

**BUILDING A BETTER FUTURE THROUGH THE SUCCESSFUL  
DEVELOPMENT OF LOW-CARBON FOOTPRINT  
MATERIAL SUBSTITUTION IN CONCRETE**



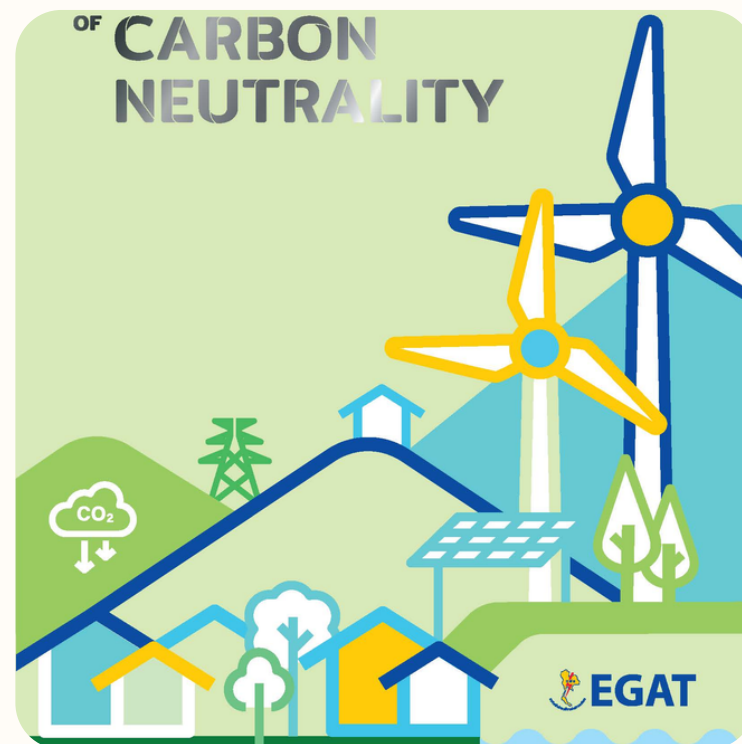
**EGAT**





## TACKLING CLIMATE CHANGE A UNITED BATTLE, COP27

- Support the use of CO2 capture technology
- Promote the use of material substitution in the cement industry



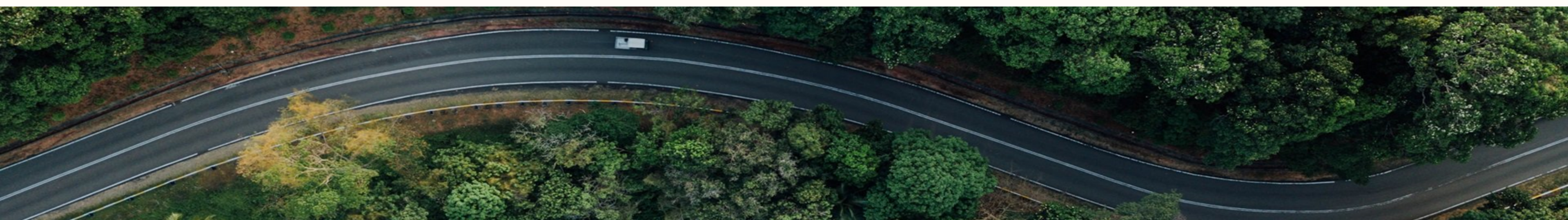
## EGAT : GREEN INNOVATION FOR SUSTAINABILITY

- Create green energy innovations for sustainability
- Strategy : Carbon Neutrality
- Circular Economy
  - CCUS



## MAE MOH CITY: SMART ENVIRONMENT

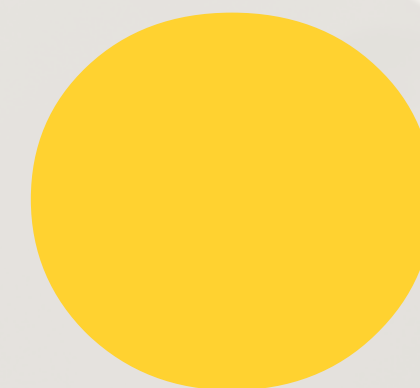
- maintain good environment for the Mae Moh community to sustainably use
- Increasing the carbon dioxide (CO2) absorption area by forestation

