastewater safely collected from sewerage systems and 4 per cent of that collected from septage are properly treated for disposal. A large portion of wastewater remains untreated and discharged directly and unsafely. In recent years, significant developments in urban wastewater management increased the percentage of households with septic tanks to 90 per cent; 70–80 per cent of households have access to piped drainage and sewerage systems and around 17 per cent of collected sewerage is treated by centralised wastewater treatment plants. Viet Nam received funds of more than \$1 billion in the last five years, 80 per cent of which came from ODA and the rest is from the state budget (Nguyen, 2018).

Urban water supply in Viet Nam currently has around 800 centralised water supply systems and 110 urban water supply companies (Nguyen, 2018). The main operators of wastewater treatment is the One Member Limited Company, which is a state-owned entity.

In 2015, the New Decree No. 15/2015 encouraged PPPs in infrastructure development, such as build-operate-transfer (BOT), build-own-operate (BOO) and design-build-lease (DBL) modes in water projects, resulting in Binh An BOT, Thu Duc BOO, Dong Tam BOO, Minh Duc DBL, etc., and stimulating an increase in foreign shareholders, such as the Song Da, Kenh Dong, and Song Duong wastewater treatment plants, among others (Nguyen, 2018).

Urban sanitation management in Viet Nam is spread among the Ministry of Construction, the Ministry of Health, the Ministry of Natural Resources and Environment (MoNRE) and the Ministry of

¹³ Presentation by Mr. Suchai Janepojanat, Director of Organization Development, Department of the Wastewater Management Authority, Thailand, https://www.unescap.org/sites/default/files/WMA_Waste%20management.pdf.

¹⁴ International Water Association, <http://www.iwa-network.org/WaCCliM/wp-content/uploads/2015/04/Thailand-utility-factsheet.pdf>.

¹⁵ Presentation by Mr. Suchai Janepojanat, Director of Organization Development, Department of the Wastewater Management Authority, Thailand, https://www.unescap.org/sites/default/files/WMA_Waste%20management.pdf.

Science and Technologies. Development planning, introducing technologies, and issuing regulations and construction standards for these activities are the responsibility of the Ministry of Construction, while water source and water source protection are the responsibility of MoNRE. The Ministry of Health manages water quality and standards for drinking water and domestic water (table 8) (IGES, 2013). Many water supply and sanitation projects were implemented with support from donors, international organisations, local communities or the private sector (IGES, 2013).

Table 8. Institutional arrangement of urban sanitation in Viet Nam

Ministries	Functions
Ministry of Construction (MoC)	Line Ministry of urban water supply, sanitation and drainage
Ministry of Natural Resources and Environment (MoNRE)	Manages water sources, water use, pollution and hydrology
Ministry of Health (MoH)	Controls drinking water and sanitation quality
Ministry of Science and Technology (MoST)	Manages standardisation and technology in water and sanitation
Ministry of Planning and Investment (MPI)	Allocates state budget. Approves investment projects (all projects need approval)
Ministry of Finance (MoF)	Distributes state funds to sectors and projects, sets annual sector goals and regulates accounting
Local Provincial People's Committee	Manages local water supply and sanitation

Source: IGES (2013).

Several major legal documents directly relate to the management and development of urban drainage and sewerage systems, including the following (IGES, 2013):

- Law on Environmental Protection, promulgated 29 November 2005, effective July 2006.
- Circular No.09/2009/TT-BXD dated 21 May 2009 of the Ministry of Construction on provisions implementing the content of the Prime Minister's Decree No.88/2007/ND-CP dated 28 May 2007 on urban drainage and industrial areas.
- Decision 1930/QD-TTg dated 20 November 2009 of the Prime Minister approving orientations for sewerage and drainage development in urban centers and industrial zones up to 2025 and a vision for 2050.
- Decision No.16/2008/QD-BTNMT dated 31 December 2008 of MoNRE on national technical regulations covering surface water quality, underground water quality, coastal water, wastewater and pesticide residues in soil.
- Decree No. 25/2013/ND-CP dated 29 March 2013 on environmental protection charges for wastewater. This decree replaces Decree No. 67/2003/ND-CP dated 13 June 2003, No. 04/2007/ND-CP and 26/2010/ND-CP.

Opportunities for private sector participation in water and sewerage services in Viet Nam have initially been scarce due to the lack of appropriate policies and incentives, inadequate tariffs and lack of an effective regulatory system (World Bank, 2013b). Viet Nam's water industry is currently in an intensive development period, which sees further expansion of services, focus on improvement of service quality and increasing participation of different stakeholders (Nguyen, 2018). The following challenges in Viet Nam's wastewater management could be potential areas for private sector companies to explore, including build-transfer projects and contracts for operation of wastewater treatment plants, wastewater system operation and management and septic tank emptying. Construction of wastewater systems and septic tank to household connections are currently open

for PPPs. Drainage and water harvesting in Viet Nam also opens opportunities for green and smart solutions. The collection and sharing of data, investment and joint-bidding opportunities, cooperation between local and international experts and the import of goods represent potential for future development in the water and sewerage industry in Viet Nam.

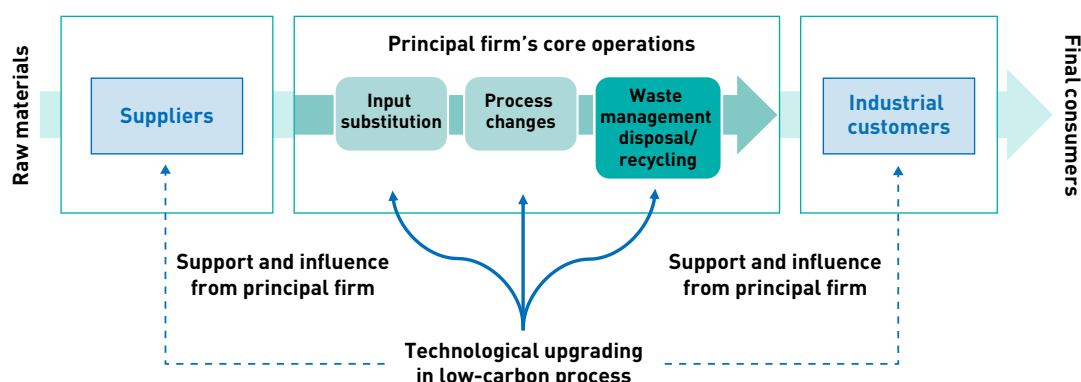
2. Refuse Disposal Services¹⁶

Urbanisation and income growth relate directly to solid waste. In the ASEAN countries, with their increasing urban populations, solid waste generation is expected to grow accordingly. According to UNEP (2017, p. vi), current per capita MSW generation in the region is 1.14 kg/capita/day, where Indonesia produces the most MSW at 64 million tons/yr; Viet Nam follows at 22 million tons, the Philippines at 14.6 million tons, Malaysia at 12.84 million tons, Singapore at 7.5 million tons, Myanmar at 0.84 million tons, and Lao PDR at 0.07 million tons.

Waste disposal is a common public service. The 2018 World Bank report, *What a Waste 2.0*, identified that the waste collection rate in East Asia and the Pacific region is only at 71 per cent and that 135 million tons of waste are not collected (Kaza et al., 2018). Related to the solid waste management challenge are marine plastics, which pose a threat to marine biodiversity and have recently received widespread global attention. The share of plastic in municipal solid waste in ASEAN is 10–18 per cent.

This subsector of environmental services helps companies use less energy by changing processes so that they can reduce gas emissions along a typical value chain (figure 4). This process technology is widely used from small cattle farms where animal dung, which is a greenhouse gas producer, can be treated and used as fuel, to large fossil-fuel energy plants where carbon capture and storage technology are used to reduce gas emissions. This subsector has potential to grow as both consumers and producers become increasingly aware of sustainability.

Figure 4. **Role of waste management and disposal and recycling along a company’s value chain to reduce gas emissions**



Source: based on UNCTAD, *World Investment Report 2010: Investing in low-carbon economy*, p. 105.

¹⁶ Defined as “Refuse collection and disposal services. Collection services of garbage, trash, rubbish and waste, whether from households or from industrial and commercial establishments, transport services and disposal services by incineration or by other means. Waste reduction services are also included” (CPC9402).

Brunei Darussalam. The Department of Environment, Parks and Recreation, under the Ministry of Development, primarily oversees waste management and disposal in the country. National policies related to waste management are the Environmental Protection and Management Order 2016 and the Hazardous Waste (Control of Export and Transit) Order 2013.

In Brunei Darussalam, the daily waste generation average per person is 1.4 kg, the same as the ASEAN average. Around 400–500 tons of waste are delivered to the country’s primary landfill in Sungai Pakum Tutong District every day. Of this amount, 36 per cent is organic waste, 18 per cent is paper and 16 per cent is plastic. Green initiatives include the No Plastic Bag Weekend, in place since 2011, which is expected to reduce the disposal of 274,000 plastic bags every weekend, totaling 13.52 million bags per year.

Brunei Darussalam is actively promoting PPPs in delivering non-core government services as one of its national strategies towards Wawasan Brunei 2035. Existing PPPs on hazardous waste disposal services include the Kehasan Sdn Bhd, which provides gasification, wastewater treatment and decanting in its main facility, the Bukit Udal Material Recovery Facility. The Department of Environment, Parks and Recreation issues permits for various environment service providers. In 2017, there were 16 registered local waste collection service providers, and in 2020, there are 17 registered local recycling companies.

Cambodia. In Cambodia, solid wastes are generally categorised into three types: domestic/household waste, commercial waste, and industrial and hazardous waste (including healthcare waste) (PIC, 2015). The imperative for a national policy on solid waste management in Cambodia was enacted in 1999 through the Sub-Decree on Solid Waste Management, which created the legal basis for the regulation of MSW and hazardous waste to protect the population’s health and conserve the environment. The policy identified the Ministry of Environment (MOE) as responsible for establishing guidelines and management for the collection, storage, transport, recycling and disposal stages. Meanwhile, local governments at the provincial and municipality levels are responsible for the collection, transport, recycling, minimising and dumping of waste at their respective localities (Article 5). Subsequent legal frameworks include the National Strategy on Integrated Solid Waste Management (2011–2025), which includes a chapter on the 3Rs (reduce, reuse, recycle); the Annual Report of the Department of the Environment of Phnom Penh (2014) and the Decision of the Cambodian Council of Ministers on the Improvement of Liquid and SWM [solid waste management] in Phnom Penh (2015).

The following are the laws, policies and guidelines related to the management of solid waste disposal in Cambodia:

- Law on Environmental Protection and Natural Resource Management (1996)
- Sub-decree on Solid Waste Management (1999)
- Sub-decree on Environmental Impact Assessment (1999)
- Prakas (Declaration) on the delegation of responsibilities to provincial/municipality departments by implementation of the Sub-decree on the Monitoring of Water Pollution and Waste Management (1999)
- Prakas on the organisation and functioning of the Environmental Provincial-Municipal Department (1999)
- Guidelines by the MOE, non-governmental organisations and Cambodia Education and Waste Management Organization on the implementation of the 1999 Sub-decree on Solid Waste Management
- Inter-ministerial prakas of the Ministry of Interior and Ministry of Environment on Waste and SWM Management in Provinces/Municipalities (2003).

PPPs in Cambodia have increased due to challenges with public financial and human resources. For instance, in 2002 the municipal government of Phnom Penh established a PPP with CINTRI Ltd. for a 49-year contract lease for waste collection. Another private company, Sarom Trading Company Co. Ltd. has been licensed by the MOE to collect, transport and dispose of hazardous wastes in Phnom Penh. In Kampot, the municipal government has contracted with GAEA Waste Management Company to collect waste and manage a dumpsite. The case of Kampot involves close collaboration among the Department of Environment for regulatory enforcement; the Department of Land Management, Urban Planning and Construction to identify and designate land for landfills; the Department of Health for village education on health and sanitation, the Department of Public Works and Transport to grant licences to the waste collection company and the Department of Economy and Finance in setting the fees charged by the contracting company.

Indonesia. Solid waste in Indonesia is generally classified into domestic and non-domestic waste, and non-domestic waste is further classified into hazardous and non-hazardous waste. The Law of Solid Waste Management (Law No. 18/2008) stipulates the management of municipal solid waste and promotes the 3Rs policy, while Law No. 32/2009 regulates industry and hazardous wastes. The three ministries responsible for solid waste management at the national level are the Ministry of Environment and Forestry's Waste and Hazardous and Toxic Waste Management, the Ministry of Public Works and Housing and the Ministry of Interior, while local governments oversee the direct handling of MSW in municipalities. The main treatment of MSW is through landfilling (69 per cent), composting (7 per cent), small-scale incineration (7 per cent), open burning (5 per cent), dumping into rivers (3 per cent) and others (10 per cent) (UNCRD, 2017b).

Solid waste management is high on the national agenda and is included in the Long-Term National Urban Development Plan 2015–2045. The government has secured a \$100 million loan from the World Bank to improve solid waste management services in urban areas, and \$1 billion in investments are to be leveraged for activities, particularly recycling and plastics leakage. Indonesia has also strengthened its actions against marine plastic waste through the 2017 National Action Plan on Marine Debris.

Indonesia recently prioritised PPPs in treating hazardous wastes, mostly through BOT schemes. As part of the National Middle-Term Development Plan (2019–2024), the government has approved the construction of four hazardous waste treatment facilities in Sumatera, Kalimantan, Sumapapua and Eastern Java (presentation by Indonesian environment officer in the Services Forum 2020).

Lao PDR. The Department of Housing and Urban Planning, under the Ministry of Public Work and Transport, and the Ministry of Natural Resources and Environment oversee municipal SWM, while the Urban Development and Administrative Agency (UDAA) has been legislated to manage the collection and disposal of solid waste for cities. Related laws and regulations on SWM are the Agreement of Waste Disposal Site Management of 2008 and the Agreement of the National Environmental Quality Standard in 2009.

A major drawback is the lack of clear definition of waste, which prevents the establishment of an efficient and systematic waste management system in the country. In major cities such as Vientiane, Luangprabang, Savannakhet and Champasak, the UDAA organises waste collection service. According to UDAA, around 40 per cent to 70 per cent of waste is collected and transported to landfills (Sang-Arun and Pasomsouk, 2012). Moreover, waste disposal practices in Lao PDR do not separate wastes, and recycling and treatment are also infrequent.

Malaysia. The National Solid Waste Management Department and the Solid Waste and Public Cleansing Management Corporation Act 2007 primarily regulate waste management in Malaysia. The Ministry of Urban Wellbeing, Housing and Local Government oversees waste management in collaboration with the Ministry of Environment and the Ministry of Health. Malaysia is one of the

first ASEAN countries to decentralise and privatise the waste management of local authorities in 1995 and 1998, respectively. The solid waste management services of 48 local authorities have been given to two concession companies: Alam Flora for the Central Region and Southern Waste for the Southern Region (Sreenivasan et al., 2012). Malaysia has also implemented the 3Rs since the 1980s, and related national policies were subsequently introduced: Integrated Solid Waste Management in Malaysia (2001), National Strategic Plan for Solid Waste Management in Malaysia (2005), and Master Plan on National Waste Minimization (2006). Environmental management activities actively promote the recycling of wastes and processing of biomass agricultural wastes and by-products (presentation by a Malaysian investment officer). Certain conditions are imposed for waste recycling: for instance companies are not allowed to import wastes, and for biomass products, the minimum value-added requirement is 50 per cent.

Myanmar. The country generates 5,616 tons/day with 0.44 kg/capita/day and is estimated to reach 21,012 tons/day with 0.85 kg/capita/day by 2025 (IGES, 2017). Waste management in Myanmar remains at a preliminary stage, with the main responsibility of waste collection and disposal at the township and city development committee levels. In Yangon, Mandalay and Nay Pyi Daw, the Pollution Control and Cleansing Departments under their respective city development committees manage the waste disposal services in their areas (IGES, 2017). The National Environmental Conservation Law (2012) was established to implement the National Environmental Policy (1994). According to the ASEAN Framework Agreement on Services (AFAS) 10th package,¹⁷ foreign service providers are permitted to invest with 100 per cent foreign capital; joint ventures and contracting systems are also allowed in Myanmar. However, the current lack of policy regulations and measures on waste management hinder the establishment of PPPs in environmental services.

Philippines. The Philippine Development Plan 2017–2022 prioritises waste management. Republic Act (RA) 9003, otherwise known as the Philippines Ecological Solid Waste Management Act of 2000, provides for the necessary institutional support mechanisms and instructs all local government units to establish ecological solid waste management programmes within their jurisdictions. The law provides the necessary integrated solutions and recognises future opportunities for policy enhancement through the creation of the National Solid Waste Management Commission, which will also oversee the implementation of plans and programmes on solid waste management. The law also emphasises that local government units shall primarily be responsible for the implementation and enforcement of the law. Under said law, the implementation of ecological solid waste management shall manage waste based on the following hierarchy: (a) source reduction and minimisation of wastes generated at source; (b) source recovery, recycling and reuse of wastes at the barangay or the smallest local unit of governance in the Philippines; (c) efficient collection and proper transfer and transport of wastes by city/municipality and (d) efficient management of residuals and of final disposal sites and/or any other related technologies for the destruction/reuse of residuals. DENR has also implemented programmes such as Manila Bay Clean Up, Boracay Clean Up, Solid Waste Management, Clean Water Program and Ground Water Assessment.

