Ministry of Environment and Food of Denmark

EMBASSY OF DENMARK
Jakarta

KEMENTERIAN
LINGKUNGAN HIDUP DAN KEHUTANAN
REPUBLIK INDONESIA

BACKGROUND STUDY

STRATEGIC SECTOR COOPERATION DENMARK-INDONESIA

CIRCULAR ECONOMY AND SOLID WASTE MANAGEMENT

EXECUTIVE SUMMARY

This background study sets to explore where Danish Competencies match Indonesia's priority areas within the Circular Economy and Solid Waste Management Sector. Hence, the study provides basic information on the Indonesian waste sector, describing its framework conditions, the recent development and challenges and opportunities within the sector. Furthermore, the background study introduces the Danish and Indonesian stakeholders and actors, and it enlightens areas for involving Danish companies. Lastly, the study provides a basis for understanding the Theory of Change.

The Royal Danish Embassy, Jakarta

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ABBREVIATIONS

ADUPI	Association of Plastic Recycling of Indonesia
APBD	Regional Revenue and Expenditure Plan
ASEAN	Association of Southeast Asian Nations
ASI	Indonesia Cement Association
B2B	Business-to-Business
BAPPENAS	National Planning and Development Agency
BPPT	Assessment and Application of Technology Agency
CEPA	Center for European Analysis
DAKOFA	Waste and Resource Network Denmark
DANIDA	Danish International Development Assistance
DEPA	Danish Environmental Protection Agency
DFC	DANIDA Fellowship Centre
DI	Danish Confederation of Industry
DKK	Danish Crowns (Valuta)
ESP	Environmental Support Programme
ESP3	Environmental Support Programme, Phase III
FMCG	Fast moving consumer goods
G20	Group of 20 (International forum)
G2G	Government-to-Government
GDP	Gross Domestic Product
GoI	Government of Indonesia
INAPLAS	The Indonesia Olefin, Aromatic and Plastic Industry Association
InSWA	Indonesian Solid Waste Association
IPI	Indonesia Association of Waste Pickers
ITF	Intermediate Treatment Facility

ISWA	International Solid Waste Association
Jakstrana	National Policy and Strategy on Solid Waste Management
JICA	Japan International Cooperation Agency
KLHK	Ministry of Environment and Forestry
LIPI	Indonesian Institute of Sciences
LoI	Letter of Intent
LMI	Lower Middle Income
MDTF	Multi Donor Trust Fund
MEMR	Ministry of Energy and Mineral Resources
MoEF	Ministry of Environment and Forestry
MoHA	Ministry of Home Affairs
MoPW	Ministry of Public Works and Housing
MoU	Memorandum of Understanding
MSWM	Municipal Solid Waste Management
NGO	Non-governmental Organization
PPP	Public-Private Partnership
PRAISE	Packaging and Recycling alliance for Indonesia Sustainable Environment
PUPR	Ministry of Public Works and Housing
RDF	Refuse-Derived Fuel
SDG	Sustainable Development Goals
SME	Small and Medium Enterprise
SSC	Strategic Sector Cooperation
SWM	Solid Waste Management
TPS	Waste Temporary Station
TPS3R	Waste Temporary Station for Reduce Reuse Recycle
USAID	United States Agency for International Development

USD	US Dollar
RT	Neighbourhood Group
RW	Neighbourhood Community
W2E	Waste to Energy
WB	World Bank

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1. INTRODUCTION

The following section will give a brief background to Indonesia and its recent development and to the Strategic Sector Cooperation, highlighting shortly its objective, methods and limitations.

Background

Indonesia, the world's third largest democracy, is developing fast. This has created increased international attention and interest. The country with its 260 million inhabitants makes up the fourth largest country in the world population-wise. Despite President Joko (Jokowi) Widodo's focus on domestic affairs and poverty eradication, the country takes an increasing role in the regional and international political arena as the *de facto* leader of the ASEAN cooperation among the 10 Southeast Asian countries. Indonesia is a member of G20 as the 10th largest economy measured by purchasing power. With this combined with a large domestic market and a productive middle class in rapid growth, Indonesia is an attractive growth market with growth rates on 5-6 % annually.

A strong political priority is continued growth and modernisation of the infrastructure. But as an unevenly distributed, and in certain provinces densely populated, transition- and growth economy, Indonesia faces significant challenges for sustainable growth. Not least with regards to environmental protection, waste management, water supply and sanitation. The environment and natural resources are under exponentially increasing pressure. While environment and climate have not had major political focus in Indonesia, the visible and concrete consequences of the environmental degradation now seems to slowly be changing the picture, which shows through the growing list of commitments and regulations from the government on SWM.

Sector development

The solid waste management sector is by far the sector where population growth and changing consumer patterns combined with insufficient regulation and infrastructure are creating the biggest impacts. According to Ministry of Environment and Forestry, Indonesia produced more than 65 million tonnes of waste in 2017 and this is estimated to increase 2-4% every year. According to World Bank studies, it is estimated that Indonesian cities are responsible for producing 38 million tonnes of this, of which only 45-50% is collected on average, with notable variations from city to city. By far most collected waste ends up in landfills, whereas only about 1.9 million tonnes is properly reused, recycled, or incinerated in a controlled way. For urban waste, this means that about 45% is not collected and eventually finds its way to water streams, parks, the sea or is illegally burned in the backyard.

As a consequence of insufficient waste collection and treatment an estimated 1.29 million tonnes of waste ends up in the ocean negatively affecting marine and coastal environment as well as the fishery- and tourist industries. About 80% of the marine debris is estimated to come from land based sources through waterways and coastal cities. Plastic waste contributes to blocking of city drainage and hence increases the risk of flooding.

Of the total waste stream, plastics constitute 12-17% of which 60-70% is considered "low value" flexible plastics, and higher quality plastics are either collected by the informal sector or reused. Additionally, with a daily level of 11 million kg of plastic waste being generated in Indonesia out of

which 9 million kg are mismanaged, Systemiq estimates that this contributes considerably to the leakage of 13.5 million tons of plastic to our oceans every year globally. Having examples of Indonesian cities, where only 1% of the municipality make use of formal waste collection services, it remains clear that an effort must be made to design waste out of the system in order to keep materials and products in use, thereby limiting pollution and promoting a regeneration of natural systems.

The relevance of the Strategic Sector Cooperation

Danish competencies, experiences and innovative solutions, as well as longer tradition for strong governmental regulation on environmental protection meets many of the challenges in Indonesia and makes Denmark a suitable knowledge partner in regards to environmental technology, solutions and governmental framework in the environmental sector. This applies not only to the short term challenges that Indonesia meets in regards to handling of water and waste, but also within meeting UN Sustainable Development Goals (SDG's) for Indonesia.

Government leadership and staff in Indonesia is looking for advice, assistance and investment in the environmental field, including exploring the concept of Circular Economy e.g. through supporting and advertising specific company solutions. While most laws are in place governing the solid waste sector, explicit emphasis has been put on implementing the goals in Indonesian regulation (*Jakstranas*) at the local level (*Jakstradas*). The activities and needs are vast, and there is a need to sort out where solutions are already in place and working as a focus is to move from plans and strategies towards action. In the workshops conducted, the Indonesian partners have especially highlighted the following as key to the partnership (For a full list of initiatives in the *Jakstranas* see Annex 1):

- Improved implementation of waste regulatory framework, e.g. from *Jakstranas* to *Jakstradas.*
- Linking the national regulatory framework and provincial/local law enforcement/incentive schemes
- Waste strategy formulation and planning at provincial and local level
- Activities to support increased resource efficiency and the development of a circular economy including deposit schemes for recycling
- Reduction of ocean plastic debris
- Waste-to-Energy schemes, including both energy recovery from organic waste, Resource-derived Fuel and thermal incineration
- Financial mechanisms to support waste management and increased resource efficiency, e.g. at intermediary treatment and terminal waste facilities
- Public-Private partnerships attracting foreign private investment

As part of Denmark's engagement in the Indonesian transition and growth economy, the Environmental Support Program (ESP) has been in operation since 2005. In its third phase the ESP3 has supported planning and management of environment and natural resource in Indonesia and is now phasing out its activities in 2018. ESP3 has had a number of activities within the solid waste management sector creating a platform for the Strategic Sector Cooperation to continue. These activities have contributed considerably to the strong environmental profile that Denmark currently holds. Hence, the SSC should build on the lessons learnt and explore the possibilities for expanding

these activities and the possibilities for future cooperation within these areas. The below table provides a short overview of opportunities in this regard.

Previous and current activities of ESP3	**Opportunities and scopes of actions**
Revision of Solid Waste Master Plans for DKI Jakarta, Semarang (incl. the Jatibarang waste processing area), Greater Magelan and Greater Pekalongan;	It is important to keep a dialogue with the four city governments on future scopes of action. With relevant local authorities, recommendations from the ESP3-supported revision of the Waste Master Plans for the four Indonesian cities should be investigated and it should be formulated if and how these recommendations may be used in the SSC from 2019.
List of ESP3-activities in central Java, including contributions to Resource-Derived Fuel (RDF) plant in Cilacap and Contributions to methane gas harvesting and processing in Jatibarang landfill in Semarang;	Geographically, the Central Java Province has strategic priority to the Royal Danish Embassy, since a number of activities with an environmental focus have already taken place in this province as part of ESP3. Due to the previous and ongoing activities, it would be fruitful to maintain close cooperation with stakeholders in this province and make use of existing contacts in e.g. local government and businesses. The RDF plant in Cilacap and biogas plant in Semarang may be monitored from 2019 with the minimum of resources available. Monitoring of these two pilot projects will not have to be a direct activity under the SSC facility, but could be handled by the SSC Team at the embassy.
Activities with the World Bank: Contribution to the World Bank's Ocean Debris Multi-Donor Trust Fund (MDTF), financing of preparations of the World Bank's Municipal Solid Waste Management project, i.e. a "hotspot" study of solid waste problems in 15 cities, and a Waste-to-Energy study focussing on potential and prospects for waste-to-energy developments in 8-10 cities.	The WB agenda on marine plastic debris should be followed closely as it is very relevant to the SSC programme. Also, continued communication with the World Bank's Municipal Solid Waste Management Project and Menko Maritime should be held. In 2018, it should be a focus to ensure SSC participation at ESP3-WB status meetings in order to align SSC to WB MSWP and to sustain and start a good dialogue with responsible key resource persons in WB and in Menko Maritime.

