Voluntary Action to Reduce GHG Emissions by RSPO Members: Methane Capture of POME

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Palm oil mill effluent (POME) represents the single largest source of Greenhouse Gas (GHG) in the operation of a palm oil mill. During the anaerobic digestion of POME in open ponds, methane gas is emitted to the atmosphere. This was confirmed in our carbon footprint study conducted back in 2008, whereby methane emission from the mill's effluent treatment system accounts, on average 89% of total mill emissions.

Faced with both challenges and opportunities in our efforts in mitigating GHG emission along our palm oil supply chain, we reviewed a range of available technologies for capturing and utilisation of methane, balancing the need for efficiency, effectiveness and cost practicalities.

To date, we have implemented 4 closed tanks anaerobic digestion systems in Indonesia and Malaysia, and 2 covered lagoon systems in Indonesia, where the captured methane are utilised either in a boiler for steam generation or biogas generator for power generation.

In the implementation and operation of our methane capture systems, we are realising actual cost savings from the displacement of fossil fuel usage. Clean Development Mechanism (CDM) provides further incentives, though it is not without its challenges.

We remain in our plans to implement methane capture systems throughout our palm oil operations and continuously improve on the processes by employing more efficient and effective technologies.

CO_2 Emission from Land Use Changes for Oil Palm Development

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The rapidly expanding oil palm (OP) plantation has been feared to cause a rapid loss of natural forest and an escalation of CO_2 emission. This on-going study is conducted to (i) analyse land use change trajectories for OP plantation development in Indonesia, Malaysia and Papua New Guinea (PNG) and (ii) estimate CO_2 emission as caused by the land use changes (LUC). LUC analysis was based on 1990, 2000, 2005 and 2010 Landsat TM interpretation with verification using statistical data, Google Earth images and other related studies. Biomass and soil C losses and gains were included in CO_2 emission calculation with emission factors based on a literature review. The analysis shows that OP plantation in Sumatra, Kalimantan and Papua of Indonesia has grown from 1.33 Mha in 1990 to 7.7 Mha in 2010. Forest displacement caused by OP plantation was 27% in the last five years and much less in the earlier years which was less than half of unverified claims that it was >55%. In Malaysia, OP plantation grew from 2.03 to around 5 Mha in 2010 with state forest, rubber and cocoa plantations as the major initial land uses. PNG's OP plantation grew from around 50,000 ha in 1990 to about 125,574 ha in 2010 and this caused only about 3% deforestation. Literatures varied in the estimate of forest C stock from 93 to 300 t ha^{-1}, time average plantation crops from 30 to 60 t ha^{-1}, shrub around 30 t ha^{-1} and grassland from 2-10 t ha^{-1}, implying that conversion of forest to plantation results in a net positive emission and rehabilitation of degraded shrub or grassland for plantation results in a net positive sequestration. Estimate of CO_2 emission from peat oxidation under OP plantation varied from 23 to 90 t ha^{-1} yr^{-1}. The estimated net annual CO_2 emissions for OP development in the three major islands of Indonesia between 2005 to 2010 is 133 Mt which was 19% of emissions from all land use changes. Emission from BG peat oxidation accounted for 19% to 66% of the total annual CO_2 emissions from OP plantation depending on the land use change trajectories. The use of peatland is about 20% in Indonesian OP plantation. We recommend that future development of OP plantation be prioritized on low C-stock lands. The use of peatland should be put as the last resort with the implementation of sustainable peatland management.