Singapore. The National Environment Agency (NEA) plans, develops and administers the country's solid and hazardous waste management systems. The national frameworks for waste management are the Environmental Public Health Act and environmental public health regulations in the areas of general waste collection, general waste disposal facilities and toxic industrial waste.

Singapore is working to become a Zero Waste Nation. In 2019, the total amount of solid waste generated was 7.23 million tons, 6 per cent less than the amount generated in 2018.¹⁸ The country

¹⁷ <https://asean.org/storage/2012/05/AFAS-10.pdf>

¹⁸ NEA, <https://www.nea.gov.sg/our-services/waste-management/waste-statistics-and-overall-recycling>.

has adopted four strategies for a sustainable waste management system: the 3Rs, waste treatment, landfill and ash management. Given its land limitations, the Singaporean approach is to minimise wastes through recycling. Waste-to-energy incineration is the main method for waste management.

PPPs in public waste collection are well developed in Singapore. Waste collection is opened for tender through a bidding process for the granting of seven-to-eight-year licences. Currently, four operators serve six sectors in the country: ALBA W&H Smart City Pte Ltd, SembWaste Pte Ltd, Veolia ES Singapore Pte Ltd and 800 Super Waste Management Pte Ltd.

Thailand. The Pollution Control Department of the Ministry of Natural Resources and Environment oversees MSW operations, while the Ministry of Public Health monitors waste management operations in municipalities, the Ministry of Industry provides licences for waste treatment facilities and the Ministry of Energy provides subsidies for waste-to-energy projects. As in other ASEAN countries, local governments manage solid waste disposal at the municipal level.

Key policies in waste management in Thailand include the following:

- National 3R (Reduce, Reuse and Recycle) Strategic Plan
- Government Green Procurement Programme
- National Environmental Basic Plan (2017–2021)
- National Solid Waste Management Master Plan (2016–2021)
- Action Plan “Thailand Zero Waste” (2016–2017).

The current level of household participation in source MSW streams is low at less than 50 per cent. MSW is both landfilled and incinerated, 39 per cent of waste collected is properly disposed, 34 per cent of waste generated is utilised and the remaining 27 per cent is improperly disposed (Thailand Country Report at the Ninth Regional 3R Forum in Asia and the Pacific, March 2019).

Viet Nam. At the national level, MoNRE is primarily responsible for environment-related programmes. Under MoNRE is the Viet Nam Environmental Administration, which houses the Waste Management and Environment Promotion Agency, which oversees waste management. Other line ministries share related waste management processes. The Ministry of Construction establishes and monitors standards for waste treatment facilities and management of wastes from construction and development. The Ministry of Agriculture and Rural Development manages agricultural and rural waste, the Ministry of Health manages hospital wastes and the Ministry of Industry and Trade manages industrial wastes.

Several laws and regulations establish the management and coordination of MSW in Viet Nam:

- The Law on Environmental Protection (2014) promotes the 3Rs.
- The National Strategy for Environmental Protection (MoNRE, 2012) establishes targets for recycling.
- The National Green Growth Strategy (2011–2020) includes directives on waste reduction and management.
- Decree 38/2015/ND-CP addresses waste and scrap management.
- Decision 16/2015/QD-TTg concerns take-back and treatment of discarded products.
- Circular 36/2015/TT-BTNMT covers management of hazardous waste.
- Inter-Ministerial Circular 58/2015/BYT-BTNMT concerns the management of medical waste.

Viet Nam lacks a clear definition of waste. Instead, waste is generally classified as non-hazardous and hazardous and as household/domestic, industrial and medical. It is also generally understood as waste generated from urban areas, be it from households, streets, construction and demolition, offices, hospitals, industries, etc. (UNCRD, 2017a).

At the local level, the Provincial People’s Council supervises waste management activities and has respective departments that oversee management at the municipality level. In Ho Chi Minh City, private operators collect about 70 per cent of MSW. These operators also set the fees for household collection service based on Decision No. 88/2008 of the People’s Committee of Ho Chi Minh City (Schneider et al., 2017). For instance, Ho Chi Minh City Urban Environment Company Limited performs waste collection and treatment. At present, 473 companies provide solid waste treatment, and 86 companies have hazardous waste treatment licence. The capacities of companies managing solid waste treatment meet 15 per cent of the current demand, and 14 per cent for hazardous waste treatment (presentation by Vietnamese environment officer in the Services Forum 2020).

The National Strategy for Integrated Solid Waste Management to 2025 sets clear directions for waste management, specifically integrating the 3R approach towards a circular economy. The development of key economic areas in the North, Central and South regions, as well as in the Mekong Delta, the Cau River basin, the Nhue-Day River basin and the Dong Nai River basin, foresees the development of a regional solid waste treatment facility. This presents a huge investment opportunity, especially in upgrading waste treatment facilities, amounting to \$3 billion up to 2030 (UNCRD, 2017a). To attract investors, the government has expressed willingness to provide preferential land, tax breaks, infrastructure investment, technology research and development support, labour training and investment credits to projects related to waste management and the 3Rs (UNCRD, 2017a).

3. Sanitation and Similar Services¹⁹

Water and sewage services cover sanitation services in most ASEAN countries as they are regulated by the same laws. The 2014 ADB report on urban water and sanitation in Southeast Asia found a lack of clear national policies and plans for sanitation development. Other problem areas include financing matters, such as high capital cost, high operation and management costs, water as a priority of low-income groups and affordability and willingness to pay (ADB, 2014, p. 116).

Sanitation services in ASEAN represent significant opportunities for PPPs, especially in operation and maintenance processes. Sanitation also has the potential “to become a resource for generating energy, reducing water stress, producing better agricultural products, and enhancing resilience to climate change” (ADB, 2014, p. 119). PPPs exist, but are few because of current policies that cause overlapping and confusing roles and responsibilities of involved agencies. In addition, the infrastructure necessary to build in water sanitation is often costly and usually publicly funded. Typically, the private sector enters leasing and concession contracts with a local government jurisdiction to build, design, operate or manage the treatment plants. However, because water and sanitation are a public service, the cost for the end user is typically low and does not provide an incentive for for-profit businesses, unless the government subsidises costs to meet the cost of the services. This leads to poor service quality or termination of contracts from the private sector. The following discussion provides an overview of the organisation of wastewater systems and services in the 10 ASEAN member states.

Brunei Darussalam. The Department of Drainage and Sewerage/Public Works Department under the Ministry of Development directs water sanitation in the country, together with the Environmental Sanitation Health Section of the Ministry of Health. By 2035, the Department of Drainage and Sewerage/Public Works Department aims to establish centralised sewerage coverage for 70 per

¹⁹ Defined as “Other sanitation and similar services including outdoor sweeping services and snow- and ice clearing services” (CPC9403).

cent of the population. The 2013 data show that 92 per cent of the population receives basic sanitation and 56 per cent have centralised sewer service, while 45 per cent use septic tanks (ASEAN IWRM, n.d.). Private sector participation in sanitation services is high in Brunei Darussalam and includes the Brunei Economic Development Board, private developers and desludging services companies.

Cambodia. The 2003 Water and Sanitation Law in Cambodia intended to create a comprehensive national policy on water supply and sanitation in urban and rural areas. Related to this is the 2004 National Water Resource Policy for the national management and protection of water resources.

Indonesia. Indonesia's National Policy on the Development of a Community-Based Water Supply and Environmental Sanitation assists local governments in implementing water and sanitation development plans in a decentralised system (ADB, 2014). In addition, the Sanitation Sector Development Program fosters the country's innovative response on sanitation issues by strengthening of the sector and institutional arrangements and promoting advocacy and awareness at all levels (ADB, 2014).

Lao PDR. The National Centre for Environmental Health and Water Supply oversees management of the technical aspects of rural water supply and environmental hygiene in Lao PDR. Meanwhile, urban water supplies are state owned and managed by provincial governments.

Malaysia. The Water Services Industry Act (2006) stipulates the policies on urban/rural sanitation and sewerage services. However, no government agency is directly responsible for sanitation management, particularly for regulating the pour flush latrine system in rural areas. Financing in these services includes MYR5.6 billion (\$1.4 billion) in the Greater Kuala Lumpur/Klang Valley in 2011–2020 (ASEAN IWRM, n.d.). Table 9 shows the per cent of the population receiving proper water supply services.

Table 9. Water supply coverage in Malaysia, 2017–2018

State	% Population served					
	2017			2018		
	Urban	Rural	Average	Urban	Rural	Average
Johor	100.0	99.5	99.8	100.0	99.9	99.9
Kedah	100.0	96.5	98.3	100.0	96.5	98.3
Kelantan	61.5	74.4	68.0	62.4	76.2	69.3
Federal Territory of Labuan	100.0	100.0	100.0	100.0	100.0	100.0
Melaka	100.0	100.0	100.0	100.0	100.0	100.0
Negeri Sembilan	100.0	99.8	99.9	100.0	99.8	99.9
Pulau Pinang	100.0	99.8	99.9	100.0	99.8	99.9
Pahang	100.0	96.0	98.0	100.0	96.0	98.0
Perak	100.0	99.2	99.6	100.0	99.2	99.6
Perlis	100.0	99.0	99.5	100.0	99.0	99.5
Selangor	100.0	99.5	99.8	100.0	99.5	99.8
Terengganu	99.1	92.9	96.0	99.1	92.9	96.0
TOTAL	96.7	96.4	96.6	96.8	96.6	96.7

Source: SPAN (2018).

Myanmar. Several ministries administer the governance and management of water sanitation in Myanmar. The Ministry of Natural Resources and Environmental Conservation oversees all environment-related issues; under it is the Environmental Conservation Department, which is responsible for managing national environmental conservation projects. Specifically, the Pollution Control Division under the Environmental Conservation Department manages water pollution and industrial wastewater activities.

While the state predominantly controls governance on water sanitation in Myanmar, opportunities for PPPs on infrastructure projects such as the construction of public water treatment facilities and wastewater treatment facilities in industrial areas are increasing. Recently, the Myanmar Investment Commission began promoting domestic and foreign direct investments in six selected sectors over the next five-year period (2021–2026). As a result, the Myanmar Investment Commission has approved investment projects on treated water supply from a Thai company worth \$6.1 million; laboratory testing, consulting, supply and installation of machinery and maintenance services for water and wastewater treatment from another Thai company worth \$1.5 million, and a central wastewater treatment plant and collection system for the Mandalay Industrial Zone under a BOT contract worth \$18.9 million also from a Thai company (presentation by a Myanmar trade officer in the Services Forum 2020).

Philippines. National sanitation policies include the National Policy on Urban Sewerage and Sanitation (1994), the Philippine Sustainable Sanitation Roadmap by the Department of Health and the National Sewerage and Septage Management Plan under the Department of Public Works and Highways. The Local Water Utilities Administration (LWUA) promotes and oversees the development of water supply systems in cities and municipalities outside of Metro Manila. Within Metro Manila cities, the Metro Manila Development Authority (MMDA) plans, monitors and coordinates waste management, transport decongestion and maintenance of the capital's livability and sustainability.

Singapore. According to the Singapore Department of Statistics, 100 per cent of the population has access to improved drinking water sources and improved sanitation since 2000.²⁰ Private companies, such as Century Water, Novexx and Net Water Asia, provide sanitation services in Singapore, especially in industrial areas.

Thailand. As of 2014, 98 per cent of the population has access to clean water, while 96 per cent of the population has access to improved sanitation (Koontanakulvong et al., 2014, p. 7). The country has adopted a sanitation programme in the National Economic and Social Development Plans and a comprehensive plan for water supply, excreta disposal and refuse disposal (ADB, 2014).

Viet Nam. Decree 88/2007, together with Decision 1930/QĐ-TTg, sets the targets under the government strategies on urban wastewater and drainage management. Despite an increase in investments in urban sanitation and wastewater treatment through ODA, major developments in national urban sanitation remain unsuccessful as most have focused on providing treatment facilities but provide limited collection systems (World Bank, 2013b). Only a few stations and treatment plants currently operate in Hanoi, such as those located in North Thang Long, Van Tri, Kim Lien, Truc Bach, Bay Mau, Ho Tay and Yen Son.²¹

In 2019, the Viet Nam Water Supply and Sewerage Association organised a capacity-building project together with the Finnish Water Forum, a public-private consortium of companies, research institutes and universities that provides water-related solutions, as part of the cooperative project called “Developing Water Supply and Sanitation in Vietnam through Partnerships” from 2017 to

²⁰ Department of Statistics Singapore, <https://www.singstat.gov.sg/find-data/sdg/goal-6>.

²¹ NGO International. “Overview of Wastewater Treatment in Vietnam”, <http://ngoenvironment.com/en/Tin-tuc-n5-OVERVIEW-OF-WASTEWATER-TREATMENT-IN-VIETNAM-d52.html>.

2020.²² This cooperation is supported by the Finland Ministry of Foreign Affairs. In 2016, Nagaoka International Corporation, a Japanese company that uses an extremely high-speed chemical-free groundwater treatment system, agreed to share technology with Hanoi Water Co. Ltd. In addition, Viet Nam also has a cooperative project with the Australian Water Association through the Viet Nam–Australian Water Utility Improvement Program (Twinning Program) and with Germany via the German–Viet Nameese Cooperation Project on Capacity Building for Water Sector in Viet Nam from 2013 to 2019, which was supported by the German government.

4. Other Environmental Services

This category of environmental services is generally not related to infrastructure and is mostly provided competitively via business-to-business relationships. The four subsectors under this category (also in figure 1) are

- Cleaning of exhaust gases (CPC9404)
- Noise abatement (CPC9405)
- Nature and landscape protection (CPS9406)
- Other environmental protection (CPC9409).

Air and noise pollution abatement usually involve a wide variety of services such as engineering, consulting, and design for environmental purposes. These services arise from efforts to comply with environmental regulations, which have increased due to national environmental legislation. The following descriptions focus on the institutional framework as data related to this category of services are hard to obtain.

Brunei Darussalam. The 2002 Pollution Control Guidelines for the Industrial Development stipulate the assessment and regulation of emissions, effluents and discharge from development and construction activities. In addition, the Environmental Impact Assessment Guidelines are prescribed in the conduct of various environmental services and activities. These two guidelines complement the regulation of environmental services in the country.

Cambodia. The Sub-Decree on the Control of Air Pollution (1999) was enacted to control air pollution. The 1996 Law on Environmental Protection and Natural Resources Management requires an environmental impact assessment (EIA) prior to the approval of public or private environment-related projects and services. Based on this law, the project owners applying for assessment shall pay the service fee for the EIA examination and monitoring.

Indonesia. The Environmental Protection Law (2009) mandates that business/activities related to environmental services apply for environmental permits based on environmental feasibility (Article 31) or recommendation of Environmental Management Efforts and Environment Monitoring Efforts, referred to as UKL–UPL (Upaya Pengelolaan Lingkungan Hidup–Upaya Pemantauan Lingkungan Hidup), which are environment permissions in the country. The minister, governors or regents/mayors shall issue the permit according to their respective boundaries of authority.

Lao PDR. The Environmental Protection Law (1999) mandates the regulation of environmental services. The Science, Technology and Environment Agency implements the policies at the national level, while its corresponding monitoring unit implements projects at the provincial, municipal and special zone levels.

²² Finnish Water Forum. "FWF in Vietnam: Developing Water Supply and Sanitation Sector in Vietnam through New Partnerships", <http://www.finnishwaterforum.fi/wp/fi/2017/09/12/fwf-in-vietnam-developing-water-supply-and-sanitation-sector-in-vietnam-through-new-partnerships/>.

Malaysia. Section 23 of the Environmental Quality Act 1974 mandates noise regulation at acceptable levels, while the EIA stipulates the requirements for noise level compliance, monitoring and mitigation for construction and other operations in commercial business and industrial zones and low-density residential and suburban and urban residential areas. The Department of Environment under the Ministry of Energy, Science, Technology, Environment & Climate Change manages noise abatement services.

Myanmar. Under the Environmental Conservation Law (2012) and the Environmental Conservation Law Rules (2014), the Environmental Conservation Committee stipulates the standards for the management and regulation of noise and vibration quality standards, emissions and effluent standards. The Myanmar investment portfolio on environmental services is shaped by different tools and frameworks: the initial environmental examination studies the feasibility and potential impacts of a project, while the EIA evaluates the potential impact to the environment and society according to Environmental Conservation Law Rules. Other assessment tools also exist to measure the potential impacts to the society, health and ecosystem of the country.

Philippines. The Philippine Environment Code (1977) stipulates the standards for environmental services such as ambient air quality, national emissions, community noise, noise-producing equipment and aircraft emissions. The Environmental Management Bureau²³ regulates and monitors air quality and noise and aircraft noise, while the Land Transportation Commission implements the standards for vehicular emissions. PENRO, CENRO, Climate Change Commission, LWUA and MMDA have authority to control and monitor environmental standards.

Singapore. Noise abatement and control in Singapore involves construction, industrial and vehicular noise controls. NEA sets the regulations for permissible noise levels for construction work, factories and vehicles. In addition, NEA oversees and regulates cleaning service establishments to maintain a clean and livable environment. The agency provides services for offices and commercial buildings, food and beverage establishments and conservancy. Of more than 1,700 environmental service establishments, 74 per cent are involved in the provision of cleaning services (NEA Licensing Database, 2016).

Thailand. Several regulations on noise abatement in Thailand include Office of National Resources and Environmental Policy and Planning (ONEP) No. 15 (1997) and ONEP No. 29 (2007).