From Danish side there is an increasing wish for developing the export markets within the solid waste management sector. It is a wish for Danish environmental authorities to "export" the strong public regulation of the environmental sector to improve the control of pollution, and hereunder reduce the amounts of waste spilled into the sea. This is a general wish for a better management of our common global environment towards reaching the SDG's but at the same time an effort to improve the regulatory framework and conditions for foreign responsible private investors in the Indonesian waste sector. Among these responsible Danish companies. Private Danish sector and their interest organisations within solid waste management has shown interest in increased export of their products and services. In 2017, DAKOFA (Waste and Resource Network Demark) finalised a database of

companies in the waste sector that is interested in export. A number of Danish technologies within waste management are deemed relevant for the Indonesian market.

In addition, both in Indonesia and in Denmark there is a strong political will to reduce ocean waste debris, hereunder especially plastic waste. It is a well-known fact that properly improved land based waste management systems will be a significant measure to reduce leakage of waste to the sea.

Other donors include The World Bank, which has recently announced commencement of a 1.1 billion USD project in solid waste management. This, and the National Strategy for Solid Waste Management, will set the pace in the development of the Indonesian waste sector over the coming years.

1.1 Developing the Indonesian-Danish Strategic Sector Cooperation

The new partnership formally took off in December 2017 with the signing of a Memorandum of Understanding between The Indonesian Minister of Environment and Forestry and the Danish Minister of Environment and Food during the Danish Prime Ministers visit to Indonesia. The MoU lays out a 5-year overall trajectory for close Indonesian-Danish cooperation within Circular Economy and Solid Waste Management.

Objective of the background study

The primary objective of this background study is to uncover and describe areas of possible collaboration under the heading of Circular Economy and Solid Waste Management by describing the Indonesian solid waste sector, its stakeholders and matching goals and ambitions of the responsible Indonesian ministry with public and private Danish competencies and solutions.

Method

The background study is prepared on the basis of several visitations to a large number of Indonesian stakeholders, as well as on 3 missions by the Danish EPA in September and November 2017 and January 2018 as well as on available sector relevant material and statistics from Indonesia and from results of ESP3 activities and World Bank Studies.

After selection of the main partners in the sector cooperation, a number of consultations have been held as meetings and workshops, where relevant topics have been discussed and agreed upon. Other major bi- and multilateral donors in the specific sector, such as the Dutch Embassy and the World Bank has been consulted in order to identify synergies, coordinate outputs and activities and avoid unnecessary overlap. These consultations have also provided more knowledge and understanding of the sector that has been used in the formulation of this background study.

Limitation

It is not the purpose of this background study to rate the SSC up against a potential SSC in other sectors. With the above background, Circular Economy and Solid Waste Management has already been selected as overarching themes. With this background study, it has been intended to lay the basis for the selection of main focus areas, topics and method of working with Indonesian authorities under the given headline.

2. INDONESIA COUNTRY OVERVIEW

The following section will provide a short overview of Indonesia's geography and the development within economy and trade.

2.1 Indonesia

Ranking as the fifth biggest country measured in land area, Indonesia is geographically diverse, among other being characterized as an archipelagic state, however also being home to big forest areas and agricultural land.

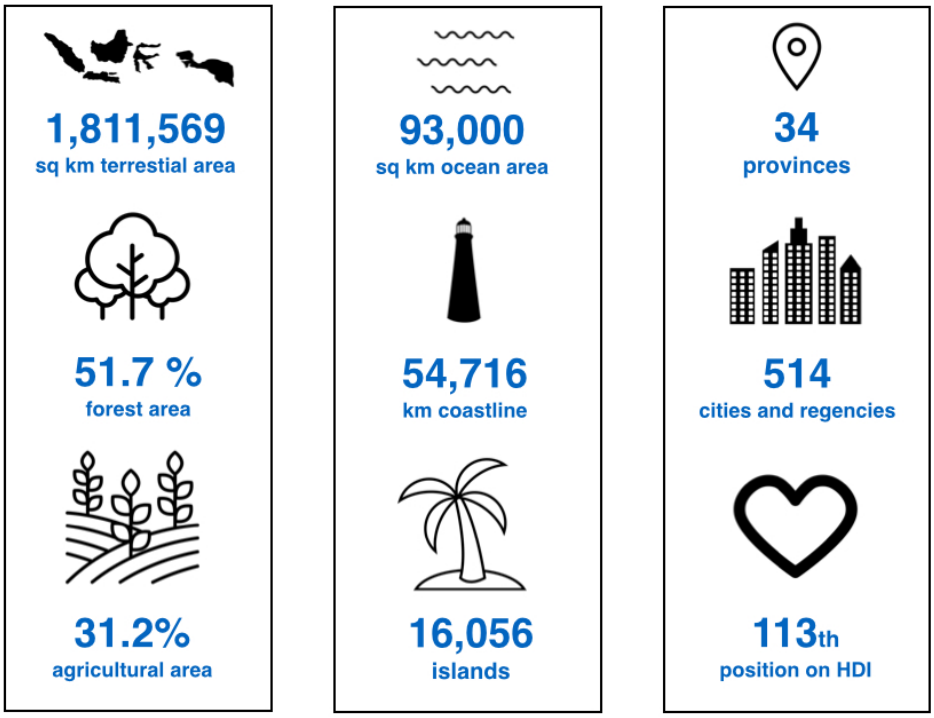


Figure 1 Indonesia overview

Considering Indonesia's geography and the fact that Java, the main island, is currently home to Indonesia's three largest cities, counting Jakarta (10,3 million inhabitants), Surabaya (2,8 million) and Bandung (2,5 million), it is no wonder that the main part of the population is concentrated on Java. This also makes Java the most populated island in the world.

With a current number of 55% of the population living in urban areas, the country is facing a strong urbanization rate of annual 2.3% for an estimation of year 2015-2020 (After World Bank and CIA Fact book).

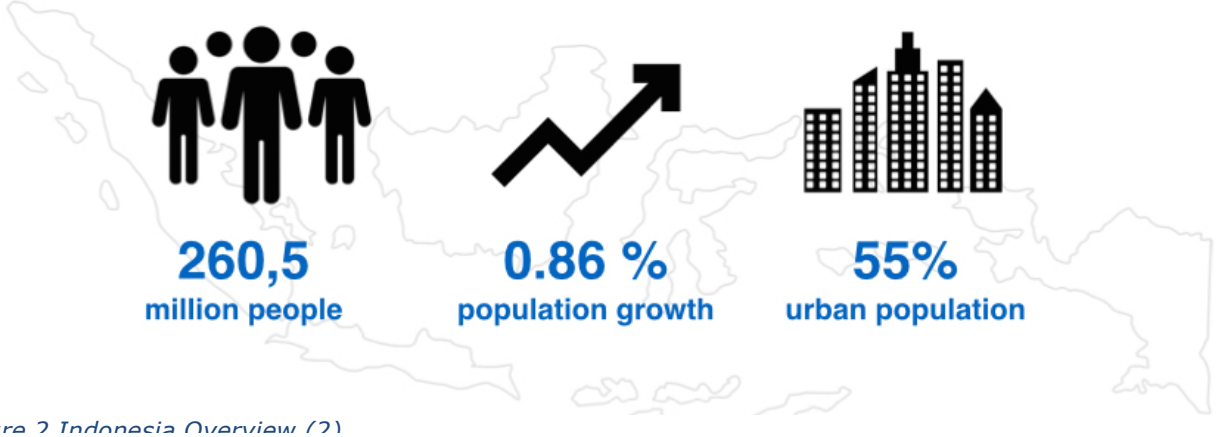


Figure 2 Indonesia Overview (2)

Moreover, Indonesia currently ranks at the 113th position of Human Development Index (0,689/Medium Human Development) according to Human Development Reports that is issued by the UNDP. It has been making its way up since the initial census in 1990 (0,528) but the progress to get out of the medium trap to High Human Development list has been very slow and uneasy.

2.2 Economy and Trade

It is an important element in the SSC that it opens door for the Danish private sector in Indonesia. In the following, a brief introduction to Indonesia's economic development and conditions for doing trade in Indonesia will therefore be provided in an overall manner as well as more specifically with the SWM sector. Moreover, the section will give perspectives to Indonesia's trade relations to Denmark, the EU and its regional partnering countries.

Table 1 Financial measures

Gross Domestic Product (GDP)	USD 953,259 billion
Gross National Income (GNI) per capita	USD 3400 as of 2016
GDP growth	5.0 % (2016)
Poverty rate	11.22% (2015)

With a GDP of 1.011 billion USD in 2017, Indonesia ranks as the 15th biggest economy worldwide and the fifth biggest economy in Asia (Statisticstimes.com, 2018). Overall, there has been a stable level of economic growth in Indonesia with an increase of around 5-6% per year the past ten years, and the Indonesian economy is projected to be among one of the 10 largest economies worldwide in 2030. The overall positive, financial development is also revealed in significant increases in the stock index and slight reductions in exchange rates, thereby promoting exports. Another factor that contributes positively to the long-term projections of the economic growth in Indonesia is the improvement in Indonesia's competitive power, which, according to the World Economic Forum, has increased gradually since 2000, ranking Indonesia as number 36 out of 137 economies. Moreover, the G20-country accounts for 40% of the economy within ASEAN, as well as Jakarta houses the ASEAN headquarters.

Despite the overall positive economic development, the future economic development faces a list of challenges. Among others, there are huge regional differences in Indonesia's GDP, having economy and population centred on Java. Moreover, structures where large state owned businesses, limited public revenues and a defective tax collection hamper economic progress and implicate the financing of forward-looking investments. In addition, Indonesia is a relatively closed economy compared to its export-oriented neighbours in the region, which is a consequence of its relatively large domestic market, which has led to the set-up of a state owned industry that concentrates on the home-market and has a weak profile on important export markets. Hence, with export levels of only 19% and imports of only 18% of GDP Indonesia lies below its neighbouring countries.

Doing business in Indonesia

Within the past years, Indonesia has moved from a 94th position to 72nd on the World Bank's index on Ease of Doing Business. This positive development is among others due to 16 reform packages that

Joko "Jokowi" Widodo, has undertaken, meaning that the business- and investment climate has been improved and liberalized. However, despite of the improvements, the foremost problematic factors for doing business in Indonesia are corruption, inefficient government bureaucracy and access to financing. Despite being addressed by government, extensive and opaque micromanagement, a comprehensive bureaucracy and continued corruption are continued challenges for doing business in Indonesia.

