LANDFILL GAS IN INDONESIA: CHALLENGES AND OPPORTUNITIES

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INDONESIA

THE BACKGROUND

- **Population ±237 million ; HDI = 0.697 -> Medium Level**
- **GDP per capita ±US$ 1000,-**
- **33 Provinces with 497cities/regencies**
- **World's largest archipelagic state: 17.508 islands with 1.9 million km2**

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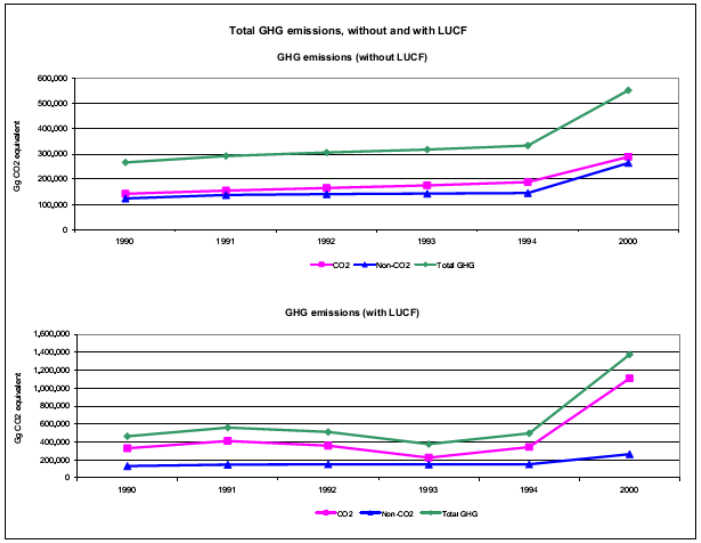
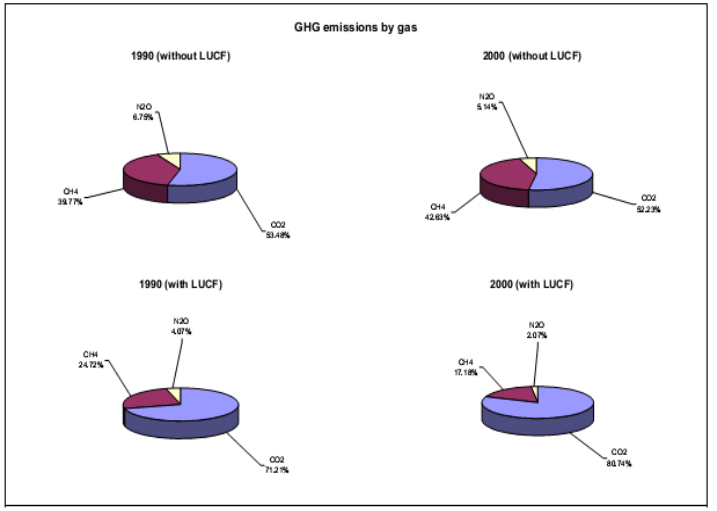
GHG EMISSION

- Due to its condition and geographic position, Indonesia is very vulnerable to impact of climate change
- Rapid development and industrialisation since last 40 years has been contributing to GHG emission significantly
- Indonesia has prominent role and responsibility in the region to involve in global initiative for mitigating climate change
- Indonesia has declared a commitment to reduce 26% GHG emission using self-efforts and 41% GHG emission using international assistances by 2020
- According to Indonesia GHG Inventory 2000 data, net emission of GHG Indonesia in 2000 is 1,38 Giga ton CO2 equivalent (GtCO2e) and will increase become 2,95 GtCO2e in 2020
- There are six key sources of GHG emission in Indonesia namely: peat, energy, forestry, waste, agriculture, and industry





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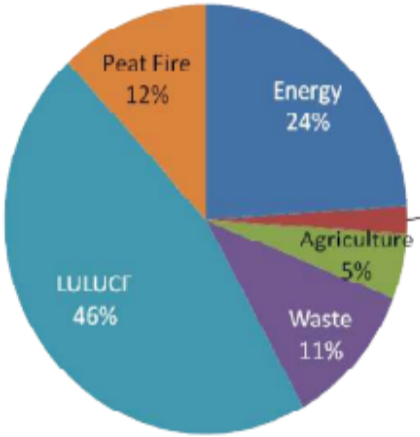
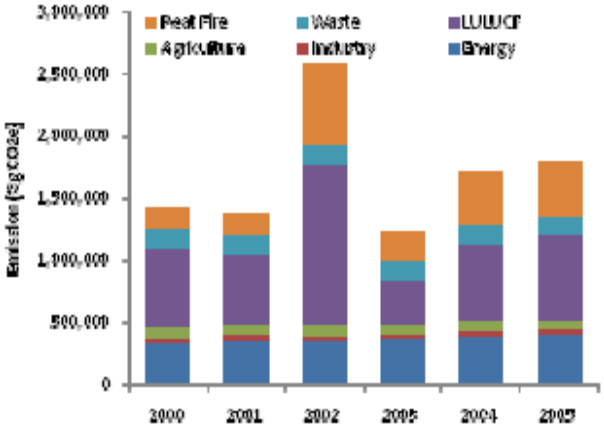
GHG EMISSION

