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Pathways for Sustainable Waste Management for Renewables: Lessons from Hawaii and Indonesia

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ABSTRACT

Waste management has been significantly difficult to address. In recent years, the national and local waste management law in Indonesia were stipulated not only to reduce volume of waste, but also to reduce greenhouse gas emissions and open pathways for renewable energy production. Addressing waste problems in Indonesia would also mean solving the pervasive marine debris issues, which is highly critical to do as the home to various marine biodiversity. However, the current state of Indonesia's waste management law and regulations had not yet reached its best condition. Turning to Hawaii, a federal state in the United States that has similar geographical characteristics as Indonesia, the much smaller island yet densely populated also had been dealing with its own waste problems in a different take. The active participation of community and establishing ambitious goal of zero waste in Hawaii contrasted the more rigid, top-down approach that Indonesia implemented coupled with a lax enforcement. This paper would cover the regulatory framework of both states in regard to its respective waste management methods that may be of lessons learned to further the achievement of zero waste state.

ABSTRAK

Pengelolaan sampah sangat sulit untuk ditangani. Dalam beberapa tahun terakhir, undang-undang pengelolaan sampah nasional dan daerah di Indonesia ditetapkan tidak hanya untuk mengurangi volume sampah, tetapi juga untuk mengurangi emisi gas rumah kaca dan membuka jalur untuk produksi energi terbarukan. Mengatasi masalah sampah di Indonesia juga berarti memecahkan masalah sampah laut yang sangat penting dilakukan sebagai rumah bagi berbagai keanekaragaman hayati laut. Namun, kondisi peraturan perundang-undangan pengelolaan sampah Indonesia saat ini belum mencapai kondisi terbaiknya. Beralih ke Hawaii, sebuah negara bagian di Amerika Serikat yang memiliki karakteristik geografis yang mirip dengan Indonesia, pulau yang jauh lebih kecil namun padat penduduknya juga telah menangani masalah sampahnya sendiri dengan cara yang berbeda. Partisipasi aktif masyarakat dan penetapan tujuan ambisius zero waste di Hawaii kontras dengan pendekatan *top-down* yang lebih kaku yang diterapkan Indonesia ditambah dengan penegakan hukum yang lemah. Penelitian ini akan membahas kerangka peraturan kedua negara terkait metode pengelolaan limbah masing-masing yang dapat menjadi pelajaran untuk lebih lanjut mencapai kondisi *zero waste*.

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INTRODUCTION

Waste has been a recurring issue for years in Indonesia. In only 2019, it is estimated that Indonesia generated over 67 million tons of waste[1], with the majority of it being one of the greatest environmental challenges—marine plastic debris.[2] Tons of plastic waste in Indonesia is mismanaged due to limited services and lack of access to disposal infrastructure, hindering improvement in waste handling.[3] It also led to communities disposing plastic waste directly into rivers, making its water bodies as one of the most polluted in the world.[4] In response to this, Government of Indonesia has set a quite ambitious target in waste management and reduction through the enactment of the National Policy and Strategy for Management of Household Waste and Waste Similar to Household Waste in 2017.[5] One of its program being to reduce waste at source by 30% and to increase recycling activities by 2025 to support reduction of marine plastic debris.[6]

Moreover, Indonesia is also facing energy challenges. With the rising populations and economic growth, so does the volume of waste production and the increasing energy demand. By 2020, energy mix of Indonesia is predominantly ruled by fossil fuels, with coal taking up 43% of the total energy consumption, followed by oil and natural gas with 35% and 20% respectively.[7] Meanwhile, renewables only account for approximately 4.8% of the total energy mix. The commencement of waste-to-energy (WTE) development in Indonesia through the national strategic project (NSP) by current president Joko Widodo[8] was an effort to reduce municipal solid waste and generate clean energy simultaneously.[9] It involves 12 WTE pilot projects at different metropolitan cities, to which have been postponed not only because of the COVID-19 pandemic, but also due to lack of attractive incentives, supporting infrastructure, and policy enforcement.[10]

Conversely, in the U.S., Hawaii is focusing to achieve zero waste through waste reduction to enhance their community and environmental health. In their latest Aloha+ Challenge, Hawaii is trying to achieve at least 70% solid waste stream before disposal by 2030 through reduction, recycling, bioconversion, and landfill diversion.[11] Moreover, Hawaii

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1 *See* Appendix I of Presidential Regulation of Republic of Indonesia No. 56 of 2018.

2 World Bank, *Plastic Waste Discharges from Rivers and Coastlines in Indonesia*, Marine Plastics Series, East Asia and Pacific Region, (Washington DC, 2021), 13.

3 ibid 14.

4 *See* WEPA, *State of water environmental issues: Indonesia*, <http://www.wepa-db.net/policies/state/indonesia/indonesia.htm> accessed on 14 December 2021

5 *See* Indonesia, *National Policy and Strategy on Household Waste and Waste Similar to Household Waste Management*, Presidential Regulation Number 97 of 2017

6 ibid 5(a).

7 BP, 'Indonesia's energy market in 2020' (*Statistical Review of World Energy – 2021*, 2021) < https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/statistical-review/bp-stats-review-2021-indonesia-insights.pdf> accessed 13 June 2022.

8 *See* Presidential Regulation of Republic of Indonesia Number 35 of 2018.

9 ibid; Law Number 18 of 2008 on Waste Management.

10 Ministry of Energy and Mineral Resources of Republic of Indonesia, *Waste to Energy Guidebook*, Directorate General for New and Renewable Energy Conservation, (Jakarta, 2015).