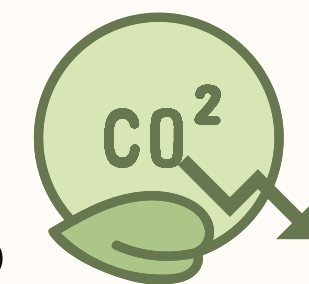
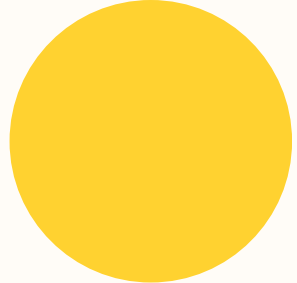


**WHAT MADE OUR**

**IDEA**

**BIG**





# COMMERCIAL ALKALI-ACTIVATED MATERIALS



**AUSTRALIA**

**AUSTRALIA**

**AUSTRALIA**

**2013**  
**Queensland's University GCI building with 3 suspended floors**  
*Source: Hassel Architect*

**2014**  
**Brisbane West Wellcamp Airport (BWWA), Toowoomba, Queensland**

**2021**  
**Glass Fiber-reinforced Geopolymer Bridges**  
**Geelong, Australia**

# THE DEVELOPMENTS OF AFA



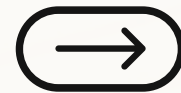
120 m<sup>2</sup>



2016

## CONCRETE SLAB

The pilot project was set up in the power plant area pouring 30 m<sup>3</sup> of alkali-activated fly ash concrete. The compressive strengths of concrete at 3, 7, and 28 days in air-cured condition were 8.7, 18.8, and 36.3 MPa respectively.



183 m<sup>2</sup>



2020

## ROAD

The high calcium fly ash was utilized as an admixture of alkali-activated fly ash concrete in road construction. The compressive strengths of concrete with air curing at the age of 3, 7, and 28 days are 21, 34, and 36 MPa respectively.

