# Energy Absolute Public Company Limited

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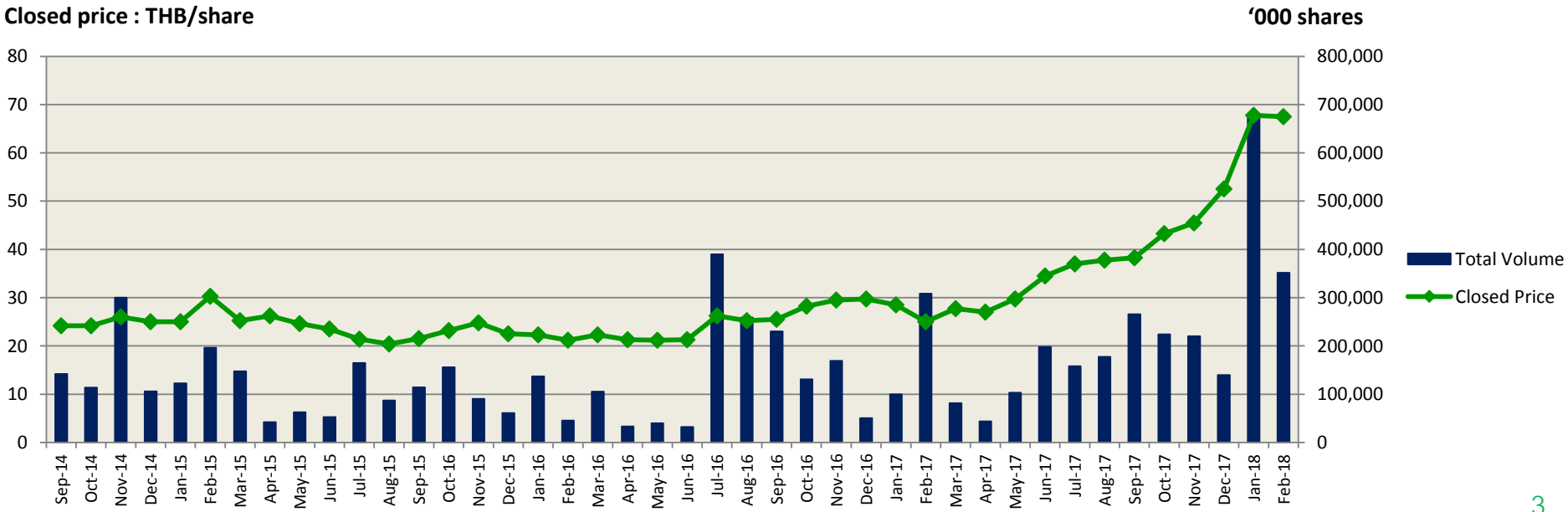
3 Our Biodiesel Business

4 Our Financial Results

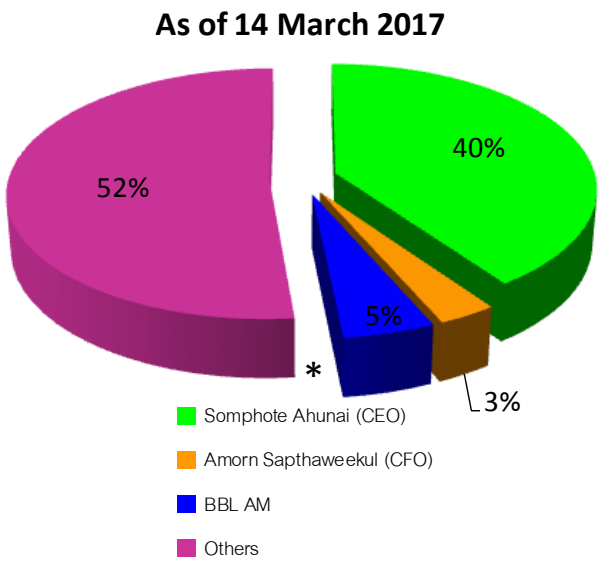
5 Our Growth

# E@ at a Glance

| | |
|---|---|
| **Established** | In 2006 to produce palm oil |
| **Core Business** | Energy (Renewable and Utilities) |
| **Secondary Market** | The Stock Exchange of Thailand since 30 Jan 2013 |
| **Market Capitalization**<br>**As of 27 February 2018** | Approximately THB 251.77 billion (US$ 8.12 billion)<br>Included in the SET50 index since 1 Jul 2017<br>Included in FTSE SET Large Cap index since 18 Dec 2017 |
| **Liquidity** | Free Float 39.86% |



