Emissions Reduction Opportunities and Policies: Manufacturing Sector

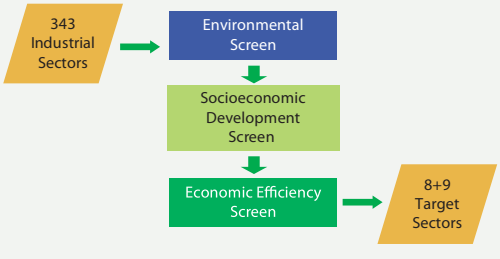
Sector Analysis

Manufacturing is a major contributor to national GHG emissions

The Indonesian manufacturing sector is one of the nation's largest sources of fossil-fuel derived greenhouse gas (GHG) emissions, and continues to grow. Overall, manufacturing was responsible for over 40 percent of Indonesia's 2005 fossil-fuel emissions (including electricity use within manufacturing). Future emissions will be even larger because emissions from fossil-fuel use (non-forestry emissions) are growing at about 6 percent per year. With the growing focus on climate change issues and the potential for carbon market finance and other forms of assistance, there is now a good opportunity to address manufacturing sector emissions in a comprehensive manner.

The Government of Indonesia (GOI), in particular the Ministry of Finance and National Council on Climate Change, has commissioned a Low Carbon Development Options study to evaluate and develop strategic options to reduce emissions intensity without compromising development objectives. The Ministry of Industry and Ministry of Environment have already identified important sectoral opportunities and the Agency for the Assessment and Application of Technology (BPPT) has prepared a technology needs assessment for climate change mitigation. This component of the Low Carbon Study provides additional support and analysis toward development of a practical and coordinated approach to managing manufacturing sector emissions. The study focuses on a few key sub-sectors that possess the combination of large reduction potential, strategic benefits for future economic development, and cost-effective opportunities. This study report adds an economic and policy dimension that may usefully complement prior work and engage the Ministry of Finance more actively in the quest for cost-effective emissions reductions. Based on this review, most of the actions appropriate in the manufacturing sector fall into three main categories: 1) energy management and efficiency deployment, 2) specific technology investments, and 3) efficiency standards.

This study focuses first on the largest emitting industries within the manufacturing sector as the starting point for a multi-tiered screening approach. The three-tiered screening process further targets industry sub-sectors that are central to Indonesia's economic development process in a carbon-constrained world, as well as key industries where cost-effective energy and emissions reduction opportunities exist.



Screening approach for Indonesian manufacturing sector.

