2016 Top Markets Report Environmental Technologies Country Case Study

Indonesia

Indonesia ranks seventh overall on the 2015 Top Markets Study (TMS) with the market for environmental technologies valued at USD 6.3 billion in 2016. Despite efforts to establish a modern environmental regime, weak technical capacity in the public sector and poor administration of assets increases the likelihood that the application of environmental technologies in Indonesia for the short term will remain the purview of the private sector and donor organizations.

Overall Rank	Air Pollution Control
7	8
Water	**Waste & Recycling**
8	2

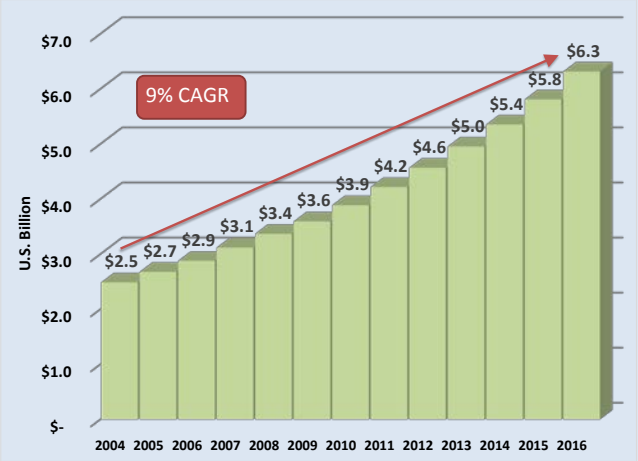
The overall environmental technologies market in Indonesia including goods and services is valued at USD 6.3 billion (2016).[1] Indonesia ranks seventh overall on the 2015 Top Markets Study (TMS) with a Composite Environmental Technologies Score of 23.4. Indonesia ranks eighth for air pollution control and water markets with a score of 9.9 and 9.3, respectively. Waste and recycling ranks second for with a score of 4.2 (see Appendix 1 for global rankings).

State of the Environmental Regime

The Ministry of the Environment and Forestry (MoEF) is the primary administrator of environmental law in Indonesia, which is principally regulated by Law No. 32 on Environmental Management and Protection. The MoEF and its authorities are responsible for environmental protection and management, and the supervision of compliance by parties responsible for business and activities conducted within their administrative areas.

Substantial investment in environment and natural resources policy and staff development coupled with strong support for policy and capacity development

Figure 1: Indonesia Environmental Technologies Market



Source: Environmental Business International with OEEI Analysis, 2016.

from both within the government and with international partners has led to only limited success with difficult and slow actual implementation of rules and procedures. This is mainly due to weak commitment by sector agencies, low awareness in local departments and capacity challenges at all levels.[2]

Despite these challenges, Indonesia's environmental regime is improving in both regulatory development and efforts to enforce environmental rules. According to the U.S. Environmental Protection Agency (U.S. EPA), these changes are the result of a government effort to strengthen both environmental rules and enforcement. Recent developments can be seen through the Environmental Business Journal-OECD Environmental Stringency Survey, which ranks environmental regimes on a scale from 1 to 7 (with 1 being lax and 7 being among the most stringent), which scored Indonesia a 3.5 in 2012, a 1.3 point improvement from its 2005 score of 2.2. Similarly, Indonesia ranks 58th on the World Economic Forum's 2011 Index for Regulatory Stringency with a score of 3.76 (on a similar scale to that of EBJ-OECD). Indonesia scored just above the median at 3.63 on the same survey for enforcement.

Market Barriers

Market barriers in Indonesia are substantial and often insurmountable in the public sector. The following barriers are most problematic for environmental technologies companies attempting to export to or work in Indonesia:

1. **Weak technical capacity to implement advanced environmental systems**
   The technical capacity to implement advanced environmental solutions varies depending on the sector at issue, with public providers of environmental services exhibiting low to medium technical capacity. This shortfall in capacity contributes to delays in project development and weak administration of existing projects.
2. **Poor asset management in public projects**
   Indonesia is plagued in the public sector by poor asset management and, in many cases, a lack of any asset management policy or attendant know-how. This has led to a variety of premature infrastructure failures. The decoupling of construction from downstream maintenance and operations compounds these problems by divorcing accountability between those that develop infrastructure from those responsible for maintaining it.[3]
3. **Perpetual delays in announced projects**
   Indonesia had developed an ambitious national agenda for environmental infrastructure development centered on a Public Private Partnership (PPP) model; however, repeated failures to secure financing have mired projects in the conceptual stage. The flaw in Indonesia's PPP model is a wholesale transfer of risk to the private sector without appropriate profit incentives.[4]
4. **Difficulty making market linkages through client industries**
   The most promising areas for environmental technologies originate from client sectors such as oil and gas or mining. It can be difficult for new-to-market exporters to develop relationships that lead to export sales with these clients, however.
5. **Lack of regulatory implementation, transparency and corruption in public tenders**
   U.S. companies have reported that tender requirements may be murky and that corrupt practices are common in many public tenders. Furthermore, projects and industrial activities, and their regulations fall directly under the command of governors or district heads. Actual implementation of rules and procedures on the local level in Indonesia has been poor.