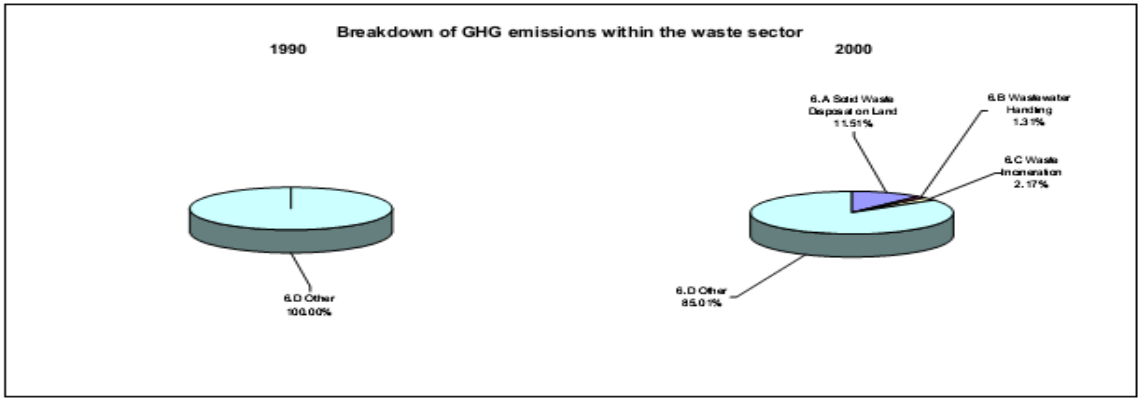


Major source of GHG in 2000 emission was from LULUCF and followed by energy sector. High inter-annual variability of national GHG emission was mainly due to high inter-annual variability in LULUCF emissions

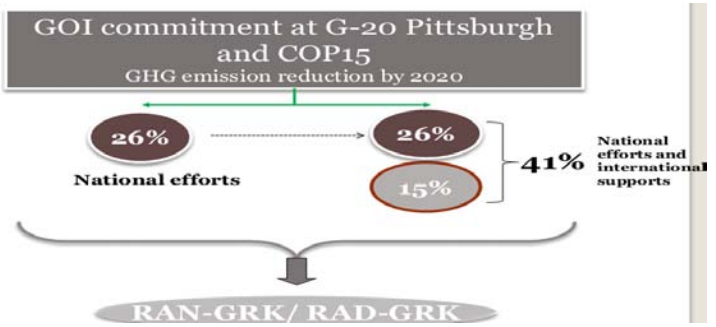
Energy	333,541
Industry	34,279
Agriculture	75,420
LULUCF+Peat Fire	821,254
Waste	151,580
TOTAL	1,416,074

Source: SNC (2010)





- Waste sector ranked the fourth biggest emission contributor among all sectors that accounted 11%.
- If land use change and forestry (LUCF) and peat are excluded from the sector, waste contributes 28,3% of GHG emission and holds the second biggest emitter after energy sector.
- Although in case of CH4 emission, MSW has much less contribution (12%) compared to waste water (87%), CH4 emission from landfill and composting is more easy to mitigate than waste water because it is a point source activities and easy to identify the institution who responsible for.



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NATIONAL ACTION PLAN FOR GHG EMISSION REDUCTION

- In order to achieve 26% (with national efforts) and 41% (with international supports) GHG emission reduction by 2020, Indonesia has developed national action plan for GHG emission reduction, it is called *Rencana Aksi Nasional Penurunan Emisi Gas Rumah Kaca* (RAN GRK).
- RAN GRK was formalised by Presidential Regulation No. 61 Year 2011.
- RAN GRK basically sets target of GHG reduction for each sector and formulises policy direction, strategy and action plan to achieve the target.
- RAN GRK for waste sector in particular, sets to reduce GHG emission as amount of 0.048 GtCO2e for 26% target plan and 0.078 GtCO2e for 41% target plan.
- The main policy for reducing GHG of waste sector is to improve MSW and waste water management systems with the following strategies:
  - Improvement of institutional capacity and regulation at local level.
  - Improvement of urban waste water management systems.
  - Minimisation of MSW generation through 3Rs (reduce, reuse and recycle) activities.
  - Improvement of MSW handling at final disposal.
  - Improvement of final disposal.
  - Utilisation of waste as source of clean energy.
- Indonesia has put a right policy direction to mitigate climate change from waste sector by putting methane capture and utilisation for clean energy as major strategy.

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THE POTENCY OF LANDFILL GAS

- The recent data shows that 99% of the final disposal is categorised as open dumping systems or unmanaged final disposals according to UNFCC final disposal classification. The rest is considerably classified as controlled landfill, a transition systems between open dumping and sanitary landfill.
- The potency of landfill gas in Indonesia had been studied by the World Bank (WB) in 2005.
- Another study was conducted in 2007) showed that estimation of landfill gas emission from final disposals in Western Java is about 535.7 thousand to 3.4 million m3/day in 5 years actively generation of landfill gas.