Viet Nam. Chapter 9, Section 5 of the 2014 Environmental Protection Law stipulates the regulations and management of dust, exhaust gases and noise, while Chapters 11 and 12 stipulate the various technical regulations applied to each environmental service and to environmental monitoring, respectively. The Ministry of Natural Resources and Environment oversees the management of these functions.

²³ The National Pollution Control Commission merged with the National Environmental Protection Council, thereby creating the Environmental Management Bureau (EMB) as a staff bureau of the DENR in 1987 by virtue of Executive Order No. 192 and absorbing the functions and powers of both the National Pollution Control Commission (with powers and functions prescribed under Presidential Decree Nos. 984 and 1067) and National Environmental Protection Council (with functions under Section 3 of Presidential Decree No. 1121, series of 1977). EMB was later converted from a staff bureau to a line bureau of the DENR by virtue of RA 8749, thereby paving the way for the creation of EMB Regional Offices.

II. ASCENDANCY OF ENVIRONMENTAL SERVICES

The following section discusses how environmental services in ASEAN configure into the four modes of international services trade (GATS).

1. Mode 1: Cross-Border Supply

Cross-border supply (Mode 1) of environmental services was commercially insignificant at the time that GATS entered into force in 1995. Since then, electronic transactions have opened new possibilities to provide environmental services across borders. In several sectors, remotely control of equipment via computers is now feasible (WTO, 2010). Examples of cross-border supply (Mode 1) of environmental services are as follows:

- Company in country A monitors wastewater treatment in country B online (UNEP et al., 2012)
- Company in country A remotely controls equipment for pump-and-treat plants for site remediation via computers
- Company in country A monitors air pollution levels in country B via computers
- Company in country A provides environmental consulting, engineering designs and testing and analysis in country B (see box 2 for an example).

Box 2. Mode 1: Case of SLP Environmental Services

SLP Environmental is an environmental consultant company based in Thailand and Myanmar. It mainly provides consulting and advisory services on environmental, social, health, safety and risk management to clients in Southeast Asia.

As an example of Mode 1 (cross-border supply), the Myanmar Ministry of Natural Resources and Environmental Conservation contracted with SLP Environmental to conduct technical reviews of EIA and initial environmental examination reports on planned offshore and onshore oil and gas exploration activities in Myanmar.

SLP Environmental developed a standardised scoring matrix that evaluates compliance with the requirements of Myanmar's environmental laws and adheres to international standards of industry practice.

Source: SLP Environmental online website, "Technical Report Reviews of Oil and Gas Project, EIAs Myanmar", <https://www.slpenvironmental.com/project/technical-eia-reviews/>.

2. Mode 2: Consumption Abroad

The consumption abroad mode of supply (Mode 2) had limited relevance in environmental services. However, it became an important mode in ASEAN recently, becoming sufficiently large to regulate the transactions under this mode. Mode 2 may come into play if the transaction involves the movement of goods/items belonging to a service consumer (WTO, 2010). Examples of Mode 2 of environmental services include

- Country A ships waste to country B for treatment and disposal
- Staff of country A go to country B for training on measuring levels of pollution in groundwater (USITC, 2012).

Even before the official ban on receiving imported plastic waste in the People's Republic of China in January 2018, most plastic waste was redirected to countries with lesser regulations, Southeast Asia in particular. The 2019 Greenpeace report indicates that ASEAN had a 171 per cent increase in plastic waste imports (HS²⁴ 3915), from 836,529 tons in 2016 to 2,265,962 tons in 2018. The top three plastic-importing countries in ASEAN are Malaysia, Viet Nam and Thailand (table 10).

Table 11 shows the combined total of plastic waste exports to ASEAN: United States (439,129 tons); Japan (430,064 tons); Hong Kong, China (149,516 tons); Germany (136,034 tons) and the United Kingdom (112,046 tons) are the top exporters of plastic waste to ASEAN (Greenpeace, 2019).

Recent policy developments in top plastic importer countries in ASEAN reflect decreasing acceptance of imported plastic waste. Malaysia and Viet Nam have stopped issuing new permits for plastic waste import, while Thailand announced in 2018 its intention to ban plastic waste imports beginning in 2021.

ASEAN countries also increasingly use plastic, generating plastic waste that accounts for 10–20 per cent of their total solid waste (box 3). This fact further complicates the marine plastic problem. Significant policy developments at the national level in four ASEAN countries concern the growing issue of marine plastic waste. Indonesia has a National Marine Debris Action Plan, with the goal of reducing plastic waste by 70 per cent by 2025. The Philippines has drafted a National Strategy on Marine Litter. ASEAN states have drafted the Bangkok Declaration on Combating Marine Debris. Finally, Viet Nam has begun drafting a National Action Plan on Management of Ocean Plastic Waste (Greenpeace, 2019).

Table 10. Plastic waste imports in ASEAN, 2016–2018 (tons)

ASEAN Member States	2016	2017	2018
Malaysia	287 673	549 876	872 797
Viet Nam	347 840	659 057	492 389
Thailand	69 487	152 244	481 381
Indonesia	120 979	128 951	320 452
Myanmar	688	1 855	71 050
Philippines	4 650	4 267	11 761
Singapore	3 354	6 422	9 018
Lao PDR	1 181	3 008	4 791
Cambodia	647	1 685	1 688
Brunei Darussalam	30	116	185
ASEAN	836 529	1 507 481	2 265 962
% Global	5.38%	11.00%	27.00%
Global	15 553 548	13 410 919	8 358 867

Source: The International Trade Commission's Trademap import data 2019 cited in Greenpeace (2019, p. 5).

²⁴ HS code refers to Harmonized Commodity Description and Coding System, or Harmonizing System (HS) for short.

Table 11. Largest five exporters of plastic waste (HS3915) to ASEAN, 2018 (tons)

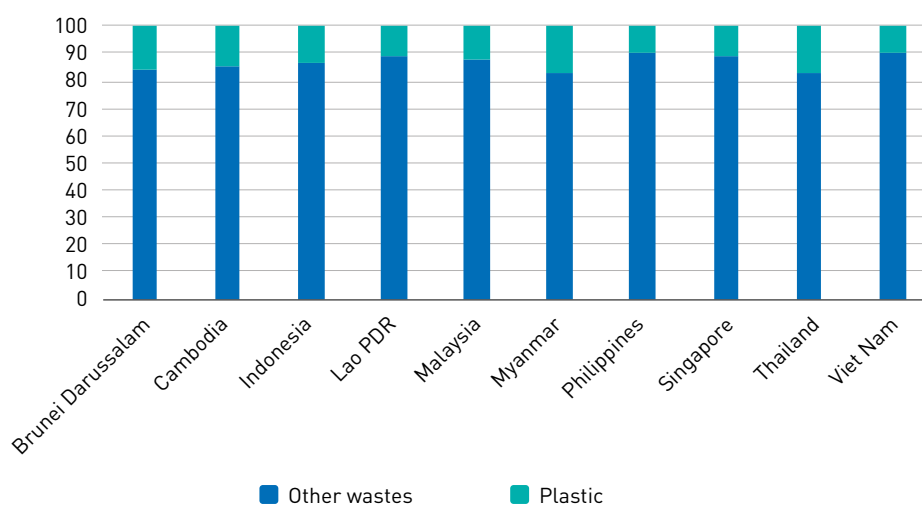
ASEAN Member States	1 st Highest	2 nd	3 rd	4 th	5 th
Malaysia	United States (218,134)	Japan (119,010)	United Kingdom (112,019)	Germany (84,856)	Hong Kong, China (48,384)
Thailand	Japan (173,371)	Hong Kong, China (99,932)	United States (84,462)	Australia (25,355)	People's Republic of China (19,374)
Viet Nam	Japan (123,254)	Thailand (11,514)	United States (74,888)	Republic of Korea (26,126)	Australia (6,357)
Indonesia	Marshall Islands (92,682)	United States (56,753)	Germany (50,587)	Netherlands (18,892)	Australia (18,639)
Myanmar	Thailand (61,470)	Japan (7,094)	Malaysia (868)	Australia (707)	People's Republic of China (166)
Philippines	Japan (2,385)	United States (1,778)	Taiwan, China (1,704)	Indonesia (1,583)	Hong Kong, China (1,200)
Singapore	Japan (4,242)	United States (1,343)	Germany (591)	Malaysia (591)	United Kingdom (523)
Lao PDR	Thailand (1,844)	Japan (625)	United States (308)	Spain (129)	Republic of Korea (76)
Cambodia	United States (1,463)	Japan (84)	Thailand (78)	People's Republic of China (40)	United Kingdom (22)
Brunei Darussalam	People's Republic of China (75)	Malaysia (42)	United Kingdom (5)	India (1)	Singapore (0.80)

Source: The International Trade Commission's Trademap import data 2019 cited in Greenpeace (2019, p. 7).

Box 3. Plastic waste in ASEAN

Among municipal solid wastes in ASEAN, plastic accounts for roughly 10 per cent of the total, ranging from about 10 per cent for Singapore and Viet Nam to 18 per cent for Myanmar and Thailand (box figure 3.1). Plastic waste draws world attention as it affects biodiversity, pollutes land and ocean and has reached an intolerable level. Adding to growing waste generated domestically, growing plastic waste trade represents another difficult dimension of waste management. In particular, the prohibition of importation of plastic waste by the People’s Republic of China has eliminated an important export destination. Thus, much of this waste has floated into the ocean, much of which has reached ASEAN seashores, constituting a marine plastic problem.

Box figure 3.1. **Share of plastic in total municipal solid waste in ASEAN, 2016**
(Per cent)



Source: World Bank, 2018.

Only five countries in ASEAN—Indonesia, Malaysia, the Philippines, Singapore and Thailand—have data for “waste treatment and de-pollution” (EBOPS 2010 (10.3.2.1)) for selected years (tables 12 and 13). While data scarcity poses challenges to fully capturing the volume of trade in Mode 1 and Mode 2, certain services, such as plastic waste trade, have been on the rise, in particular after the Chinese import restrictions on plastic waste from abroad (tables 10 and 11). The result of the Chinese ban is an estimated 111 million metric tons of displaced plastic waste by 2030 (Brooks et al., 2018).

Export to the world. The most recently available data (table 13) indicate that the ASEAN countries are not yet exporting environmental services (waste treatment and de-pollution) at a significant scale. In 2010, Indonesia was the largest exporter among ASEAN countries, exporting waste treatment and de-pollution services valued at \$6 million. Singapore and Thailand exported \$1.3 million and \$0.7 million, respectively. In all ASEAN countries where statistical data are available, waste treatment and de-pollution accounted for less than 0.01 per cent of all service exports and less than 0.001 per cent of total exports of goods and services in 2010.

Import from the world. The import of waste treatment and de-pollution services was 10 times larger than exports at \$68.3 million, led by imports into Indonesia (table 12). In 2010, Indonesia imported \$67 million worth of waste treatment and de-pollution services from the world, accounting for 0.3 per cent of total import of services and 0.05 per cent of total import of goods and services. Singapore imported \$1.3 million in 2010, accounting for 0.001 per cent of total services import and 0.0003 per cent of total goods and services import. While available information is rather limited, the share of waste treatment and de-pollution services is insignificant for both total imports of services and total imports of goods and services in ASEAN countries.

Table 12. Import of waste treatment and depollution services and its share in total imports of services and in goods and services, 2005–2010 (Millions of dollars and per cent)

Country	2005	2006	2007	2008	2009	2010
<i>Waste treatment and depollution export</i>						
Brunei Darussalam	..	..	..	..	..	..
Cambodia	..	..	..	..	..	..
Indonesia	80	31	2	1	102	67
Lao PDR	..	..	..	..	..	..
Malaysia	0.9	..	..	..	..	..
Myanmar	..	..	..	..	..	..
Philippines	1.1	0.8	0.1	..	..	..
Singapore	..	..	..	1.4	..	1.3
Thailand	..	..	..	..	..	..
Viet Nam	0.4	..	..	..	..	..
ASEAN total	82.40	32.08	1.92	2.82	102.00	68.33
<i>Share in total exports of services</i>						
Brunei Darussalam	..	..	..	..	..	..
Cambodia	..	..	..	..	..	..
Indonesia	0.6%	0.27%	0.01%	0.009%	0.77%	0.40%
Lao PDR	..	..	..	..	..	..
Malaysia	0.3%	..	..	..	..	..
Myanmar	..	..	..	..	..	..
Philippines	0.01%	0.007%	0.001%	..	..	..
Singapore	..	..	..	0.002%	..	0.001%
Thailand	..	..	..	..	..	..
Viet Nam	0.009%	..	..	..	..	..
ASEAN total	0.07%	0.024%	0.001%	0.0015%	0.058%	0.032%
<i>Share in total exports of goods and services</i>						
Brunei Darussalam	..	..	..	..	..	..
Cambodia	..	..	..	..	..	..
Indonesia	0.08%	0.029%	0.001%	0.0010%	0.081%	0.04%
Lao PDR	..	..	..	..	..	..
Malaysia	0.0005%	..	..	..	..	..
Myanmar	..	..	..	..	..	..
Philippines	0.003%	0.0018%	0.0003%	..	..	..
Singapore	..	..	..	0.0003%	..	0.0003%
Thailand	..	..	..	..	..	..
Viet Nam	0.001%	..	..	..	..	..
ASEAN total	0.012%	0.004%	0.0002%	0.0003%	0.012%	0.006%

Source: AJC, based on World Bank and UNCTAD data.

Waste treatment and depollution export : worldbank (<https://datacatalog.worldbank.org/dataset/trade-services-database>)

Total Export of Services: UNCTAD Stat

Total Exports of goods and services: UNCTAD Stat

Table 13. Export of waste treatment and depollution services and its share in total exports of services and in goods and services, 2005–2010 (Millions of dollars and per cent)

Country	2005	2006	2007	2008	2009	2010
<i>Waste treatment and depollution import</i>						
Brunei Darussalam	..	..	..	..	..	..
Cambodia	..	..	..	..	..	..
Indonesia	9.1	4.9	3.1	0.3	6.3	6.0
Lao PDR	..	..	..	..	..	..
Malaysia	0.8	..	..	..	..	..
Myanmar	..	..	..	..	..	..
Philippines	1.1	0.8	0.1	..	..	..
Singapore	..	..	..	0.5	1.4	1.3
Thailand	0.3	..	..	..	..	0.7
Viet Nam	..	..	..	..	..	..
ASEAN total	11.36	5.61	3.21	0.76	7.72	8.06
<i>Share in total import of services</i>						
Brunei Darussalam	..	..	..	..	..	..
Cambodia	..	..	..	..	..	..
Indonesia	0.04%	0.02%	0.01%	0.001%	0.03%	0.02%
Lao PDR	..	..	..	..	..	..
Malaysia	0.004%	..	..	..	..	..
Myanmar	..	..	..	..	..	..
Philippines	0.02%	0.01%	0.002%	..	..	..
Singapore	..	..	..	0.0005%	0.002%	0.001%
Thailand	0.001%	..	..	..	..	0.002%
Viet Nam	..	..	..	..	..	..
ASEAN total	0.01%	0.00%	0.002%	0.000%	0.00%	0.00%
<i>Share in total import of goods and services</i>						
Brunei Darussalam	..	..	..	..	..	..
Cambodia	..	..	..	..	..	..
Indonesia	0.01%	0.01%	0.003%	0.000%	0.0%	0.00%
Lao PDR	..	..	..	..	..	..
Malaysia	0.0006%	..	..	..	..	..
Myanmar	..	..	..	..	..	..
Philippines	0.003%	0.002%	0.0003%	..	..	..
Singapore	..	..	..	0.0001%	0.0004%	0.0003%
Thailand	0.0003%	..	..	..	..	0.0004%
Viet Nam	..	..	..	..	..	..
ASEAN total	0.00%	0.001%	0.0004%	0.0001%	0.00%	0.001%

Source: AJC, based on World Bank and UNCTAD data.

Waste treatment and depollution export : worldbank (<https://datacatalog.worldbank.org/dataset/trade-services-database>)

Total Export of Services: UNCTAD Stat

Total Exports of goods and services: UNCTAD Stat

3. Mode 3: Commercial Presence

Establishment of commercial presence (Mode 3) is the predominant mode of supply in environmental services because many of them, such as sewage services and refuse disposal services, are infrastructure dependent and require a continuous and long-term local presence (WTO, 2010).

Examples of Mode 3 of environmental services include

- Waste management company in country A establishes a subsidiary office in country B
- Engineering firm of country A establishes a subsidiary in country B to provide environmental design and consulting services to local clients.

Commercial presence could ensure additional investment in and transmission of technology and know-how to the recipient countries. For instance, local firms in developing countries often seek partnerships with more established international firms to acquire industry knowledge and experience (WTO, 2010).

Table 14 shows the estimated sales of environmental services through commercial presence.²⁵ Singapore and Thailand have the largest numbers of foreign entities, followed by Malaysia and Viet Nam. The estimated sales of the foreign entities in ASEAN are at least \$1,400 million in 2016, of which more than half is from the foreign entities based in Singapore. Foreign entity sales in Thailand are reported to be \$129 million, although this is likely an underestimate because half of the foreign affiliates in that country did not reveal their sales data. Foreign affiliate sales in Malaysia are estimated to be \$470 million. Brunei Darussalam, Cambodia and Lao PDR were not included in the sources used.