Market Opportunities

Air Pollution Control

Power Plant Emissions Reduction

Indonesia's coal consumption now accounts for 22 percent of total energy consumption, surpassing gas as the second most consumed fuel used in conventional thermal generation. Indonesia currently has 51 gigawatts (GW) of installed generation capacity and electrification has reached about 87 percent[5], but many remote areas still have

very limited access to electricity and those that are connected to the grid suffer from power shortages.[6] To address these capacity issues, in 2006 the government embarked upon the first stage of its "fast track" plan, designed to accelerate power plant development.

The government managed to add 8.1 GW under the first phase and planned to complete Phase One by the end of 2015. Phase Two includes approximately 18 GW of new capacity (60 percent from coal), expected to come online by 2022.[7] More than a dozen smaller units are to be installed on Sumatera, Kalimantan and Bali during the same timeframe.[8] In mid-2015, President Joko Widodo announced additional installation goals of 36.7 GW by 2019, including 20 GW from coal-fired plants, 13 GW from gas-fired and 3.7 GW from renewable sources.[9]

In the first phase, electricity sector demand for coal more than doubled by 2014 as a result of coal-fired generation capacity additions.[10] 80 percent of the power plants built during the next decade will come from fossil fuel combustion, further opening the market for U.S. air pollution control technologies and services. The scope for deployment of air pollution control technologies in Indonesia is contingent on improvements in both enforcement and technological expertise -- areas where the United States has engaged bilaterally since the 1990's.[11]

Key Technologies in Demand:
- Continuous emissions monitoring systems
- Dry sorbent injection technologies
- Flue gas desulfurization equipment
- Activated carbon injection technologies
- Inspection, adjustment, maintenance and repair services
- Selective catalytic reduction technologies
- Selective non-catalytic reduction controls
- Urea to ammonia reagent systems
- Electrostatic precipitators (wet and dry)

Air Quality Monitoring

The U.S. EPA collaborated with the Ministry of Environment on a 2013 study which showed that 60 percent of Jakarta's population suffered from various air pollution-related health effects, including asthma and coronary disease. The study concluded that the total direct health cost of these illnesses was 38.5 trillion rupiah (about USD 2.8 billion) a year.[12] Indonesia launched an urban air quality improvement in 2006 that included installation of air quality management systems in 10 cities. The system, however, never operated effectively due to its high costs, and it lacked the capacity to monitor fine particulates.[13] The International Atomic Energy Agency (IAEA) recently worked with Indonesia's National Nuclear Energy Agency (BATAN) to add nuclear analytical techniques to the national air quality monitoring program. The project includes collaboration with local cities, provincial environmental protection agencies, and the Ministry of the Environment and Forestry (MoEF) and BATAN. There are now sampling locations in 16 cities covering Indonesia's largest islands, and the project is expected to expand to cover 34 cities over the next three to five years.[14]

Monitoring data has already helped to lower legal thresholds of lead concentrations in ambient air, and it will serve as a foundation for tracking air quality and developing corrective actions going forward. MOEF recently indicated that the ministry is planning to purchase and install seven PM 2.5 monitors in 2016 and 2017. The City of Jakarta also recently purchased two PM 2.5 air monitors and has indicated its plans to budget for the purchase of additional monitoring equipment. U.S. technology providers interested in developing a foothold in this market should pursue opportunities through official tenders as well as through donor efforts, including those of the Asian Development Bank, the World Bank, technical facilities within Asia Pacific Economic Cooperation (APEC) and the U.S. Agency for International Development (USAID).

Key Technologies in Demand:
- Fenceline monitoring
- Continuous emissions monitoring
- Ambient air quality monitoring equipment
- Source emissions measurement technologies

Mobile Source Emissions Reduction

The primary cause of air pollution in Jakarta and other major cities continues to come from vehicle emissions. According to the Indonesian Ministry of Environment and Forestry (MoEF), the source of around 70 percent of the country's urban air pollution is the transportation sector, and 90 percent of those emissions come from land transportation.

Several factors contribute to worsening pollution in the transportation sector, including lenient emissions and fuel quality standards as compared with other Asian megacities, as well as lax enforcement. The government has stated that it plans to move from Euro 2/II, promulgated in 2006, to Euro 4/IV -equivalent standards soon.[15] At least one source also reports that the government is in the process of improving emissions standards for new vehicles beginning in 2017.[16] Considering the double-digit growth of vehicle sales in Indonesia since 2007[17], if such policy reform is implemented, it could offer significant opportunities for U.S. companies in the medium-term.