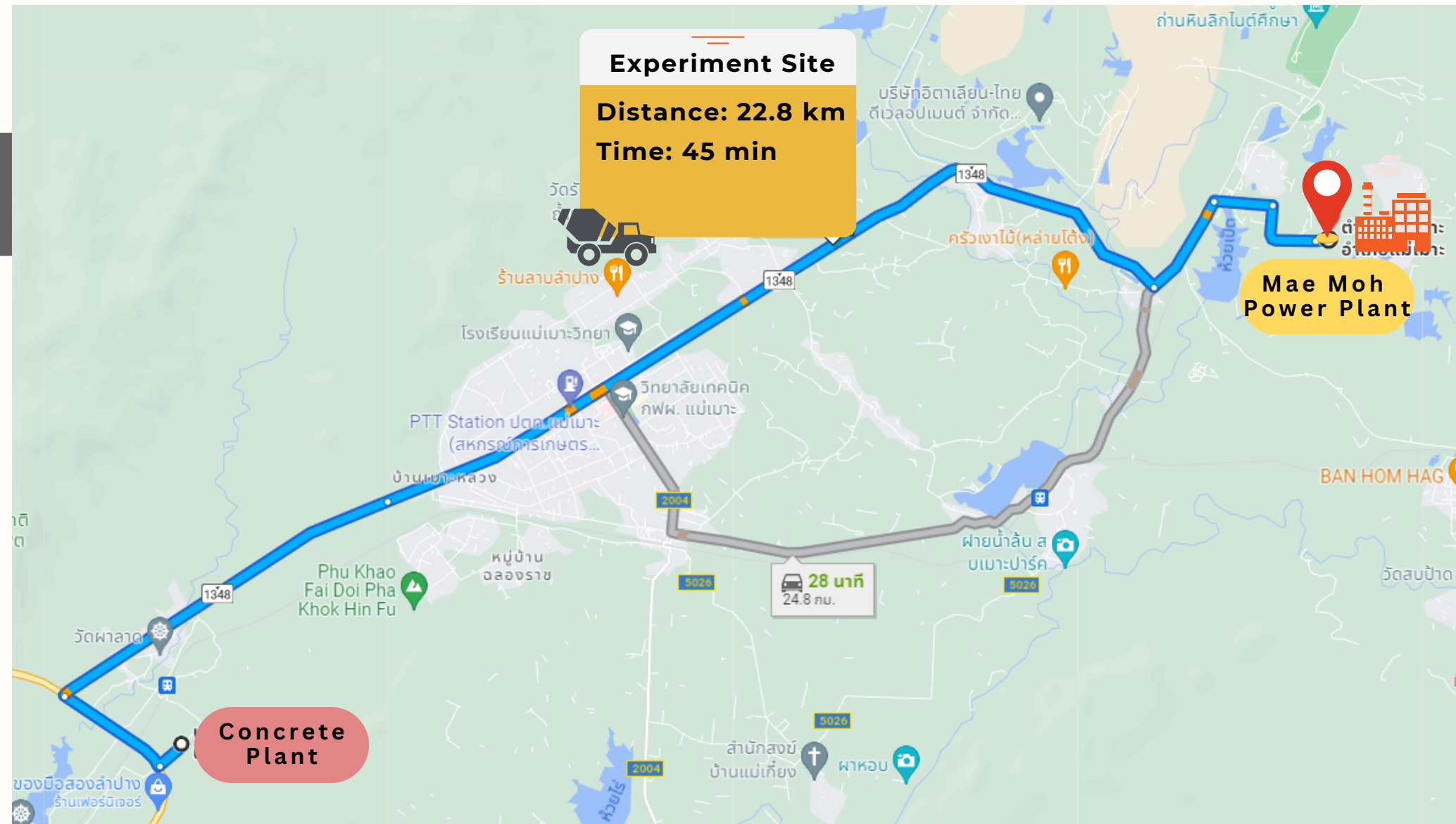


2022

## RAILWAY SLEEPER

The alkali-activated fly ash was applied to railway sleepers that meet the requirements of the State Railway of Thailand and a sleeper standard. The compressive