

# Montmorillonite MMT

Petchaboon, Wichienburi,  
Thailand





## Montmorillonite – Reserves in Hand 100 rais (160,000 sqm)

### Carbon Teak Company Limited Discovery of Montmorillonite

9 million tons of MMT

Montmorillonite – Property and Usage

#### Superior Clay Property with 3 Nano-Layers

- Montmorillonite (MMT) is a natural clay mineral belonging to the smectite group. It is a product of volcanism and hydrothermal activity.
- MMT color can ranged from white, yellow, green pink and red.
- Due to its 3 Nano-layers structure, MMT takes up water between their layers and can exchange organic liquids.
- MMT Nano Clays has superior overall properties compared to traditional additives and fillers, for example, strength, stiffness, optical clarity and permeability.

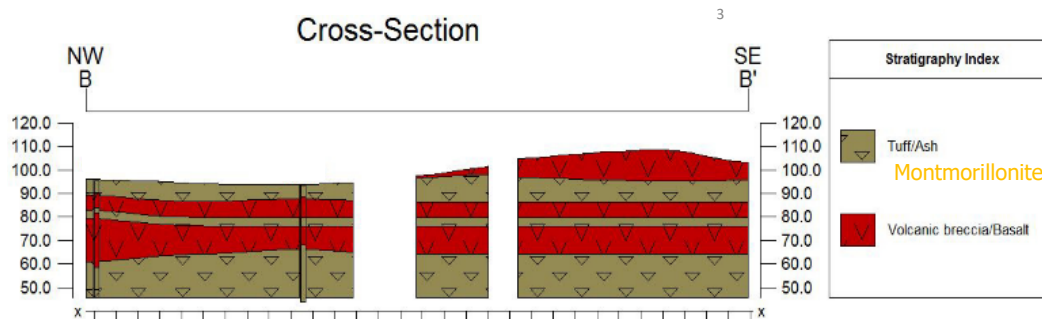
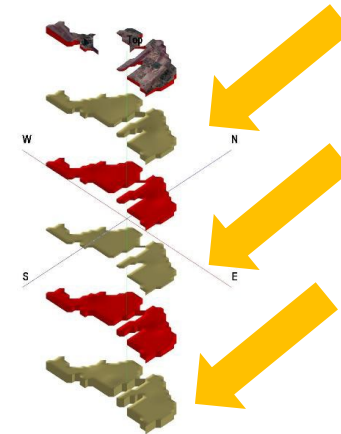
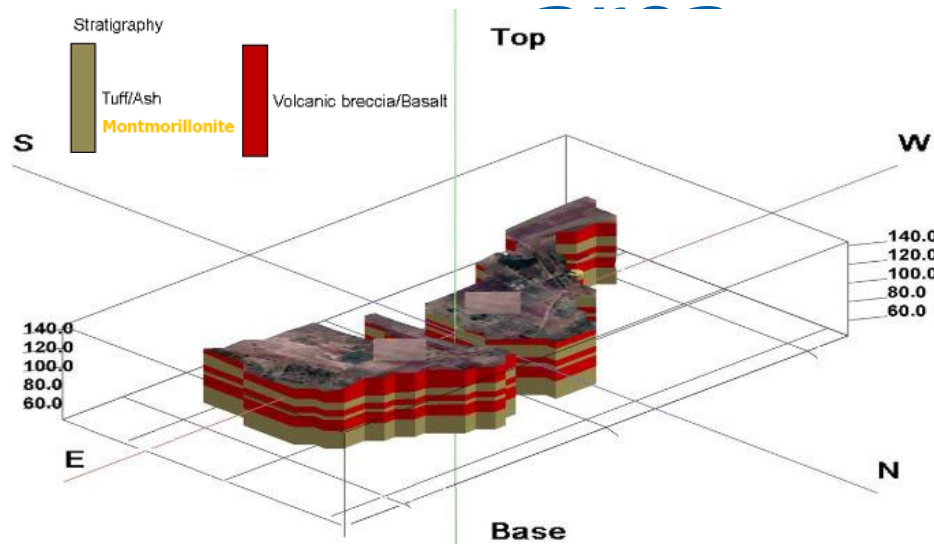


#### Usage

- **Cattle feed and pet food:** MMT clay is used as an anti-caking agent.
- **Bleaching Agent:** For vegetable oil and biodiesel oil.
- **Alcohol Beverage:** In powder form, it can be used as flocculant by tossing into the pond or pools of water. Same method could be used to purify organic matter in water.
- **Cosmetic:** MMT is used to absorb excess water and oil, reduce too high cosmetic density, stabilize ingredient formula, extend shelf life, adjust cosmetic viscosity and used in deep cleansing agent.