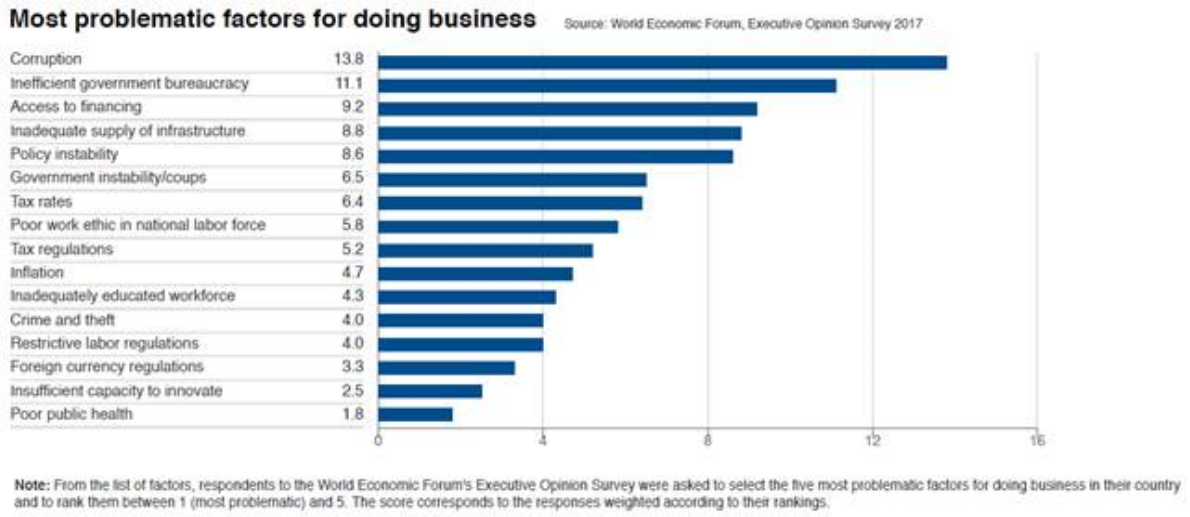


Figure 3 Most problematic factors for doing business

Denmark in Indonesia

The priorities of the Indonesian government within all forms of infrastructure (at land, at sea, in air), within energy, water, waste management and maritime, does to a large extent match Danish solutions, technologies and products. Because of a general demand of Danish (and other countries') solutions within especially environment and energy, there is a potential for a market for Danish businesses in and export to Indonesia. To a certain extent, the intentions to explore this market has already been entered, with Denmark and Indonesia being committed to an overall bilateral Plan of Action 2017-2020 and on more specific agreements on cooperation with Indonesia within agriculture, health, maritime affairs, energy and transport and environment.

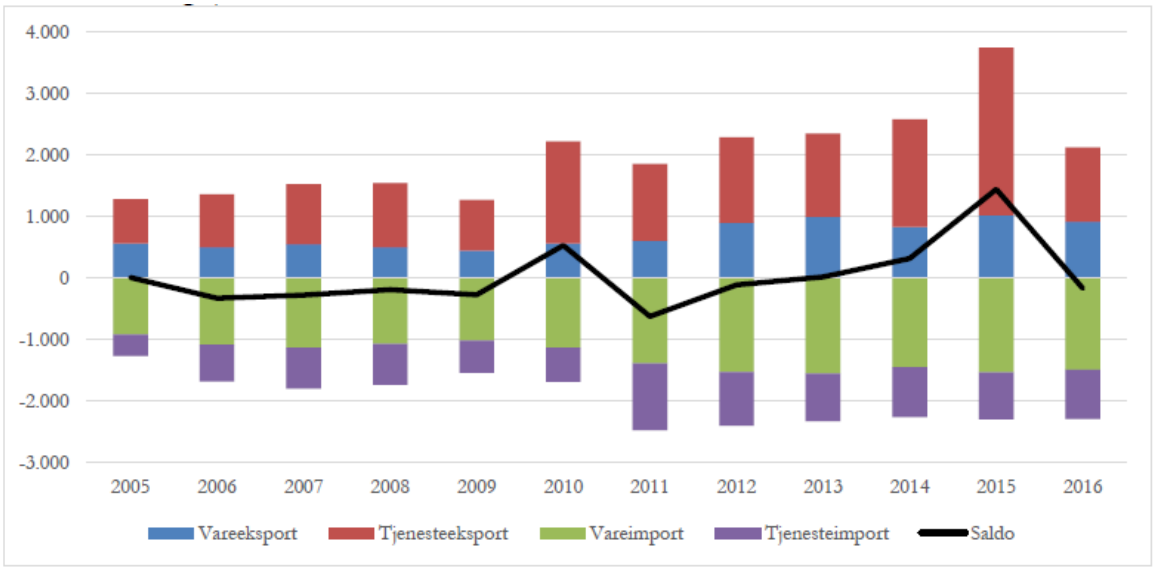
In order for a foreign company to establish themselves in the Indonesian market, it is the experience of current companies that stamina, local presence, a long-term strategy and prioritizing the market in terms of both time and money is necessary. This would be that case in most markets, as well as politics and economy are closely interlaced factors in Indonesia. This means that regulation and politics are traditionally adjusted in accordance with a strong nationalism and protectionism, which is politically motivated and part of the Indonesian increasing self-consciousness. For Danish businesses that wish to invest in Indonesia, it will therefore inevitably involve substantial capital outlays compared to other countries in the region as well as the market itself can seem obscure.

A challenge for Denmark to enter the Indonesian waste sector is that currently there are only a limited number of larger businesses within the solid waste sector in Denmark. However, a few companies, such as RUNI and DESMI are already active in the waste sector Indonesia, as well as some Danish

businesses with technologies relevant to Indonesia, e.g. Ørsted and Solum Gruppen, have already shown interest in an expansion to the market. Novozymes and Grundfos are large-scale businesses that by virtue of their other markets hold interests within waste management, as well as the Danish B&W Vølund expect to supply waste incineration technologies, should the possibility of incineration plants become reality. Furthermore, a number of Danish-founded consultancy companies with knowledge within the waste sector, such as Rambøll and DHI, have established themselves on the Indonesian market. A number of production companies, the biggest being ECCO and service companies, the biggest being ISS, are requesting sound environmental policies and regulatory structures within their field of business.

Export and import levels

Following a number of years with positive development in commerce between Denmark and Indonesia, there was a relatively big recess in 2016 in Danish exports, due to extraordinary high levels of export in '14 and '15 that were linked to impressive construction works.



Kilde: Danmarks Statistik

Figure 4 Danish commerce of goods- and services with Indonesia, mil. DKKR

In 2016, Denmark exported goods and services to Indonesia at a level of 2.1 billion DKK, while the import reached a level of 2.3 billion DKK. Within these numbers, seaborne carriage (freight/goods), transportation, medicine and construction services were the most significant sectors.

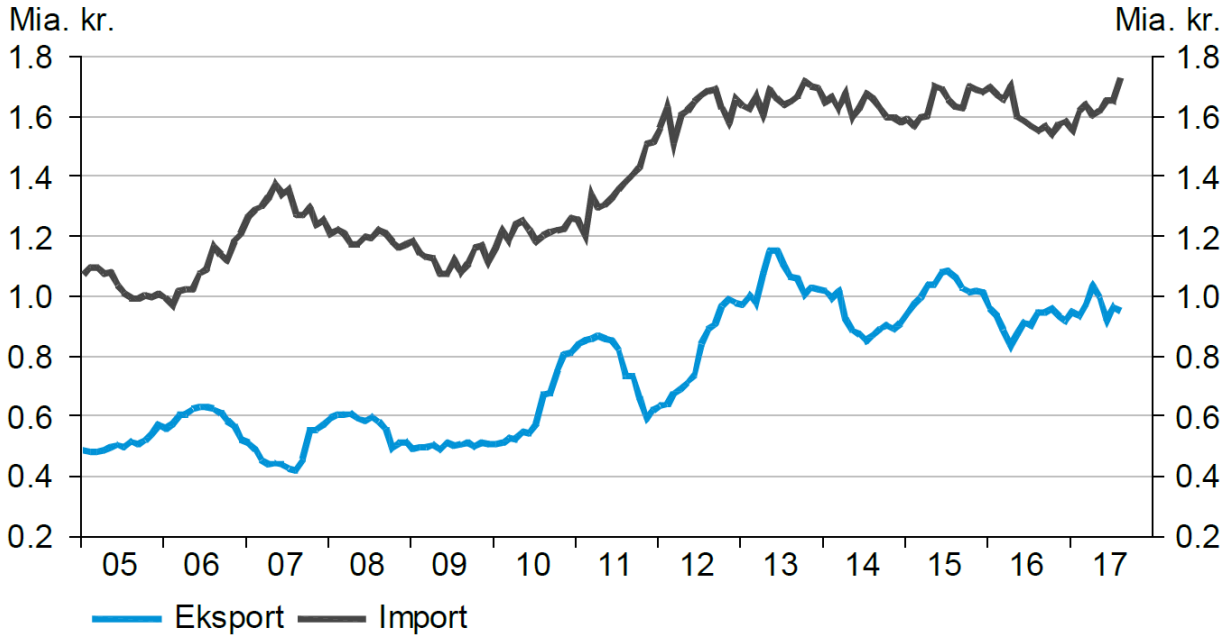


Figure 5 Danish exports and imports to Indonesia, total over past 12 months, billion DKK.

Within the first 8 months of 2017 the export of goods increased with 5% compared to that of the same period in 2016. Concerning exports of services there has been an increase of 26% within the first 9 months of 2017, compared to that of 2016. On the basis of this, the Danish Ministry of Foreign Affairs projects a total increase in Danish export to Indonesia at levels of 15%.

EU and Indonesia

When zooming a bit out, the bilateral trade in goods between the EU and Indonesia amounted to €25.3 bn in 2015, with EU exports worth €10 bn and EU imports worth €15.4 bn, making the EU Indonesia's fourth biggest trade partner. Indonesia is the fifth EU partner in ASEAN and in the same year, it ranked 30th in the overall EU trade worldwide. Bilateral trade in services between EU and Indonesia in 2014 amounted to €6 bn in 2014, with EU exports amounting to €4.1 bn and Indonesia's exports amounting to €1.9 bn

CEPA negotiations

Following exploratory discussions in April 2016 to further deepen EU-Indonesia trade and investment relations, negotiations for an EU-Indonesia free-trade-agreement were launched on 18th of July 2016. Four rounds have been held so far, the last one being in February 2018. The fifth round is expected before summer 2018 in Brussels. The ambition is to conclude a free trade agreement that facilitates trade and investments and covers a broad range of issues, among others in the waste sector, including tariffs, non-tariff barriers to trade, trade in services and investment, trade aspects of public procurement, competition rules, intellectual property rights as well as sustainable development.

A Free Trade Agreement will develop a key aspect of the overall relationship between the EU and Indonesia which is framed by the Partnership and Cooperation Agreement which entered into force on 1 May 2014.