11 Hawai'i Voluntary Local Review, *Aloha+ Challenge 2020 Benchmark Report: Hawai'i's Voluntary Local Review of Progress on the Sustainable Development Goals*. (*HGG Local2030 Hub*.,2020).

was the first state to establish a 100% renewable portfolio standard (RPS) goal[12], that requires all of the interstate utility sales to come from renewable sources by 31 December 2045.[13] This is due to Hawaii being a polluted state –especially its oceans. One of its polluted beaches, Kamilo Beach, piled at least 15 – 20 tons of trash every year.[14] To alleviate some of the burden with waste generation, Hawaii has one active waste-to-energy facility called H-POWER that helps reduce a big portion of Honolulu's waste.

With increasing human and animal population as well as urban expansion and impacts of tourism activities, Hawaii has similar environmental issues like Indonesia. Their surrounding waters are affected by increasing marine debris from land and ocean sources, so does industrial or land runoffs. Both Hawaii and Indonesia are also the home to some of the world protected species.[15] Addressing waste problems and sustainable energy production in both states is vital, not only for the livelihood and sustainability of their citizen lives, but also to adhere and fulfill their international commitment for climate change actions.[16] Following the recent COP26 held in Glasgow, the waste sector was actually not highlighted as one of the agenda to reach net-zero state, often seen only as source of methane emissions.[17] One of the ways we can address climate change actions is actually from waste resource being an endless cycle of methane emission source. This paper will undertake the general law, policy, and programs of waste management currently being implemented by Indonesia and State of Hawaii in achieving their national and international goals to reduce waste and meeting their GHGs reduction goals.

METHODS

The method adopted in this study is normative descriptive analysis. The author conducted analysis in two parts, focusing on any laws, regulations, ordinances, policies and plans that the State of Hawaii and Indonesia has established to carry out their waste management respectively. Firstly, the author identified the laws and regulations in Indonesia, from national to regional level, and highlighted the programs relevant to carry out sustainable waste management efforts in accordance with the established national action plans. Secondly, the author carried out the same method to identify the prevalent laws and

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12 Haw. Rev. Stat. §269-92 Haw. (2016).

13 ibid (a).

14 Liz Barney, 'Welcome to Hawaii's 'plastic beach', one of the world's dirties places' *The Guardian* (Hawaii, 10 January 2020) <https://www.theguardian.com/us-news/2020/jan/10/kamilo-beach-plastic-hawaii-pollution> accessed 14 December 2021

15 *See* The Hawaiian Islands, 'Protected Species and General Conservation' <https://www.gohawaii.com/trip-planning/travel-tips/responsible-travel/protected-species>; SHERLOC of UNDOC, 'List of Protected Plants and Animals' <https://sherloc.unodc.org/cld/en/legislation/idn/list_of_protected_plants_and_animals/list_of_protected_plants_and_animals/list_of_protected_plants_and_animals.html?> accessed 14 December 2021.

16 *See* EPA, 'Ocean Dumping: International Treaties' <https://www.epa.gov/ocean-dumping/ocean-dumping-international-treaties>; IMO, 'Indonesia ratifies several IMO instruments' <https://www.imo.org/en/MediaCentre/PressBriefings/Pages/33-indonesiaratifies.aspx>, (IMO, 2012); Climate Action Tracker, 'Indonesia' <https://climateactiontracker.org/countries/indonesia/; https://climateactiontracker.org/countries/usa/> accessed 14 December 2021.

17 Helena Nageler-Petritz, 'Waste sector critical to combat climate change' (*Waste Management World*, 5 November 2021) <https://waste-management-world.com/a/waste-sector-critical-to-combat-climate-change> accessed 14 December 2021.

regulations of State of Hawaii. The identification of the legislations and programs in both countries was carried out by literature review.

This paper aims to provide a simple comparison between Indonesia and State of Hawaii. The reason why both states are chosen is because both states are comprised of geographically similar characteristics, being comprised of islands and home to diverse marine biodiversity, as well as having dense population that is prone to pollution.[18] Waste is clearly a critical issue due to both country' characteristics, as it impacts not only the sustainability of their tourism activities, but also the quality of their citizen' lives.

Indonesia addresses waste management through its main legal framework, Law Number 18 of 2008. This is the basis for all other supporting and implementing regulations in waste management sector. This Lawdifferentiate the type of waste to be regulated; household waste that is "derive[d] from household daily activities, excluding feces and specific waste"; household-like waste that is "derive[d] from commercial area, industrial area, special area, social facilities, public facilities, and/or other facilities; and specific waste, which includes those that contains hazardous and toxic materials, derived from disaster, leftovers from construction and demolition, and non-processed waste due to unavailable technology.[19] For the purpose of this research, "waste" as referred to in further passage will adhere to this definition.

Most of the implementing regulation in waste management sector in Indonesia are regulated in a ministerial regulation or presidential regulation. The main law usually serves as the guideline to establish specific measures to be taken by local government. This is why a lot of things, if not regulated yet, are not being handled because local government have no guidelines to refer to. The Waste Management Law in Indonesia have been enacted since 2008 without any amendment. Most of the regulations used in this paper have just been recently enacted thus there will be no significant progress to attest the result of those regulations or have been enacted for so long without any significant progress.

The State of Hawaii, on the other hand, have updated their Integrated Solid Waste Management from time to time.[20] In 2020, their waste reduction goals have been revised to adjust to their previous goals of reducing waste for 25% by January 1, 1995, and 50% by January 1, 2000.[21] While waste source reduction is hard to quantify due to limited data[22], Hawaii is actually showing significant improvement in waste diverted from landfill, which will be explained later in further passage of this paper. Moreover, not only within the legal context, but communities in Hawaii are also taking waste management in a serious manner. It is an interesting distinction that can be seen in the priority actions stipulated in Indonesia' national action plan to tackle waste – engaging community participation, which can be seen prominently in Hawaii' waste management laws and policy. The author will explore these policies, plans, and lay down the key highlight points of each states' waste management system.

