



Abstract Format

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Applying Circular Economy to a Coal-fired Power Plant: Opportunities and Challenges

**Muhammad Nazry Chik*, Mohd. Hariffin Boosroh, Noraziah Muda, Liyana Yahya and
Afifi Zainal**

Researchers, CO₂ Utilization Research Group, Advanced Research Program, TNB Research
Sdn. Bhd, Kajang, Malaysia

*Corresponding author: nazry@tnb.com.my

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Abstract

Circular Economy has been actively pursued and studied in recent years, being it as an implementing framework of the broader sustainable development. Applicable industries where Circular Economy can fit in include but not limited to, textiles, manufacturing, food and beverages, and agriculture. In energy industry, particularly in coal-fired power plants, CO₂ can be the main actor in the eventual Circular Economy episodes. This article disseminates some thoughtful works by Tenaga Nasional Berhad (TNB) in making its coal-fired power station a better, more sustainable power plants in the future. Through his research arm - TNB Research Sdn. Bhd. (TNBR's) - this notion has been fused into its bold Advanced Research Program where re-utilization and transforming of emitted CO₂ into useful products be the utmost agenda. There are two methods for the agenda: (i) chemical, and (ii) biological method. The chemical method involves improvement and enhancement in the absorption and adsorption approaches, pertaining to materials used, process optimization and test facilities erected. Conversion of separated CO₂ into methane is one of the agenda's hydrogenation utilization pathway. On the other hand, the biological method deals with in-situ domestication of marine microalgae species in an engineered photobioreactor columns. Focusing on species, culture technique, flue gas dynamics and photobioreactor system design, the strive is towards improving microalgae growth rate and productivity. Together, these methods are already pinpointing several opportunities in technologies and businesses in CO₂ re-utilization, while at the same time posing several key challenges to be addressed towards a balanced sustainability criteria.