Investments in Solid Waste Management Sector

The running commercial investments in the sector of MSWM (Municipal Solid Waste Management Sector) in Indonesia have been proven very limited along the years. It has been difficult to refer to investments made under this sector. Generally, investments for this sector are mainly coming from development cooperation under multilateral development banks or under G2G cooperation and the own revenue base for the sector is as a general rule of thumb only at 2%. However, some notable PPP-based activities that have taken place are:

City	Type of Activity	Remarks
DKI Jakarta	Privatisation of landfill management and operation	Signed in 2008 for an operation of 20 years. The contract was terminated in 2016 due to tripartite dispute on the contract.
	Construction of ITF	Together with Finland-based investor, Jakarta signed an MoU for a construction of thermal-based treatment facility with capacity of 1200 tonnes per day. The construction work has not yet started. Jakarta is estimated to construct another three facilities as effort to reduce waste hauled to Bantar Gebang landfill.
Surabaya	Privatisation of landfill management and operation	Still in operation, with additional landfill gas to energy plant. Within 2018, the operator will build another WtE plant utilizing gasification technology.

Table 2 Notable PPP-activities

In addition to G2G cooperation and PPP activities, a growing attention to B2B is being observed. Land owners in Jakarta consider to make their property available to the city administration if they can offer a combined solution with e.g. separation and treatment of various waste fractions. As example the Indonesian based Adaro Power consider to construct W2E facilities at their Jakarta properties and service the city administration. During the course of the SSC, It should be followed up if such B2B ventures will gain interest.

As being published by the Indonesian Ministry of National Development Planning, BAPPENAS, through their publication on short and long term loan plans (Green Book and Blue Book), numerous plans of loans have been directed to develop infrastructure projects in Indonesia within the year 2015-2019, and one of them is dedicated to the development of solid waste management program. A number of USD 30.686 billion worth of loan is reserved for an extensive development of infrastructure projects, whereby Solid Waste Management program accounts for a USD 250 million of it (0.7%). The loan will cover two projects called Advanced Solid Waste Management for Sustainable Urban

Development (Advance SWM-SUD) and The Improvement of Solid Waste Management to Support Regional Area and Metropolitan Cities that are being implemented by the Ministry of Public Works and Housing.

In addition to this, World Bank in Indonesia is planning to collect a round of investment for SWM infrastructure that amounts to USD 1.1 billion. Despite of major financing arrangement for SWM in Indonesia, World Bank report in 2012 estimates that an overall need of SWM cost for LMI equates to USD 20,1 billion. It is very clear that the investment will only cover the improvement of MSWM in selected cities, and will leave remaining gap to the sector. This is also reflected by the ability of local governments in allocating annual budget for MSWM that is below what is recommended.

3. SOLID WASTE SECTOR OVERVIEW

In the following, an overview of the solid waste sector in Indonesia is provided, introducing the structure of the waste sector, what characterizes it, the waste composition and the management of it in order to provide a basis understanding of the Indonesian Solid Waste Sector. It is first of all important to note that the sector can be characterized as complex and varied with both the national government, provincial- and city governments, the private sector and communities playing important roles. Hence, providing a clear overview is difficult, due to especially three factors. These are a lack of financing, lack of data management and a big informal sector.

Lack of financing
The Indonesian waste sector is characterized by being underfinanced. Based on estimations from The World Bank (2012) approximately 0.7 kg waste is generated per day per capita on a national average, which means that the need to finance the Municipal Solid Waste Management (MSWM) service accounts to USD 15 to USD 20 per capita per annum. Nonetheless, on average only USD 5 - USD 6 per capita per annum, or roughly 2.6% of the city budget, is allocated to the MSWM, meaning that the cities' waste management depend heavily on the city economies.

Lack of data management
The solid waste sector is highly undocumented due to e.g. waste being managed illegally because of bad infrastructure, lack of incentives and lack of financial allocations, meaning that numbers and a precise overview of waste flows are highly uncertain and to a large degree is based on estimations. Moreover, the already existing ADIPURA waste reporting system does not work properly due to among others lack of financing, human capacities and the system being voluntary for the municipalities. According to the Indonesia Association of Plastic Recycling (ADUPI), there are currently 134 recycling businesses recorded as official members. This number is likely limited to the ones operating legally and bound to membership aspects.

The informal sector
The Indonesian waste sector is characterized by a big informal sector, which contributes to unmanaged waste flows and lack of knowledge on activities within the sector. The Indonesian Association of Waste Pickers (IPI) estimates that there were 25,000 waste pickers operating in the metropolitan Jakarta alone through the year of 2010-2014, with a solid of 6,000 pickers operating on a daily basis at Bantar

Gebang landfill. Based on studies from the ESP program it is estimated that the same number of pickers are operating in many landfills that belong to metropolitan and big cities. Meanwhile, a total of 22,000 waste pickers were being recorded as the official member of IPI back in 2011, but only limited to members residing and operating within Java Island.

3.1 Waste Composition and Treatment

Indonesia is expected to produce 66.5 million tonnes of waste in 2018 and 67.1 tonnes in 2019 of household waste and household similar waste. Of this, an estimated 63% ends up in landfills and 8.5% remains untreated. The rest is being buried or treated with formal or informal methods.

Solid Waste Treatment	**Percentage**
Disposed to landfill	63%
Buried	11.9%
Composted and Recycled	11.4%
Burned	5.2%
Untreated	8.5%

Table 3 Solid Waste Management Treatment in IndonesiaDue to among others the lack of financial measures, no landfill in Indonesia can be categorized as a standard Sanitary Landfill and only a few can be categorized as Controlled Landfill, having the rest categorized as open dumping landfills.

Separation and treatment

In general, only little waste separation takes place at household level. It is the responsibility of the household to bring its waste to the waste collection point and often the community has a role to further transport the waste to a TPS before the responsibility of the waste is taken over by the municipality. Materials in the waste that have high enough value to be sold and that are not already taken out by the household for selling or reuse, will be of value to the informal sector (the scavengers/waste pickers). Much of it will be picked out on the way from household to TPS. This lack of source separation and subsequent scavenging, leads to municipal waste having a composition as shown below in figure 6 when it is received at the TPS and responsibility for further transportation and treatment is handed to the local government.

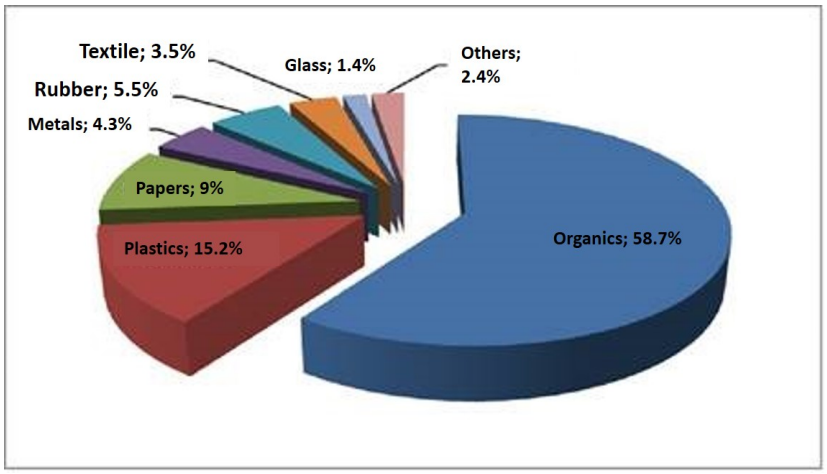


Figure 6 composition of SW from households, Indonesia

The figure above shows the composition of solid waste from households, revealing the large content of organic matter (58.7%) and secondly plastic (15.2%). The large organic content reduces the burning capacity of the waste with its high water quantity and low calorific value. A better separation of the organic waste will enable treatment and improve further separation of the recyclable waste fractions while improving the burning capacity of the residue.

Organic materials in Municipal Solid Waste

In a city setting, only a small fraction of the organic waste is treated. This is basically done through two methods for composting. One is composting at household level and the second is at composting plants. Composting plants can either be a community-based scheme or take place at a transfer station (TPS 3R).

Composting generally takes place on a scale that can only be considered for demonstration purposes. Hence, the composting plants' main purpose are considered to be awareness raising and capacity building. Composting plants often fail to run properly and there is a net cost associated to running the plants. This is mainly due to the non-existing market for compost generated from waste materials. Compost made from mixed waste may contain undesirable elements such as seeds and plastic. The compost made from mixed waste contains less nutrients than fertilizer and is less attractive to customers.

Hazardous and Infectious Waste in Municipal Solid Waste

According to Law No 18/2008 on Waste Management, hazardous and toxic waste from small sources can be part of the municipal waste stream as the "specific waste" component. This "specific waste" stream is not currently regulated and the government is still drafting a regulation for the management of specific wastes. Healthcare waste is regulated by the Minister of Health's Decree No. 1204/2004 on the environmental health requirements of hospitals. Infectious waste in solid form must be destroyed through incineration with temperatures above 1,000°C.

Recyclable waste and Role of Informal Sector in Municipal Solid Waste

The informal sector is the "system" that handles far most of the recyclable waste materials. The number of all recyclable waste that is handled by the informal sector is highly unrecorded, but DANIDA estimates that the range equates from 10% and 25% out of total generated waste. Waste is picked out all along the waste chain from household to landfill. Informal waste pickers, or scavengers, collect, separate and sell glass, metal, paper, carton and plastic to waste buyers, users and up cyclers.

In residential areas, there are waste buyers/traders, people who go from door to door, to buy and collect material from households, such as newspapers, magazines, electrical and electronic equipment, bottles, and car batteries. The buyers rarely collect plastic products, so these are mostly picked up from the waste bins by scavengers. Most of the recyclable materials are collected at the waste generation point, as this is where the highest amount of valuable materials can be found and where these are the least contaminated by pollutants. The recycling activities take place at every step in the SWM system, from source and until final disposal sites.

People collection directly from the waste source generally serve a specific area and there is an informal agreement among the scavengers regarding their territory. All scavengers sell their recovered materials to waste shops. The waste shops sort the recovered materials to maximise their sales price and to meet the purchaser's requirements. Some materials will be resold by the waste shop directly to the industries, whilst others will be sold to agents or suppliers that in turn organise the sale to the industry.

3.3 Legal framework of Solid Waste Management in Indonesia

The organisation of Indonesia's legal framework is stipulated in Law No. 12/2011 on *Establishment of Regulatory Regulations*. For solid and hazardous waste management the regulations fall into the hierarchy illustrated below.