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18 *See* EIA, 'Hawaii: State Profile and Energy Estimates' <https://www.eia.gov/state/analysis.php?sid=HI>; *see also* IEA, 'Indonesia' <https://www.iea.org/countries/indonesia> accessed 14 December 2021.

19 Article 2 of Law Number 18 of 2008 on Waste Management.

20 *See* State of Hawaii, H.N. No. 2155 (US).

21 Haw. Rev. Stat. §342G-3 (US).

22 Hawaii Green Growth Local2030 Hub, *Aloha+ Challenge 2020 Benchmark Report: Hawaii's Voluntary Local Review of Progress on the Sustainable Development Goals* (Hawaii, 2020) 32.

RESULTS AND DISCUSSION

1. Waste Management Law, Policy, and Program in Indonesia

Through its Waste Management Law, Indonesia addresses the significance of waste reduction and waste handling policies.[23] Waste reduction activities include restriction of waste generation, recycling and reusing waste activities. These activities should be implemented by the government and local government by establishing target of reduction in certain period of time. Furthermore, the central and local government must facilitate an economically friendlier technology for waste reduction, encouraging 3Rs (Reuse, Reduce and Recycle) activities, applying the use of eco-friendly label on such products, and promoting recycled goods in the market.[24] The Waste Management Law does not limit the obligation to reduce waste only to the government, but is also extended to business actors and communities. Although the language of the regulation does not suggest strict liability, however business actors and communities alike should use products that create the least amount of waste, recycleable, reusable, and/or degradable.[25] Any of these stakeholders contributing to waste reduction can be incentivized[26], either in the form of awards and/or publication of good performance appraisal for private actors[27], or in the form of gift products, discounts voucher, and award prize.[28]

As regards to waste handling implementation, the Waste Management Law listed 5 key activities: waste sorting, collection, transport, treatment, and/or final processing. [29] Conventionally, waste that is unable to be reduced, reused, or recycled will be disposed in landfills. These 5 activities are to ensure that there is the least or minimum amount of waste as possible that fills up landfills. Through sorting, waste can be categorized and separated according to its type, amount, and characteristics, which will help create an effective and efficient waste treatment system. Recyclable and reusable waste will be collected and transported to an integrated waste treatment plant as opposed to being mixed up with the waste that will be disposed in landfills.

The Government of Indonesia also adopted the same policy for reduction and 5 key handling activities for the management of Specific Waste through Government Regulation Number 27 of 2020. This regulation was stipulated to address the different means and method required to reduce and handle Specific Waste due to its special characteristics, concentration, or volume. Specfici Waste includes Hazardous and Toxic Substances (B3 Waste, also includes electronic waste), waste from disasters, debris, technologically untreatable waste, and/or waste that occurs periodically.[30] An effective sorting system will help regular waste treatment plant and Specific Waste-licensed treatment plant to carry out their job efficiently, which highlights the importance of sorting and the integration of

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23 Article 19 of Law Number 18 of 2008 on Waste Management.

24 ibid s 20(2).

25 ibid s 20(3); 20(4).

26 ibid s 21.

27 Article 22 of Regulation of Minister of Environment and Forestry Number P.75/MENLHK/SETJEN/KUM/1/10 of 2019 on Waste Reduction Roadmap for Producers.

28 ibid Appendix III (6).

29 Waste Management Law, s 22.

30 Article 2 of Government Regulation Number 27 of 2020 on Management of Specific Waste.

financing and compensation provided by the government for any waste management activities. Because waste management activities financing is sourced from the State and/or Regional Budget[31], the success of waste management in Indonesia feasibly relies on adequate fund allocation from the central and regional government. It is a known fact that the citizen of Indonesia requires influential and impactful drivers for massive behavioral change to a more sustainable waste management through self-sorting, but this skepticism is also driven by the lack of adequate facilities and infrastructure for sorting and the lack of professional waste management capacity.[32]

Notwithstanding the need for adequate funding, sustainable waste management in Indonesia can only be achieved through cumulative cooperation between stakeholders that demands for defined regulatory framework. The following are a number of policies, plans, and/or actions taken by Government of Indonesia, either at central or regional level, addressing the prevalent waste issues.

1.1 National Policy and Strategy of Waste Management (JAKSTRANAS) and Regional Policy and Strategy of Waste Management (JAKSTRADA)

In 2017, the President of Indonesia established the National Policy and Strategy of Waste Management (JAKSTRANAS) through the enactment of Presidential Regulation Number 97 of 2017. JAKSTRANAS serves as the guideline for local government to establish their own waste reduction and handling policy along with its supporting programs.[33] This national level policy sets out the target of waste reduction and waste handling, respectively 30% and 70% by 2025.[34] Waste reduction will be implemented through diverting waste generation, recycling and reusing waste.[35] Some of the strategies stipulated in this regulation include the preparation of standard and procedures for waste reduction and handling, cooperation between central and local government, establishing JAKSTRANAS Information System for monitoring, increasing community participation through education and informative communication, incentivizing waste reduction, obligating producer of waste to comply with the Jakstranas, and more.[36]

Indonesia is running behind in achieving their goal in waste reduction rate. The Ministry of Environment and Forestry reported that approximately 67.8 million tonnes of waste were generated in 2020, and yet only 14.17% out of its 22% reduction target was met.[37] Although historically, this pales in comparison with the achievement of national waste reduction through 2015 – 2018, which was within the range of 1.7 – 2.7%. Nevertheless, the Government of Indonesia fell short of its 2020 waste reduction target, and stronger

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31 Waste Management Law, s 24.