# Shareholder Structure




Number of Total Shareholders = 8,223

## Mr.Somphote Ahunai

### Chief Executive Officer

**Education**

- MBA from University of Pittsburgh, USA
- Bachelor of Engineering from Chulalongkorn University, Thailand

**Previous Work**

- Analyst and Researcher in USA.
- Managing Director of a Securities Brokerage company in Thailand
- Managing Director of a Renewable Energy company in Thailand

## Mr.Amorn Sapthaweekul

### Deputy to CEO and Chief Finance Officer

**Education**

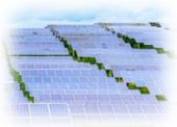
- Master of Science from Chulalongkorn University, Thailand
- Bachelor of Business Administration (Finance and Banking) from Thammasat University, Thailand

**Previous Work**

- Investment Banker and Financial Advisor,
- Director in a Renewable Energy company

# Our Business and Group Structure





- **Bio Diesel**
- **Renewable Power**
  - **Solar Power**
    - Lopburi
    - Nakornsawan
    - Lampang
    - Phitsanulok
  - **Wind Power**
    - Songkhla
    - Nakhonsithammarat
    - Chaiyaphom
- **Energy Storage**
  - Amita Technologies Inc. Taiwan
  - New Company 50 GW Factory
- **EV Charging**
  - Energy Mahanakorn Co., Ltd.
  - Shenzhen Growatt Power Technology
- **R&D Center**

- 2009 Biodiesel
- 2011 Solar Power
- 2015 Wind Power
- 2017-2018 Energy Storage + EV Charging + R&D for New Business

664 MW

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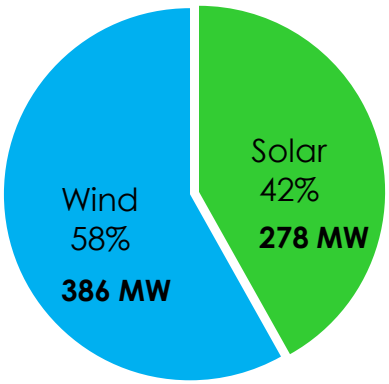
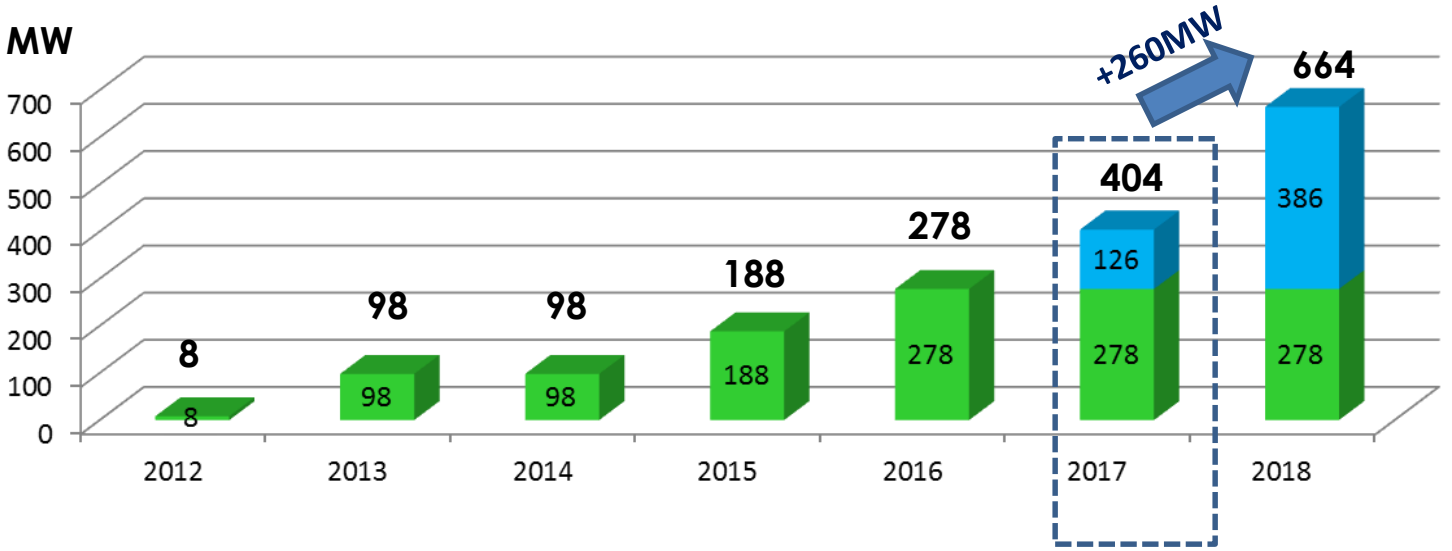
# Project Pipeline