# Montmorillonite – Reserves in Hand 100rais(160,000 sqm)



## Montmorillonite Project Benefit

### Expect market for 150,000 tons capacity

Bleaching Clay for cooking oil Industry 75,000 Ton/year  
Antitoxin Clay for Animal Feed Industry 75,000 Ton/year

### Expect Market Price

Bleaching Clay for cooking oil Industry 442 USD/Ton  
Antitoxin Clay for Animal Feed Industry 882 USD/Ton

### Expect Project Benefit per Year

Bleaching Clay for cooking oil Industry 22.74 M.USD/Ton  
Antitoxin Clay for Animal Feed Industry 55.82 M.USD/Ton  
TOTAL EXPECT BENEFIT 78.56 M.USD/Year

# *Phase I Outcome*

## *Bleaching clay*



**Bleaching capability comparison ST5 vs China vs Indonesia clay**





Bleaching capability of PM's activated clay compare to market available activated clay



# Montmorillonite Production Process



Detail exploration to select area ~ 200 Rai Mineral reserve 1.5 M



Mining



Raw Montmorillonite Dressing Plant



Dryer



Activated Montmorillonite Plant

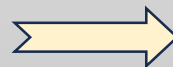
High Quality Montmorillonite Product



Washing and Dryer



Activated Montmorillonite Product



Product Blending and Grinding

Commercial Product



**Bleaching Clay  
for  
Palm Oil Industry**

**Moisture and Odor  
reduction Clay  
For Animal farm**

**Toxin Binder Clay  
For  
Animal feed**

**Water quality  
improvement Clay  
For Shrimp Farm**

# Montmorillonite Estimated Investment Budget



Production rate 150,000 Ton/year 10 Years Operation  
Total Product 1,500,000 Ton

## Investment Cost

Activity	Cost (THB)	Cost/Ton	
		(THB)	%
1 Lab Scale Product Development	5,000,000	3.33	1.60
2 Reserve Verification	8,000,000	5.33	2.56
3 Pilot Scale Product Development for customer trial	15,000,000	10.00	4.79
4 Plant Design and Construction permit	10,000,000	6.67	3.19
5 Plant Construction	250,000,000	166.67	79.87
6 Mine design and mining permit	15,000,000	10.00	4.79
<b>Total</b>	<b>303,000,000</b>	<b>202.00</b>	<b>96.80</b>



# Montmorillonite Direct Operating Cost



PM GROUP

## Operating Cost

Activity	Cost/Ton (THB)
1 Mining Cost	300.00
2 Mineral Dressing Cost	300.00
3 Mineral Drying Cost	300.00
4 Acid Activated Washing and Drying Cost	6,450.00
4.1 Acid Cost 5,000	
4.2 Energy Cost 1,050	
4.3 Washing and drying Cost 400	
5 Product Blending and Grinding Cost	300.00
<b>Total</b>	<b>7,650.00</b>

### Acid Activated Cost Condition

1. Sulfuric Acid 1 Mol 10 cc Mineral 1 g
2. Boiling at 80 C Timing 10 Hour

### Cost Reduction Plan

1. Reduce Boiling Time
  2. Reduce Acid
- On going in Chemical Lab Testing

# Montmorillonite Production Cost and Market Price

Production rate 150,000 Ton/year 10 Years Operation  
Total Product 1,500,000 Ton

Direct Product Production Cost	Cost/Ton
1 High grade Montmolilonite production cost	1,200.00
2 Activated Montmolilonite production cost	7,650.00
3 Blending Montmolilonite production cost 50%(1) : 50%(2)	4,425.00

Commercial Product	Direct Cost/Ton (THB)	Price /Ton (THB)	Margin /Ton	
			(THB)	(%)
1 Bleaching Clay for Palm Oil Industry	7,650.00	15,000	7,350.00	96
2 Moisture and Odor reduction Clay for Animal farm	7,650.00	25,000	17,350.00	227
3 Toxin Binder Clay for Animal feed	4,425.00	30,000	25,575.00	578
4 Water quality improvement Clay for Shrimp Farm	4,425.00	12,000	7,575.00	171

