Policy Brief Proposal for Biogas Waste Banks in Indonesia[1]

Background

Managing growing amounts of waste is a significant challenge for Indonesia. The Government of Indonesia has set out plans for waste incineration and has adopted a 3R (Reduce, Reuse, Recycle) strategy to address the problem.

National legislation and the Government's intention are however not fully accompanied by allocating resources to municipalities, local and regional actors, for implementation. Initiatives by communities and NGOs in relation to the Government's waste bank strategy has though resulted in some actions under the 3R approach. Larger municipalities (cities) are also moving forward with waste incineration plants.

The waste sector is included in Indonesia's nationally determined contribution (NDC) to the Paris Agreement. Key emissions from this sector comes from industrial waste and wastewater, but solid municipal waste also contributes to a significant amount of greenhouse gas emissions.

Effective implementation of 3R policy, institutional capacity and the deployment of relevant technology are important elements for moving towards a zero-waste society. Communities can bring environmental sustainability across the entire waste management chain through the implementation of 3R and zero waste concepts. Behavioural change is key to achieve a zero-waste society along with the infrastructural, technology and financial incentives.

3R technologies cover collection, sorting, resource recovery (including Waste to Energy), recycling, efficient material processing, industrial production, industrial symbiosis, eco-design, product sharing, etc. Technology development and use practices are largely currently centred around recycling and less on reduce and reuse.

The Biogas Waste Bank Program[2]

One approach for addressing the waste problem in Indonesia while at the same time achieving emission reductions is to elaborate a strategy based on the 3R concept. 3R activities have been implemented in many countries as part of CDM-projects (emission reduction projects under the Kyoto Protocol) but in terms of carbon finance, the waste sector is underrepresented. Up-scaled waste management programmes have not become a typical CDM activity, but there have been some programmes and several proposals for programmes within the frame of Nationally Appropriate Mitigation Actions (NAMAs).

Building on the existing waste bank concept, where leaving waste at a recycling station functions as a deposit in a money bank providing income to citizens that take the time of returning valuable waste to the waste bank, a biogas waste bank program is proposed in this report. Waste banks have been implemented on several locations in Indonesia, typically providing for returning recyclable waste that

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[1] The virtual pilot has been developed by Johan Nylander and Noim Uddin, CPMA International Uppsala AB; Andreas Pettersson and Björn Martén, Ennuwa, and a team led by Dicky Edwin Hindarto, Yayasan Mitra Hijao, Indonesia.

[2] This is a virtual pilot, which means that no exchange of information or discussions relating to the real implementation of this proposal has taken place with the Government of Indonesia. The program proponents have not requested any consent, intention or suggested any obligation to the Government of Indonesia, nor any regional or local organisations. This is purely a theoretical study.

has some value (metals, glass). However, existing waste banks are not economically viable without support from the municipality or other sources.

The biogas waste bank program builds on small-scale retting of organic waste that citizens bring to the waste bank. The biogas is upgraded and stored in LPG bottles (these are reused, which already is common practice). Citizens that have brought a given amount of waste will receive LPG cannisters for free when a target amount of waste delivered have been reached.

Over time the biogas waste banks could be economically self-sustained, depending on how much biogas is sold and how much is returned to citizens for free, but initial support and long-term backing will be needed to create a sustainable program. Initial capital costs for equipment, initial salaries, education and communication require external funding too.

The biogas waste bank program could benefit from international climate or carbon finance, providing additional sources of funding for ensuring adequate implementation and sustained operation. The model could be a Standardized Crediting Framework, in which a central body or fund, has a coordinating responsibility and manages climate finance, and sale of emission reductions. A possible host fund for the programme is the Indonesia Climate Change Trust Fund.

A key element in the proposed activity is that organic waste should be managed – or taken out – from the waste management process at an earlier stage. That is, it should not be transported to landfill to dry and eventually be incinerated, or not. We propose to arrange so that organic material can be separated, either directly at the household (preferred) or at the waste bank.