| | | | | | |
|---|---|---|---|---|---|
| **Solar** | **+ 8 MW** | **+ 90 MW** | | **+ 90 MW** | **+ 90 MW** |
| | Lopburi | Nakorn-sawan | | Lampang | Phitsanu-lok |

| | | | |
|---|---|---|---|
| **Wind** | **Had Kanghan** (Songkhla and Nakornsritammarat) | **126 MW** | |
| | **Hanuman** (Chaiyaphum) | | **+ 260 MW** |

# Electricity Price Structure

**Base Tariff** + **Adder** (10 years from COD) + **Ft** (Fuel Adjustment Charge) = **Baht/kWh**

**Peak Time:**
Weekdays
09.00 –22.00
**4.2243** Bt./kWh

**Off-Peak Time:**
Weekdays
22.00 – 09.00
+ Weekend + Holidays
**2.3567** Bt./kWh

**Solar**
**8 Bt.**

- Lopburi
  8 mw
  Until Oct 2022

**Solar**
**6.5 Bt.**

- Nakornsawan
  90 mw
  Until Dec 2023
- Lampang
  90 mw
  Until Feb 2025
- Phitsanulok
  90 mw
  Until Apr 2026

**Wind**
**3.5 Bt.**

- HKH 1 = 36 mw
  Until Mar 2027
- HKH 2&3 = 90 mw
  Until Jun 2027
- Hanuman Projects
  260 mw

**-0.159** Bt./kWh
For Jan – Apr 2018

# Solar Power

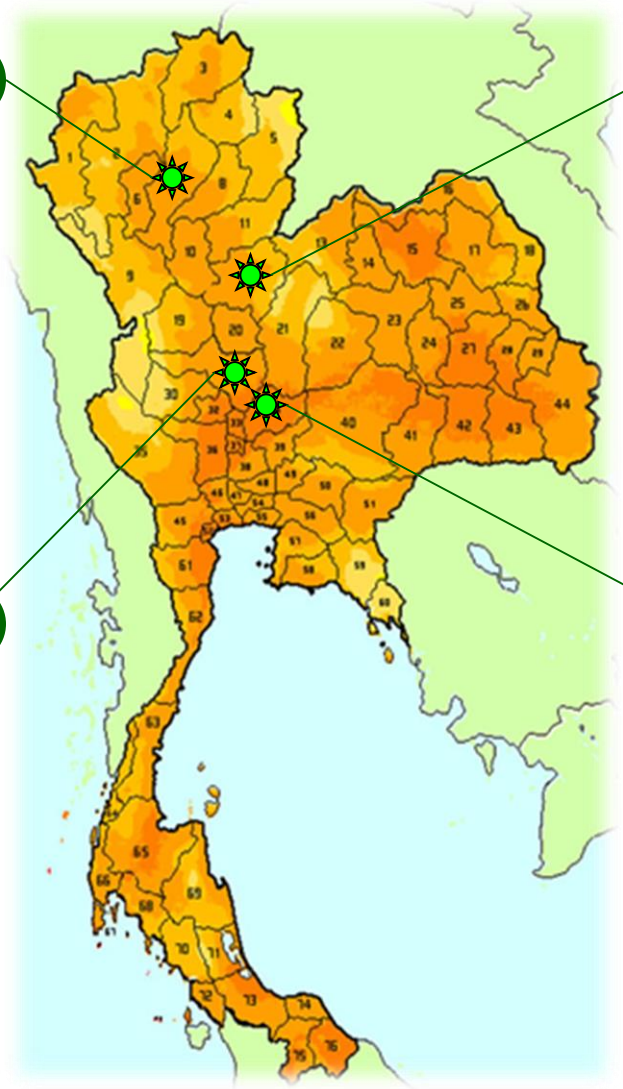
## 278 MW

### 3 Lampang (THB 8.07 bil)

| | |
|---|---|
| Contracted Cap: | 90 MW |
| Installed Cap : | 128.396 MW |
| **Technology:** | **Tracking system** |
| **COD :** | **17 Feb 2015** |
| Land area : | 2,354 Rais (930 acres) |
| **Adder :** | **6.50 baht/kwh** |