Few Sectors are Associated with Majority of Emissions

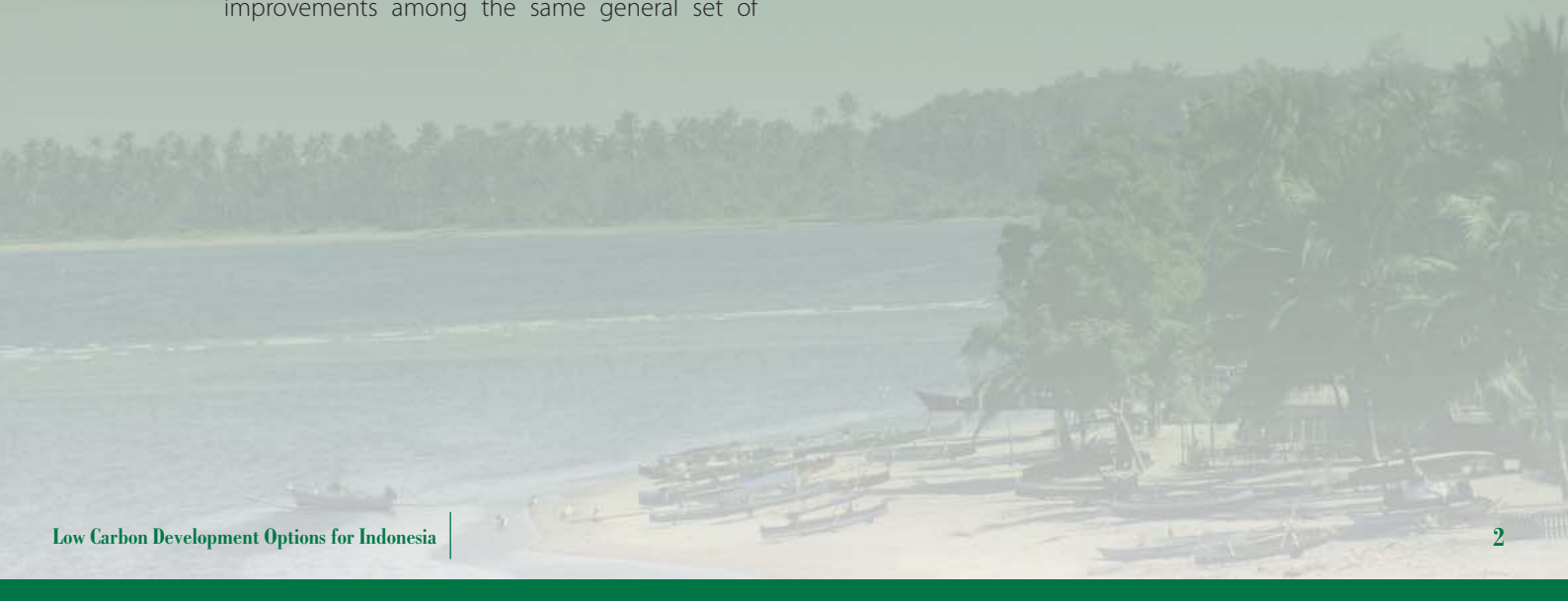
This review of greenhouse gas emissions from the manufacturing sector found that the largest emitters are concentrated within just four main economic sectors: non-metallic minerals, textiles, basic metals, and food and beverage. Looking in more detail at the industry or sub-sector level, there are several other significant emitters that might also be considered targets for emissions reduction efforts including garments, pulp, porcelain, auto parts, fertilizer, and crumb rubber.

Most of these sub-sectors are key to the current or future Indonesian economy as measured by a variety of statistics including their value added (textile, garments, transportation equipment, food and beverage), annual growth rate (auto parts, non-metallic minerals), or economic multipliers (food and beverage, textiles). If the GOI is seeking targets for emissions reductions, or potential carbon market opportunities, it makes sense to start with these sub-sectors that represent the combination of the most potential reductions and the most important economic targets. Public policy makers should be interested in making these sub-sectors more modern, efficient, and clean as a contribution to Indonesia's development and competitiveness, as well as to its environment. In fact, the Ministry of Industry has already identified several of these basic manufacturing sectors for further study and action.

Finally, the analysis shows that there is significant potential for cost-effective energy efficiency improvements among the same general set of sectors (i.e., cement, metals, textiles, garments, food and beverage). This indicates that much can be done to reduce the carbon intensity of the manufacturing sector with overall cost savings. Analysis shows that many of these sub-sectors also have an economic motive and incentive to reduce energy use, together with the emissions that come in parallel.

Different Policy Options are Suited to Different Sectors

Having identified these low-carbon opportunities, the next step is to consider how to approach these opportunities. This study reviewed global best practices and focused on approaches that are both cost effective and desirable for economic development, while also contributing to climate change mitigation. Based on this review, most of the actions appropriate in the manufacturing sector fall into three main categories: 1) energy management and efficiency deployment, 2) specific technology investments, and 3) efficiency standards. Note that the sub-sectors identified for further action include both large capital-intensive industries with relatively few plants (e.g., steel) and diverse industry groups consisting of many smaller and medium-sized enterprises (e.g., textiles or automobile parts manufacturing). Different interventions may be appropriate for the two types of industries. More specific and tailored interventions, such as energy audits, might be cost effective for a few large plants. Alternatively, efficiency standards might be appropriate (and easier to apply) across an industry consisting of thousands of small and medium sized firms (e.g., food and beverage manufacturing).



To complement the technical and regulatory options, this analysis also emphasized fiscal policy options that could enhance and support the investment and energy management options. This fiscal angle may appeal to the Ministry of Finance and serve as an entry point for integrated and coordinated actions across ministries. Fiscal policy options would likely best be used to augment or provide an additional incentive to adopt a more technical standard or practice. For example, depreciation rules can provide an incentive for installation of newer, energy efficient technologies.