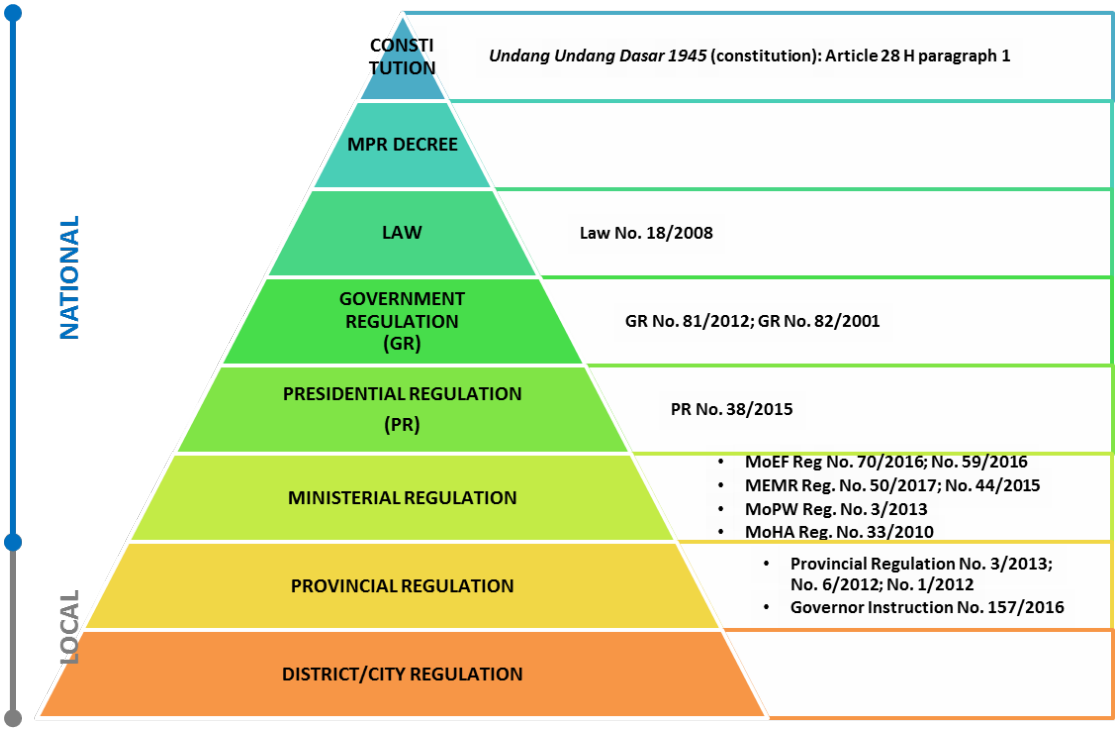


Figure 7 Hierarchy of SWM's regulation Framework, based on Law No. 12/2011.

Based on the illustration above, it can be seen that the constitution is the main basis for the formulation of laws and regulations in Indonesia. The regulations have judiciary authority according to the level of the hierarchy that enacted it. Regulations governing solid waste management can be found in both national and local legislation. These regulations are listed below. Principal regulations that will have direct relevance to the SSC are marked with an asterisk and discussed in detail in Annex 1. Below however, the national regulations with relevance to the SSC is listed.

Law

a) Law No. 18/2008 on Solid Waste Management.*

Governmental Regulations

a) Governmental Regulation No. 81/2012 on Management of Household and Household-like Waste.*
b) Governmental Regulation No. 82/2001 on Water Quality Management and Water Pollution Control.

Presidential Regulations

a) Presidential Regulation No. 97/2017 on National Policies and Strategies for the Management of Household Waste and Similar Waste (*Jakstrana*).*
b) Presidential Regulation No. 18/2016 on Acceleration of Development of Waste-to-Energy Plant in Province of DKI Jakarta, Cities of Tangerang, Bandung, Semarang, Surakarta, Surabaya

and Makassar. This regulation has been revoked by the Supreme Court due to social resistance. *

c) Presidential Regulation No. 35/2018 on The Acceleration Of Waste To Energy Facility Installation That Are Based From Environmentally Friendly Technology. This regulation is issued as a response to the previous Presidential Regulation 18/2016 that was revoked*
d) Presidential Regulation No. 38/2015 concerning the Cooperation between Government and Enterprises on Infrastructure Provision.

Ministerial Regulation

a) MEMR Regulation No 50/2017 on Utilization of Renewable Energy Resources for Electric Supply.
b) MoEF Regulation No. P.70/Menlhk/setjen/Kum.1/8/2016 on Emission Quality Standard from Thermal Waste Treatment Activities.
c) MoEF Regulation No. P.59/Menlhk/setjen/Kum.1/7/2016 on Leachate Quality Standard from Landfill Processing Activities.
d) MEMR Regulation No. 44/2015 on Electricity Purchased by PLN Sourced from City Waste-to-Energy Plant.
e) MoPW Regulation No. 3/2013 on Implementation of Solid Waste Infrastructure and Facilities in Handling Household and Household-like Solid Waste.
f) MoEF Regulation 13/2012 on Reduce, Reuse and Recycle by means of Waste Bank.
g) MoHA Regulation No. 33/2010 on Solid Waste Management Guideline*

Provincial Regulation

Various provincial regulations and Governor instructions on Solid Waste Management, spatial planning and supervision and Development of Waste Banks, temporary storage facilities (TPS) and intermediate treatment facilities (ITF), public awareness raising, etc.

City/Regency Regulation

Various regulations and Mayor instructions at district level on Solid Waste Management, spatial planning and operation/supervision, public awareness raising, etc.

Each policy issued by one level in the hierarchy must be in line with the relevant regulations at the levels above. In Indonesia, the principal law that regulates solid waste management is Law 18/2008 concerning *Solid Waste Management*. The key content of the national regulation for solid waste management is explained in the Annex 1.

3.4 Strategies, plans and actions at national level

The following section will give an introduction to the foremost important strategies and plans that holds relevance to the Strategic Sector Corporation, since the activities of the SSC actively focuses on feeding into already existing programmes.

GoI Long-Term National Urban Development Plan 2015-2045

This National plan sets targets of urban service standards and city waste management – demanding high sector performance. Solid Waste management is high on the national agenda, as exemplified by the underlying National Medium Term Development Plan's (RPJMN) "100-0-100" target of eliminating all slums and providing universal access to water and sanitation, including solid waste, by 2019[1].

This is an ambitious goal for improvement of public service delivery given current estimates that only 45 to 50% on Indonesia's urban solid waste is collected, with significant variation in performance among cities. As an example, the disposal sites in West Jakarta reaches a level of 98% collection and transfer whereas disposal facilities take care of only 15% in South Tangerang. While data quality remains an issue, collection rates seems to have improved modestly over time, with the former Ministry of Environment reporting 40% of solid waste collected in 2001.

Marine debris

The government of Indonesia has pledged to reduce plastic and other marine waste by 70% by 2025, which is strongly linked to overall 100% urban collection targets on land. The pledge is built over four target pillars, namely: Reduce land-based waste leakage, Reduce sea-based leakage of solid waste and other pollutants, Reduce accumulated coastal and marine pollution, Reduce plastics production and use.

Indonesia's Plan of Action on Marine Plastic Debris 2017-2025 was published in June 2017 by The Coordinating Ministry of Maritime Affairs and depicts of total 58 activities to be implemented by 15 different ministries. The three top ministries working most for the plan are: The Ministry of Industry, Ministry of Marine and Fisheries, and Ministry of Environment and Forestry. Ministry of Industry is taking a large portion in the plan and responsible in total 16 activities (28%), whereas Ministry of Environment and Forestry is responsible for 10 activities.

Jakstrana

The new *Jakstrana* is currently the lead driving factor of new initiatives in the government waste management scene as it pinpoints goals that have to be reached in a given time frame.

Compared to what Indonesia has managed to achieve of former goals and targets in the sector, the targets in the *Jakstrana* may seem rather ambitious. The National Development Planning Agency (BAPPENAS) estimates that only 16% of the government budget required for solid waste management is currently available to reach all targets in the sector. With this in mind, *Jakstrana* may also be intended as a tool to attract donor finance and private investment to reach national goals and hence not only a plan for spending the available government budget for SWM over the 8-year period. Even with the anticipated 1 billion USD World Bank Program on Solid Waste Management in Indonesian cities, there is still a far way to bridge the gap reach the

There is no immediate consequences described in the plans about what will happen if the 2025 targets are not achieved.

Waste Banks

[1] The 100-0-100 target refers to 100% household access to water supply; Zero slums; and 100% household access to sanitation (including waste water treatment and solid waste collection

Decentralised waste banks or *Bank Sampah* is a relatively new concept for recycling as a part of waste management. KLHK promotes waste banks as a strategic program to involve informal community-based efforts to collect sorted recyclable waste that has economic value. According to the ministry, the positive impacts of the waste bank development programme is inseparable from the participation of people at the grass root level.

Waste banks are community-based establishments. There are more than 5.000 waste banks in Indonesia now and number is increasing. Waste banks are set up in neighbourhoods typically for about 1.000 residents and are usually run by poorer people who wish to increase their income. Waste bank customers bring non-organic waste to the banks where it is treated like a deposit. Transactions are recorded preferably in a bank book that the customer holds or alternatively in lists kept by the bank. Some banks also accept organics waste, however most do not as their physical space is limited. The waste banks sell the deposited material to mobile agents for reuse or recycling. Thus, the waste deposits are transformed into money that can be withdrawn when needed after a contribution of about 15% is deducted for the waste bank's operating costs.

At current it is estimated that the waste banks handle less than 1% of all recyclable waste.

Waste to Energy sector

Within the W2E sector, many actors are waiting to see if an adjusted version of the Presidential Decree 18/2016 on Waste-to-Energy will be issued, allowing acceleration of large scale incineration of household waste. Basically, the more overall Government Regulation 81/2012 vaguely implies possible scenarios for deployment of thermal incineration plants. However, due to the vague formulations, investors have been calling for more specific regulations, hence the Presidential Decree 18/2016 on Waste to Energy was issued. With this regulation it was among others intended that the long process of formal tendering would be shortened, thereby easing establishment of thermal incineration facilities. However, due to pressure from NGO's and other stakeholders, the Indonesian Supreme Court in November 2016 revoked the regulation for it to undergo judicial review. Among the arguments against the regulation, perspectives such as incineration not being environmentally friendly and having health consequences, thereby violating the Solid Waste Law, Health Law and Stockholm Convention Ratification Law, was raised. Continuously, the regulation undergoes judicial review, however it is unclear where in the process and if and how the regulation will be reissued. Due to the revocation of the legislation, several initiatives have been put on hold and is still awaiting for further development on the revision of the regulation. Among these counts several private actors, including the Danish company Babcox & Wilcock Völund that are involved in tenders and contracts as subcontractors of thermal incineration technologies. Also, public and private landowners in areas where incineration plants have been suggested are on standby as well as a number of ministries and government agencies are involved in building the infrastructure and rearranging the solid waste management system.