strengths of concrete with air curing at the age of 3, 7, and 28 days are 39, 45, and 66 MPa respectively.

# SITE EXPERIMENT



## ROADWORKS



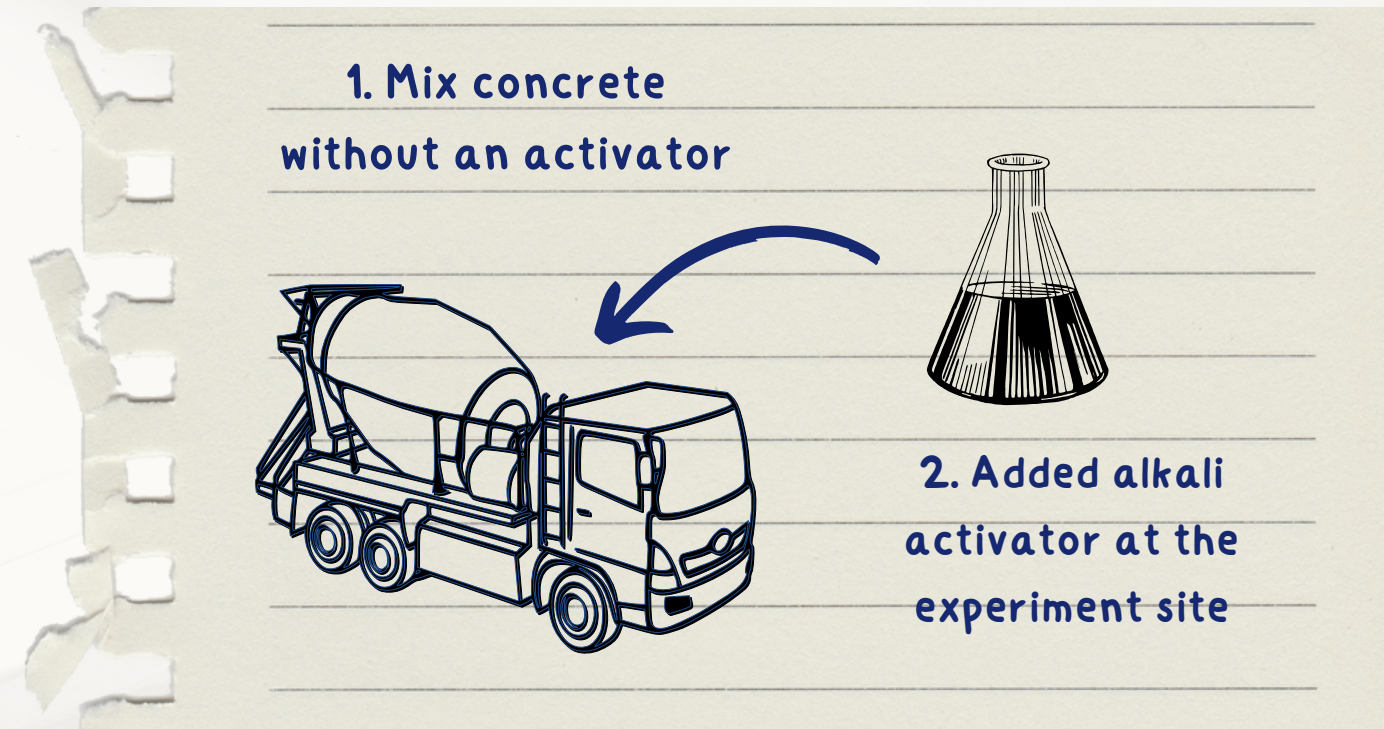
Location : Mae Moh Power Plant, Lampng, Thailand