The presence of ASEAN entities providing environmental services abroad is much smaller than the number of foreign entities operating in ASEAN, only 19 compared with 137 foreign entities in ASEAN. Out of the 19 ASEAN companies identified, nine were based in Singapore. The estimated sales of ASEAN entities abroad were \$383 million, of which Singaporean companies accounted for 90 per cent or \$350 million.

Table 15 shows the amount of investment flows to environmental services in ASEAN. According to UNCTAD's FDI and mergers and acquisitions data, 74 investment cases were identified in ASEAN between 2003 and 2017, with a total estimated investment value of \$1.5 billion. Although the list may not be exhaustive, it shows that Singapore received the largest amount of investment—27 investment projects worth \$948 million—followed by Malaysia, Viet Nam and Thailand. Out of the 74 investment cases, 27 per cent was investments in solid waste management services and 19 per cent was investments in wastewater treatment/sewage services (figure 5). In terms of investment from ASEAN, 59 investment cases were identified with a value of \$1.1 billion. Singapore led outward investment from ASEAN to the world, with 39 investment cases worth \$856 million (table 15). Appendix A tables (1) and (2) provide concrete examples of investment through Greenfield and mergers and acquisitions in the areas of waste management services and water and sewage system services.

²⁵ Data were compiled from various sources, including Toyo Keizai Shimposha's database for Japanese affiliates in ASEAN and Orbis data. AJC identified foreign affiliates in each AMS that engage in one of the subcategories of environmental services (i.e., waste management services, sewage/wastewater management services and sanitation services) and summarised the sales data. Sales data are significantly underestimated because almost half of companies identified did not provide sales data.

Table 14. Mode 3: Estimated sales of environmental services through foreign presence, 2016a
(Millions of dollars)

Country	Receipt from abroad		Supply to the world	
	Number of foreign entities	Estimated sales ^b	Number of ASEAN entities abroad	Estimated sales ^b
Brunei Darussalam	..	..	..	..
Cambodia	..	..	..	..
Indonesia	6	7 [4]	1	.. [1]
Lao PDR	..	..	..	..
Malaysia	18	471 [3]	6	6 [2]
Myanmar	1	.. [1]	..	..
Philippines	8	77 [1]	..	..
Singapore	50	716 [20]	9	350 [3]
Thailand	42	129 [22]	2	5
Viet Nam	12	2 [10]	1	22
ASEAN total	137	1 403 [61]	19	383 [6]

Source: AJC, based on data from Toyo Keizai Shimposha, UNCTAD, and Orbis.

^a Data of the most recent available year was used for those companies for which 2016 sales are not available.

^b Figures in parentheses indicate the number of affiliates for which sales cannot be estimated.

Table 15. Investment flows to environmental services in ASEAN, 2003–2017
(Millions of dollars)

Country	Investment to ASEAN		Investment from ASEAN	
	Number of ASEAN companies that received investment	Estimated investment amount ^a	Number of ASEAN companies that invested abroad	Estimated investment amount ^a
Brunei Darussalam	..	..	..	..
Cambodia	1	.. [1]	..	..
Indonesia	6	14 [1]	2	0,1 [1]
Lao PDR	..	..	..	..
Malaysia	17	16 [9]	14	169 [3]
Myanmar	1	.. [1]	..	..
Philippines	..	..	..	..
Singapore	27	948 [8]	39	856 [5]
Thailand	10	8 [7]	3	32
Viet Nam	12	535 [7]	1	.. [1]
ASEAN total	74	1 521	59	1 058

Source: AJC, based on data from UNCTAD, Thomson Reuters, Greenfield, M&A.

Note: Investment amount is underestimated because the sources do not cover all investment projects.

^a Figures in parentheses indicate the number of affiliates for which investment amount was not available.

Figure 5. **Type of environmental services which received investment from the world, 2017**
(Per cent)

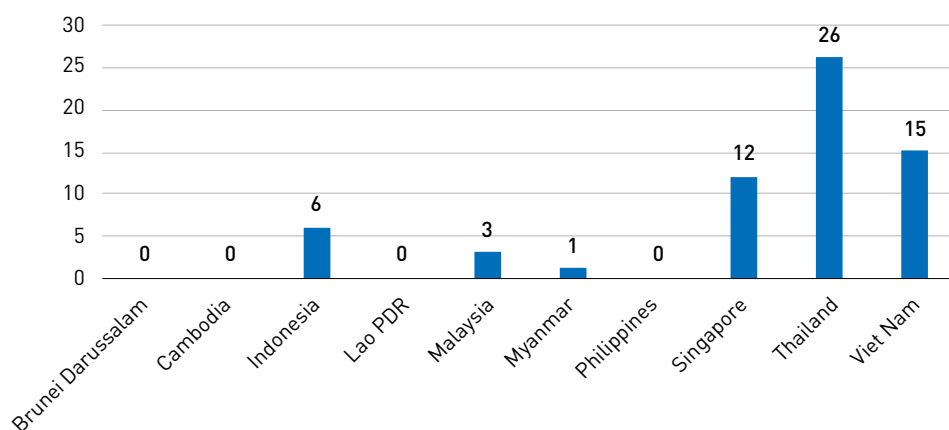


Source: AJC, based on data from UNCTAD and Thomson Reuters.

Japanese companies are actively exploring market opportunities in ASEAN to export environmental services, particularly in the areas of wastewater management and solid waste management. These sectors are also listed as priority sectors in the ASEAN-Japan Environmental Cooperation Initiative introduced in 2017 (box 4). According to Toyo Keizai Shimposha and Orbis, 63 Japanese companies reportedly operated environmental services in ASEAN in 2017, mainly concentrated in Thailand, Viet Nam and Singapore (figure 6).

Investment from Japanese companies is concentrated on water treatment systems, which received 60 per cent of Japanese investment in 2017. Water treatment systems included wastewater management and the production and maintenance of water treatment equipment. Twenty-one per cent of Japanese investment went into solid waste management, including the treatment of hazardous waste, 5 per cent went to building cleaning and maintenance services, followed by 2 per cent into air treatment services (figure 7).

Figure 6. **Number of Japanese companies operating environmental services in ASEAN, 2017**



Source: AJC, based on data from Toyo Keizai Shimposha and Orbis.

Figure 7. Types of environmental services that Japan invested in, 2017 (Per cent)



Source: AJC, based on data from Toyo Keizai Shimposha and Orbis.

Box 4. ASEAN-Japan Environmental Cooperation Initiative

At the 15th ASEAN+3 Environment Ministers Meeting held in Bandar Seri Begawan, Brunei Darussalam, on 13 September 2017, Japan proposed a new initiative called the “ASEAN-Japan Environmental Cooperation Initiative”, to strengthen cooperation between Japan and ASEAN to achieve sustainable development. The Initiative strongly emphasized areas such as climate change, water management, biodiversity conservation, chemical pollution management, wastewater management, quality environmental infrastructure development for sustainable cities and cooperation in SDGs, including disseminating high-quality infrastructure from Japan.

Under the ASEAN-Japan Dialogue on Environmental Cooperation framework, several initiatives/activities on environment have been implemented, including

- Support to the ASEAN SDGs Frontrunner Cities Programme funded by the Japan-ASEAN Integration Fund, the ASEAN-Japan Climate Change Action Agenda, and the ASEAN-Japan Energy Efficiency Partnership
- Promotion of collaborative research with the Economic Research Institute for ASEAN and East Asia in the areas of circular economy and establishment of the Regional Knowledge Centre for Marine Plastic Debris
- Promotion of bilateral cooperation with ASEAN countries based on the Basic Strategy of the Promotion of Environmental Infrastructure.

Between 2020 and 2022, Japan plans to mobilise \$3 billion from the public and private sectors, including \$1.2 billion loans and investments for ASEAN through JICA (Mission of Japan to ASEAN 2020).²⁶

²⁶ https://www.asean.emb-japan.go.jp/itpr_en/pr20_0114en.html.

4. Mode 4: Presence of Natural Persons

The temporary movement of natural persons (Mode 4) is relevant to environmental services: especially intra-corporate transferees appear to be of particular significance as firms must be able to send managers or technicians with specialised skills abroad when they operate through affiliates (WTO, 2010). Mode 4 is needed as consultancy and engineering services companies increasingly requires physical movement of consultants and engineers. However, data on the movement of natural persons related to environmental services is non-existent and so capturing its volume is not possible. An example of Mode 4 of environmental services include an environmental consultant of country A travels to country B to perform an initial assessment of a remediation site.

III. TRADE AGREEMENTS AND REGULATIONS AMONG AND IN THE ASEAN MEMBER STATES

As with other services, the main types of trade liberalisation in environmental services are service market access and national treatment. As Modes 3 and 4 are the main forms for providing environmental services, barriers such as investment restrictions or restrictions on the movement of service providers could likely impede service flows in these two modes (Jacob and Møller, 2017; Steenblik and Geloso Grosso, 2011). The 2016 Asia-Pacific Economic Cooperation (APEC) report on the Survey of Regulatory Measures in Environmental Services in 21 APEC economies identified more than 195 measures on environmental services under CPC94. Licensing and approval procedures are the most prevalent regulatory measures in most countries, particularly as these processes can be discretionary in some countries. Of the environmental services, waste treatment and disposal services are the most highly regulated (APEC Policy Support Unit, 2016). Table 16 lists common restrictions on environmental services in Modes 3 and 4.

Important barriers to Mode 4 include limitations on the qualification and licensing of foreign professionals, controls on employing or hiring of foreign workers and temporary entry requirements for businesspersons. Control on workers (for both service providers and providers of environmental services) is another common type of regulatory measure countries place on trade in environmental services.

Table 16. Restrictions on environmental services (particularly affecting Modes 3 and 4)

Mode 3: Commercial presence	Mode 4: Presence of natural persons
Restrictions on the legal form of companies	Nationality or residency requirements for accreditation of certain types of services
Economic needs test for the establishment of a commercial presence	Limited recognition of third-country diplomas required to practice regulated professional services
Foreign equity limits	Costly and time-consuming visa applications
Restrictions on the acquisition of land and real estate	Labour market tests
Limited eligibility for subsidies, including tax benefits	Limitations on the duration of stay of foreign providers
Public monopolies restricting entry of private service providers	Professional qualification exams
Government procurement favouring local suppliers	Controls on workers
Investment screening procedures	
Local content requirements	

Sources: Sauvage and Timiliotis (2017); APEC Policy Support Unit (2016, Table 1).

This section examines the status of liberalisation of environmental services in ASEAN, using the “Hoekman Index” (definition follows) to measure commitment to liberalisation for environmental services under the AFAS 10th package, which was agreed during the ASEAN Economic Ministers Meeting in August 2018 and signed in 2020.

Hoekman (1995) proposes an indexation method for measuring the GATS-style degree of commitment in the services sector. This method assigns values to eight cells (four modes with two aspects—market access (MA) or national treatment (NT)—each) as follows. First assign the value 1 when the sector at issue is “fully liberalised”; 0.5 when “limited (but bound)”; 0 when “unbound” (government has not committed to liberalise) by subsector, by mode and by aspect (MA or NT). Then take the simple average for aggregation and calculate the average value by services sector and by country.²⁷ The higher the resulting number, the more liberal the country’s service trade commitments are relative to the free trade agreement (FTA) members. Using the database constructed for this study, the Hoekman Index is derived for all 155 subsectors (out of which four subsectors are related to environmental services). Then the simple average at the level of the 11 sectors (1 sector for environment services) can be calculated. The Hoekman Index takes the value between 0 and 1, with 0 referring to the most restricted status, while 1 being the most open situation.

Table 17 shows Hoekman Index calculations for environmental services (see Appendix B for ASEAN member states’ specific commitment tables under the AFAS 10th package). Overall, the environmental services are well committed to trade liberalisation. By mode, Mode 1 and Mode 2 are more deeply committed than Mode 3 (Mode 4 is not subject to negotiation under AFAS). Two countries (Cambodia and Lao PDR) committed to full liberalisation for all four modes with varying degrees for other countries from 0.54 to 0.92 (table 17).

²⁷ This simple but objective indexation method applies a “digital” (i.e., discrete points of 0, 1, or 0.5) treatment to sometimes ambiguous legal texts. Based on the “law of large numbers”, aggregation of these digitised figures is expected to reflect some degree of service trade liberalisation.

Table 17. Hoekman Index by ASEAN member state for environmental services (under the AFAS 10th package)

Subsector	CPC code	Mode	Brunei										Viet Nam	
			Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand			
06.A. Sewage Services	9401	Mode1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.5	0	0	0.75	
		Mode2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0	1.00	1.00	
		Mode3	0.75	1.00	0.5	1.00	0.75	0.5	0.75	0	0.75	0	0.75	1.00
		Average	0.92	1.00	0.83	1.00	0.92	0.83	0.75	0.00	0.75	0.58	0.58	0.92
06.B. Refuse Disposal Services	9402	Mode1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.5	0.5	0.75	
		Mode2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
		Mode3	0.75	1.00	0.5	1.00	0.75	0.5	0.75	0.75	0.75	0.75	1.00	
		Average	0.92	1.00	0.83	1.00	0.92	0.83	0.92	0.75	0.75	0.75	0.92	
06.C. Sanitation and Similar Services	9403	Mode1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0	0	0	1.00	
		Mode2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
		Mode3	0.75	1.00	0.5	1.00	0	0.5	0.75	1.00	0.75	0.75	1.00	
		Average	0.92	1.00	0.83	1.00	0.67	0.83	0.58	0.67	0.58	0.58	1.00	
06.D. Other	9409	Mode1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.5	0.5	0.75	
		Mode2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
		Mode3	0.75	1.00	0.5	1.00	0.75	1.00	0.75	0.75	0.75	0.75	0.75	
		Average	0.92	1.00	0.83	1.00	0.92	1.00	0.92	0.75	0.75	0.75	0.83	
Average of all subsectors and modes			0.92	1.00	0.83	1.00	0.85	0.88	0.79	0.54	0.67	0.92		

Source: AJC, calculated from the specific commitment tables under the AFAS 10th package.

However, some “unbound” commitments have prudential reasons, e.g., supply of services in Mode 1 might be technically infeasible. This paper also recognises the difference between no commitment (i.e., unbound) and no commitment technically feasible (i.e., unbound*) as Appendix B indicates.²⁸ Aside from this, the environmental services are well committed.

Some observations by country follow.

Brunei Darussalam: The index value overall is rather high (0.92). In Mode 3, a joint venture requirement with the upper foreign participation limit of 70 per cent applies; as a majority ownership (70 per cent) by foreign suppliers is allowed, Brunei’s degree of liberalisation in this sector is rather high.

Cambodia: All subsectors are fully liberalised (the index value is 1.0), implying the willingness of Cambodia to promote trade in this sector.

Indonesia: Commitments are high on the whole (with the index value of 0.83). In Mode 3, the requirement of joint venture, upper limits on foreign equity participation (70 per cent), and qualification and registration requirements apply.

Lao PDR: Like Cambodia, all subsectors are fully liberalised (the index value is 1.0), implying the willingness of the Lao PDR to promote trade in this sector.

Malaysia: The index value is 0.85. Locally incorporated joint venture and licence requirements apply, possibly reflecting the country’s promotion of this sector under the collaboration of domestic and foreign suppliers.

Myanmar: Commitments are high overall (with the index value of 0.88). Some performance requirements apply, implying the policy intention to promote this sector through inward foreign investment.

Philippines: The overall index value is 0.79. Joint venture requirements and upper limits on foreign equity participation apply, implying the presence of potential domestic suppliers of environmental services.

Singapore: The overall index value is 0.54; sewage services are unbound because this subsector is deemed to be a basic social infrastructure. Upper limits on foreign equity participation apply elsewhere, implying the presence of well-established domestic suppliers.

Thailand: The overall index value is 0.67. “Unbound because of technical infeasibility” in Mode 1 is the main reason for this value; otherwise, the sector is rather open.

Viet Nam: The overall liberalisation degree is high (0.92), second only to Cambodia and to Lao PDR and the same as Brunei Darussalam. “Other environmental protection services” is the least liberalised subsector in environmental services.

²⁸ No commitment (i.e., unbound) and no commitment technically feasible (i.e., unbound*) differ. A country that specifies unbound in its commitment is free in a given sector and mode of supply to introduce or maintain measures inconsistent with market access or national treatment. The advancement of digital technologies is expected to enhance the degree of technical feasibility. For further reference, see Guidelines for the Scheduling of Specific Commitments (WTO Document S/L 92, dated 28 March 2001).

Implications of Shifting from Positive Listing to Negative Listing— from AFAS to ATISA.

Liberalisation of trade in services has implications that transcend national boundaries and the competitive environment. Liberalisation of trade in services in ASEAN has thus far advanced under AFAS. Under AFAS, liberalisation measures have been expanded in a form called a “package” for each round of negotiation, and in 2018, the 10th package, which is the final stage, was signed. In 2020, the ASEAN Trade in Services Agreement (ATISA) to strengthen AFAS was signed. Under the ASEAN Economic Community (AEC) Blueprint 2025, an ASEAN-wide “highly integrated economy” is envisioned. Promotion of ATISA negotiations and legislation for further integration of trade in environmental services is a crucial policy vehicle. With the transition from AFAS to ATISA, the liberalisation method changes from positive listing to negative listing. While AFAS adopted the “positive list method”, which clarifies the service subsectors for liberalisation in the form of commitment tables, ATISA, in contrast, adopts the “negative list method”, which, in the form of reservation tables, lists service subsectors exempted from the obligation of trade liberalisation.