Meanwhile, focus lies on other types of energy recovery from household waste, such as biogas, composting, RDF plants, etc. Most larger landfills are equipped with a (not very well) functioning methane collection and energy production plant, and there are a good number of small scale pilot projects in Indonesia involved in energy recovery. Some of these plants are still referred to as Waste-to-

Energy, even if material recycling would be a more appropriate terminology in case of the organic fraction of the household waste.

3.5 Identified challenges and potential in the Indonesian SWM sector

The Municipal Solid Waste Management sector in Indonesia is faced with many challenges. These are especially, however not limited to, funding capacity and a condition of uninformed society on waste management, but with the challenges there are also openings for improvement that could fruitfully be addressed.

Framework conditions

Poor separation of organic waste

With a status of Lower-Middle Income country, Indonesia is still generating predominantly organic waste in its waste stream, and on average, MoEF records that this fraction, i.e. food waste and garden waste, makes almost 60% out of the entire waste stream with poor at-source separation and leaves the recyclable materials highly contaminated. This strongly affects the intermediate action for MSWM in order to create a better Circular Economy approach in Indonesia and it affects the waste treatment and process in general.

The challenge of poor separation is further sharpened by the geographical condition of the archipelagic state that affects the logistical transportation and collection in trying to close the loop on national level. This is especially the cases for islands with less existing recycling industries and/or cement factories, as many of these plants are located on Java Island.

Furthermore, the geographical challenge leads to a domino effect in the strength of municipalities in financing the proper waste management, because many cities no longer can rely on a generic landfill operational scheme due to e.g. lack of available land. Also, a lack of capacity and resources mean that many cities are short in funding and creativity to attract investments in order to create a full-scale operational intermediate waste sorting and treatment facility. As a consequence, the cities depend heavily to the leadership and political prioritisation of respective Mayors to set aside budget and heavily subsidize the activities proportionally. In many cases, this is one of the reasons why many municipalities do not have the ability to pay the tipping fee.

Challenged framework conditions and the informal sector

The institutional framework in Indonesia is complicated and the political landscape in the waste sector is fragmented with responsibility spread out among 15 different ministries. This creates a list of different challenges in an institutional and political manner.

Among others, the large role of the informal sector in the recycling industry challenges the institutional framework because the informal sector's presence and importance to the recycling industry makes it difficult to regulate the market. This is among others due to a very limited amount of waste data being reported from the informal sector and due to possible resistance from people involved in the informal sector and limited power to enforce rules and regulation.

Additionally, the decentralisation process for MSWM is happening gradually together with global and national development. This results in a scattered and undocumented condition of waste management actors, especially informal sectors, as well as reliable inventory of waste data nationally.

Strategies and regulation to enforcement

It has been observed that in cities or regencies with strong leadership and focus on environmental issues there is a general improvement in the sub-management and operation of the city's environmental services. This clearly and visibly results in a cleaner environment at street level. Larger cities such as Jakarta and Surabaya also have strong local regulations in place. However, there is clearly still a lack of strategies, plans and options for enforcement within this regulation. Strategies and plans seem to focus on where there is a specific opportunity and often result in pilot projects and demonstration plants or other rather narrowly focused efforts to improve a certain issue in the management of solid waste. This clear lack of medium-term strategies and plans in the environmental sector at local level gives the impression that the efforts to improve – and keep improved – a city's environmental status - will only last as long as the strong and focused leader is still in place. An effort to formulate and consolidate strategies and plans at mid -level within in local authorities is expected to lead to longer term improved environmental status. Clear and drawn up local environmental strategies and plans may also be used as a tool to attract investment in the sector.

Moreover, there is a strong level of national regulation for most areas in the solid waste sector. However, it is difficult, in a timely manner, to have the national regulation "seep through" to local level and make tangible provincial and local medium term strategies and plans. Also, a lack of medium term strategies on provincial and local level leads to an immediate power for the political top leadership (mayors and governors) that mainly have their election period for implementation time. Despite many localized and well-working demonstration facilities and pilot projects there is no overall coherence between well intended activities in the sector. Also, there is no strategy for upscaling of technologies have yet proven to work in Indonesia or in similar situations in other countries; This may lead to doubling of efforts, lack of structured capture of experience and inefficient use of the limited budget. Many solutions are simple, robust and proving to work in similar contexts in other countries or regions of Indonesia, but limited finance (or limited courage to make financial decisions), inhibits the solution to be scaled up or constructed at a large scale.

Public resistance to incineration

A strong case of public resistance to waste facilities has also been a significant challenge in Indonesia. The Presidential Regulation 18/2016 on the acceleration scheme for waste management by allowing cities to deploy thermal technology facility was revoked back in 2016 due to public resistance. The social dispute on the perspective of waste facility was also shown back in 2004, where a construction project for an intermediate treatment facility (ITF) by private investment was arbitrarily stopped by the public living nearby the facility due to the long-standing misperception about waste facility (i.e. odorous, heavy vehicles operating in the neighbourhood etc.). From then on, many municipalities have been treading very carefully for any plan that involves reconstruction or construction of waste facilities, especially landfills. A solid and consistent communication, information, and education to the public regarding many MSWM aspects is a basic need to catalyse the information gap in the society.

Lack of funding
Current operational practices require significant (financial) strengthening. The waste management sector is strongly underfunded both in regards to investments and more operational practices. Local government allocations are small (average 2.6% of total APBD) at USD5-6 per capita/year – a rate that compares poorly to international benchmarks (USD 15-20 per capita/year). Waste management systems are heavily subsidized from local budgets. The lack of investment in the sector leads to severe inefficiencies and much higher operating costs.

Moreover, it is difficult to achieve additional investments from credible businesses, since a lack of capacity in the local governments creates a lack of confidence and unreasonably high risks to the private sector. This is simply because private businesses are resistant to compete with the large informal sector that accounts for 15 % of the total waste recycling compared to the formal recycling systems that captures less than 5% of the generated waste.

Potential in Municipal Waste Management Sector

Together with challenges, potentials are also identified within the MSWM. Many of the sector's challenges also moonlight as opportunities in a short to long term MSWM issue.

To start with, there is a strong urbanisation rate, population number and population growth rate, and stable economic growth are the main indicators that waste generation will still become topical strong point of the country in a long term perspective. Moreover, in lack of land for landfills it can be attractive for local governments and national government to have more comprehensive and up-scaled intermediate waste facilities in order to transition to a Circular Economy approach. Therefore, many initiatives and plans to tackle MSWM issue have been running in place. On the national level, Indonesia has agreed on giving stronger attention through its long-term and short-term policy products. The latest targets for waste management were issued through *Jakstranas* to pursue the lagging progress in multi-sectoral waste management. Additionally, an ambitious target for a 70% reduction of ocean debris by 2025 was also declared in 2017. These official targets will need a lot of attention and support - especially on the strengthening of waste data management to create a waste balance to obtain the said targets.

As an archipelagic state, tremendous recommendations and studies on a replication of best practices as well analysis of locally working technologies are the most needed by many municipalities. Available challenges and advantages on local level are most often overlooked and failed to identify. Discovering their capacity that can lead to locally working recommendation will be one of the needs in local and national levels, especially recommendations that can lead to practicable technology or funding arrangement

Lastly, a wide gap is happening in the MSWM sector, especially concerning the major MSWM infrastructure development in reference to the population and waste generation situation. With the current focus on development, MSWM aspects can be aligned into mainstream issue. Thus, creating more opportunities for investment scheme.

4. STAKEHOLDERS

For the SSC, it has been important to actively reflect upon and select what partners to engage actively with and what other partners to keep close to the SSC. In the following, an understanding will be given on the process of mapping the stakeholders that are relevant to the SSC, as well as an introduction to the different stakeholder groups will be given.

4.1 Stakeholder mapping

Having identified a list of relevant stakeholders, these were assessed in order to identify their key interests in the SSC and to what extent their interest will affect the SSC. Additionally, it has been relevant to consider, what the SSC would find them useful for, and the below listed parameters have therefore been used for the analysis of the stakeholders:

- Their stake in the SSC
- What does the SSC need from them?
- Risks and mitigation of risks

Additionally the stakeholders have been graded on a scale from 1-3 on two parameters: 1) the stakeholder's power/influence on the SSC and 2) on the stakeholder's interest in the SSC. For the full list, references are made to Annex 2.

Based on the grading, the stakeholders have been placed in the stakeholder map (see figure 6). The stakeholder map contributes to a better understanding of how the different stakeholders should be managed, following different categories; *watch, communicate generally, keep satisfied, manage actively, keep on side or keep informed.*

