

Executive Summary

A low-carbon energy transition is crucial for Indonesia. The major CO₂ emission sectors in Indonesia are power generation and transport, especially road transport. In addition, most power generation is from coal power plants and gasoline, with diesel oil mainly used as transport fuel. Thus, reduction of coal consumption for power generation and gasoline and diesel consumption for vehicles is indispensable. Rapid increase of solar energy is one of the options for Indonesia; however, due to its negative characteristics, which are intermittent power supply, small capacity factor, and seasonality, its baseload is insufficient. A combination of solar energy and batteries seems to be appropriate; however, batteries are still expensive and have limited electricity storage time. In road transport, battery electric vehicles (BEVs) are an option for Indonesia, but due to their higher price and the need for investment to equip the charging stations, their penetration will still take time. Despite these conditions, Indonesia has significant potential to contribute to reduce coal consumption and gasoline and diesel oil consumption through biomass.

Biomass co-firing in coal power plants is an available technology in Japan and other East Asia Summit countries. Currently, the mixing rate of biomass co-firing in Japan is 20%–25%, which would help Indonesia reduce CO₂ emissions from coal power plants. In addition, biomass power generation systems in Japan are also using wood pellets as a fuel. This technology also can be applied in Indonesia using wood chips in lieu of pellets since they are cheaper. In the Indonesian road transport sector, B30 and B50 biofuels, i.e. bioethanol and biodiesel, can substitute for gasoline and diesel oil. Thus, biofuels have substantial potential to reduce CO₂ emissions in the Indonesian road sector.

Biomass supply in Indonesia can cover demand up to 2040; nonetheless, reforestation should be implemented continually. In addition, the wood chips/pellets supply chain should also be established. However, the higher biomass supply price of woodchips/pellets and biofuels is still an issue. One way to decrease the price is expansion of biomass demand; in other words, seeking scale merit. Initially, however, government support is needed in the form of co-firing and biofuels mixing ratios, enforced biomass use by government sector, and supplemental conditions on licenses to independent power producers and motor companies. Another way to decrease the price is technology development; second- and third-generation bioethanol is expected to realise an affordable price under open biomass markets to foreign companies in Indonesia.

While the Association of Southeast Asian Nations (ASEAN) region including Indonesia does not have abundant wind and solar resources, in contrast with, respectively, Europe and the Middle East, it is a so-called rich green area, making utilization of biomass an important energy policy. Thus, this report recommends Indonesia to use biomass for co-firing coal power generation and bio-gasoline and biodiesel oil.