Both methods have pros and cons, but as economies advance and open their markets to foreign companies, shifting from the positive to the negative approach is a natural consequence. This is because, among other things, countries have fewer industries that prohibit investment from abroad and both investors and host countries understand increasingly clearly the sectors in which foreign companies can invest, though this still carries cost implications for doing business (box 5).

In this connection, four ASEAN members—Brunei Darussalam, Malaysia, Singapore and Viet Nam—are signatories to the Comprehensive and Progressive Trans-Pacific Partnership (CPTPP) (see Appendix C). This appendix lists reserved subsectors for environmental services. As shown, few areas are reserved, i.e., the market opening of environmental services seems to be high. This would imply that under the proposed ATISA the degree of market opening would also be high to facilitate trade in environmental services.

Box 5. Positive list vs. negative list: Implications for doing business in environmental services

The transition from AFAS (which takes the positive list style) to ATISA (negative list style) will affect business activities by foreign suppliers. The negative list style basically enables higher commitments; in this sense, the transition from AFAS to ATISA is a welcome situation for foreign suppliers of environmental services. However, transparency may be lacking in the sense of “which subsector is covered by the reservation list”. For example, “hazardous waste” is rather ambiguous, leading to lack of policy transparency (which is also true for the positive list style, because the phrase can also be used under the positive list style).

Introducing a negative list approach may also have some “hidden costs”: for example, while no reservation may exist in a particular (environmental) sector, at the subnational or practical level, restrictive measures and/or fee payments (e.g., at the time of work permit application as an environmental specialist or associated fees and related business costs of asking a judicial scrivener for application by proxy) might apply.

As for the negative list approach, there can be a “current reservation” based on the current (existing) policy measures and there can also be a “future reservation (or reservation for the future)”, for which no currently binding policy measure exists. This might lead to a wider-than-necessary government discretion, posing difficulties for foreign service suppliers. A frequently used phrase in a future reservation is “(our country) reserves the right to adopt or maintain any measures relating to (particular sectors)”.

.../

Box 5. Positive list vs. negative list: Implications for doing business in environmental services
(Concluded)

A performance requirement may also exist in terms of, e.g., technology transfer from investing foreign firms to local firms in the same subfield, and sometimes what is meant by technology transfer is unclear. Thus, securing policy transparency while avoiding undesirable government discretion continues to be an issue even under the negative list style.

IV. IMPACTS OF LIBERALISATION AND DEREGULATION OF ENVIRONMENTAL SERVICES ON ECONOMY

This section addresses the impact of service trade liberalisation on the economy and on the quality of environmental services. However narrowly environmental services are defined here following the GATS classification, to discuss the impact of trade in environmental services, introducing a holistic view on the linkage between society and environment would be desirable. Figure 8 shows the structure of society at large from environmental perspectives, which can help illustrate the impact of liberalising trade in environmental services. This figure shows two human-initiated economic processes, i.e., (i) endosomatic processes, which mean human body-related activities including labour force that consume energy from the environment, and (ii) exosomatic processes, meaning activities using outside-human devices. The loop of human activities can be described from a hierarchical perspective in terms of division of human control over short-term “efficiency” and long-term “adaptability”. The human time and activities available to society can be allocated to three levels: a higher “mental” level, the “human-body” level and a lower “material” level. The “mental” level comprises activities symbolised as A in the figure that are needed to guarantee long-term environmental adaptation. These activities provide society with new cultural identity, knowledge, technology and human reproduction.

The “human-body” level (i.e., (i) endosomatic processes) comprises activities symbolised as B in the figure that are needed to ensure everyday maintenance of the structure of human mass, in terms of controlling matter and energy consumed by society. On the “material” level, C activities are needed to guarantee efficiency improvement in the current society at the focus level. These activities provide flows of inputs from the natural environment.

The loop generated by “exosomatic” (i.e., outside the human body) devices, that is, machines that are society’s capital assets, has two interfaces, one with humans and the other with the environment. In the former interface, machines or capital assets represent a cost for humans in the sense of requiring human labour inputs, yet in return they provide necessary energy inputs to society. In the latter interface, machines as capital assets withdraw energy from and dispose wastes into the environment. Given a particular land area, the degree of machine-related activities relative to the degree of ecological activities determines society’s environmental loading ratio (non-renewable energy use to renewable energy use). A higher environmental loading ratio has a negative environmental impact; conversely, trade liberalisation allows a more efficient supply of environmental services, which lowers the ratio and serves as a positive environmental impact.

From an economic development perspective, continuously increasing ET and C, i.e., increasing energy throughput while decreasing the use of energy for efficiency, would be desirable. Then there are related social impacts of liberalising trade in environmental services at the exosomatic level (ii): liberalisation of trade in environmental services can increase FI, consisting of HH and SS. Also, trade liberalisation could economize B&M, which relates energy inputs to manufacturing processes, and will secure E&M, FS and ES. In terms of the GATS-based service classification that is the focus of this report, “a. Sewage services” and “c. Sanitation and similar services” are related to B activities in figure 8; “b. Refuse disposal services” is connected to “Wastes” and “d. Other services (e.g., cleaning services of exhaust gases, noise abatement services, nature and landscape protection services)” can be related to all the labels in figure 8, i.e., A,²⁹ B and C activities and FI, B&M, E&M, FS, ES, ET and wastes. In this sense, services trade liberalisation could contribute to reducing environmental challenges. Sauvage and Timiliotis (2017) show that freer trade could reduce the cost of environmental services, thus helping firms to access cheaper or more advanced technology to mitigate environmental harm.

More specifically, Kirkpatrick (2006, p. 12) describes the positive impacts of liberalisation of environmental services as follows:

- Clean water and waste collection services delivered to more citizens, leading to healthier human environments
- Use of waste recycling to create alternative sources of energy
- In-country presence of foreign firms creating opportunities for environmental management education and training and skills transfer to other commercial sectors
- Availability of more environmental technologies to address environmental problems more appropriately, implying a potential move away from end-of-pipe solutions to preventive ones
- Reinvestment of a share of profits in research and development of new environmental technologies and skills, environmental infrastructure upgrades and new environmental investments.

Further potential economic and development benefits include

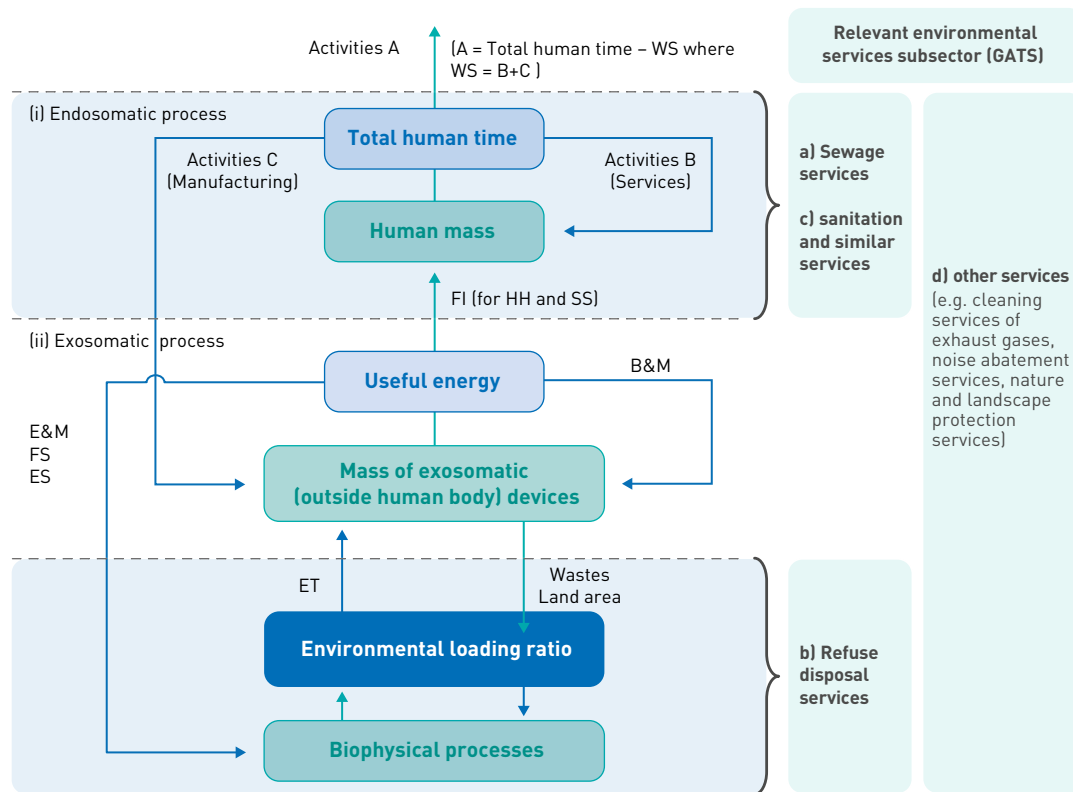
- Relief of pressure on government budgets, including at state and municipal levels. Savings may be reallocated to environmental policy, inspection and enforcement budgets; to other social services or to the overall budget balance.
- The creation of skilled and unskilled jobs for local workers in design, construction and long-term operation of facilities.
- The provision of water and waste management systems attracting foreign and local investment to the community, bringing more jobs, stable economic growth and an increased local tax base.
- Local private sector partners extending their experience in large and/or much specialised projects that are then exported to other countries with similar needs and operating conditions.
- BOT operations that revert to local ownership at a specified time and include significant environmental resources and sources of jobs that continue into the future.

However, some potential negative impacts are

- Potentially new or higher fees for consumers
- Loss of employment within existing service providers
- Loss of subsidies to existing monopoly utilities, which means that they are unable to compete with new providers.

²⁹ A activities [creative/mental/cultural activities] will be used at least partially as inputs for the next-period creation of exosomatic devices (i.e., new machines) in the form of “creative destruction” (i.e., the current exosomatic devices must be scrapped); figure 8 is just a snapshot focusing on the current state.

Figure 8. Human society as an evolving environmental system



Source: Adapted from Mayumi (2001), figure 9.4.

- Note: Symbols in the figure denote the following concepts:
- A: activities (creative/mental/cultural/activities): Human activities necessary to guarantee long-term adaptability (or sustainability)
 - B: activities (services): Human activities that provide the system of controls over the network of matter and energy consumed by society
 - C: activities (manufacturing): Human activities that guarantee efficiency in the set of everyday operations
 - FI: Fixed investment
 - SS: Service sector
 - HH: Household
 - B&M: Building and maintenance
 - E&M: Energy and mining
 - FS: Food security
 - ES: Environmental security
 - WS: Time for work supply
 - ET: Energy throughput (volume of energy use).

In their analysis of FTA negotiations in Asia, Fink and Molinuevo (2007) find that while interest in the fields of construction and tourism is high, negotiation results are few in the fields of environment, health, transport and finance. Generally speaking, among current ASEAN FTAs, Singapore makes commitments at higher levels than the GATS (Mitchell and Rae, 2009).

The degree to which advancement in liberalising environmental services has contributed to the entry of overseas companies is difficult to quantify. Sasaki (2017) analysed the market trends for the environmental services trade in APEC and showed that when it is freer the differences between foreign and domestic companies tend to be narrower. This result indicates that opening markets to overseas companies would increase social welfare.

Absent detailed numerical evidence, some anecdotes may be useful. In Thailand, for example, deregulation of industrial waste disposal since 2001 has increased the number of firms operating in environmental services and the overall recycling rate (of used products), with the Board of Investment applying a preferential tax rate to the relevant environmental firms.³⁰ As for energy efficiency services, the APEC Policy Support Unit describes the importance of introducing foreign technology (2017a) in addressing renewable energy services (2017b) and taking up damage remediation services, both of which indicate the positive impact of inviting foreign suppliers of environmental services (2017c).

Policy efforts by the ASEAN member states under the United Nations Framework Convention on Climate Change (UNFCCC) also indicate the impact of liberalising environmental services on socioeconomic activities, as evidenced by internationally binding commitments to reduce greenhouse gases. Following are excerpts from these commitments by country, in the form of Intended Nationally Determined Contributions of UNFCCC.³¹ Liberalisation of trade in environmental services, when geared towards this goal, would produce positive socioeconomic impacts on country-level pledges (made in 2015 as internationally binding commitments in terms of environmental mitigation)³² as highlighted in the following.

Brunei Darussalam: The country's economy benefits from revenues from the extraction, refining and export of its oil and gas reserves. Given that the energy sector is the dominant sector with respect to gross domestic product (GDP) and greenhouse gas emissions generated, the country's first mitigation contribution primarily concerns actions within the energy sector, followed by the land transport sector and the forestry sector. Brunei Darussalam pledges to reduce total energy consumption by 63 per cent by 2035 compared with business-as-usual (BAU) levels and to increase the share of power generated by renewables to 10 per cent by 2035. The country also pledges to reduce carbon dioxide (CO₂) emissions from morning peak hour vehicle use by 40 per cent by 2035, compared with BAU levels, and it pledges to increase total gazetted forest reserves to 55 per cent of total land area, compared with the current 41 per cent coverage.

Cambodia: The country wishes to address climate change in terms of energy industries, manufacturing industries, transport, other sectors and land use, land use change and forestry (LULUCF). Cambodia aims to reduce emissions 27 per cent below a BAU scenario by 2030, with an additional target to increase forest cover to 60 per cent of national land area by 2030. This is conditional upon international support. Commitment includes a section on adaptation.

Indonesia: The country focuses on agriculture, LULUCF, energy, industrial processes and product use and waste disposal/management. Indonesia targets a 29 per cent reduction in emissions by 2030, compared with BAU. Indonesia says it will increase its reduction goal to 41 per cent, conditional on support from international cooperation. Commitment includes a section on adaptation.

Lao PDR: The country emphasises the greenhouse gas reduction impact arising from forestry, renewable energy, rural electrification, transport services and the use of large-scale hydroelectricity. Lao PDR commits to several policies and actions designed to reduce emissions, which it will need financial support to implement. Commitment includes a section on adaptation.

³⁰ <http://jsts.moo.jp/thaigakkai/wp-content/uploads/2014/11/thaigakkai-13-3-sasaki.pdf>.

³¹ While UNFCCC mainly addresses greenhouse gases, it is considered to be a comprehensive policy framework for regulating society overall in terms of environmental conservation.

³² According to Carbon Brief (under the Paris Agreement), <https://www.carbonbrief.org/paris-2015-tracking-country-climate-pledges> and <https://www4.unfccc.int/sites/NDCStaging/Pages/All.aspx>.

Malaysia: The country focuses on energy, industrial processes, waste disposal/management, agriculture and LULUCF. Malaysia intends to reduce its greenhouse gas emissions intensity of GDP by 45 per cent by 2030 relative to the emissions intensity of GDP in 2005. Thirty-five per cent of this reduction is unconditional, while 10 per cent is conditional upon receipt of climate finance, technology transfer and capacity building from developed countries.

Myanmar: Its focus is on the forestry sector, the energy sector, renewable energy (hydroelectric power and rural electrification) and energy efficiency (industrial processes and cook stoves). Myanmar presents several sectoral goals that include increasing hydropower capacity to 9.4 gigawatts by 2030, achieving rural electrification based on at least 30 per cent renewable sources and increasing forested area to 30 per cent by 2030. Efforts to calculate and present a reliable estimate of current emissions are part of the pledge. Commitment includes a section on adaptation.

Philippines: The country earmarks energy, transport, waste, forestry and industry sectors. The Philippines aims to reduce emissions by about 70 per cent by 2030, relative to a BAU scenario, on the condition of international support. Commitment includes sections on adaptation and loss and damage. To reduce greenhouse gas emissions, the Philippine government adopted a national strategy to reduce emissions from deforestation and forest degradation as part of its 2010 National Framework Strategy on Climate Change and the 2011–2028 National Climate Change Action Plan. The strategy defines activities that will slow deforestation and encourage afforestation and sustainable forest management (GIZ, n.d.).

Singapore: Energy efficiency is a key strategy for Singapore, and the country aims to produce goods in an energy- and carbon-efficient manner. Singapore pledges a 36 per cent reduction in emission intensity by 2030, compared with 2005 levels, with emissions peaking around 2030. Singapore intends to achieve this without international market mechanisms, although the country will continue to study their potential. Commitment contains information on adaptation activities.

Thailand: Its mitigation efforts primarily focus on the energy and transport sector. Thailand commits to an unconditional 20 per cent reduction in emissions by 2030, compared with BAU levels. This could increase to 25 per cent, conditional upon the provision of international support. Commitment includes section on adaptation.

Viet Nam: The country focuses on energy, industry, transport, agriculture, waste and the LULUCF sectors. Viet Nam targets an 8 per cent reduction in emissions by 2030, compared with a BAU scenario. This could be increased to 25 per cent conditional upon international support. The country also pledges to increase forest cover to 45 per cent. Commitment includes a section on adaptation.

V. POLICY SUGGESTIONS

To maximise benefits and minimise negative impacts, ASEAN member states need policy measures that are based on the status quo of their environmental- and trade-related activities. This section proposes recommendations and policy measures to promote trade in environmental services. These services should be viewed from a much broader policy perspective for environmental sustainability and thus in relation to climate change, regardless of the size of their contribution to climate change. Waste management, which includes landfills and wastewater treatment, is projected to emit gases of 1.7 gigatons of CO₂ equivalents (GtCO₂) globally in 2030 with a mitigation potential of 1.5 GtCO₂ if the required investment is made (UNCTAD, 2010, p. 109). While gas emissions from waste management are small compared with other industries (e.g., 18.7 GtCO₂ for the power sector), nearly 90 per cent of gas emissions is mitigated in this services sector (only 54 per cent for power).