# Yearly Montmorillonite Market



Source : 2022

Commercial Product	Thailand Import (Ton)	Market				Expect Market			
		Thailand (Ton)	Malaysia (Ton)	Total (Ton)	Value (THB)	Thailand (Ton)	Malaysia (Ton)	Total (Ton)	Value (THB)
1. Bleaching Clay for Palm Oil Industry For Other oil industry	150,000	80,000	1,300,000	1,380,000	20,700,000,000	25,000	10,000	35,000	525,000,000
		70,000				31.25% Market	0.77% Market		
Commercial Product	Thailand Import (Ton)	Market				Expect Market			
		Thailand (Ton)	Vietnam (Ton)	Total (Ton)	Value (THB)	Thailand (Ton)	Vietnam (Ton)	Total (Ton)	Value (THB)
2. Moisture and Odor reduction Clay for Animal farm	40,000	40,000	40,000	80,000	2,000,000,000	4,000	4,000	8,000	200,000,000
						10% Market	10% Market		
Commercial Product	Thailand Import (Ton)	Market				Expect Market			
		Thailand (Ton)	Vietnam (Ton)	Total (Ton)	Value (THB)	Thailand (Ton)	Vietnam (Ton)	Total (Ton)	Value (THB)
3. Toxin Binder Clay for Animal feed	100,000	100,000	125,000	225,000	6,750,000,000	30,000	27,000	57,000	1,710,000,000
						30% Market	22% Market		
Commercial Product	Thailand Import (Ton)	Market				Expect Market			
		Thailand (Ton)	Vietnam (Ton)	Total (Ton)	Value (THB)	Thailand (Ton)	Vietnam (Ton)	Total (Ton)	Value (THB)
4. Water quality improvement Clay for Shrimp Farm	200,000	200,000	2,000,000	2,200,000	26,400,000,000	20,000	30,000	50,000	600,000,000
						10% Market	2% Market		
Total	Thailand Import (Ton)	Thailand Market (Ton)	Domestic Market Value (THB)	Total Market (Ton)	Total Market Value (THB)	Expect Market			
						Total (Ton)	Value (THB)		
	490,000	490,000	8,650,000,000	3,885,000	55,850,000,000	150,000			3,035,000,000