Key Technologies in Demand:

- Emissions control technologies for passenger cars, light duty vehicles (LDVs) and heavy duty vehicles (HDVs)

Waste Management and Recycling

Municipal Solid Waste and Landfill Management

As of 2015, 69 percent of the 64 million tons of the solid waste generated in Indonesia each year was sent to largely unsanitary landfills. The national recycling rate hovers around 2 percent, with a slightly higher rate (7.5 percent) in urban areas.[18] Jakarta city residents alone dump approximately 6,700 tons of untreated solid waste every day into a single landfill - Bantar Gebang, the country's largest - which is on track to reach capacity by 2019. Waste picking in open dumpsites is common and sustains an unregulated, informal recovery sector.

The Indonesian government recently has made efforts to improve the country's management of solid waste. In 2008, it passed *Law Number 18 Regarding Waste Management*, which focuses on the management of municipal solid waste, guides the management of solid waste stream and encourages recycling. The law seeks to establish a national framework under which new technologies are utilized to address environmental issues and create economic value from the waste generated by citizens. It charges the national government and local authorities with the implementation of proper waste management procedures and facilities.

In 2011, the government introduced a municipal "garbage bank" (*bank sampah*) program to encourage source separation. Under the program, households weigh and record their non-organic solid waste, which is then dropped off at local collection points in exchange for funds deposited into household accounts. A system based on GPS technology is being created to improve residents' participation and coordinate waste banks across the country.[19] A robust national *bank sampah* program would help centralize waste collection in communities and facilitate the development of waste management infrastructure.

Key Technologies in Demand:

- Waste collection technologies
- Environmental monitoring and analytical equipment

Waste-to-Energy

In its Nationally Determined Contribution (NDC) to the December 2015 Paris Climate Agreement, Indonesia committed to "develop a comprehensive [waste management] strategy to improve policy and institutional capacity at the local level." The NDC text specifically refers to reduction of the amount of waste sent to landfill, reduction of waste-based greenhouse gas emissions and addition of renewable sources, including waste-to-energy specifically, into Indonesia's energy mix. While waste-to-energy can be part of more comprehensive waste management strategies, source reduction and recycling are recognized as preferred methods for solid waste management ("Reduce, Reuse, Recycle"). Additionally, any waste-to-energy solutions should give due attention to air pollution and climate risks.

In early 2016, the government submitted a draft presidential regulation (*Perpres*) to President Widodo focused on developing waste-to-energy (WtE) power plants as part of an effort to resolve acute waste management issues in seven pilot cities: Jakarta, Bandung, Tangerang, Semarang, Surabaya, Surakarta and Makassar.[20] Less than a handful of WtE plants are currently in operation across the archipelago. A new directive fostering public private partnerships (*Perpres* 38/2015)[21] should help to increase private sector engagement. Together with the government's ambitious power generation goals (see "Power Plant Emissions Reduction" above) and its increased emphasis on waste reduction, WtE is likely to offer opportunities for U.S. firms going forward.

Key Technologies in Demand:

- Waste-to-energy technologies and equipment
- Environmental engineering and design services

Water and Wastewater Treatment

Municipal Water Treatment and Transmission Systems

Municipal drinking water treatment is expanding in Indonesia, albeit slowly, to meet the country's National Medium-Term Development Plan, the Rencana Pembangunan Jangka Menengah Nasional (RPJMN), which set the goal of 100 percent access to drinking water and sanitation services during the 2015 to 2019 period. Drinking water and sanitation access were 68.5 percent and 60.5 percent, respectively, in 2014.[22] Indonesia has an estimated USD 225.5 billion of water supply investments planned and is electing to use Public Private Partnership (PPP) models to finance approximately 35 percent of the projects.[23]

Underpinned by Build-Own-Transfer (BOT) models, the Indonesia PPP projects in practice have been financed through bilateral and multilateral aid agencies[24] and tendered at a much more gradual pace than envisioned in national development plans. The government seeks to remedy previous difficulties with PPP projects through its recently promulgated PPP regulation, the Presidential Regulation (PR) number 38/2015. The PR broadens the type of infrastructure projects for which PPP is available, including social infrastructure, and allows for forms of payment other than end-user fees.[25]

The Ministry of National Development Planning's (BAPPENAS) PPP Book lists 15 water infrastructure projects planned with a total value of USD 1.59 billion.[26] The majority of projects are focused on drinking water storage, treatment and transmission, leaving wastewater treatment as the next hurdle in satisfying Indonesia's need for basic water and sanitation services. A few wastewater treatment projects in urban areas are listed, such as the DKI Jakarta Sewage Treatment Plant, a planned USD 512 million[27] project to be tendered.[28]

Announced projects for the 2016 tendering period have a cumulative estimated value of USD 1.56 Billion.[29] Marquee opportunities include the Karian-Serpong water conveyance scheme valued at USD 536 million, the Jakarta wastewater treatment project valued at USD 173.5 million, the Jatiluhur-Jakarta water supply valued at USD 134.4 million, the Pekanbaru Seletan Water Supply valued USD 132 million and the Jatigede water supply system valued at USD 117 million.