Households, or entrepreneurs (waste pickers), collect organic material and bring to the waste bank where it is weighed and checked for content. The household or entrepreneur will have an account at the waste bank in which organic material delivered is registered as deposits in kilograms. In the same way as you return metal cans and get paid, you will get paid for returning organic material. This is the basic idea behind the Biogas Waste Bank concept. However, depending on the scale and level of operation, a varying amount of biogas also needs to be sold. Thus, the economic incentive of bringing organic waste to a waste bank may have to be variable from location to location (the pre-set targets can vary). In any case, a basic principle is that it should be economically beneficial to bring organic waste to the waste bank.

The household or entrepreneur can get paid cash directly, or increase the amount in the account, or when a pre-set level is reached, collect a 3, 12 or 15 kg cylinder of biogas for cooking. Instead of paying for someone collecting waste, this approach means that there is an incentive to collect organic waste and deliver it to the waste bank. It does not matter who makes the collection and delivery.

The programme could result in business opportunities for waste pickers. A recent report recommends that waste-to-energy technologies should be implemented through inclusive business models. The report states that waste to energy solutions need to include waste pickers (and their associations) to protect the livelihood of those who are most vulnerable. An inclusive business models would shift the institutional scene from a purely municipal concern to cooperation between waste picker organizations, municipalities and private operators of biogas facilities.[3]

The biogas waste bank can produce biogas at the site or transport larger volumes of organic waste to another site. This is something that must be explored locally and taking into consideration that

[3] UNFCCC (2018) Mitigation benefits and co-benefits of policies, practices and actions for enhancing mitigation ambition: implementation of circular economies with a focus on waste-to-energy technologies and on industrial waste reuse and prevention solutions, FCCC/TP/2018/2, p.29

unnecessary transportation should be avoided. At the waste bank, the organic waste is put in an open tank, weighed, and when cleared of non-organic material processed through a mill and forwarded into digester (preferably a vertical flow digester). This approach is technology neutral in the sense that the biogas can be produced using different approaches and construction materials for the digesters.

The digesting process will produce three outputs. Biogas, organic residues that can be used as fertilizer, and organic residues that can be burned. The biogas generated can be directly used for different purposes but before being canned in a 3, 12 or 15 kg LPG cannister, a simple scrubbing process is needed.

In Indonesia, many household appliances run on LPG: it is used for cooking as well as heating water. The basic idea of the proposal is that organic waste should be collected, converted into biogas that households can use, and that the households as well as waste banks should have an economic incentive to contribute to and sustain this circular approach.

While the organizational set up for the proposed activity is still to be determined (this is a virtual pilot), it is unlikely that it can or will be driven by the private sector, i.e., that companies in the waste management of biogas sector, or carbon finance project developers, would take on the planning, preparation, and implementation of the activity. It is more likely that the activity is prepared and implemented by an entity that can receive and channel national and international funding and engage the private sector, as well as local government and other organisations, in aspects of the implementation.

Activity's relation to the NDC

Claiming emission reductions from the international support is likely to be possible, however, the approach of having a conditional and a unconditional target in the nationally determined contribution as well as lack of clarity regarding what policies and measures will lead to achieving the unconditional or conditional part respectively can make international transfer of emission reductions from the waste sector challenging.

A key concern for many countries is how and when they will be assured about achieving the NDC to the extent that they can transfer any mitigation outcomes and thus not use those emission reductions against their own targets. This concern can be addressed, but the severity of the concern should not be underestimated. This means that the role for climate finance, i.e. international finance not resulting in international transfer of mitigation outcomes, could be very important during the build-up phase.

One of the challenges for developing an Article 6 activity is to understand how emission reductions from a specific activity relate to the target of the NDC. Part of this challenge is to understand what is to be implemented under the unconditional target and what is to be implemented under the conditional target. The NDC of Indonesia does not specify this in any detail and a question is how the unconditional mitigation target could be achieved without using Article 6 and how, if at all, it could be implemented using Article 6.