No	City	MSW (ton/y) Million	CH_4 emission (m^3/year) Million	Electricity (MW)
1	Medan	0.7	27	5
2	Pekanbaru	0.3	11	2
3	Padang	0.4	16	3
4	Jambi	0.2	7	1
5	Palembang	0.6	23	5
6	Lampung	0.4	15	3
7	Jakarta	3.5	140	29
8	Bandung	0.8	32	7
9	Semarang	0.5	21	4
10	Yogyakarta	0.1	5	1
11	Surabaya	0.8	33	7
12	Denpasar	0.2	9	2
13	Pontianak	0.2	7	1
14	Banjarmasin	0.2	7	2
15	Samarinda	0.2	9	2
16	Balikpapan	0.2	6	1
17	Makassar	0.5	19	4

Source : World Bank (2005)

No.	Location	LFG Vol.Rate (m^3/d)	CH_4 conc. (%)
1	Sukamiskin, West Java	2.508 to 4.669	77.02 to 88.38
2	Grenjeng, West Java	1.996 to 12.581	67.44 to 70.68
3	Benowo, East Java	2.245 to 15.723	51.29 to 58.5
4	Jelekong, West Java	3.742 to 6.967	56.40 to 56.90
5	Leuwigajah, West Java	5.116 to 10.676	55.4 to 55.7
	Range	*1.996 to 15.723*	*51.29 to 88.38*
	Average	*6.623*	*63.71*

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THE EXISTING LANDFILL GAS PROJECTS

- According to National Commission for Clean Development Mechanism (CDM), there are several existing landfill gas project under CDM scheme including: Suwung Landfill in Bali by Navigat Organic Energy Indonesia, Batulayang Pontianak Landfill Capture, Flaring, and Electricity Project in West Kalimantan by Gikoko Kogyo Indonesia, Palembang Landfill Flaring Project in South Sumatera by Gikoko Kogyo Indonesia, Sumurbatu Bekasi Landfill Flaring Project in West Java by City of Bekasi and Gikoko Kogyo Indonesia, and Tamangappa Makassar Landfill Flaring Project in South Sulawesi by City of Makassar and Gikoko Kogyo Indonesia.
- Unfortunately, all projects are likely discontinued since the CDM schemes that they were proposed remain unclear .
- Fortunately, Indonesia still has ongoing project of landfill gas capture and utilisation located at Bantargebang Integrated Waste Treatment Facility in Bekasi that belongs to Capitol City of Jakarta. One of business plan of this facility is capturing methane gas and converting into electricity which is expecting to generate 25 MW power by 2023.

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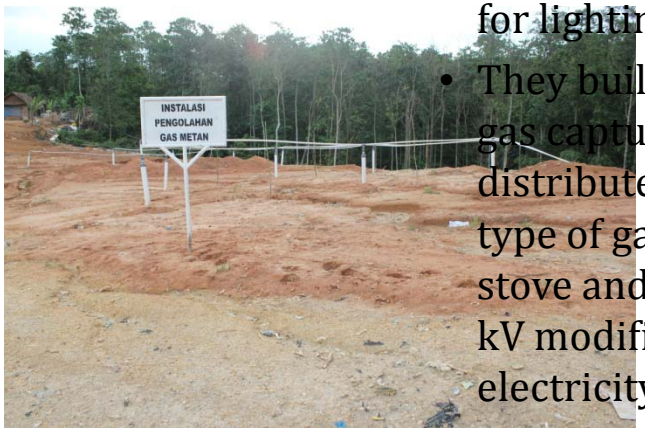
CHALLENGES OF LANDFILL GAS PROJECTS

- The implementation of landfill gas in Indonesia is likely a hard issue because we are facing some big challenges that must be encountered.
- Here some challenges that could become barriers for developing landfill gas project as follows:
  - High investment cost, low payback period.
  - There is no incentive and clear funding mechanism provided by government especially in investment and tender mechanism.
  - Lack of knowledge and awareness of stakeholders concerning landfill gas issue.
  - Low of capacity and competency of domestic industry sector in the area.
  - Community opposition concerning environmental impacts of landfill projects.

INDONESIA

OPPORTUNITIES FROM LOCAL INITIATIVE BEST PRACTICE



- Local initiative has proven us that they succeeded to change the barriers into opportunities in landfill gas project implementation.
- Kendari Municipality as capitol city of South East Sulawesi has completely succeeded capturing and utilising landfill gas by optimising their local capacity including local resource and budget as well as a simple yet proven technology which they can handle easily.
- Landfill gas project at Puuwatu Landfill of Kendari City has been implementing GHG emission reduction by conducting three mitigation activities including landfill gas for flaring, landfill gas for cooking, and landfill gas for lighting.
- They built a simple and easy to handle landfill gas capture facility. From this facility they then distribute the gas using piping systems to three type of gas utilisation namely flaring facility, stove and discharging facility for cooking, and a 7 kV modified-generator set for converting gas into electricity.

THANK YOU

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