After basic infrastructure and supply needs are met, the predominant concern for Indonesia is likely to become drinking water quality. For the 20 percent of the population that does have a mains water connection, the quality of the municipal water supply is low, and drinking water directly from the tap is discouraged.[30] In the short term this will continue to fuel a strong Point-of-Use (POU) technology market. In the longer-term, utilities will need to grapple with improving water quality and reliability and reducing non-revenue water.

Technologies and Services in Demand:

- Engineering, procurement and construction services
- Operations services
- Advanced filtration
- Membrane filtration
- Sludge dewatering equipment
- Waste to energy technology
- Anaerobic digestion
- Nitrification
- Biological denitrification
- Monitoring equipment
- Testing equipment
- Point-of-Use devices

Process and Produced Water

The Indonesian government's Master Plan identifies 22 key industries for priority expansion and investment. Among those 22 sectors, several are key client industries for the water sector, especially mining (nickel, copper), coal, oil and gas, food and beverages, textiles, steel, and aluminum smelting.[31] Coupled with government emphasis on water resource protection, effluent management and water reuse are likely to be growth markets in addition to influent treatment technologies.

The burgeoning oil and gas sector should provide growing opportunities for process based water treatment, particularly as offshore development continues. The prevalence of international oil

companies working in Indonesia could provide a rational sales conduit for qualified producers of process water technologies. Furthermore, the government recently initiated four shale gas study projects and expects commercial shale gas production to begin by 2018.[32] Shale gas development will necessarily yield opportunities for both process and produced water treatment.

Technologies and Services in Demand:
- Wastewater treatment technologies
- Advanced filtration
- Membrane filtration
- Purification equipment
- Petrochemical and mining effluent treatment systems

Environmental Consulting and Engineering

Environmental impact assessments are administrated by the AMDAL Appraisal Commission, which evaluates environmental proposals and documentation in order to provide the MoEF with input and recommendations on the feasibility of business activities. In order to conduct business activities that may damage the environment, a permit is required to obtain a business license. Indonesian environmental law stipulates that everyone has the right to access documentation, such as environmental impact analysis, reports and evaluation results. The MoEF works to encourage citizen participation.

Coupled with high expected growth in its construction sector, which is expected to surpass Japan by 2030, Indonesia may also become a center for environmental engineering and consulting services contingent on the government's stringency with requiring adequate site assessment for forthcoming projects.

Technologies and Services in Demand:
- Environmental Impact Assessment and analysis

ETWG Agency Initiatives and Programs

U.S. Environmental Solutions Toolkit

The Toolkit compiles the U.S. Environmental Protection Agency's (U.S. EPA) environmental regulations, related underlying research and a list of U.S. companies that provide technologies necessary to implement similar environmental regulatory actions abroad. The Toolkit is used by U.S. EPA officials or environmental consultants as a reference tool within bilateral activities that focus on addressing environmental concerns.

Power-Gen International Buyer Program

Power-Gen, one of the leading U.S. power generation equipment and services trade shows, has partnered with the U.S. Department of Commerce's International Buyer Program to encourage foreign participation in the show. This platform is leveraged to discuss policies and exchange technical information regarding power plant emissions control with Indonesian participants and to foster business relationships between Indonesian end-users and U.S. emissions control providers.

WasteExpo International Buyer Program

WasteExpo, one of the leading U.S. waste management trade shows, has partnered with the U.S. Department of Commerce's International Buyer Program to encourage foreign participation in the show. This platform was leveraged to exchange relevant technical information with Indonesian participants and to introduce Indonesia buyers to U.S. waste management technology providers.

U.S. EPA Collaboration

The U.S. Environmental Protection Agency (U.S. EPA) has worked with the Indonesian government through the "Breathe Easy Jakarta" program to facilitate improved technical capacity to implement an air monitoring network. Other areas of collaboration have included training in environmental enforcement, environmental impact assessment and site remediation. U.S. EPA also cooperates with Indonesian partners and the United Nations Environment Programme (UNEP) under the Global Partnership for Clean Fuels and Vehicles (PCFV) and Climate and Clean Air Coalition (CCAC).

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