## Domestic and Oversea Market size Ton

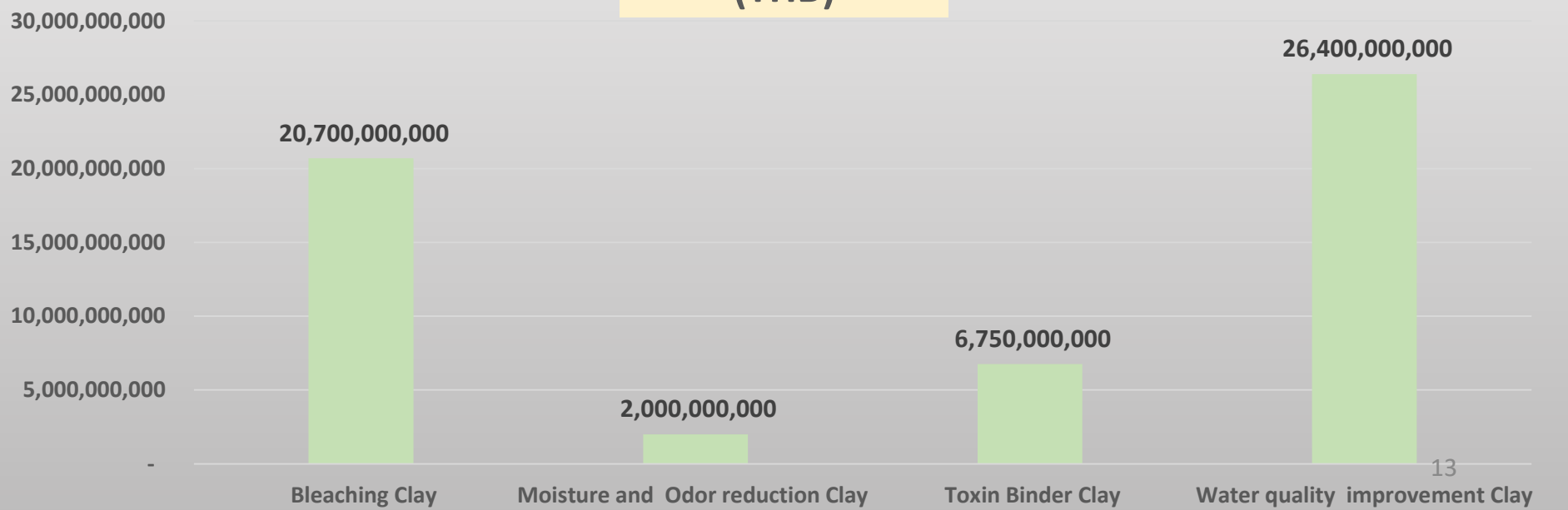




### Total Market Size (Ton)

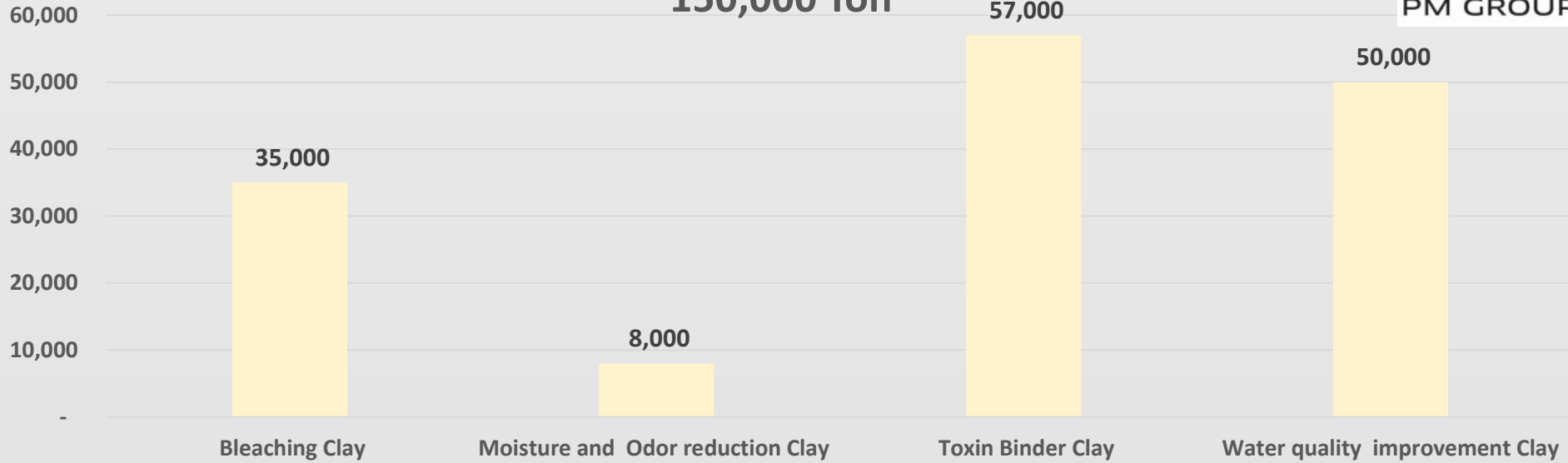


### Total Market Size (THB)

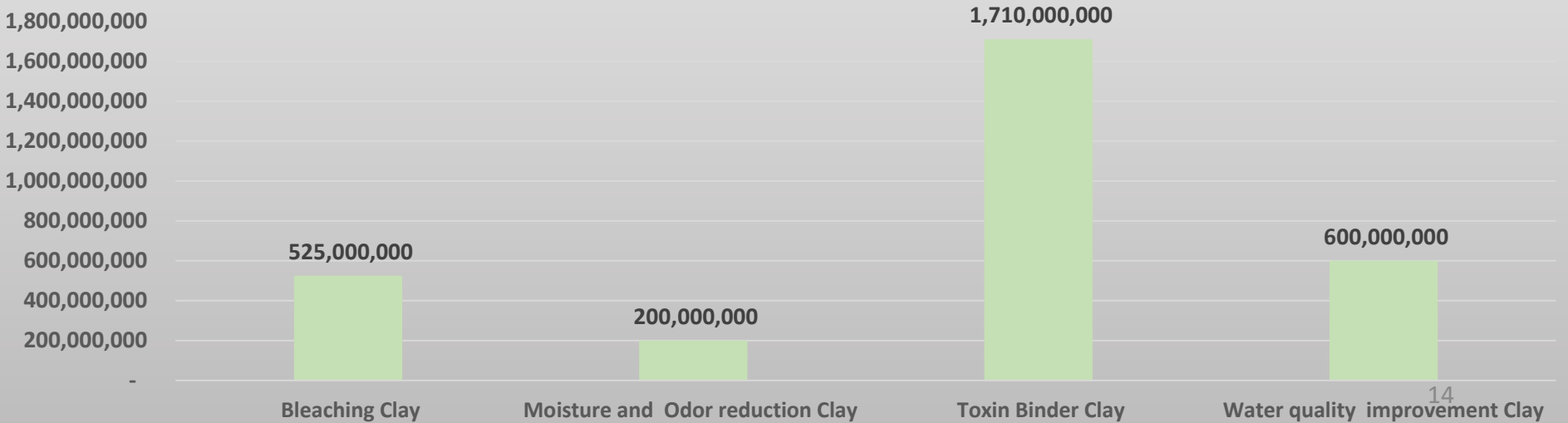




# Expected Market 150,000 Ton



# Expected Market Value 3,035,000,000 THB



# Projected Cashflow and IRR



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Estimate production 1.5 million tons

Production capacity (,000 ton)

Year	0	1	2	3	50	75	150	150	150	150	150	150	150	150	150	130	130
Initial investment	-	-	250,000,00														
	53,000,000	0															
Sales				1,011,650,000	1,517,475,000	3,034,950,000	3,034,950,000	3,034,950,000	3,034,950,000	3,034,950,000	3,034,950,000	3,034,950,000	3,034,950,000	3,034,950,000	3,034,950,000	3,034,950,000	3,034,950,000
Cost of goods sold				267,500,000	401,250,000	802,500,000	802,500,000	882,750,000	971,025,000	1,068,127,500	1,174,940,250	1,292,434,200	1,421,677,000	1,563,845,400	1,677,000,000	1,845,400,000	1,954,000,000
Contribution margin				744,150,000	1,116,225,000	2,232,450,000	2,232,450,000	2,152,200,000	2,063,925,000	1,966,822,500	1,860,009,750	1,742,515,700	1,613,272,000	1,471,104,500	1,471,104,500	1,471,104,500	1,471,104,500
Overhead				120,000,000	132,000,000	145,200,000	159,720,000	175,692,000	193,261,200	212,587,320	233,846,052	257,230,657	282,953,720	311,249,090	311,249,090	311,249,090	311,249,090