In order to ensure robust accounting, including how to perform corresponding adjustments, it is useful to have a quantification of the NDC and an inventory that is updated and can support in tracking the NDC progress. A challenge here is the quality of the national emissions inventory and current emissions data collection systems. Indonesia submitted its first national communication to the UNFCCC in 1999, the second one in 2011 and the third in 2018. Indonesia has submitted its first and second biennial update reports (BUR), as well as REDD+ forest emissions reference levels in 2016. Thus, Indonesia's national MRV system is improving. However, while the institutional set-up has seen

some efforts towards stronger integration, there are still several parallel processes, with unclear interconnections. The implication of a greenhouse gas inventory with different levels of granularity (and using different platforms for different types of data) in different sectors is that it could be difficult to get informative updates on the performance towards the NDC target.

The expected total growth of emissions from the waste sector is 4,9% annually up to 2030. For 2012, the second BUR reports that the main part of emissions from the waste sector are methane emissions: 2,940 CO_2, 106,212 CH4, 3,198 N_20 (total 97,117 CO2e). Changes between 2012 and 2016 may seem small in the waste sector, but the increase in CH_4 between 2000 and 2016 for instance represents an amount equal to Sweden's domestic emissions.

Indonesia is implementing a national policy and strategy for solid waste management under Presidential Regulation No. 97 Year 2017 (JAKSTRANAS) as a masterplan to target 30% reduction and 70% handling of solid waste by 2025 with the support of initiatives such as the Clean City Program and Waste Bank Program, build recycling facilities and promote public participation programs (this seems to be included in pre-2020 baseline).

According to the RAN-GRK (National Action Plan for Greenhouse Gas Reduction), the fair scenario will result in emissions growing to 244 MtCO2e in 2030, which is a reduction compared to BAU of 31 MtCO2e or 11%. In the Ambitious scenario, a further reduction of 18 MtCO2e is achieved, making a total reduction of 18% versus BAU. In the Ambitious scenario, waste sector emissions grow to reach 226 MtCO2e, accounting for 13% of total emissions in the Ambitious scenario.

The ambitious NDC scenario suggests a reduction of 18% in the waste sector. Specific measures for achieving this target is not elaborated in the RAN-GRK or the NDC. In other words, there is no available information the policies, measures and programmes that would lead to an implementation of the fair scenario on the one hand, and an ambitious scenario on the other hand. The description of policies and measures (mitigation measures) is quite general. The plan for reaching the reduction targets compared to BAU is largely left to local and regional efforts under the 3R framework. It is thus quite difficult to assess what will be additional to the measures anticipated for reaching the unconditional target and what measures are not additional.

Baseline considerations

The first aspect to be considered is if the organic material in the absence of the activity would decay in the open, be burned in the open, or degrade at a landfill, or, be combusted in a waste incineration plant.

The second aspect concerns the use of the biogas and what this gas can replace. In rural areas and parts of cities, access to LPG could be limited why charcoal and firewood, as well as kerosene could be possible baseline fuels for cooking. A complication of such a baseline is the LPG is subsidized and over time can be assumed to replace e.g. kerosene. The biogas can also replace LPG for cooking (mainly) and for heating.

A third aspect is the use of the biofertilizer which is a residue from the biogas retting process. If this replaces chemical fertilizers, this would also reduce emissions since production of chemical fertilizers is a heavy emitting industry.

Additionality

From the perspective of achieving the NDC, it would only be good if similar facilities would be implemented, even if having support from any other source. However, for the purpose of exporting mitigation outcomes, to pursue the Biogas Waste Bank programme as an Article 6 activity, the GoI probably would like to be convinced that the activity is not part of the activities that would take place anyway

We have reviewed small-scale biogas initiatives and can conclude that these typically need international or government support and the implementation of these cannot be said to be common practice. One aspect working as a barrier for using biogas for cooking is the national subsidized LPG programme. Biogas users though benefit from using bio-slurry as fertilizer. The Indonesia Domestic Biogas Programme (IDBP) has installed 21,316 systems in ten provinces.[4] The report from that programme shows that government funding is needed for biodigester construction and that the direct subsidy needed makes it difficult to arrange on market-based conditions.

[4] IDBP (2017) Interim Report Indonesia Domestic Biogas ProgrammeJanuary - June 2017