General Policy Recommendations

While rich in natural resources including food and energy, the ASEAN region faces environmental degradation due to increased population and rapid economic development, among other factors.³³ These changes have also led to increased consumption of resources and generation of wastes, resulting in unsustainable development. Therefore, despite an abundance of natural resources, the ASEAN region, like other regions, is facing an enormous challenge in keeping a delicate balance between environmental sustainability and economic development. Recognising this situation, ASEAN has had environmental cooperation for sustainable development and regional integration in place since 1977. The framework for ASEAN-wide environmental cooperation is administered by the ASEAN Socio-Cultural Community (ASCC) Blueprint 2025, which envisions “an ASEAN Community that engages and benefits the peoples and is inclusive, sustainable, resilient, and dynamic”.

More specifically, the “sustainability” component of the ASCC Blueprint mentions the following four items:

- C.1. Conservation and Sustainable Management of Biodiversity and Natural Resources
- C.2. Environmentally Sustainable Cities
- C.3. Sustainable Climate
- C.4. Sustainable Consumption and Production.³⁴

A clear-cut conceptual framework can be proposed with a view to realising these objectives. Among the GATS-defined service sectors, the category of “environmental services” remains relatively under-defined. Based on generally accepted perceptions, environmentally friendly economic activities

³³ This paragraph is based on the website “ASEAN Cooperation on Environment”, <https://environment.asean.org/about-asean-and-the-environment/>.

³⁴ An ASEAN strategic plan on environment has been developed to break down the policy targets under the ASCC Blueprint 2025 into more detailed workable actions. The following seven strategic priorities have been identified under the plan:

- Nature conservation and biodiversity
- Coastal and marine environment
- Water resources management
- Environmentally sustainable cities
- Climate change
- Chemicals and waste
- Environmental education and sustainable consumption and production.

are those that aim for sustainable development without degrading the environment. A schematic description follows.

Negative environmental harm, or impact, H (in a generic sense, including but not limited to the emission of carbon dioxide), is decomposable into three factors,

$$H = (H/R) \times (R/GDP) \times GDP$$

where

H = Negative environmental harm, or impacts (in general, including carbon dioxide emissions)

R = Resource use for economic activities

GDP = Gross domestic product.

Environmentally friendly economic activities can then be any type of economic activities contributing to the increase of GDP and either (a) reduction of H/R (i.e., environmentally cleaner resource use) or (b) reduction of R/GDP (more efficient resource use), with a view to reducing the level of H overall.

Meanwhile, under the Paris Agreement on Climate Change, all the ASEAN members have submitted “climate action plans” on a voluntary pledge basis (see the previous section). Under the Paris Agreement, most importantly, technological improvements are viewed as the main source of mitigation and adaptation strategies, in addition to price-based incentive provision.

Nordhaus (2016), however, mentions that environmental adaptation would be more important than environmental mitigation because the pledge level by countries is not enough.³⁵ Then multiple activities for environmental mitigation as well as adaptation would be indispensable. This translates into multimode service trade activities. Consultation on mitigation and adaptation strategies, for example, could be sourced by truly “innovative” (Wankel and Stoner, 2008) foreign suppliers in Modes 1, 3 and 4.

Workable Policy Recommendations

As mentioned in Section IV, freer trade could reduce the cost of environmental services and help firms access cheaper or more advanced technology to mitigate environmental harm. Focusing on the aforementioned conceptual aspects, i.e., (a) reducing H/R and (b) reducing R/GDP , table 18 matches the previously mentioned four policy targets (C.1. through C.4.) under the ASCC Blueprint 2025 and the environmental services trade subsectors defined by WTO.

Because environmental adaptation seems to be more important than environmental mitigation due to the currently limited degree of mitigation policy efforts (Nordhaus, 2016), full utilisation of all four modes of trade in environmental services is imperative. For example, promoting information-and-communications-technology-based environmental mitigation/adaptation in Mode 1; receiving relevant training in Mode 2; establishing innovative foreign firms, possibly under a joint venture agreement with local firms in Mode 3 and enabling environmental specialists’ movement across the ASEAN region in Mode 4 should be materialised under ATISA.

³⁵ Unlike its predecessor the Kyoto Protocol, which set environmental targets with a legally binding force, the Paris Agreement emphasises consensus building, thereby allowing voluntary and nationally determined targets (Aldy and Stavins, 2010; Stern, 2006; Sugiyama et al., 2010).

Table 18. Matching of the targets under the ASEAN Community Vision 2025 and the environmental services trade subsectors defined by WTO

Subsector defined by WTO	Targets under the ASEAN Community Vision 2025			
	C.1. Conservation and Sustainable Management of Biodiversity and Natural Resources	C.2. Environmentally Sustainable Cities	C.3. Sustainable Climate	C.4. Sustainable Consumption and Production
	<i>Suggested policy (where applicable)</i>	<i>Suggested policy (where applicable)</i>	<i>Suggested policy (where applicable)</i>	<i>Suggested policy (where applicable)</i>
a. Sewage services	..	For reducing <i>R/GDP</i> : introduction of smart grids for sewage management	..	..
b. Refuse disposal services	For reducing <i>R/GDP</i> : introduction of garbage separation policy in sightseeing areas	..	..	For reducing <i>H/R</i> : introduction of biodegradable packages for consumption items For reducing <i>R/GDP</i> : facilitation of using "my-bags" for shopping
c. Sanitation and similar services	..	..	For reducing <i>H/R</i> : introduction of carbon tax	..
d. Other services (e.g., cleaning services of exhaust gases, noise abatement services, nature and landscape protection services)	..	..	For reducing <i>R/GDP</i> : introduction of top-runner policy (dynamic targeting of reducing carbon dependency, based on the currently most efficient practices)	For reducing <i>R/GDP</i> : introduction of environmentally friendly service standards

Source: AJC.

CONCLUSION: WHAT IS NEXT?

This section makes some future-oriented suggestions for the following four environmental categories defined as “environmental services” under GATS:

- a. Sewage services
- b. Refuse disposal services
- c. Sanitation and similar services
- d. Other services (e.g., cleaning services of exhaust gases, noise abatement services and nature and landscape protection services).

However, gaps exist between the aforementioned, narrowly defined GATS classification and more broadly captured “environmental services”: variations exist in the definition of environmental services. A set of policy recommendations on the need to develop possible approaches to delineating commitments/activities that fall under environmental services vis-à-vis other related services could be considered.³⁶

To operationalise next-step policy efforts by ASEAN, policy objectives in connection to environmental provision would need to be fine-tuned. In concrete terms, trade-related environmental provisions under FTAs are crucial. Table 19 shows policy objectives of environmental provisions scored by perceived importance (based on George, 2014). As shown, “ensuring that environmental laws are not relaxed” is the first policy objective listed, hence explicitly including this policy objective in FTAs could lead to further trade liberalisation by attracting technologically advanced foreign suppliers of environmental services defined by WTO (as indicated previously). Likewise, piecemeal attempts to include the other policy objectives in the table could be beneficial for promoting trade in environmental services by technologically advanced foreign suppliers.

As mentioned previously, drastic environmental mitigation (i.e., controlling global warming fully) is infeasible by policy options alone. This is due mainly to the public good nature of the global environment and the global nature of environmental problems intensified by the increasing regional and international connectivity of ASEAN economies: while all countries including the ASEAN member states are affected, they also tend to avoid making drastic policy commitments. Focusing on adaptation to emerging new environmental situations would be a feasible policy option, especially for smaller countries, including many of ASEAN members, which have less control over the global environment.

ASEAN has engaged in trade negotiations not just among its member states but also with non-ASEAN countries. Most notably, the 10 ASEAN members and Australia, Japan, New Zealand, the People’s Republic of China and the Republic of Korea have just concluded the Regional Comprehensive Economic Partnership (RCEP).³⁷ This plurilateral agreement includes provisions for trade in environmental services.³⁸ While a detailed analysis of the contents of RCEP takes time and is beyond the scope of this paper, which centers on ASEAN members, a preliminary look at the agreement finds that for environmental services (and the other service sectors), a combination of positive listing and negative listing is applied, indicating a transition from the former (positive listing) to the latter (negative listing). If the RCEP agreement is implemented fully, movement of

³⁶ Environmental consultancy services, as part of GATS-defined “professional services” and part of “other business services”, can also fall under any one of the aforementioned categories (a–d) depending on the specific environmental services at issue. In the actual commitment under FTAs, cross-referencing among relevant subsectors might be needed.

³⁷ RCEP was signed by the 15 (ASEAN 10 plus five) negotiating countries on 15 November 2020.

³⁸ The text of RCEP is available at https://www.mofa.go.jp/ecm/ep/page24e_000272.html.

environmental firms and specialists across the ASEAN-plus five single market would be freer. Still, an ASEAN-wide, piecemeal approach to implementing measures (as illustrated previously) for increasing trade in environmental services continues to be needed. ASEAN member states under multiple trade frameworks (including RCEP) should further promote environmental improvement, be it mitigatory or adaptive in nature, leading to an increase of concrete business projects by green foreign firms with funds and technology. ASEAN member states, in collaboration with multiple stakeholders, including international organisations such as the ASEAN-Japan Centre, are expected to strive to achieve the ASEAN Community Vision 2025.

Table 19. Policy objectives of environmental provisions scored by perceived importance

Policy Objective	Score ^b
Ensuring that environmental laws are not relaxed	19
Ensuring trade does not harm the environment	17
Promoting globally sustainable development	17
Effectively enforcing environmental legislation	16
Ensuring coherence between environmental and trade objectives	16
Ensuring a level playing field in environmental legislation	15
Promoting environmental cooperation	15
Mitigating transboundary/global environmental impacts	14
Promoting green growth	11
Promoting implementation of multilateral environmental agreements ^a	11
Promoting the use of environmental management tools	11
Promoting trade in environmental goods and services	10
Promoting better governance in partner economies	10
Collaborating on research	9
Minimising adverse effects of environmental legislation on trade	9
Using trade measures to achieve environmental objectives	9
Mitigating impacts via ex ante impact assessments	9

Source: George (2014), Table 3.

^a Concerning multilateral environmental agreements, future trade agreements involving ASEAN could contain measures that prohibit trade in certain species or products, or that allow countries to restrict trade in certain circumstances (https://www.wto.org/english/tratop_e/envir_e/envir_neg_mea_e.htm).

^b According to George (2014), OECD prepared a questionnaire regarding the main factors that influence the negotiation of environmental provisions in regional trade agreements. Respondents (representatives from OECD member countries) were asked to score the importance (i.e., choose from these three qualitative judgments: "high importance", "medium importance" and "low importance") of their own jurisdiction's main objectives for the inclusion of environmental provisions in regional trade agreements from the suggested list. In total, 10 responses representing OECD member countries were received. Then the score was calculated as (no. of high responses × 2) + (no. of medium responses). The maximum score is 20, and the minimum score is 0. As the number of responses is limited, the scoring serves an indicative purpose rather than being statistically definite and representative.

REFERENCES

- Academy of Science Malaysia. (2015). *Strategies for the Improvement of Water Supply and Wastewater Management Service in Malaysia*. Volume 1, https://www.akademisains.gov.my/asmpub/?smd_process_download=1&download_id=200.
- ADB. (2014). *Urban Water Supply and Sanitation in Southeast Asia: A Guide to Good Practice*. Mandaluyong City: Asian Development Bank.
- Aldy, J.E. and R.N. Stavins, Eds. (2010). *Post-Kyoto International Climate Policy: Implementing Architectures for Agreement*. Cambridge: Cambridge University Press.
- APEC Group on Services. (2010). "Survey on APEC Trade Liberalization in Environmental Services", APEC Group on Services, APEC Committee on Trade and Investment, APEC Secretariat, Singapore, <https://apec.org/Publications/2010/05/Survey-on-APEC-Trade-Liberalization-in-Environmental-Services>.
- APEC Policy Support Unit. (2016). "Survey of Regulatory Measures in Environmental Services", <https://www.apec.org/Publications/2016/11/Survey-of-Regulatory-Measures-in-Environmental-Services>.
- APEC Policy Support Unit. (2017a). "Sector Study on Environmental Services: Energy Efficiency Businesses", https://www.apec.org/-/media/APEC/Publications/2017/10/Sector-Study-on-Environmental-Services-Energy-Efficiency-Businesses/217_PSU_Environmental-Services_Energy-Efficiency-Businesses.pdf.
- APEC Policy Support Unit. (2017b). "Sector Study on Environmental Services: Environmental Damage Remediation Services", https://www.apec.org/-/media/APEC/Publications/2017/10/Sector-Study-on-Environmental-Services-Renewable-Energy/217_PSU_Environmental-Services_Renewable-Energy.pdf.
- APEC Policy Support Unit. (2017c). "Sector Study on Environmental Services: Renewable Energy", https://www.apec.org/-/media/APEC/Publications/2017/10/Sector-Study-on-Environmental-Services-Environmental-Damage-Remediation-Services/217_PSU_Environmental-Services_Env-Damage-Remediation-Services.pdf.
- ASEAN IWRM. (n.d.). "Overview of IWRM in Brunei", ASEAN Integrated Water Resources Management, <https://aseaniwrm.water.gov.my/iwrm-in-brunei/>.
- ASEAN IWRM. (n.d.). "Overview of IWRM in Malaysia", ASEAN Integrated Water Resources Management, <https://aseaniwrm.water.gov.my/iwrm-in-malaysia/>.
- ASEAN Secretariat. (2017). "Fifth ASEAN State of the Environmental Report", ASEAN Secretariat, Jakarta, <https://environment.asean.org/soer5/>.
- Brooks, A., S. Wang and J. Jambeck. (2018). "The Chinese Import Ban and Its Impact on Global Plastic Waste Trade", *Science Advances* 4(6): eaat0131.
- Fink, C. and M. Molinuevo. (2007). *East Asian Free Trade Agreements in Services: Roaring Tigers or Timid Pandas?* Washington, DC: World Bank.
- George, C. (2014). "Environment and Regional Trade Agreements: Emerging Trends and Policy Drivers", OECD Trade and Environment Working Papers 2014/02, Paris.
- GIZ. (n.d.) "National REDD+ system for the Philippines". Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, <https://www.giz.de/en/worldwide/18259.html>.
- Greenpeace. (2019). "Southeast Asia's Struggle Against the Plastic Waste Trade", A Policy Brief for ASEAN Member States, https://storage.googleapis.com/planet4-philippines-stateless/2019/06/a72e63b1-waste-trade-report-5b-1.pdf?_ga=2.100347866.552988082.1560739055-281246604.1499670505.
- Hoekman, B. (1995). "Assessing the General Agreement on Trade in Services", World Bank Discussion Paper No. 307, Washington, DC.

- IGES. (2013). "Urban Domestic Wastewater Management in Viet Nam—Challenges and Opportunities", Policy Brief Series 5, Water Environment Partnership in Asia, http://www.wepa-db.net/pdf/1403policy_brief/PolicyBrief_2013_5.pdf.
- IGES. (2017). *Waste Management in Myanmar. Current Status, Key Challenges and Recommendations for National and City Waste Management Strategies*. Kanagawa: IGES Centre Collaborating with UNEP on Environmental Technologies (CCET).
- ITC. (2014). Presentation in the Seminar on the Implementation of APEC Environmental Goods Commitments, https://www.intracen.org/uploadedFiles/intracencorg/Content/Exporters/Sectors/Service_exports/Trade_in_services/APEC%20Seminar%20on%20Environmental%20Goods.pdf.
- Jacob, A. and A.K. Møller. (2017). "Policy Landscape of Trade in Environmental Goods and Services", ARTNeT Working Paper Series No. 166, April 2017, ESCAP, Bangkok, <https://www.unescap.org/sites/default/files/AWP%20No.%20166.pdf>.
- Kaza, S., L. Yao, P. Bhada-Tata and F. Van Woerden. (2018). "What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050", Urban Development Series Knowledge Papers, World Bank, Washington DC.
- Kirkpatrick, C. (2006). "Trade in Environmental Services: Assessing the Implications for Developing Countries in the GATS", ICTSD Trade and Environmental Series Issue Paper No. 3, International Centre for Trade and Sustainable Development, Geneva.
- Koontanakulvong, S., P. Dounmanee and P. Hoisungwan. (2014). "Water Security Index Concept. Thailand's Water Security Situation in the Context of World and ASEAN", Presentation at the 11th Kovacs Colloquium, 16–17 June 2014, UNESCO Headquarters, Paris.
- Mayumi, K. (2001). *The Origin of Ecological Economics: The Bioeconomics of Georgescu-Roegen*. London: Routledge.
- METI, Government of Japan. (2019). *Feasibility Study on the Overseas Expansion of Quality Infrastructure Project in FY2018: Study on Industrial Wastewater Treatment and Wastewater Monitoring Business in the Republic of the Union of Myanmar*. Tokyo: Ministry of the Economy, Trade and Industry.
- Mitchell, A. and J. Rae. (2009). "Evaluation of Commitments and Offers of Liberalisation in Environmental Services", Georgetown Law and Economics Research Paper No.1507129, Washington, DC.
- Nguyen, V. (2018). "Water and Wastewater Management in Viet Nam: Status, Plans, and Business Opportunities", Presentation in UNIDO ITPO Tokyo Seminar on Water Supply and Wastewater Treatment, Smart Engineering Tokyo 2018, Tokyo, Japan.
- Nordhaus, W. (2016). "Projections and Uncertainties about Climate Change in an Era of Minimal Climate Policies", <http://cowles.yale.edu/sites/default/files/files/pub/d20/d2057.pdf>. Retrieved from Cowles Foundation.
- PIC. (2015). "Waste Management Challenges in Cambodia and Experiences from Other Countries", Research Paper, Parliamentary Institute of Cambodia, Phnom Penh.
- Research, Innovation and Enterprise Secretariat, Singapore. (2016). *Research, Innovation, Enterprise 2020 Plan, Singapore*, <https://www.mti.gov.sg/-/media/MTI/Resources/Publications/Research-Innovation-and-Enterprise-RIE-2020/RIE2020.pdf>.
- Sang-Arun, J. and K. Pasomsouk. (2012). "A Guide for Improving Municipal Solid Waste Management and Promoting Urban Organic Waste Utilization in Lao PDR." IGES Working Paper No. SCP-2012-01, Sustainable Consumption and Production Group, Institute for Global Environmental Strategies, Kanagawa.
- Sasaki, S. (2017). "An Analysis of the Relation between the Non-Tariff Barrier of Waste Disposal Treatment Service and Foreign Capital Companies", APEC Workshop on Environmental Services, <https://www.pecc.org/resources/environment-1/2473-an-analysis-of-the-relation-between-the-non-tariff-barrier-of-waste-disposal-treatment-service-and-foreign-capital-companies>.