32 Rukuh Setiadi, 'Tiga kendala ini sebabkan rendahnya upaya pemilahan sampah di Indonesia' (*The Conversation*, 13 April 2020) <https://theconversation.com/tiga-kendala-ini-sebabkan-rendahnya-upaya-pemilahan-sampah-di-indonesia-132682> accessed 18 June 2022.

33 Article 2 of Presidential Regulation Number 97 of 2017 on National Policy and Strategy of Household Waste and Waste Similar to Household Waste.

34 ibid s 5.

35 ibid s 3(2).

36 ibid s 4(1)-(2).

37 Vika A. Dihni, 'KLHK: Target Pengurangan Sampah Hanya Tercapai 14,17% pada 2020' (*Katadata.co.id*, 9 February 2022) <https://databoks.katadata.co.id/datapublish/2022/02/09/klhk-target-pengurangan-sampah-hanya-tercapai-1417-pada-2020> accessed 18 June 2022.

commitment should be fulfilled to be able to achieve the 30% target by 2025. As of now, all 34 provinces in Indonesia have prepared and stipulated its own Regional Policy and Strategy of Waste Management (JAKSTRADA), subject to JAKSTRANAS as the reference guideline.[38]

Waste management programs as identified by the Ministry of Environment and Forestry though an evaluation of JAKSTRANAS and JAKSTRADA implementation in 2019 include[39], as follows:

1. Waste generation reduction
    a. Diverting waste generation, e.g., use of reusable cutlery/appliances and shopping bags, ban or restriction of plastic bags at modern retail shops.
    b. Waste reuse, e.g., use of organic waste in biopore infiltration holes to help prevent flooding or making seed compost from fermenting organic waste.
    c. Waste recycles, e.g. recycling household waste and producing them into useful, new products through waste banks.
2. The 5 key waste handling activities through:
    a. 3Rs Integrated Waste Treatment Plant.
    b. Waste Recycling Center.
    c. Biodigesters (a system that transforms organic waste into gas and creates liquid fertilizer, commonly installed for households).[40]
    d. Thermal waste treatment.
    e. Sanitary and/or controlled landfills.
    f. Waste to energy technology.

These programs will be integrated to each regional policies and established through a stipulation of Governor/Mayor Regulations coupled with incentives and disincentives to encourage sustainable and integrated waste management.

1.2 12 Pilot Waste-to-Energy Projects through Acceleration of National Strategic Project

The Government of Indonesia strives to increase economic growth through infrastructure development by its establishment of the National Strategic Projects (NSP). This program initiates mechanism to accelerate infrastructure delivery and expedite issuance of relevant regulation.[41] It includes major infrastructure projects, including the development of waste-to-energy (WTE) in 12 metropolitan cities in Indonesia, including the capital city Jakarta, and other metropolitan cities such as Bandung, Semarang, Surakarta, Surabaya, Denpasar,

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[38] Directorate General of Waste Management, *Jakstranas dan Evaluasi Jakstrada Pengelolaan Sampah Rumah Tangga dan Sampah Sejenis Sampah Rumah Tangga* (Ministry of Environment and Forestry, 24 July 2019) 16-18 <https://dlh.bulelengkab.go.id/informasi/download/jakstranas-dan-evaluasi-jakstrada-pengelolaan-sampah-rumah-tangga-39.pdf> accessed 18 June 2022

[39] ibid, 8.

[40] UN Climate Technology Centre & Network, 'Biodigester' (*UNFCCC Technology Mechanism*) < https://www.ctc-n.org/technologies/biodigester#:~:text=A%20biodigester%20system%20utilizes%20organic,microorganisms%20present%20in%20the%20waste.> accessed 18 June 2022.

[41] KPPIP, 'National Strategic Projects' <https://kppip.go.id/en/national-strategic-projects/> accessed 15 December 2021.

and Makassar.[42] A WTE is any machine/equipment able to treat and process waste into electricity, enabling significant reduction of waste volume and treatment time using eco-friendly and tested technology.[43] The Ministry of Energy and Mineral Resources projected that the 12 WTEs plant will generate a combined 234 MW of electricity by burning 16,000 tons of waste a day.[44]

The development of WTEs, unfortunately, is obstructed by the COVID-19 pandemic. In its initial stage, WTEs development was also hindered by the lack of Tipping Fee allocated in the State Fiscal Budget. A Tipping Fee, recognized as 'Waste-Processing Service Fee' under the Indonesian State Fiscal Budget[45], is expenses sourced from each region's Fiscal Budget based on volume of waste managed per ton, which serves its purpose as compensation for waste-processing services for the WTE plant, excluding the collecting, transporting, and final processing fees.[46] As set out in the recently established regulation from the Minister of Finance, Tipping Fee is allocated at the highest price of IDR 500,000 (five hundred thousand Indonesian rupiahs) per tons of waste.[47] With the stipulation of this regulation, it is anticipated that it will increase private capital investments. Due to the WTE being a project with high-end technology that proves to be costly in O&M, as well with Indonesia lacking in investment, further obstructing this pilot project. As of this date, Surabaya is the only city in Indonesia that has an operating WTE plant, namely WTE Benowo, which has been generating 12 MW electricity through processing 1,000 tons of waste per day. Indonesia's owned State Electricity Enterprise (PLN) purchased 9 MW from WTE Benowo, which powers approximately 5,885 households in Surabaya area.[48]

1.3 National Action Plan to Reduce Greenhouse Gas (GHG) Emissions ("RAN-GRK")

This action plan serves as the baseline guideline that targets sectors and activities potentially serving as GHG emission sources/absorber.[49] Like most policy in Indonesia, it is proposed on national level, then the national plan acts as the guideline for the action plan in local level (provincial, city, municipal). Waste management is one of the big five sectors regulated under this policy.