Depreciation				43,000,000	43,000,000	43,000,000	43,000,000	43,000,000	43,000,000	43,000,000	43,000,000	43,000,000	43,000,000	43,000,000	43,000,000	43,000,000	43,000,000
EBIT				581,150,000	941,225,000	2,044,250,000	2,029,730,000	1,933,508,000	1,870,663,800	1,754,235,100	1,626,163,690	1,485,285,000	1,330,318,000	1,159,855,400	1,159,855,400	1,159,855,400	1,159,855,400
Tax 30%				174,345,000	282,367,500	613,275,000	608,919,000	580,052,400	561,199,140	526,270,554	487,849,109	445,585,520	399,095,570	347,956,630	347,956,630	347,956,630	347,956,630
EAT				406,805,000	658,857,500	1,430,975,000	1,420,811,000	1,353,455,600	1,309,464,600	1,227,964,600	1,138,314,580	1,039,699,500	931,223,000	811,898,800	811,898,800	811,898,800	811,898,800
EAT+Depreciation	-	-	250,000,00	449,805,000	701,857,500	1,473,975,000	1,463,811,000	1,396,455,600	1,309,464,600	1,227,964,600	1,138,314,580	1,039,699,500	931,223,000	811,898,800	811,898,800	811,898,800	811,898,800
	53,000,000	0		0	0	0	0	0	60	26	9	47	2	2	2	2	

8%

166

IRR %

NPV 8% 6,313,232,664

PB 3.67 years

## Assumption

Sale price average fix Baht/ton 20,233

Market share ~

30%

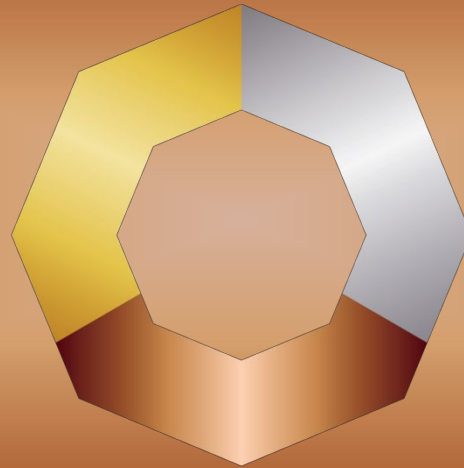
10% incremental yearly from yrs.

COGS 6 onward 5,350 onward

10% incremental yearly from yrs.

O/H 3 onward

# Corporate Profile



## PM GROUP

### Corporate Office Address

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