### 4 Phitsanulok (THB 9.5 bil)

| | |
|---|---|
| Contracted Cap: | 90 MW |
| Installed Cap : | 133.92 MW |
| **Technology:** | **Tracking system** |
| **COD :** | **1 Apr 2016** |
| Land area : | 1,800 Rais (732 acres) |
| **Adder :** | **6.50 baht/kwh** |



### 2 Nakornsawan (THB 6.7 bil)

| | |
|---|---|
| Contracted Cap: | 90 MW |
| Installed Cap : | 126.126 MW |
| **Technology:** | **Fixed system** |
| **COD :** | **23 Dec 2013** |
| Land area: | 1,858 Rais (735 acres) |
| **Adder :** | **6.50 baht/kwh** |

### 1 Lopburi (THB 812 mil)

| | |
|---|---|
| Contracted Cap: | 8 MW |
| Installed Cap : | 9.33 MW |
| **Technology:** | **Fixed System** |
| **COD :** | **17 Oct 2012** |
| Land area: | 315 Rais (124.5 acres) |
| **Adder :** | **8 baht/kwh** |

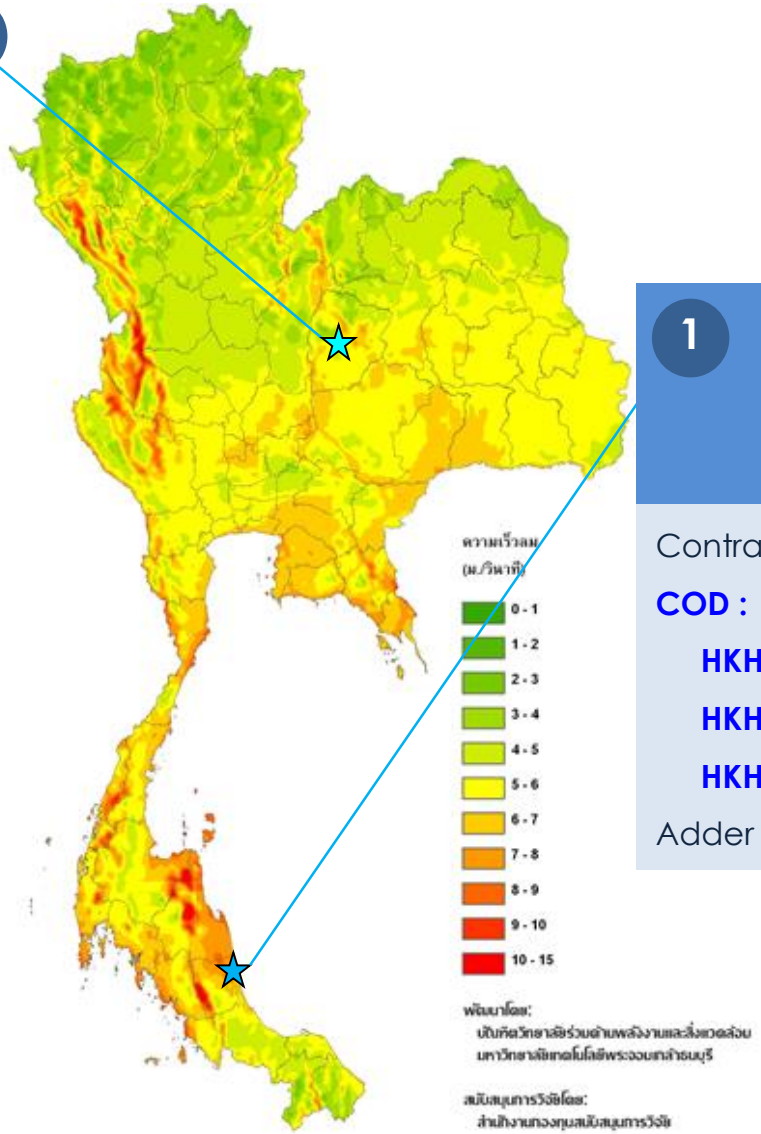
*Note : 1 acre = 2.529 rais*

# Wind Power

## 386 MW

**2 Hanuman : HNM (Chaiyaphum) THB 20 bil.**

| | |
|---|---|
| Contracted Cap: | 260 MW |
| SCOD : | 2018 |
| Adder : | 3.50 baht/kwh |
| **Status:** | **During Construction** |