Date: 21 August 2020

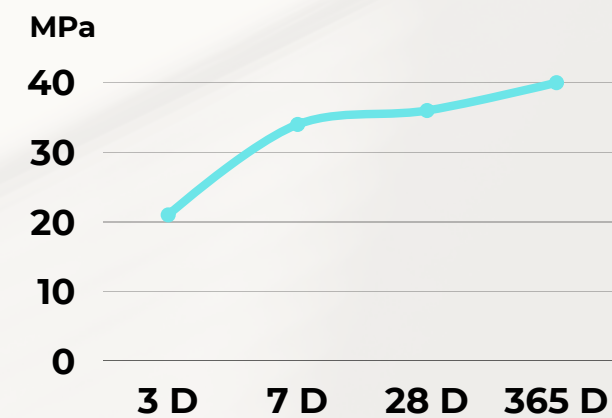


# SITE EXPERIMENT



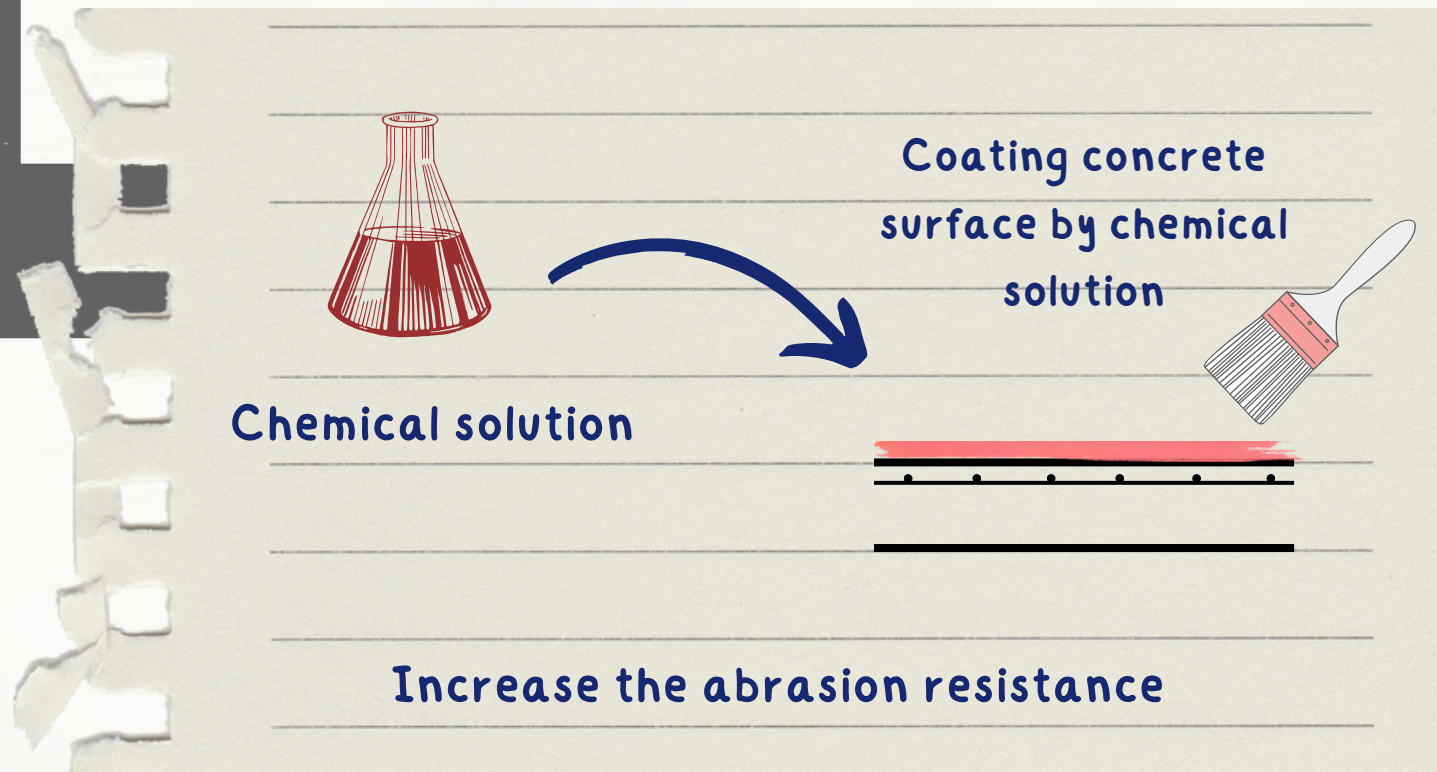
Due to production and transportation processes took the time up to 60 mins.

Compressive Strength (Cube, MPa.)	3 D	7 D	28 D	365 D
AFA	21	34	36	40



The early strength of concrete significantly increases and continues to rise gradually after 7 days.

# SITE EXPERIMENT



The abrasion resistance of concrete surfaces was tested by the rotating-cutter method compared to weight loss on the samples' surface at 28 days.