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42 *See* Appendix of Presidential Regulation Number 58 of 2017 on Accelerated Delivery of National Strategic Projects.

43 Article 1(6) of Presidential Regulation Number 35 of 2018 on Accelerated Development of Installation of Eco-friendly Waste to Energy (WTE).

44 Basten Gokkon, 'Indonesia, facing a waste crisis, plans to burn it for electricity' (*Mongabay*, 22 July 2019) <https://news.mongabay.com/2019/07/indonesia-facing-a-waste-crisis-plans-to-burn-it-for-electricity/> accessed 18 June 2022.

45 Waste Management Law, s 24.

46 Accelerated Development of Installation of WTE Regulation, s 1(4).

47 Article 10(5) of Regulation of Minister of Finance Number 26/PMK.07 of 2021 on Funding Support of State Fiscal Budget for Waste Management in Regions.

48 Purpasari Setyaningrum, 'Teknologi PLTSa Benowo, Menerangi Kota Surabaya Sambil Menyelesaikan Persoalan Sampah' (*Kompas.com*, 15 February 2022) <https://surabaya.kompas.com/read/2022/02/15/210033478/teknologi-pltsa-benowo-menerangi-kota-surabaya-sambil-menyelesaikan?page=all> accessed 8 June 2022.

49 Ministry of National Development Planning/BAPPENAS, *Guideline for Developing Local Action Plan for Green House Gas Emission Reduction (RAD-GRK)* (*Ministry of National Development Planning,* 2011) 1.

The Government of Indonesia has targeted its waste sector to achieve emission reduction in two phases: for 26% and 41% through increasing waste handling and domestic waste sewage.[50] The action plan as set out in the appendix of this policy are, development of facility and infrastructure for sewage treatment, projected to reduce at least 2 tons of GHG emission and landfills using integrated with 3Rs system, expected to reduce GHG emission by 46% tons.[51]

Another project also being prioritized by the government in relation to integrated waste management is production of eco-friendly energy, with waste-to-energy facilities projected to reduce GHG emissions by 26%. In doing so, waste reduction through thermal technologies will be overseen by Ministry of Environment and Forestry, and Ministry of Public Works will facilitate financing source and investment in waste sector.[52]

Within 2010 – 2017, 32 out of 34 provinces in Indonesia has reported its Regional Action Plan for Emission Reduction (RAD-GRK). For the majority of these regional plans, emission reductions activities include utilization of methane gas at landfill, increase of composting activities at 3Rs Integrated Waste Treatment Plant, organic waste recyle at Waste Bank, and operation of Sewage Treatment Installation (IPAL). Based on a report by the Ministry of National Development that monitors the implementation of RAN-GRK, the most effective method to reduce emissions is methane gas capture and utilization at landfill, however only a few number of operating landfill is equipped with methane gas capture technologies.[53]

1.4 Marine Waste Management and Single-Use Plastic Bans

Indonesia is known to have a vast and profitable marine environment; however, it is commonly known that this maritime country releases at least 200 thousand tons of plastic waste into the ocean every year.[54] Plastic waste are clogging up rivers and its run-offs ended up polluting the ocean.[55] These are due to extremely lax environmental protection law enforcement. Marine waste management is addressed through Presidential Regulation Number 83 of 2018, that also emphasizes regulating plastic waste in the ocean. Currently, there are efforts from the government to address specific mitigation under the National Action Plan on Marine Waste Management for 2018 – 2025[56], prioritizing several mitigation measures, such as increasing community awareness through recycling and waste segregation education programs, campaigns, and awarding innovators in waste

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50 Appendix I of Presidential Regulation Number 61 of 2011 on National Action Plan for the Reduction of GHG Emissions.

51 ibid.

52 ibid.

53 Secretariat of RAN-GRK, *Laporan Implementasi: Perencanaan Pembangunan Rendah Karbon* (*Kementerian Perencanaan Pembangunan Nasional/ Badan Perencanaan Pembangunan Nasional (Bappenas)*, February 2019) 45 <https://lcdi-indonesia.id/wp-content/uploads/2021/09/20190828-FINAL-FIX-Buku-Laporan-RAN-GRK.pdf> accessed 15 June 2022.

54 World Bank, "Stemming the Plastics Tide in Indonesia: Policy, Investments, and Research" <https://www.worldbank.org/en/news/feature/2020/10/06/stemming-the-plastics-tide-in-indonesia> accessed 15 December 2021.

55 Eijas Ariffin, 'Indonesia's Plastic Waste Problem' <https://theaseanpost.com/article/indonesias-plastic-waste-problem> (*The ASEAN Post*, 6 July 2018) accessed 15 December 2021.