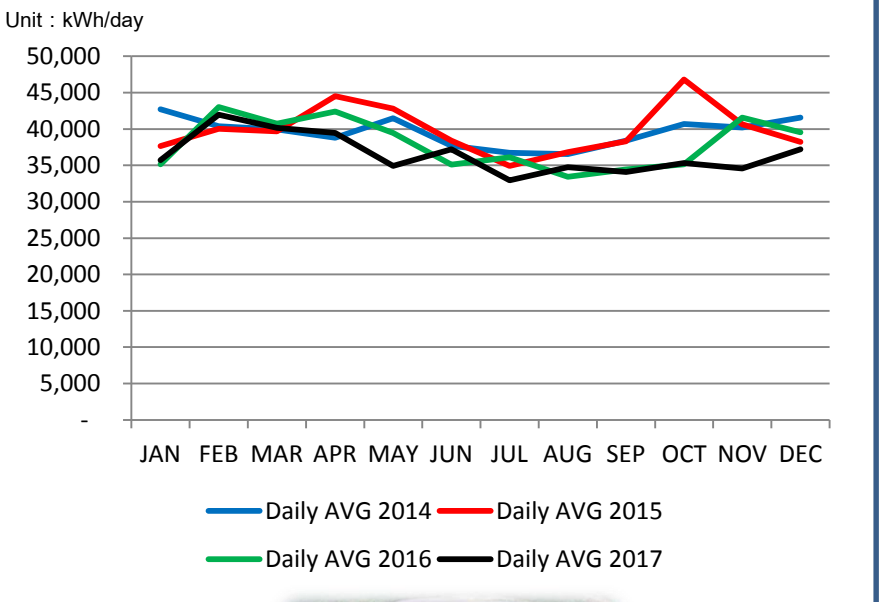

**1 Hadkanghan : HKH (East Coast Southern) THB 10.4 bil.**

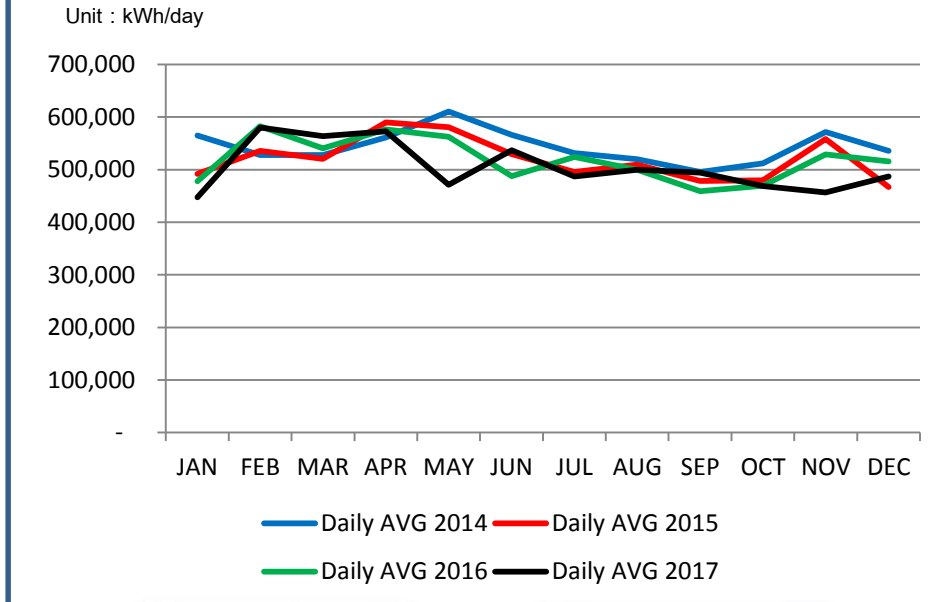
| | |
|---|---|
| Contracted Cap: | 126 MW |
| **COD :** | |
| **HKH 1 = 36 MW** | **COD 3 Mar 17** |
| **HKH 2 = 45 MW** | **COD 10 Jun 17** |
| **HKH 3 = 45 MW** | **COD 23 Jun 17** |
| Adder : | 3.50 baht/kwh |