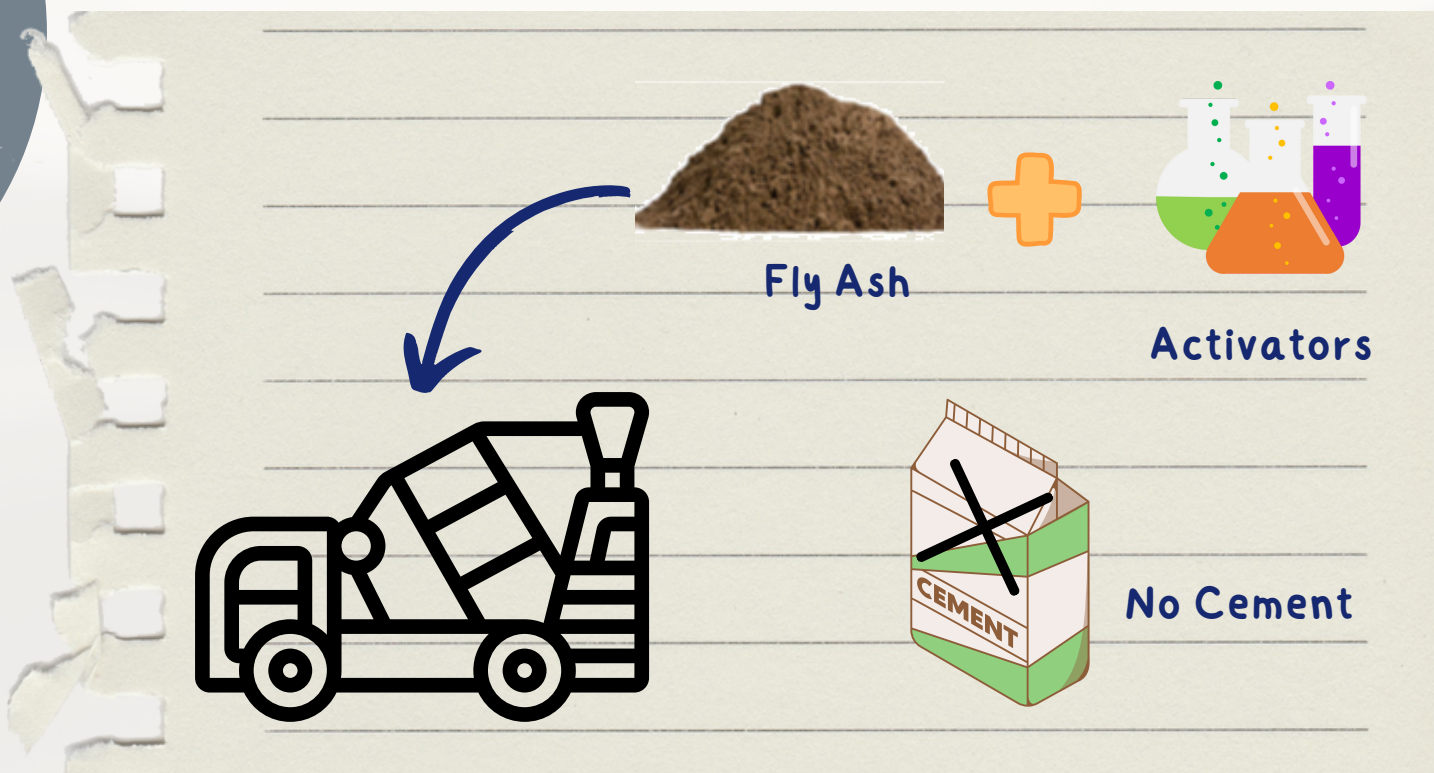
The comparison of

1. OPC concrete
2. Alkali-activated fly ash concrete without covering chemical solution
3. Alkali-activated fly ash concrete covering with chemical solution after 1 day

Weight Loss at 28 days (gram)	OPC-Concrete	Without chemical	Coating by chemical solution
AFA	8 g	13 g	8 g



# AFA RAILWAY SLEEPER



The sleeper will be cut its strand when the compressive strength reached up to 40 MPa according to the sleeper standard.