The possible policies and interventions to save energy and reduce emissions are briefly summarized in the table below.

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Manufacturing Sector Organization	Capital Stock / Investment Options	Regulatory Options / Efficiency Standards	Fiscal Policies: Incentives & Enhancements	Energy Management & Efficiency
Few Targets: Concentrated, large firms	• Co-firing /co-generation • Alternative fuels • Heat recovery • Process optimization & control	• Grinding equipment • Motors • Kilns • Spray dryers	• Incentives for sectoral CDM / carbon mkts • Faster depreciation • Access to cheaper capital • Targeted tax policies	• In-house energy audits • Energy Service Companies
Many Targets: Dispersed, smaller firms	• Co-firing /co-generation • Alternative fuels • Heat recovery	• Arc furnaces & drive efficiency • Compact Fluorescent Lighting • Loom & Mill Efficiency	• Fiscal incentives for investment • Faster depreciation for new equipment • Financing or incentives for Energy Service Companies • Targeted donor or grant assistance	• Energy mgmt • Energy Service Companies • Target donor assistance

A summary of potential policy interventions for the largest emitting sectors and potential fiscal policy implementation approaches are briefly listed here and discussed in more detail in the full report.

Cement – Sectoral CDM projects along the lines of the successful Indocement project that is currently reducing GHGs through biomass cofiring and manufacture of blended cements are options for the remaining cement plants in Indonesia (only about 18 plants total). Grinder efficiency (e.g. vertical mills) along with process optimizations offers additional efficiency opportunity. The Ministry of Finance can support the financing of such projects by providing access to international technology funds, revising capital depreciation schedules, or offering tax incentives for new efficiency investment.

Iron and Steel – Sectoral CDM might also be appropriate for the primary steel making subsector, which is more energy intensive than secondary steel processing. Additional financing may be needed, however, given this subsector's high incentive to cut costs, but lower ability to pay for new equipment (as measured by value added). Voluntary agreements have been successful in China and could be considered as an alternative to regulation. ESCO services should be used to review a wide range of energy efficiency options identified in both the US and India for secondary steel processing plants and integrated steel plants.

Pulp – There are 9 primary pulp mills in Indonesia and the GOI might consider direct grant programs for these few facilities given their large efficiency opportunity coupled with a low incentive to improve (as measured by share of energy to input costs). On the other hand, there is higher profit in this subsector relative to others, so direct regulation could also be considered. Grants or subsidies could make various cogeneration, heat recovery, and process efficiency projects economically viable.

Porcelain/Ceramics – There is a wide range of efficiency performance at the individual firm-level within this subsector, suggesting that a government-sponsored program of energy audits and subsequent energy management could greatly improve the performance of underperforming firms. Government support for audits and ESCO services may add incentive for technology investment. A published ranking of efficiency performance coupled with government incentives may create a competitive environment within this industry group to encourage efficiency utilization.

Fertilizer Manufacture – Similar to the pulp industry, there are a limited number of firms manufacturing the bulk of Indonesian fertilizer. Hence, a tailored program of government support for the 15 largest manufacturers could achieve significant GHG reductions at limited expense. Audits would better illustrate the plant-specific efficiency measures that provide the greatest return for investment within this subsector.

Textiles – Once Indonesia's key strategic export, this industry sector – including textile fiber manufacture, spinning mills, weaving mills, and the finished textile subsector – has been allowed to age and is now widely acknowledged to suffer from inefficient and nearly obsolete equipment. Textile mills and looms are strong candidates for efficiency standards supported by government or international finance programs. Electricity and process-heat cogeneration may be an important opportunity within this sector as well. Given the economic development implications, a donor-assisted program of a multilateral development bank might support efforts to transform this sector.

Other industries with distributed, smaller firms and less concentrated targets – Statistics have shown that the variability of efficiency within subsectors is typically greater than the differences between subsectors, suggesting that all sectors may have potential for efficiency improvements. Those identified in this report are likely to have some of the greatest inefficiencies, and thus may benefit the most from interventions. In general, electric energy efficiency identified through energy audits or ESCO service providers are going to provide the greatest opportunity to identify specific opportunities for individual manufacturing facilities as well as complementary fiscal policies to enable needed transformations.

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