# Power production of Solar Farms

| Lopburi 8 MW : COD 17 Oct 2012 | | | | |
|---|---|---|---|---|
| Unit : kWh | 2014 | 2015 | 2016 | 2017 |
| Total Power Output | 14.5 mil. | 14.6 mil. | 13.9 mil. | 13.1 mil. |
| Average Daily Output | 39,591 | 39,893 | 37,867 | 36,521 |

| Nakornsawan 90 MW : COD 23 Dec 2013 | | | | |
|---|---|---|---|---|
| Unit : kWh | 2014 | 2015 | 2016 | 2017 |
| Total Power Output | 198.5mil. | 189.6 mil. | 189.1 mil. | 184.2 mil. |
| Average Daily Output | 543,638 | 519,693 | 518,632 | 505,401 |

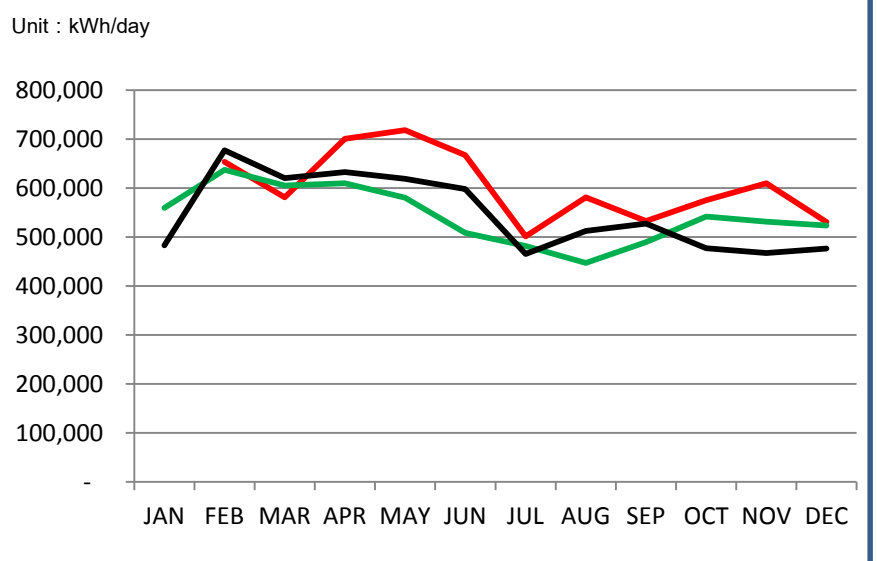


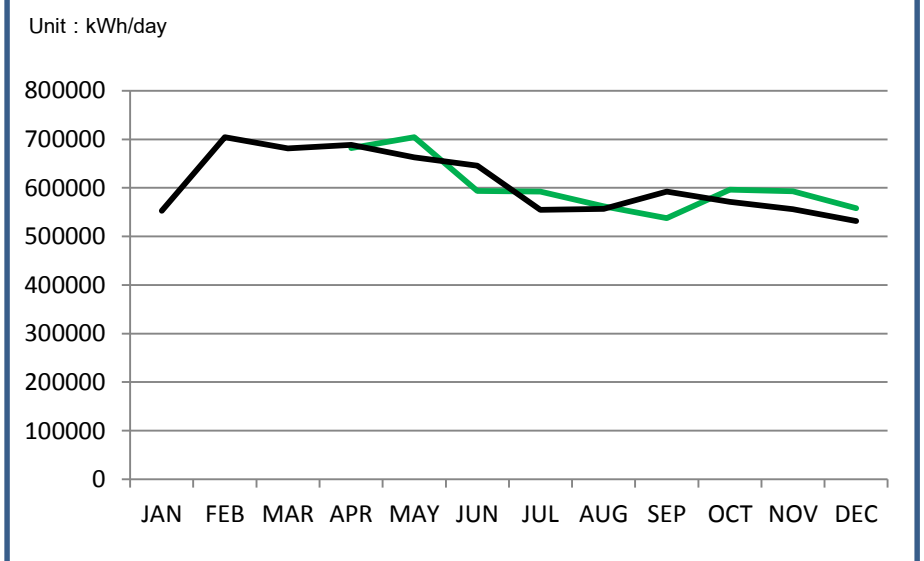