Compressive Strength (MPa.)	3 D	7 D	28 D
AFA	38	45	65



# ACTIVATED FLY ASH

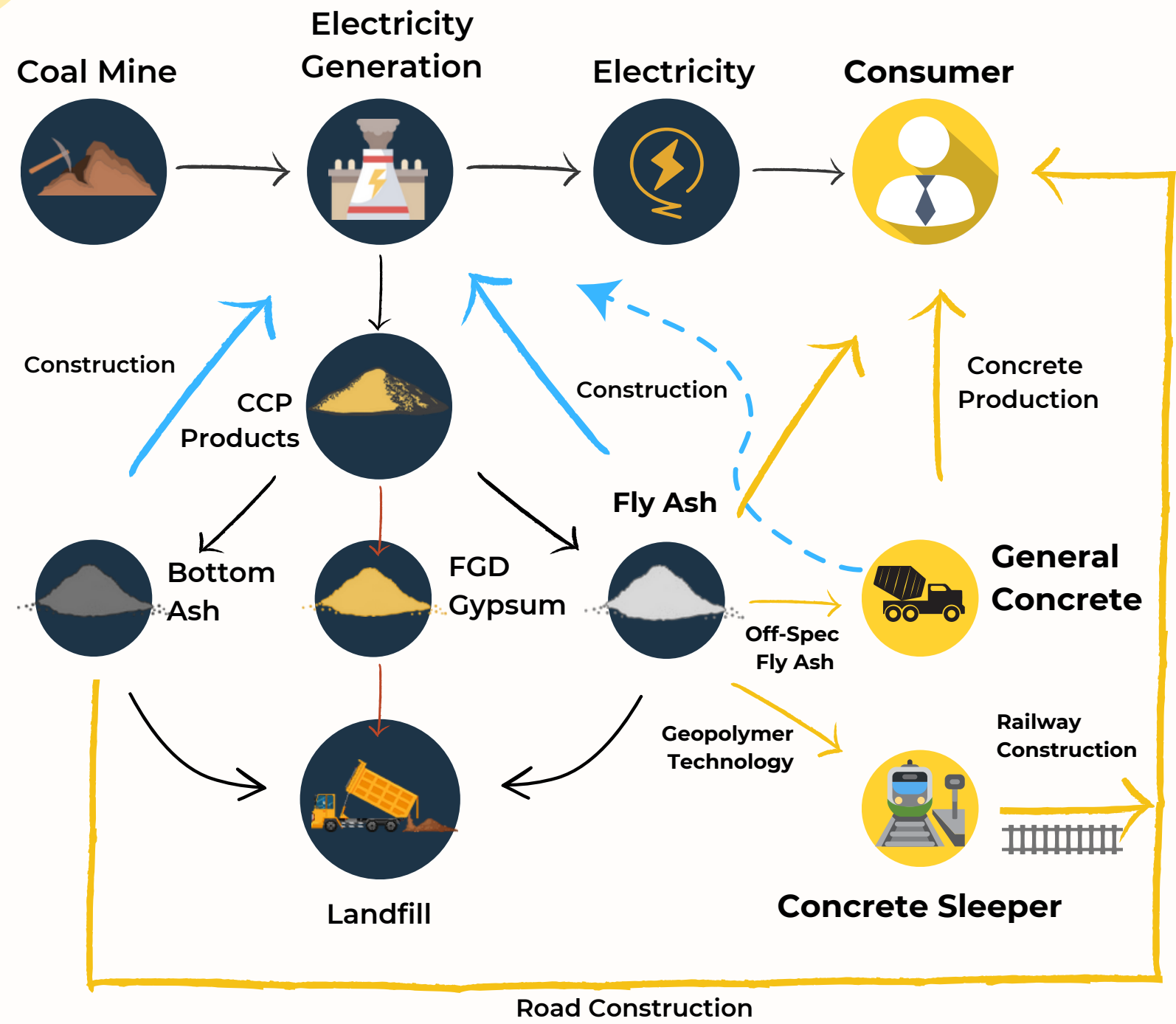
## CONCLUSION

Comparison Concrete Type	OPC Concrete	AFA Concrete
High Compressive Strength	✓	✓
Corrosion Resistance		✓
Cost Advantages		✓
Reduce CO2 Emission		✓
Product Preference	✓	✓
Color Preference	✓	


- Alkali-activated fly ash can be applied to OPC concrete applications
- High calcium oxide in fly ash leads to fast forming and less required activator resulting in **cost reduction**
- Coating by the activator at the concrete surface can increase the abrasion resistance



# COAL COMBUSTION PRODUCT BUSINESS




Fly Ash 1.6 MT/Year  
 Bottom Ash 0.9 MT/Year  
 FGD Gypsum 1.6 MT/Year




**LINEAR ECONOMY**

Take → Make → Waste



**WASTE UTILIZATION**

encourage the use of by-products for maximum benefit and reduce landfill volume



**CIRCULAR ECONOMY**

Create value from existing resources in the system as much as possible

## Product Development

2023

The product development process for commercialization



## By-Product Utilization

2016

Develop and utilize power plant by-products



01

02

03

## Carbon Neutrality

2050

EGAT become carbon neutrality organization.



**EGAT**



**DECARBONIZATION ROAD MAP**



# EGAT

## CONTACT

### CHALERMPHOL BUNSONG

HEAD, PRODUCT DEVELOPMENT SECTION:  
COAL COMBUSTION PRODUCT BUSINESS



CHALERMPHOL.B@EGAT.CO.TH



+66(0)90 541 5956

*Thank You*