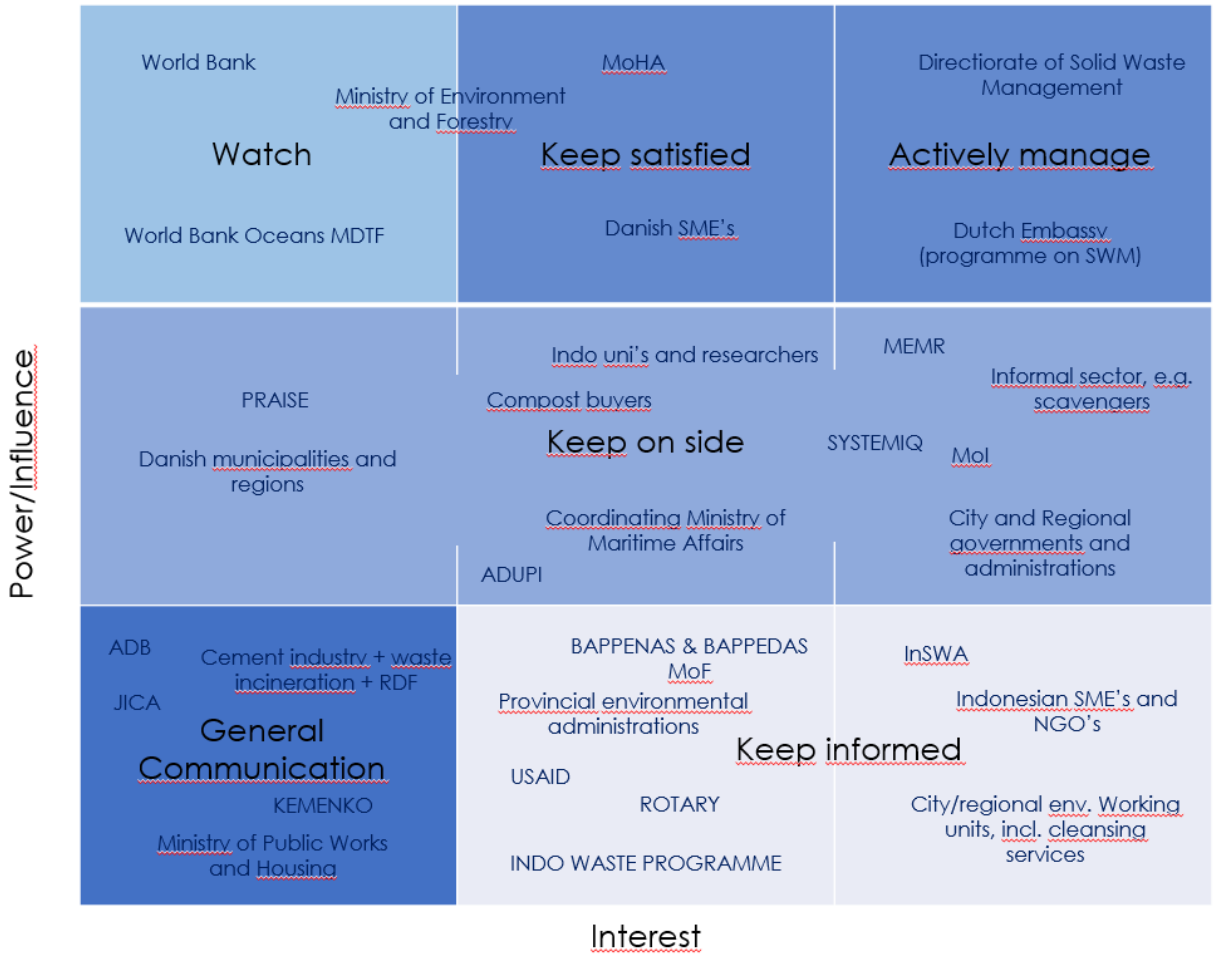


Figure 8 SSC Stakeholder Map

While it has been the aim to map all stakeholders in Indonesia with relevance to the sector cooperation, there is a number of other governmental, non-governmental and commercial stakeholders working in the solid waste sector that have been deemed of less relevance and not included in the overall mapping. Reference is made to Annex 2 for more information on all mapped stakeholders.

This is a picture of the current situation. Though major stakeholders will remain an important part of the SSC and continue to be actively managed, stakeholder mapping is a dynamic tool, and many stakeholders may change their influence and interest to the SSC over time. The stakeholder mapping is frequently consulted and adjusted with partners in order to ensure continuous best possible handling of all stakeholders.

4.2 Groups of Stakeholders

Public

There are multiple ministries and other stakeholders associated with waste management in Indonesia. A range of ministries and agencies have been identified and all have slightly overlapping activities and some have an unclear mandate. Ministry of Environment and Forestry (KLHK) has the responsibility

for developing policies, formulating regulations, and coordinating efforts in pollution control (waste collection and recycling). Ministry of Public Works and Housing (PUPR) is generally limited to providing technical advice, promoting pilot projects, and constructing/supervising large-scale off-site solid waste infrastructure (such as landfills and large-scale treatment plants). Although the ministries offer sectoral interlinkages across departments, persistent overlaps in their roles and responsibilities adversely affect efficiency and effectiveness of execution of mandates and institutional responsibilities. There is limited monitoring of local government performance (e.g. Adipura Awards (KLHK), Green Cities Index (Bappenas), Kota Hijau (PUPR)). Enforcement is largely absent, both at community level and management of waste facilities.

In Indonesia, delineation is drawn between the collection, transfer and disposal pathway responsibilities of local government and communities. The Ministry of Home Affairs Regulation No 33/2010 addresses administrative aspects of waste management at the level of households, residential estates, commercial and industrial estates, as well as at public and social facilities.

City and district government are ultimately responsible for solid waste management. Local government regulations often fail to uphold national government laws and policies. The Municipal Planning Agency and Cleansing Services Unit are the main local government agencies responsible for planning and implementation of solid waste management. However, the finances available to local government are insufficient to cover the high recurrent expenditures associated with collection and landfill maintenance. Furthermore, the transfer of solid waste responsibilities to local governments is not accompanied with transfer of necessary technical skills.

Responsibilities for specific stages of waste service provision are as follows:

- Collection and transport of household waste to Temporary Disposal Facilities (TPS) or Intermediated Transfer Facilities (TPST) are the responsibility of the neighbourhood and community organisations (RT/RW)[2];
- Transport of waste from the TPS/TPST to the Landfill (TPA), rarely via an Intermediate Treatment facility (ITF) is the responsibility of local government;
- Collection and transport of estate waste from source to TPS/TPST, or directly to ITF/TPA, is the responsibility of the estate management (residential, commercial or industrial);
- Collection and transport of waste from public and social facilities is the responsibility of local government.
- Management of municipal solid waste in public places (streets, parks, waterways, etc.) is handled by different departments depending on the city.

Research institutions

[2] RT/RW is the neighbourhood organisation (RT) within an urban village. The activities of several RT are coordinated by a community organisation (RW). RT/RW are voluntary institutions, established through discussion and agreement among communities, whose role is to corporate with the sub-district or village head to advance community empowerment. Each RT/ and RW has a head, secretary and treasurer. RT/RW activities are not salaried. Operational funding is through sub-district or village budget and from higher level grants.

Indonesia's government-based research institutions are part of the independent public institution under the Ministry of Research, Technology, and Higher Education, namely Indonesia Institute of Sciences (LIPI) and the Agency for Assessment and Application of Technology (BPPT). BPPT has been actively developing and advising cities and ministries on the best practicable waste processing technologies and state of the art technology development and will be used as knowledge partners when relevant throughout the partnership. In the meantime, LIPI has never been working in the specific MSWM issue, nor Circular Economy. However, LIPI has been working on the area of urban and human ecology that also supports the area of sanitation.

In addition to the public research institutions, public universities in Indonesia are actively working on the higher education curriculum of waste management. The most active universities in Indonesia that work on waste issues, namely: University of Indonesia (Jakarta), Bandung Institute of Technology (Bandung), Bogor Institute of Agriculture (Bogor), Gadjah Mada University (Yogyakarta), Surabaya Institute Tenth of November (Surabaya), University of North Sumatra (Medan), University of Tanjungpura (Pontianak), and University of Hasanudin (Makassar).

Private Sector

Private large-scale businesses in Indonesia working for Circular Economy and Solid Waste Management are limited and the sector is dominated by many SME's. In Indonesia a designated company that works for solid waste services are almost invisible and below the radar. However, an alliance consisting of global Fast-Moving Consumer Goods (FMCG) companies operating in Indonesia called PRAISE (Packaging and Recycling Alliance for Indonesia Sustainable Environment) have been working on the Extended Producers Responsibility issue by having initiatives and collaboration by the respective members on take-back and recycling activities. Additionally, Indonesia has had two cities experiencing in landfill operational and management: Jakarta and Surabaya. Navigat Organik Energy and Sumber Organik are the companies that have been working with the two cities, respectively.

On waste to energy initiative, the Association for Cement Indonesia (ASI) had agreed to take up the initiative by contributing through co-processing activity utilising the Refuse-Derived Fuel (RDF). Holcim Lafarge started to agree for RDF processing activity in West Java town of Narogong and Central Java city of Cilacap. Together with Holcim, other cement company Indocement has also been in a strong initiative of taking waste from Jakarta and Bogor to be processed in their kiln, with annual approximate capacity of 116,000 tonnes and 302,000 tonnes, respectively. Holcim, Indocement, and ASI participated also in the regulation formulation on the guideline of co-processing initiative for RDF that was led by Ministry of Industry.

Interest organisations, non-governmental organisations and civil society

A wealth of civil society organisations, small private companies and social enterprises are active on the solid waste sector. Indonesia's Solid Waste Management Association (InSWA) is the member of International Solid Waste Association (ISWA) and work closely with government partners on various topics and coordination efforts. InSWA consists of various initiatives both from private and public sectors and has been working with solid waste advocacies in the entire country. Many of the civil society and organisations are working also within consultancy services on solid waste management,

namely: Sustainable Waste Indonesia (SWI), Systemiq, EnviroSolutions and Consulting (ESC), Arkonin, and many others.

Other associations are more based in particular interests, hereunder Association of Plastic Recycling of Indonesia (ADUPI), Association of Plastic Industry in Indonesia (INAPLAS), as well as a number of civil society organisations and social enterprises with knowledge and standpoints on solid Waste. Some of them e.g. Waste for Change offers more commercial services such as waste collection from office buildings, residential, and industry and links to recycling industry and with the intention to minimise waste to landfill. Lastly, also members from Greenpeace Indonesia were active during the repealing of the Presidential Regulation No. 18/2016 on Acceleration of Development of Waste-to-Energy Plant.

Other Donors and multilateral agencies (and coordination amongst them)

A number of other donors are involved in the Solid waste arena in Indonesia at national level. A major one is the World Bank, who is having a 1.1 billion USD MSWM program in the pipeline to start in 2018. This is almost a doubling of the total public funds going to the sector, and is aimed to coordinate the sector at high level to provincial level and also to invest in particular waste infrastructure in selected cities. With the current size of the SSC it will not be possible to significantly affect the course of the WB project, but it will be of utmost importance to keep close ties and linkages to major stakeholders in the WB program in order to align activities or play in capacity building activities to the WB program.

JICA has been a large contributor to the sector at various levels of government from national level to pilot scale in selected cities. JICA's 3R project has come to an end and is now in a standstill period before it will be decided if a second phase MSWM program is to be enacted in Indonesia.

The Netherlands are implementing a very similar partnership to the SSC, also operated through a partnership of Indonesian and Dutch environmental authorities and partly facilitated through the Embassy of the Netherlands. Many aspects of this cooperation is very similar to the Danish SSC, i.e. it is aiming to improve the framework conditions in the Indonesian SWM sector in order for gaining access for private (Dutch) investment. The Dutch sector cooperation is also implemented under a bilateral MoU and started in 2016-early 2017 approximately one year earlier than the Danish SSC. A close collaboration with the Dutch initiative has been initialised, both in a day-long meeting with our (common) Indonesian main partner office under KLHK, and also in a Danish-Dutch meeting and subsequent exchange of information in order to align activities next to each other and exploit synergies of the programmes. It is assessed that by aligning programs and keeping a constant flow of information between the two programs, there will be no direct competition between the programmes or the potential companies involved. Where there is an issue, it will revolve around having to utilise time and resources from the same Indonesian government department, which is already stretched time/resource wised. But collaboration between Dutch and Danish programs may also give an advantage, as the attention of Indonesian Partners to both programs can be made when at meeting by either Dutch or Danish delegation.