56 Appendix of Presidential Regulation Number 83 of 2018 on Marine Waste Management.

management technologies; managing land waste from rivers or industrial run-offs; management of coastal and shore waste through development of reception facility at every ports and its supporting facilities and monitoring programs; R&D; and diversifying financial schemes to support marine waste management programs. [57] Citizens and communities are also taking direct participation in battling marine waste issues in Indonesia. There has been a number of campaigns advocating against plastic waste that clog ups the ocean and is ingested by sea animals, especially in regard to single-use plastic straws.[58]

Only several provinces and municipals in Indonesia have banned Single-use Plastic in local level. Some of these bans are facing resistance and even judicial review request from plastic industries.[59] As of December 2019, there are only 3 out of 34 provinces and 28 out of 508 municipalities that have adhered to ban single-use plastic.[60] Bali, one of the most visited tourism spot, had been the first province to enact single-use plastic product bans through the enactment of Governor of Bali Regulation Number 97 of 2018, stipulating that plastic bags, polystyrene (commonly known as Styrofoam) and plastic straws are banned and shall be replaced with other alternatives.[61] Only administrative sanctions are available for any institutions or businesses still using or providing single-use plastic products for daily activities.[62] Furthermore, Government of Indonesia also imposed an excise tax of Rp 30,000 (US $2.10) per kilograms of plastic bags to help combat excessive plastic bag use.[63]

1.5 Indonesia Circular Economy

The Government of Indonesia issued the waste management roadmap through the stipulation of Presidential Regulation Number 97 of 2017, which announced the 30% waste reduction and 70% waste treatment pledge by 2025.[64] One of its programs being the establishment of the National Commitment to a Circular Economy. The Indonesia Circular Economy Forum (ICEF) was established to encourage stakeholders in Indonesia not only to achieve the targets set out in JAKSTRANAS, but also the UN Sustainable Development Goals (SDGs) and their commitments regarding circular economy.[65]

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57 ibid.

58 Ulya Prisandani and Adzhana Amanda, 'The Importance of Regulating Plastic Marine Pollution for the Protection of Indonesian Marine Environment' (2019) 35(1) Yuridika <https://doi.org/10.20473/ydk.v35i1.10962> accessed 9 June 2022.

59 Ministry of Environmental and Forestry, *National Plastic Waste Reduction Strategic Actions for Indonesia*, (*Ministry of Environment and Forestry of Republic of Indonesia*, June 2020), 22 <https://wedocs.unep.org/bitstream/handle/20.500.11822/32898/NPWRSI.pdf?sequence=1&isAllowed=y> accessed 9 June 2022.

60 ibid vi.

61 Article 4(1) of Governor of Bali Province Regulation Number 97 of 2018 on Limitation of Single-Use Plastic Product.

62 ibid 22.

63 S. O. Simorangkir and I Ketut D. P. Yoga, 'Excise tax: Right step to combat plastic pollution' (*The Jakarta Post*, 6 March 2020) <https://www.thejakartapost.com/academia/2020/03/06/excise-tax-right-step-to-combat-plastic-pollution.html> accessed 16 December 2021.

64 National Policy and Strategy of Waste Management, s 5.

65 ICEF, 'National Commitment to a Circular Economy in Indonesia' (*Indonesia Circular Economy Forum*, 2022) <https://indonesiacef.id/en/national-commitment/> accessed 16 June 2022.

Circular economy has been dubbed as one of the most sustainable economy system, which allows significant reduction of waste by designing systems and products that require fewer resources and ensuring an efficient use and extended lifespan of the materials.[66] In 2021, the Minister of National Planning and Development of Indonesia, in cooperation with the United Nations Development Programme (UNDP) and supported by the Government of Denmark, had released a report titled "The Economic, Social, and Environmental Benefits of Circular Economy in Indonesia." This report focuses on the five key sectors on which the circular economy model will be implemented in Indonesia: food and beverages, textiles, wholesale and retail trade (especially to plastic packaging usage), construction, and electronics.[67]

The reason why circular economy implementation in Indonesia will be focused on these five sectors because it represents approximately 1/3 of Indonesia's GDP and these sectors employs more than 43 million people, only in 2019.[68] According to a research by the Statistics Indonesia (BPS), these five sectors also contribute at least 96 million tonnes in 2021, with an average projected increase of 57% waste by 2030.[69] Implementing circular economy will benefits Indonesia not only within the environmental sector by reducing waste, but will also provide economic and social benefits through creation of new jobs and recovery of raw materials from disposed waste. The full adoption of a zero-waste circular economy model will grow Indonesia's economy to USD 45 billion by 2030. As of this date, the ICEF is in the process of preparing the National Circular Economy Action Plan and Strategy for Indonesia.[70]

2. Waste Management Law, Policy, and Plan in Hawaii

2.1 Aloha+ Challenge

This program was established to achieve Hawaii's commitment to the UN Sustainable Development Goals (SDGs). In 2014, the Hawaii State Legislature passed Senate Concurrent Resolution 69 (SCR 69) to endorse and support the Aloha+ Challenge[71], which contains six targets for sustainability[72], including achieving 70% Clean Energy, 20 – 30% Local Food production, increasing Natural Resource Management to reverse natural

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66 Ministry of National Development Planning of Indonesia *Summary for Policymakers: The Economic, Social, and Environmental Benefits of a Circular Economy in Indonesia* (Jakarta, 2021) 2.

67 UNDP, 'A new report on circular economy presents strong case for increasing Indonesia's GDP while saving the environment' (*UNDP*, 25 January 2021) < https://www.undp.org/indonesia/press-releases/new-report-circular-economy-presents-strong-case-increasing-indonesia%E2%80%99s-gdp-while-saving-environment#:~:text=Jakarta%2C%20January%2025th%2C%202021%20%E2%80%93,Planning%20(Bappenas)%2C%20in%20partnership> accessed 17 June 2022.

68 Ministry of National Development Planning of Indonesia *Summary for Policymakers: The Economic, Social, and Environmental Benefits of a Circular Economy in Indonesia* (Jakarta, 2021) 5.

69 ibid.

70 ICEF, 'National Commitment to a Circular Economy in Indonesia' (*Indonesia Circular Economy Forum*, 2022) <https://indonesiacef.id/en/national-commitment/> accessed 16 June 2022.

71 State of Hawaii, *Aloha+ Challenge, Recommendations for Taking Action and Tracking Process*, Report to the Twenty-Eighth Legislature, December 2014.

