TNChE Asia 2023	**TNChE Asia 2023 Conference** **" Decarbonization of Process Industry and Next-Generation Materials for Sustainability "** **Presenter Bio Data & Abstract**	TIChE

EGAT

Full Name : Chalermphol Bunsong

Organization : EGAT

Current Position : Head, Product Development Section (Coal Combustion Product Business)

Working Experience : 8 years

Title of Presentation : Building a Better Future through the Successful Development of Low-Carbon Footprint Material Substitution in Concrete

Presentation Abstract :

The Mae Moh power plant of the Electricity Generating Authority of Thailand (EGAT) is a large lignite coal-fired power plant located in Lampang province, Thailand. Fly ash is a byproduct of coal combustion, and it is generated in significant quantities approximately 2 million tons annually, about 60% of the total production of domestic fly ash has been produced from Mae Moh and commercially sold since 1999's. Nowadays, Mae Moh Fly Ash (MMFA) with pozzolanic properties can be used as a Supplementary Cementitious Material (SCM) to partially substitute in Ordinary Portland Cement (OPC). It improves the strength and durability of concrete and reduces the need for cement to lower costs, thereby reducing greenhouse gas (GHG) emissions. MMFA is Class C (ASTM C 618) type, primarily silicon (Si), aluminum (Al), iron (Fe), and calcium (Ca) oxides with spherical shape and containing free lime less than 4% and sulfur trioxide (SO3) less than 5%. It was found that generally, MMFA has higher CaO content, and higher alkali content, enhancing the workability and strength of concrete.

Hence, the cement industry is an important sector for GHG emission mitigation strategies. Considering these benefits, the concept of concrete production in Thailand has shifted from a focus solely on cost reduction to considering factors such as performance, environmental sustainability, and CO_2 reduction. The utilization of fly ash has played a significant role in this shift, as it addresses multiple aspects of sustainable concrete production. Aiming to minimize waste, and drive the circular economy by following the Coal Combustion Product (CCP) roadmap framework, EGAT R&D Alkali-activated fly ash concrete has gained attention as a sustainable alternative to traditional cement-based concrete. The project investigates the construction of road pavement, concrete sleeper, and also solar ballast by using alkali-activated fly ash concrete. Fly ash with a high CaO content of over 30% and NaOH 6M are being used as the main ingredients for activating the fly ash without the addition of cement. Thus, promoting substitute material efficiency, switching to lower-carbon applications, and advancing innovative near-zero-emission plans.