- Sauvage, J. and C. Timiliotis. (2017). "Trade in Services Related to the Environment", OECD Trade and Environment Working Papers 2017/02, OECD Publishing, Paris, <http://dx.doi.org/10.1787/dc99bf2b-en>.
- SPAN, Government of Malaysia. (2018). *Annual Report*. National Water Services Commission, Suruhanjaya Perkhidmatan Air Negara, <https://www.span.gov.my/document/upload/D5JoapftrLSaCCPh69zqhGokD8pzn8B.pdf>.
- Schneider, P., H.A. Le, J. Wagner, J. Reichenbach and A. Hebner. (2017). "Solid Waste Management in Ho Chi Minh City, Vietnam: Moving towards a Circular Economy?" *Sustainability* 9(286):1–20. doi:10.3390/su9020286.
- Sreenivasan, J., M. Govindan, M. Chinnasami and I. Kadiresu. (2012). "Chapter 3: Solid Waste Management in Malaysia—A Move towards Sustainability", in Luis Rebellon (Ed.), *Waste Management—An Integrated Vision*, IntechOpen No. 2507. doi:10.5772/50870.
- Steenblik, R. and M. Geloso Grosso. (2011). "Trade in Services Related to Climate Change: An Exploratory Analysis", OECD Trade and Environment Working Papers 2011/03, OECD Publishing, Paris.
- Stern, N. (2006). *The Economics of Climate Change: The Stern Review*. Cambridge: Cambridge University Press.
- Sugiyama, T., O. Kimura and F. Noda. (2010). *Shou Enerugi Seisakuron: Koujou, Jigyousho deno Shouene Hou no Jikkousei* (Energy Conservation Policy: Effectiveness of Energy Conservation Law at the Factory and Establishment Level) [in Japanese]. Tokyo: Enerugi Forumu.
- Thailand Country Report. (2019) "Thailand Country Report at the Ninth Regional 3R Forum in Asia and the Pacific, 4–6 March 2019", <https://www.uncrd.or.jp/content/documents/7538Combined-front%20page+report-Thailand.pdf>.
- UN. (2020). "World Water Development Report: Water and Climate Change". <https://unesdoc.unesco.org/ark:/48223/pf0000372985.locale=en>.
- UNCRD. (2017a). "Viet Nam Country Chapter. State of the 3Rs in Asia and the Pacific." Secretariat of the Regional 3R Forum in Asia and the Pacific, United Nations Centre for Regional Development, Institute for Global Environmental Strategies. Nagoya, Japan.
- UNCRD. (2017b). "Indonesia Country Chapter. State of the 3Rs in Asia and the Pacific." Secretariat of the Regional 3R Forum in Asia and the Pacific, United Nations Centre for Regional Development, Institute for Global Environmental Strategies. Nagoya, Japan.
- UNCTAD. (2010). *World Investment Report 2010: Investing in a Low Carbon Economy*. Geneva: UNCTAD.
- UNEP. (2017). "Waste Management in ASEAN Countries". Nairobi, UNEP.
- UNEP, ITC and ICTSD. (2012). "Trade and Environment Briefings: Environmental Services, ICTSD Programme on Global Economic Policy and Institutions", Policy Brief No. 7, International Centre for Trade and Sustainable Development, Geneva.
- USITC. (2012). "Environmental and Related Services, Investigation No. 332-533", United States International Trade Commission, Washington, DC.
- Wankel, C. and J.A.F. Stoner. (2008). *Innovative Approaches to Global Sustainability*. New York: Palgrave.
- World Bank. (2018). "What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050", Urban Development Series Knowledge Papers, Washington, DC.
- World Bank. (2013a). "Urban Sanitation Review: Indonesia Country Study", Washington, DC.
- World Bank. (2013b). "Viet Nam Urban Wastewater Review", Washington, DC.
- World Bank. (2013c). "Urban Sanitation Review: Philippines Country Study", Washington, DC.
- WTO. (2010). "Background Note on Environmental Services", Note by the Secretariat submitted to the Council for Trade in Services (S/C/W/320), Geneva.

APPENDIX A. SELECTED FDI CASES IN ENVIRONMENTAL SERVICES IN ASEAN, 2003–2009

(1) Waste management services

Year	Host ASEAN country	Investing country	Investor name	Type of investment	Investment amount (Million \$)	Capital share obtained (%)	Acquired company (for M&A only)
2003	Malaysia	France	Veolia Water	Greenfield	24.2	100	..
2003	Malaysia	Australia	Ecogen Energy	M&A	..	100	Conwaste Disposal Services Sdn Bhd
2005	Thailand	Malaysia	Tex Cycle (TCSEB)	Greenfield	3.92	100	..
2006	Singapore	China	Tongfang (Tinghua Tongfang)	Greenfield	2	100	..
2006	Malaysia	Malaysia	UE Novoi(Malaysia)Sdn Bhd	M&A	1	100	Dataran Tenaga(M)Sdn Bhd
2007	Viet Nam	Korea, Republic of	Kbec	Greenfield	9.7	100	..
2007	Malaysia	United Kingdom	TWMA Group	Greenfield	9.7	100	..
2007	Viet Nam	United States	Asia Biogas	Greenfield	5.3	100	..
2007	Malaysia	Hong Kong, China	Paperbox Holdings Ltd	Greenfield	-	100	Genting Sanyen Utilities & Services Sdn Bhd
2007	Thailand ^a	Thailand	ISCN Technology(Thailand)Co Ltd	M&A	..	75	Odyssey Technologies(TH)Co Ltd
2008	Thailand	unspecified	..	M&A	..	30	Suvarnabhumi Environmental Care Co Ltd
2009	Viet Nam	Korea, Republic of	Kbec	Greenfield	40	100	..
2009	Singapore	India	Majestic Asset Investments Corp	M&A	..	5	Dayen Environmental Ltd
2009	Malaysia ^b	Singapore	IFA Accountancy Institute Ltd	M&A	-	35	Airchem Holdings Sdn Bhd
2010	Singapore	Australia	University of New South Wales	Greenfield	14.3	100	..
2010	Malaysia ^c	Malaysia	Air Pollution Control Engineering Sdn Bhd	M&A	..	100	Wet Air Sdn Bhd
2011	Singapore	Singapore	KKR China Water Investment Holdings Ltd	M&A	114	39	United Envirotech Ltd
2013	Singapore	Singapore	KKR China Water Investment Holdings Ltd	M&A	40	45	United Envirotech Ltd
2014	Myanmar	Japan	Dowa Eco-System	Greenfield	36	100	..
2014	Singapore	Hong Kong, China	Sound(HK)Ltd	M&A	13	51	Sound Global Ltd
2015	Singapore	Austria	Loacker Recycling	Greenfield	2.4	100	..
2015	Singapore	Germany	Remex Mineralstoff	Greenfield	4.6	100	..
2015	Singapore	Cayman Islands	CKM (Cayman) Co Ltd	M&A	365	59	United Envirotech Ltd
2016	Viet Nam	Japan	Kume Sekkei	Greenfield	74.5	100	..
2016	Singapore ^e	China	China Reform Puissance Overseas GP LP	M&A	286	23	CITIC Envirotech Ltd
2017	Viet Nam	Japan	CAN Holdings	Greenfield	74.5	100	..
2018	Viet Nam	Switzerland	Sowareen Solutions	Greenfield	2.9	100	..
2018	Malaysia	United Kingdom	Serba Dinamik International Ltd	M&A	4	15	Green & Smart Holdings PLC
2019	Indonesia	Japan	Prasadha Pamunah Limbah Industri	Greenfield	74.5	100	..
2019	Malaysia	Myanmar	Recyflo	Greenfield	8.2	100	..
2019	Viet Nam	United Kingdom	Wiser Environment	Greenfield	2.9	100	..
2019	Singapore	United States	Stericycle	Greenfield	74.5	100	..

Source: UNCTAD data.

^a Owner is in Malaysia. ^b Owner is in Singapore. ^c Owner is in UAE. ^d Ultimate acquirer is in the United States. ^e Owner is in the United States.

(2) Water and sewage system services

Year	Host ASEAN country	Investing country	Investor name	Type of investment	Investment amount (Million \$)	Capital share obtained (%)	Acquired company (for M&A only)
2005	Viet Nam	Czech Republic	Omnipol Group	Greenfield	24.2	100	
2007	Singapore	United States	Marmon	Greenfield	50	100	
2008	Thailand	Belgium	Global Water Engineering	Greenfield	0.05	100	
2008	Indonesia	Japan	Kubota	Greenfield	9.7	100	
2008	Viet Nam	Japan	Metawater	Greenfield	9.7	100	
2008	Indonesia	United Kingdom	Adhya Tirta Batam (ATB)	Greenfield	6	100	
2008	Malaysia	United Kingdom	HydroChem	Greenfield	0.34	100	
2008	Singapore	United States	Marmon	Greenfield	20.59	100	
2009	Viet Nam	Malaysia	Salcon Bhd	Greenfield	9.7	100	
2009	Thailand	United States	MTP HPPO Manufacturing	Greenfield	33.11	100	
2009	Singapore	Malaysia	Synergy Heights Sdn Bhd	M&A	-	49	Koasial Eco Industries Pte Ltd
2010	Singapore	Hungary	Organica Water	Greenfield	5.3	100	
2010	Singapore	United States	Insituform Technologies Inc	M&A	1	100	Insitu Envirotech (SE Asia) Pte Ltd
2011	Viet Nam	Japan	Metawater	Greenfield	195	100	
2011	Singapore	Netherlands	PWN Technologies	Greenfield	20.1	100	
2011	Viet Nam	Korea, Republic of	Hanshin Engineering & Construction Co Ltd	M&A	31	10	Petrovietnam Construction JSC (PVC)
2012	Singapore	Japan	Mitsubishi Rayon	Greenfield	1.9	100	
2012	Singapore	Japan	Meiden Singapore	Greenfield	8.117	100	
2012	Indonesia	Japan	Nihon Suido Consultants Co Ltd	M&A	-	100	PT DACREA Design & Engineering Consultants
2014	Singapore	Hong Kong, China	Beijing Enterprises Water Group	Greenfield	20.1	100	
2014	Indonesia	Singapore	Impiro	M&A	-	0	
2015	Viet Nam	United States	Vietnam Waste Solutions	Greenfield	450	100	Contained Energy Indonesia PT
2015	Indonesia	Singapore	Impiro	M&A	-	95	Contained Energy Indonesia PT
2015	Thailand	Japan	Takada Corp	M&A	-	100	Kikuchi Industry (Thailand) Co Ltd
2015	Myanmar	Singapore	MIL 4 Ltd	M&A	-	14	Apollo Towers Pte Ltd
2016	Viet Nam	Korea, Republic of	Hanwha	Greenfield	74.5	100	
2016	Cambodia	Thailand	JWD InfoLogistics PCL	M&A	-	5	Phnom Penh Special Economic Zone Plc
2017	Viet Nam	China	Yang Xiaodong	M&A	-	6	Vneco1 Electricity Construction JSC
2018	Singapore	United States	Gradiant Corporation	Greenfield	0.8	100	
2019	Malaysia	France	Veolia Water Solutions & Technologies	Greenfield	20.1	100	
2019	Thailand	Malaysia	Anurak Water Treatment Facilities	Greenfield	74.5	100	
2019	Viet Nam	Spain	Acciona Agua	Greenfield	74.5	100	
2019	Singapore	South Africa	Reatile Group Proprietary Ltd	M&A	-	20	Juwi Renewable Energies Pte Ltd

Source: UNCTAD data.

APPENDIX B.

SPECIFIC COMMITMENT TABLES FOR ENVIRONMENTAL SERVICES UNDER THE AFAS 10TH PACKAGE

Brunei Darussalam

Subsector	Limitation on Market Access	Limitation on National Treatment
Refuse disposal services (CPC 9402)	(1) None (2) None (3) Through a joint venture with foreign equity participation not exceeding 70%	(1) None (2) None (3) None
Other environmental services	(1) None (2) None (3) Through a joint venture with foreign equity participation not exceeding 70%	(1) None (2) None (3) None
Sewage Services (CPC 9401)	(1) None (2) None (3) Through a joint venture with foreign equity participation not exceeding 70%	(1) None (2) None (3) None
Sanitation and Similar Services (CPC 9403)	(1) None (2) None (3) Through a joint venture with foreign equity participation not exceeding 70%	(1) None (2) None (3) None

Source: AFAS 10th package.

Cambodia

Subsector	Limitation on Market Access	Limitation on National Treatment
Sewage services (CPC 9401)	(1) None	(1) None
Refuse disposal services (CPC 9402)	(2) None	(2) None
Sanitation and similar services (CPC 9403)	(3) None	(3) None
Other services		
- Cleaning of exhaust gases (CPC 9404)		
- Noise abatement services (CPC 9405)		
- Nature and landscape protection services (CPC 9406)		
- Other environmental services not included elsewhere (CPC 9409)		

Source: AFAS 10th package.

Indonesia

Subsector	Limitation on Market Access	Limitation on National Treatment
A. Sewage services (CPC 9401) Wastewater management	(1) None (2) None (3) Joint venture with foreign equity participation up to 70%	(1) None (2) None (3) Subject to qualification and registration requirement and procedure
B. Refuse disposal services (CPC 9402) Solid waste disposal services, only for - Integrated hazardous waste treatment facility services for oil sludge and waste mercury treatment in a particular area. The services provider must be equipped with modern and sophisticated technology and environmental safety. The product will be used as a new material or energy power. - In site hazardous waste treatment facility services for the treatment of waste of mining products and waste of fly ash and bottom ash of coal product.	(1) None (2) None (3) Joint venture with foreign equity participation up to 70%	(1) None (2) None (3) Subject to qualification and registration requirement and procedure
C. Sanitation and similar services (CPC 9403) limited to public sanitation facilities only	(1) None (2) None (3) Joint venture with foreign equity participation up to 51%	(1) None (2) None (3) Subject to qualification and registration requirement and procedure
Sanitation and similar services (CPC 9403) limited to hazardous and toxic substances only	(1) None (2) None (3) Joint venture with foreign equity participation up to 70%	(1) None (2) None (3) Subject to qualification and registration requirement and procedure
D. Cleaning services of exhaust gases (CPC 9404) Air pollution control	(1) None (2) None (3) Joint venture with foreign equity participation up to 70%	(1) None (2) None (3) Subject to qualification and registration requirement and procedure
Other environmental protection services (CPC 9409) Limited to laboratory services for environment (laboratory that has the ability and authority to test and examine the environmental quality parameter according to current environmental laws and regulations)	(1) None (2) None (3) Joint venture with foreign equity participation up to 51%	(1) None (2) None (3) Subject to qualification and registration requirement and procedure

Source: AFAS 10th package.

Lao PDR

6. ENVIRONMENT SERVICES

The scope of commitments extended to services in Vientiane Capital only. Publicly funded services are excluded.

Subsector	Limitation on Market Access	Limitation on National Treatment
Sewage services (CPC 9401)	(1) None	(1) None
Refuse disposal services (CPC 9402)	(2) None	(2) None
Sanitation and similar services (CPC 9403)	(3) None	(3) None
Cleaning of exhaust gases (part of CPC 9404)		
Noise abatement services (part of CPC 9405)		
Nature and landscape protection services (CPC 9406)		

Source: AFAS 10th package.