72 Haw. S. Con. Res. No. 69 <https://www.capitol.hawaii.gov/session2014/bills/SCR69_.HTM> accessed 14 December 2021.

resource losses, 70% Waste Reduction, establishing Smart Sustainable Communities, and increasing Green Workforce and Education.[73]

Previously, the law in State of Hawaii has mandated solid waste stream reduction by 50% by January 1, 2000.[74] As this target was not reached, the State of Hawaii, its four counties and the Office of Hawaiian Affairs agreed to recommit the target and increase commitment to 70% waste reduction before 2030 through source reduction, recycling, bioconversion, and landfill diversion methods. As of today, Hawaii is on track with their solid waste diversion goals, with 50.12% of it have been diverted from landfill, either for reuse or recycling.[75] While the total annual waste generation remained relatively the same with 2.453 million tons in 2018[76], at least 90% of the waste in City and County of Honolulu are incinerated by H-POWER WTE facility that annually converts over 700,000 tons of waste, generating an average of 5% electricity on O'ahu between 2007 – 2019.[77] With that amount of waste processed by H-POWER, the WTE reduces GHGs emissions by 603,000 tons of CO2, which is the equivalent of taking 117,000 passenger vehicles off the road for one year.[78] The energy produced can also power up 34,000 homes per year, and H-POWER was able to recover 15,700 tons of metal for recycling annually.[79]

2.2 Zero Waste Hawaii

Zero Waste Hawaii is a statewide coalition of organizations and initiatives in each county that collaborates to reduce waste in Hawaii by building and promoting responsible systems for production, consumption, and waste management.[80] The Hawaii County, for example, had adopted Resolution 356-07 to embrace and adopt principles of Zero Waste as a long-term goal through the 2009 Zero Waste Implementation Plan. The latest 2019 update to the plan focuses on waste diversion and assessment of potential existing facilities for waste management operations.[81] Some of the programs being highly prioritized in the plan include[82]:

1) Expanding and improving public education and awareness program in source reduction
2) Developing policies and ordinances to mandate recycling rates

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73 Aloha+ Challenge, 'Aloha+ Challenge Goals' <https://aloha-challenge.hawaiigreengrowth.org/aloha-goals/> accessed 14 December 2021.

74 *See* Haw. S.B. No. 3084 S.D. 2 <https://www.capitol.hawaii.gov/session2020/bills/SB3084_SD2_.HTM> accessed 15 December 2021.

75 Aloha+ Challenge, 'Solid Waste Reduction 01 | Total Solid Waste Diversion' <https://alohachallenge.hawaii.gov/pages/swr-01-total-solid-waste-diversion> accessed 14 December 2021.

76 Office of Solid Waste Management, Dept. of Health, Hawaii, *Annual Report to the Thirty-First Legislature State of Hawaii 2021 Pursuant to Section 342G-15*, <https://health.hawaii.gov/opppd/files/2020/12/342B-15-2021-OSWM-Legislative-Report.pdf> accessed 15 December 2021.

77 Hawaii Green Growth Local2030 Hub, *Aloha+ Challenge 2020 Benchmark Report: Hawaii's Voluntary Local Review of Progress on the Sustainable Development Goals*, 32 (2020).

78 COVANTA, 'H-POWER' <https://www.covanta.com/where-we-are/our-facilities/honolulu> accessed 19 June 2022.

79 ibid.

80 Aloha+ Challenge, p 33.

81 County of Hawaii Integrated Solid Waste Management Plan Update 2019, ES-1.

82 ibid ES-6-9.

3) Complete capital projects to facilitate expanded recycling programs, for example, by modifying infrastructure at recycling and transfer stations
4) Expanding opportunities to recycle in public areas and during public/community events
5) Potential cooperation between State/Counties to send unrecyclable materials to H-POWER

The programs as set out in the Zero Waste Implementation Plan is also in line with the goals in the Aloha+ Challenge.

2.3 Joint Community Programs

There are various community organizations and volunteers dedicated to clean Hawaii beaches, specifically addressing the issue of marine debris and plastic pollution. The Hawaii Environmental Cleanup Coalition was established in 2017 by 11 organizations and their joined efforts to remove over 445,000 pounds of litter, marine debris, and derelict fishing nets from Hawaii coastlines.[83] Zero Waste Hawaii is an organization and initiatives that collaborates to reduce waste in Hawaii by building and promoting responsible systems for production, consumption, and waste management. [84] Re'Use Hawaii is an NGO which diverts tons of reusable building material from landfill to be distributed to community centers who need it.[85]

2.4 Other related laws and ordinance

2.4.1 Hawaii Integrated Solid Waste Management Act

In improving their commitment to recycling for Hawaii' sustainable future, the Hawaii Integrated Solid Waste Management Act require the counties to prioritize source reduction and recycling and bioconversion before transferring the waste to landfill or incinerator. Each county may choose to transfer waste directly to the landfill or to be incinerated at their discretion, however, source reduction and recycling should still be their utmost priority for sustainable waste management. In implementing the programs, each county in State of Hawaii must also consider the minimization of litter and illegal dumping. [86]

2.4.2 Disposable Food Ware Ordinance

The City and County of Honolulu, as the capital of and most populated city in State of Hawaii[87], has adopted the Disposable Food Ware Ordinance ("DFWO") in 2019 to phases out single-use plastic service ware and food ware products. Businesses are prohibited from providing plastic bags used for checkout to transport prepared foods[88], however handleless plastic bags to package loose items like bakery goods, fruits, or vegetables, or bags used

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83 Hawaii Green Growth Local2030 Hub, *Aloha+ Challenge 2020 Benchmark Report: Hawaii's Voluntary Local Review of Progress on the Sustainable Development Goals* (2020) 30.