The EU delegation is having interest in circular economy and reduced leakage of plastic to oceans and the activities of EU, hereunder delegations, will be followed closely on a running basis.

Various other bilateral agreements with Indonesia exist within the topic of Solid Waste Management. Hereunder many with directly trade related objectives. Valuable to mention is *Innovation Norway* and German cooperation, as well as Australian and South Korean interests.

A wealth of pilot projects and demonstration facilities as well as research and feasibility studies on the topic are also supported by various bilateral agencies. This is to be expected to continue and increase due to the increasing visible importance of the waste problems in Indonesia and the growing international concern of plastic debris leaking into the oceans.

Danish-based stakeholders involved in SWM and CE (including brief capacity assessment)

Public institutions and parastatals

Ministry of environment and Food: The Ministry of Environment and Food of Denmark is responsible for administrative and research tasks in the areas of environmental protection, farming and food production. At the local levels, much of the administrative responsibility has been delegated to the municipalities. The ministry consists of four agencies and local Centres across the country. The Ministry was created in the summer of 2015 as a result of the fusion between The Ministry of the Environment and The Ministry of Food, Agriculture and Fisheries of Denmark.

Ministry of foreign affairs of Denmark: The role of the Ministry is to support Danish interests in a way that furthers the freedom, security and well-being of Danish citizens abroad, while working for peace and stability in the world. In practice, the Ministry helps Danish companies in their export and Danish citizens in emergency situations abroad through close cooperation between the headquarters on Asiatisk Plads in Copenhagen and the representations abroad. The ministry is also hosting 25 sector counselors with sector expertise at Danish embassies.

The Danish Ministry of Energy, Utilities and Climate: The Ministry is responsible for national and international efforts to prevent climate change, as well as energy issues, national geological surveys in Denmark and Greenland and meteorology issues. The ministry was established in 2007 as a part of the Danish government's increased efforts to promote a greener and more sustainable society. These efforts include a governmental goal that Denmark one day becomes independent of fossil fuels. The ministry has also responsibilities in the economic regulation of waste management.

Local Government Denmark (KL): KL is a private interest and membership organization for all 98 municipalities in Denmark. It is KL's objective to defend the Danish municipalities' common interests and to help the municipalities carry out their political and administrative duties.

Interest and Civil Society Organisations

Danish Waste Association (DAF): DAF is a policy-driven interest group consisting of municipal waste units. Danish Waste Association aims to promote its members' interests in waste management. DAF has 53 members consisting of municipalities and joint municipal waste management companies in Denmark.

DPA-System: DPA-System is short for “Danish Producer Responsibility System”. DPA-System is in charge of administrative tasks associated with the rules on producer responsibility under Danish environmental law regarding waste from electrical and electronic equipment, end-of-life batteries, and end-of-life vehicles.

DAKOFA - Waste and Resource Network Denmark: DAKOFA is an independent member-based organization. The task is to prepare the Danish waste and resource sector for navigating in a dynamic society and a globalized world. DAKOFA is an association where both private and public actors can meet to exchange experience and views in a non-political forum. DAKOFA has roughly 260 members including national and local authorities, private organizations, research institutions, local authorities and inter municipal waste management companies, waste producers, waste handlers, transport companies, consultants and suppliers.

Danish Nature Conservation Association (DN): DN is the largest voluntary nature and environmental NGO-organization in Denmark. DN has 130,000 members and 95 local branches across the country. DN strives to be "the voice of nature" in relation to politicians, agriculture, industry and the Danish population.

Confederation of Danish Industry (DI): DI is a private organization funded, owned and managed entirely by 10,000 companies within manufacturing, trade and service industry. On the behalf of member companies, DI works to provide the best conditions for Danish businesses in order to improve the opportunities for growth and overall competitiveness.

The Confederation of Danish Enterprise (DE): DE is the network for the service industry in Denmark. DE represents 17,000 Danish companies and 100 Confederation of Danish Industry (DI): DI is a private organisation funded, owned and managed entirely by 10,000 companies within manufacturing, trade and service industry. On the behalf of member companies, DI works to provide the best conditions for Danish businesses in order to improve the opportunities for growth and overall competitiveness.

The Confederation of Danish Enterprise (DE): DE is the network for the service industry in Denmark. DE represents 17,000 Danish companies and 100 trade associations within trade, tourism, business services, IT, welfare services and transportation. DE is a private non-profit organization whose goal is to make running a business easier for the members.-profit organization whose goal is to make running a business easier for the members.

Private sector involved

Denmark is among the leading countries in the waste management sector with a unique experience regarding waste management and processes. The industry has changed during the last 20 years from waste management to resource management in which waste is seen as a potential resource rather than only an environmental problem. Today the industry works with waste as a resource for reuse and recycling with innovation such as industrial symbiosis, where waste from one company becomes a valuable resource to other companies, who are able to reuse the waste for further production.

Annex 3 provides a list of the most important Danish companies in the waste management sector including companies present on the market with an office or an agent, companies that have shown interest either through present or previous engagement in the market, in a project or on the market, and companies not engaged meaning no previous or present engagement on the market or in projects to our knowledge. Companies not engaged have been selected by the following criteria: Waste companies that provide technology in the areas of waste collection, waste sorting, preparation for reuse, and recovery of raw materials.

The list also gives an overview of the company size with three categories where a small company has 1-25 employees, a medium size company has 26-100 employees, and a large scale company has 101 employees or more.

5. OTHER RELEVANT DANISH SUPPORT AND FOUNDATION IN INDONESIA

5.1 Danish experiences in Indonesia

ESP3

It is the intention to work on the good foundation that the Danish-Indonesian development cooperation ESP3 program provides and which the ESP has built up since 2005. ESP and especially the ESP3 has been mentioned previously.

SSC on Energy

The SSC on Energy has been active in Indonesia since 2015. There are a number of methodological experiences that this new SSC may learn from in relation to approaching Indonesian partners as well as an overview of a related sector. A few areas of direct common relevance between the two SSC's have been identified:

1. Communication efforts - often messages are comparable and may gain from being communicated simultaneously or as part of one piece of information.
2. Possible areas of common interest: biomass treatment and Waste-to-Energy, building materials for energy efficiency and circular economy.
3. Geographic focus: traction can be made if both SSC's aim to focus in specific provinces. E.g., both energy and environmental planning authorities may be reached at the same time in Central Java, Bali or Lombok.
4. Issues that has to do with the SSC framework - common feedback and understanding of SSC guidelines.

Trade Council

The Danish Trade Council (TC) operating from the Danish Embassy has numerous contacts in and knowledge of relevant Indonesian authorities and businesses in the sector. Although TC is predominantly working on a case-to-case basis, there is much coherent knowledge to tap into and a

close cooperation with TC is necessary to make the SSC a success. Similarly, TC may benefit from a number of activities in the SSC. Directly identified is:

- Contribute with relevant sector knowledge within the Environmental Area, and as a starting point especially within waste.
- Information sharing, e.g. when one or more businesses are included in the G2G cooperation as well as when TC carries out tasks for environmental businesses.
- Concretise DEPA's effort on exports and elucidate the interfaces they share with TC.
- Inform and to the extent possible include TC staff in study trips and exchanges between Indonesia and Denmark, being relevant at regional levels as well.
- Daily cooperation with TC environment/energy-counsellor. Participate in relevant GIT meetings to the degree possible.

TC has access to various programs for promoting business activities abroad, hereunder VITUS, Danida business partnerships, etc. However, the Danish business sector of relevance for the SSC project is dominated by small or medium enterprises. Many SME's make it difficult to promote the interest of the Danish business sector within the SWM sector. For most Danish SME's in the sector, Indonesia is remote and hard-to-access, not the first choice export market. Many SME's have more interest in a direct commercial opportunity that in a long-term effort to improve the framework conditions of the sector.

This makes it even more relevant and important to consider Danish interest organizations, existing innovation networks and export organizations in the field of SWM. This e.g. DAKOFA, Dansk Affaldsforening, Danish Confederation of Industry, etc. in the promotion of Danish business interest, as these organisations will be more likely to have the resources to lift the agenda to a higher level than immediate commercial interests.

5.2 Other opportunities through SSC

Danish Fellowship Center (DFC) (research, courses and scholarships).

There is a great interest among the Indonesian partners to go for study tours, exchange visits and international experience sharing. Whether this interest is based in a profound academic interest, sector interest or in a simple opportunity to visit another country is a bit unclear. Likely, it is a mix of interests. Nevertheless, DFC arranged courses and scholarships will play a significant role in the motivation and may be used as a driving factor in relation to other parts of the SSC. It is therefore recommended to utilise access to courses, scholarships and research through DFC to as large an extent as possible.

SSC in other countries

A number of SSC's with an environmental focus is running in other countries, hereunder Kenya, Turkey, Vietnam, South Africa and China. It is recommended to continue good dialogue with both Sector Counsellors at Embassies and focal points at Danish partners' institutions throughout the SSC in Indonesia. This may be done on a running basis and during the annual Sector Counsellor seminars in Copenhagen.

5. CONCLUSION/RECOMMENDATION

The objective of this background study has been to explore where Danish Competencies match Indonesia's priority areas within the Circular Economy and Solid Waste Management Sector.

Underlined by new national regulations and ambitious commitments to improve Indonesia's performance in the waste sector, it appears that focus on environment- and waste issues are climbing up the political agenda. This is among others driven by the increasingly visible and concrete consequences of the environmental degradations that are largely caused by the waste sector. At present, reality is nonetheless far away from Indonesia's targets, and the country faces a list of challenges in order to reduce the amounts of produced waste and to increase the amounts of waste being managed properly. Efforts need to be put on improving political and institutional framework conditions and to allocate capacity to municipalities both in terms of funding and human resources.

For the Strategic Sector Cooperation to play an important role in the agenda of improving Solid Waste Management in Indonesia and to make the cooperation beneficial for both partnering countries, it is pivotal that planned activities feed into the national strategy of Jakstranas and the local strategies Jakstrada. Furthermore, efforts should be in line with Danish experiences, technologies and expertise in the Circular Economy and Waste Management sector. This can be met through a close focus on supporting a strengthening of the waste data management in Indonesia and through providing assistance on knowledge- and capacity building. Considering Danish experience with and technology on treatment of organic waste as well as Indonesia's challenges in this regard, this also constitutes an evident area of cooperation. It is furthermore important that efforts to upgrade local and national strategies and plans are built on experiences from already functioning practices in Indonesia.

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