Malaysia

Subsector	Limitation on Market Access	Limitation on National Treatment
Sewage services (CPC 9401) Covers only removal, treatment and disposal of industrial effluents (Only for services contracted by the private sector. Does not include public works functions owned and operated by federal, provincial, district or municipalities or contracted out by them.)	(1) None (2) None (3) Only through a locally incorporated, joint venture with Malaysian individuals or Malaysian controlled corporations or both and aggregate foreign shareholding shall not exceed 70 per cent	(1) None (2) None (3) None
Refuse disposal services (CPC 9402*) Covering private industrial waste management services covering treatment and disposal services	(1) None (2) None (3) Only through approval of the National Solid Waste Management Technical Evaluation Committee and approved licence from the National Solid Waste Management Department; aggregate foreign equity shall not exceed 51 per cent	(1) None (2) None (3) None
Refuse disposal services (CPC 9402*) Covering solid waste disposal services, only for - Integrated biomass treatment facility services. - The services provider must be equipped with high technology specifically built for biomass solid waste disposal services and fulfil all environmental safety requirements. The product will be used as a new material for energy purposes.	(1) None (2) None (3) Foreign equity shall not exceed 70 per cent	(1) None (2) None (3) None
Sanitation and similar services Sweeping and snow removal services (CPC 94030)	(1) None (2) None (3) Unbound	(1) None (2) None (3) Unbound
Protection of ambient air climate (CPC 9404—corresponds to cleaning services of exhaust gases) Covers only services provided at industrial premises to remove air pollutants, including monitoring of mobile emissions and implementation of control systems or reduction programmes (Only for services contracted by the private sector. Does not include public works functions owned and operated by federal, state, district or municipal authorities or contracted out by them)	(1) None (2) None (3) Only through a locally incorporated joint venture corporation with Malaysian individuals or Malaysian controlled corporations or both and aggregate foreign shareholdings shall not exceed 70 per cent	(1) None (2) None (3) None
Noise abatement services (CPC 9405) Covers only monitoring programmes and installation of noise reduction and screen in residential, commercial and industrial premises (Only for services contracted by the private sector. Does not include public works functions owned and operated by federal, state, district or municipal authorities or contracted out by them)	(1) None (2) None (3) Only through a locally incorporated joint venture corporation with Malaysian individuals or Malaysian controlled corporations or both and aggregate foreign shareholdings shall not exceed 51 per cent	(1) None (2) None (3) None
Nature and landscape protection services covering only contaminated soil clean-up and remediation (part of CPC 94060) (Only for services contracted by the private sector. Does not include public works functions owned and operated by federal, state, district or municipal authorities or contracted out by them)	(1) None (2) None (3) Only through a locally incorporated joint venture corporation with Malaysian individuals or Malaysian controlled corporations or both and aggregate foreign shareholdings shall not exceed 51 per cent	(1) None (2) None (3) None

Source: AFAS 10th package.

Notes: * after a CPC code means the sector is part of the wider service sector elsewhere indicated. ** after a CPC code means the sector is part of the wider service sector indicated by the CPC code. Unbound* means unbound due to lack of technical feasibility.

Myanmar

Subsector	Limitation on Market Access	Limitation on National Treatment
Sewage services (CPC 9401)	(1) None (2) None (3) Commercial presence of foreign suppliers and/or providers are permitted in accordance with the Myanmar Companies Law 2017, in effect from 1 August 2018 and the Republic of the Union of Myanmar Investment Law (2016) As stipulated in the Myanmar Investment Law (2016), the investment may be carried out in any of the following forms: (i) carrying out an investment by a foreigner with 100 per cent foreign capital on the business permitted by the Commission; (ii) carrying out a joint venture between a foreigner and a citizen or the relevant government department and organisation; (iii) carrying out by any system contained in the contract approved by both parties.	(1) None (2) None (3) a. Foreign service suppliers and/or providers must comply with existing laws, rules and regulations concerning investment, taxation, immigration and labour. b. Foreign organisations and persons are not allowed to own land in Myanmar. However, land may be on long-term lease, depending on individual circumstances.
Refuse disposal service (CPC 9402)	(1) None (2) None (3) Commercial presence of foreign suppliers and/or providers are permitted in accordance with the Myanmar Companies Law 2017, in effect from 1 August 2018 and the Republic of the Union of Myanmar Investment Law (2016). As stipulated in the Myanmar Investment Law (2016), the investment may be carried out in any of the following forms: (i) carrying out an investment by a foreigner with 100 per cent foreign capital on the business permitted by the Commission; (ii) carrying out a joint venture between a foreigner and a citizen or the relevant government department and organisation; (iii) carrying out by any system contained in the contract approved by both parties.	(1) None (2) None (3) a. Foreign service suppliers and/or providers must comply with existing laws, rules and regulations concerning investment, taxation, immigration and labour. b. Foreign service organisations and persons are not allowed to own land in Myanmar. However, land may be used on long-term lease, depending on individual circumstances.
Sanitation and similar services (CPC 9403)	(1) None (2) None (3) As indicated in the horizontal commitments	(1) None (2) None (3) As indicated in the horizontal commitments
Others:	(1) None	(1) None
- Noise abatement services	(2) None	(2) None
- Environmental consultancy	(3) None	(3) None
- Cleaning of exhaust gases		

Source: AFAS 10th package.

Philippines

Subsector	Limitation on Market Access	Limitation on National Treatment
A. Sewerage services (CPC 9401)	(1) Unbound* (2) None (3) For participation in public and/or private sewerage services, up to 40 per cent foreign equity participation is allowed. For participation in public and/or private sewerage services in Metro Manila, it is subject to negotiations and agreement with concessionaires (i.e., Manila Water and Maynilad) and approval/regulation by the Metropolitan Waterworks and Sewerage System (MWSS). If the parties agree (MWSS and the two concessionaires), amendment of the Concession Agreement shall be made. For areas outside Metro Manila, entry into public and/or private sewerage services is subject to the following: a) Where local water districts (LWDs) exist, participation or entry should be in the form of partnership or corporation that may then enter into a BOT scheme or other similar schemes or forms of contractual agreements/ arrangements with the LWDs. b) In the absence of existing LWDs, entry should still take the form of partnership or corporation; however, the contractual agreements/arrangements that may be entered into will be with local government unit/s concerned.	(1) Unbound* (2) None (3) None
Sewage services (CPC 9401)	(1) None	(1) None
Sewage services limited to removal, treatment and disposal of industrial effluents (CPC 9401**)	(2) None (3) Up to 70% foreign equity participation is allowed	(2) None (3) None
Sewage services (CPC 9401)	(1) None	(1) None
Environmental consultancy services on hazardous waste management and refuse disposal	(2) None (3) Up to 70% foreign equity participation is allowed	(2) None (3) None
B. Refuse disposal services - Establishment of recycling center/facility and treatment, storage and disposal facility under the BOT scheme (CPC 94020**)	(1) None (2) None (3) The limitations on foreign equity in the horizontal section do not apply for projects under the BOT scheme. However, a Special Contractor's Licence is required for foreign companies to undertake construction activities.	(1) None (2) None (3) None
C. Sanitation and similar services	(1) Unbound*	(1) Unbound*
Sanitation and similar services limited to hail-clearing services (CPC 9403**)	(2) None (3) Up to 70 per cent foreign equity participation is allowed	(2) None (3) None
D. Other	(1) None	(1) None
Cleaning services of exhaust gases for a factory (CPC 9404)	(2) None (3) Up to 70 per cent foreign equity participation is allowed	(2) None (3) None

Source: AFAS 10th package.

Notes: * after a CPC code means the sector is part of the wider service sector elsewhere indicated. ** after a CPC code means the sector is part of the wider service sector indicated by the CPC code. Unbound* means unbound due to lack of technical feasibility.

Singapore

Subsector	Limitation on Market Access	Limitation on National Treatment
Refuse collection services except hazardous waste management (CPC 94020**)	(1) Unbound, except for consulting services. (2) None. (3) None, except the refuse collector must be incorporated in Singapore. The number of public waste collectors is limited by the number of geographical sectors in Singapore.	(1) Unbound, except for consulting services (2) None (3) None
Refuse disposal services except landfill services and hazardous waste management (CPC 94020**)	(1) Unbound, except for consulting services (2) None (3) None, except the company must be incorporated in Singapore	(1) Unbound, except for consulting services (2) None (3) None
Sanitation and similar services (CPC 9403) Cleaning of exhaust gases (CPC 9404) Noise abatement services (CPC 9405)	(1) Unbound* (2) None (3) None	(1) Unbound* (2) None (3) None
Servicing of chemical toilets	(1) None (2) None (3) Foreign equity participation allowable up to a maximum of 70 per cent	(1) None (2) None (3) None

Source: AFAS 10th package.

Notes: * after a CPC code means the sector is part of the wider service sector elsewhere indicated. ** after a CPC code means the sector is part of the wider service sector indicated by the CPC code. Unbound* means unbound due to lack of technical feasibility.

Thailand

Subsector	Limitation on Market Access	Limitation on National Treatment
A. Sewage services: Environmental consultancy on sewage system, refuse disposal, hazardous waste management, air pollution and noise management, sanitation and other environmental management services (CPC 9401) Environmental protection and environmental abatement services (CPC 9401) Sewage services (including industrial wastewater treatment system) (CPC 9401)	(1) Unbound* (2) None (3) As indicated in 3.3 of the horizontal section	(1) Unbound* (2) None (3) None
Sewage removal services usually provided using equipment such as waste pipes, sewers or drains (part of CPC 1.1: 94110)	(1) None (2) None (3) As indicated in 3.1 of the horizontal section	(1) None (2) None (3) None
B. Refuse disposal services (including hazardous waste management and incinerator) (CPC 9402)	(1) Unbound* (2) None (3) As indicated in 3.3 of the horizontal section	(1) Unbound* (2) None (3) None
B. Refuse disposal services: Hazardous waste treatment and disposal services (CPC Version 1.1: 94222)	(1) Unbound* (2) None (3) As indicated in 3.1 of the horizontal section	(1) Unbound* (2) None (3) None
C. Sanitation and similar services (CPC 9403)	(1) Unbound* (2) None (3) As indicated in 3.3 of the horizontal section	(1) Unbound* (2) None (3) None

.../

C. Sanitation and Similar Services: Beach cleaning services Drain unblocking services (CPC Version 1.1: part of 94390)	(1) Unbound* (2) None (3) As indicated in 3.1 of the horizontal section	(1) Unbound* (2) None (3) None
D. Other: - Cleaning services of exhaust gases (including industrial emission abatement) (CPC 9404) - Noise abatement services (CPC 9405) - Nature and landscape protection services (CPC 9406) - Other environmental protection services (CPC 9409)	(1) Unbound* (2) None (3) As indicated in 3.3 of the horizontal section	(1) Unbound* (2) None (3) None
- Marine environmental protection services (CPC Version 1.1: Part of 94900)	(1) Unbound* (2) None (3) As indicated in 3.1 of the horizontal section	(1) Unbound* (2) None (3) None

Source: AFAS 10th package.

Notes: * after a CPC code means the sector is part of the wider service sector elsewhere indicated. ** after a CPC code means the sector is part of the wider service sector indicated by the CPC code. Unbound* means unbound due to lack of technical feasibility.

Viet Nam

ENVIRONMENTAL SERVICES

Access to certain geographic areas may be restricted for national security reasons

Subsector	Limitation on Market Access	Limitation on National Treatment
Sewage services (CPC 9401)	(1) Unbound due to technical feasibility (except related consulting services) (2) None (3) None	(1) None (2) None (3) None
Refuse disposal services (CPC 9402)	(1) Unbound due to technical feasibility (except related consulting services) (2) None (3) None	(1) None (2) None (3) None
Sanitation and similar services (CPC 9403)	(1) None (2) None (3) None	(1) None (2) None (3) None
Nature and landscape protection services (CPC 9406)	(1) None (2) None (3) None	(1) None (2) None (3) None
Other services - Cleaning services of exhaust gases (CPC 94040) - Noise abatement services (CPC 94050)	(1) Unbound due to technical feasibility (except related consulting services) (2) None (3) None	(1) None (2) None (3) None
Environmental impact assessment services (CPC 9409)	(1) None (2) None (3) None, except that foreign ownership is limited to 51 per cent until 11 January 2011. After that: None.	(1) None (2) None (3) None

Source: AFAS 10th package.

APPENDIX C.

NEGATIVE LIST COMMITMENTS UNDER THE COMPREHENSIVE AND PROGRESSIVE TRANS-PACIFIC PARTNERSHIP (CPTPP) FOR ENVIRONMENTAL SERVICES

A general note on Annexes I and II:

Annex I under CPTPP lists some existing restrictions on foreign service suppliers or investors. Each party has undertaken to ensure that it does not make any measure, as listed in this Annex, more restrictive. If a party to CPTPP changes any of these measures to become more open to foreign service suppliers and investors, that new measure will be automatically captured by the CPTPP, which means it cannot be made more restrictive in the future. This is called the “ratchet mechanism”. Annex II, however, lists areas where each party has reserved the right to impose new restrictions on foreign service suppliers or investors.

(1) Brunei Darussalam

Annex I under CPTPP

Sector:

Environmental Services

Obligations Concerned:

National Treatment (Article 9.4)

Performance Requirements (Article 9.10)

Local Presence (Article 10.6)

Measures:

Pollution Control Guidelines for Industrial Development of Brunei Darussalam Planning Guidelines for Earthworks Development (Focus on Environmental Sensitive Area) 2009

Planning Guidelines and Standards for Industrial Development 2010

Environmental Impact Assessment Order 2011 (Draft)

Environmental Protection and Management Order 2012

Hazardous Waste (Control of Export, Import and Transit) Order 2011 (Draft)

Hazardous Waste (Control of Export, Import and Transit) Regulations (Draft)

Administrative Measures and Guidelines

Description:

Investment and Cross-Border Trade in Services

1. Foreign nationals and enterprises may not provide consultancy services on environmental protection and management, waste management services, landscape design management and maintenance services and janitorial services, roadside and cleaning works services, unless
 - (a) They are established as an enterprise in Brunei Darussalam;
 - (b) They register for either Certificate A or Certificate B, as a contractor or supplier; or
 - (c) They comply with any requirement to transfer technology or other proprietary knowledge to persons in Brunei Darussalam as long as such requirement to transfer technology or other proprietary knowledge does not unreasonably prejudice the legitimate interests of the owner of the technology or proprietary knowledge and is not for the purposes of commercial exploitation by Brunei Darussalam.

2. In the case of Certificate A, a foreign national or enterprise may not own equity shareholding other than what is prescribed in the following table, in any enterprise that applies to be registered as a contractor or supplier:

Table 20. Allowable equity shareholding by a foreign national or enterprise

Class	Project Threshold	Level of Foreign Equity Allowed
I	Up to BND 50 000	None
II	Exceeding BND 50 000 but not more than BND 250 000	None
III	Exceeding BND 250 000 but not more than BND 500 000	20 percent
IV	Exceeding BND 500 000 but not more than BND 1.5 million	50 percent
V	Exceeding BND 1.5 million but not more than BND 5 million	70 percent
VI	Exceeding BND 5 million	90 percent
Building Specialist and Supplier	No threshold	90 percent
Mechanical and Electrical Specialist and Supplier	No threshold	90 percent

3. For greater certainty, Certificate A refers to certificates that are required for participating in government and private projects, while Certificate B refers to certificates that are required for participating in private projects only.

Annex II under CPTPP

Not listed

(2) Malaysia

Annex I under CPTPP

Not listed

Annex II under CPTPP

Sector: Sewage and Refuse Disposal

Sanitation and Other Environmental Protection Services

Obligations Concerned: National Treatment (Article 9.4)

Description: Investment

Malaysia reserves the right to adopt or maintain any measures relating to the collection, treatment and disposal of hazardous waste (excluding carbon gases).

Existing Measures:

Environmental Quality Act 1974 [Act 127]

(3) Singapore

Annex I under CPTPP

Environmental Services

Sector: Sewage and Refuse Disposal, Sanitation and other Environmental Protection Services

Subsector: Waste management, including collection, disposal and treatment of hazardous waste

Industry Classification:

Obligations Concerned:

Market Access (Article 10.5)

Local Presence (Article 10.6)

Level of Government: Central

Measures: Environmental Public Health Act, Cap.95

Description: Cross-Border Trade in Services

Foreign service suppliers must be locally incorporated in Singapore.

The public waste collectors (PWCs) rendering services to domestic and trade premises are appointed by public competitive tender. The number of PWCs is limited by the number of geographical sectors in Singapore. For industrial and commercial waste, the market is open to any licenced general waste collectors.

Annex II under CPTPP

Environmental Services

Sector: Sewage and Refuse Disposal, Sanitation and Other Environmental Protection Services

Subsector:

Wastewater management, including but not limited to collection, disposal and treatment of solid waste and wastewater

Industry Classification:

Obligations Concerned:

National Treatment (Article 9.4 and Article 10.3)

Most-Favoured-Nation Treatment (Article 9.5 and Article 10.4)

Performance Requirements (Article 9.10)

Senior Management and Boards of Directors (Article 9.11)

Market Access (Article 10.5)

Local Presence (Article 10.6)

Description:

Investment and Cross-Border Trade in Services

Singapore reserves the right to adopt or maintain any measure affecting wastewater management, including but not limited to the collection, treatment and disposal of wastewater.

Existing Measures:

Code of Practice on Sewerage and Sanitary Works Sewerage and Drainage Act, Cap. 294, 2001 Rev Ed

(4) Viet Nam

Annex I under CPTPP

Not listed

Annex II under CPTPP

Environmental Services

Sewage Services (CPC 9401)

Insert new commitments as follows:

Mode 1: Unbound, except related consulting services.

Mode 2: None.

Sanitation and Similar Services (CPC 9403)

Insert new commitments as follows:

Mode 1: None.

Mode 2: None.

Mode 3: None.

ASEAN- Japan Centre

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