84 ibid p 33.

85 ibid.

86 *See* Haw. Rev. Stat. §342G-2 (2016)

87 United States Census Bureau, 'Hawaii' (*US Census Bureau*) <https://www.census.gov/geographies/reference-files/2010/geo/state-local-geo-guides-2010/hawaii.html> accessed 13 June 2022.

88 City and County of Honolulu, Ordinance 19-30, 40 (2019), CD1, FD1, §9-9.1.1. (1).

for laundry or for transporting chemical pesticides may still be provided. [89] Some exemptions are provided upon requests, however there is a really narrow margin to use plastic cutlery or Styrofoam in Hawaii. In situations where there are no reasonable alternatives available, food vendor or private actors may apply for the restrictions exemptions, accompanied with the food vendor's information, and the factual basis needed to support the requested determination.[90]

2.4.3 Hawaii Marine Debris Action Plan

Marine debris has been a pervasive issue and is especially complex to address in a state like Hawaii that has dense population, but relatively small body of land. Adding to the fact that the state is geographically isolated and often visited by tourists from all over the world, Hawaii regularly has a great amount of marine debris drifting in its waters. Various stakeholders from the government in federal and state level, private actors, and NGOs have converged to establish the Hawaii Marine Debris Action Plan to address this major problem.

The Hawaii Marine Debris Action Plan was specifically tailored to address four goals identified by Hawaiian local marine debris community – prevention, ocean-based marine debris, removal, and research. Prevention efforts here refers to approaches to change consumer behavior through outreach and education, partnership with businesses and industry to support waste reduction efforts, coordinate efforts between government and volunteer groups to enforce laws reducing local sources of marine debris, and deployment of physical mechanism for prevention.[91] These strategies will involve a number of action plan, including the contributing organizations that will focus on each action. For example, Surfrider Foundation is listed as the contributing organization to certify 100 restaurants to be 'Ocean-Friendly' (OFRs), which must qualify for 7 criterias: only reusable foodware available for onsite dining, providing paper straws only by request, no Styrofoam or plastic bags even for takeout or to-go orders, nor any provision of single-use utensils, straws, condiments. All beverages cannot be sold in plastic bottles. Lastly, these criterias should adhere to proper recycling practices.[92]

The Hawaii Marine Debris Action Plan also address ocean-based marine debris, which are abandoned, lost, or discarded fishing gear and other marine debris accumulations drifted to Hawaii. Partners and contributing organizations to this goal conduct education and outreach to ocean users for proper and legal waste management at sea, identify funding and provide low-cost disposal option, or identify fishing materials and practices designed to reduce marine debris. Moreover, government of Hawaii also seeks public-private partnership (PPPs) to develop industry standard and build monitoring capacity for illegal discharge. For the sustainability of the program, the action plan also talks about strategies of effective response plans through sustainable funding mechanisms and resources for vessel removal and disposal.[93]

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89 ibid, §9-9.1.2. (2).

90 ibid, § 41-27.3.

91 NOAA, The 2021 Hawaii Marine Debris Action Plan, p 8-12.

92 Surfrider Foundation, 'Ocean Friendly Restaurants' <https://hawaii.surfrider.org/programs/ofr/> accessed 17 June 2022.

93 2021 Hawaii Marine Debris Action Plan p 13-18.

The next key goal is the essence of saving the ocean: removal. Marine debris removal is imperative to reduce threats and harm to marine biodiversity and indirectly the human population caused by the marine debris. This is carried out by utilizing effective methods to first locate the marine debris accumulations, then coordinating an effective reporting systems in response to identified debris. Through the use of any available information to prioritize cleanup sites, the contributing organizations will later develop capacity for the removal and disposal of marine debris.[94] Finally, the action plan addressed research as the last goal. Essentially, there will always be a need for a better understanding of the marine debris traits, life cycle, accumulation rate. Knowing this would help advance a more sophisticated standardized methods or best management practices of mitigation, outreach, and removal efforts of marine debris.[95]

CONCLUSION

In comparison, the laws, policy, and programs currently or planned to be implemented to address waste problems in State of Hawaii and Indonesia is intriguing. There is almost a prevalence of best practice conforming standard in Indonesia's waste management law and policy, as opposed to the particularly tailored policies and plans in Hawaii. Moreover, despite having a very ambitious target of waste reduction, the government of Hawaii is supported by the consciousness and initiatives of communities, NGOs, private actors, and citizens' willingness to participate in sustainable waste management. The same cannot be said to the relationship between policymakers and communities in Indonesia. With a rigid model of policy without much outreach and education activities implemented, there has not been any kind of trust established between the government of Indonesia and its citizens to drive a massive change in sustainable behavior, coupled with the fact that waste management itself has not been prioritized yet in most provinces in Indonesia. This can be seen only by the fact that most waste treatment plant or facilities are not adequate, nor it is manned with professionals with the capacity to treat waste sustainably.

Adapting more community-friendly regulations would allow Indonesia to carry out their duties in reducing waste. The Waste Management Law has not been amended since 2008, hence an amendment should be carried out to allow more updated guidelines for the newer waste issues that have not been addressed in the original version. Nevertheless, waste management in Indonesia is a rapidly changing sector, as more and more development are being established and more progress are seen compared to 5 years ago. It is a compelling field to research on, as you cannot help but feel the individual burden to a worldwide goal. It is why law and policymakers should take community participation in consideration and keeping industry in mind to facilitate individual participation, and in doing so, helping the world having less waste at a time.

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[94] ibid p 19-23.

[95] ibid p 24-31.

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