# Power production of Solar Farms

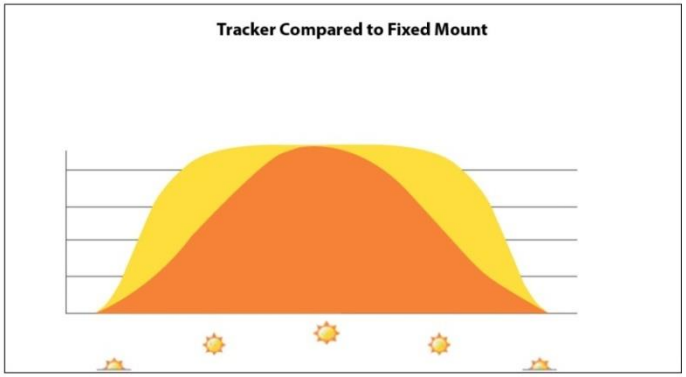
| Lampang 90 MW with Sun tracker : COD 17 Feb 2015 | | | |
|---|---|---|---|
| Unit : kWh | 2015 | 2016 | 2017 |
| Total Power Output | 191.3 mil. | 197.9 mil. | 199.0 mil. |
| Average Daily Output | 601,474 | 540,737 | 546,332 |

| Phitsanulok 90 MW with Sun tracker : COD 1 Apr 2016 | | |
|---|---|---|
| Unit : kWh | 2016 | 2017 |
| Total Power Output | 165.6 mil. | 221.7 mil. |
| Average Daily Output | 602,221 | 608,289 |




# Higher Output from Sun Tracking System

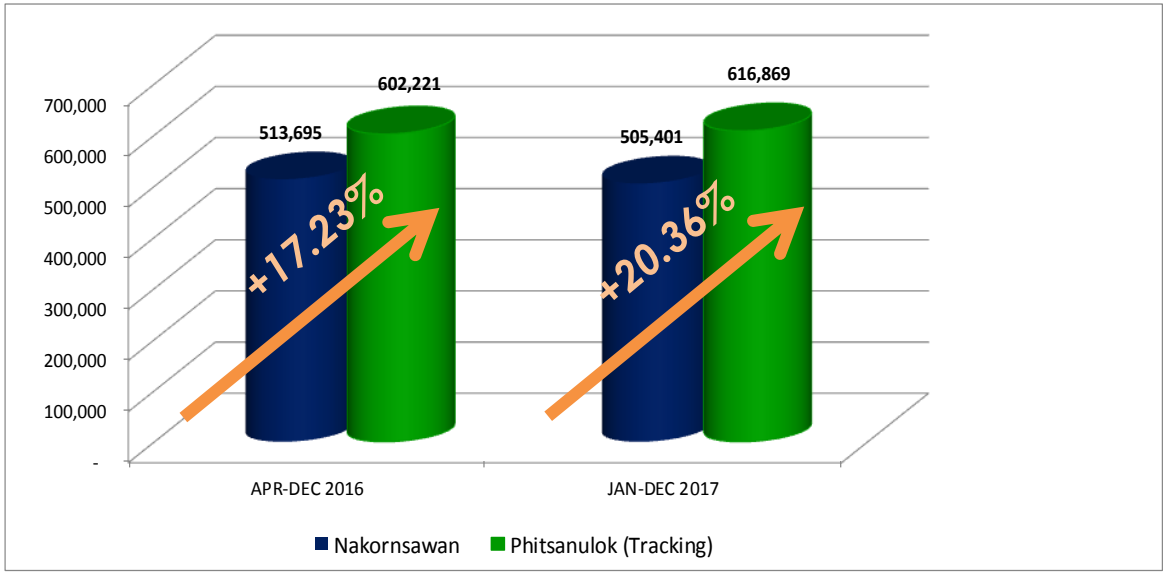



Tracker

Fixed

Installing sun tracking system is expected to increase power production at 10-15%

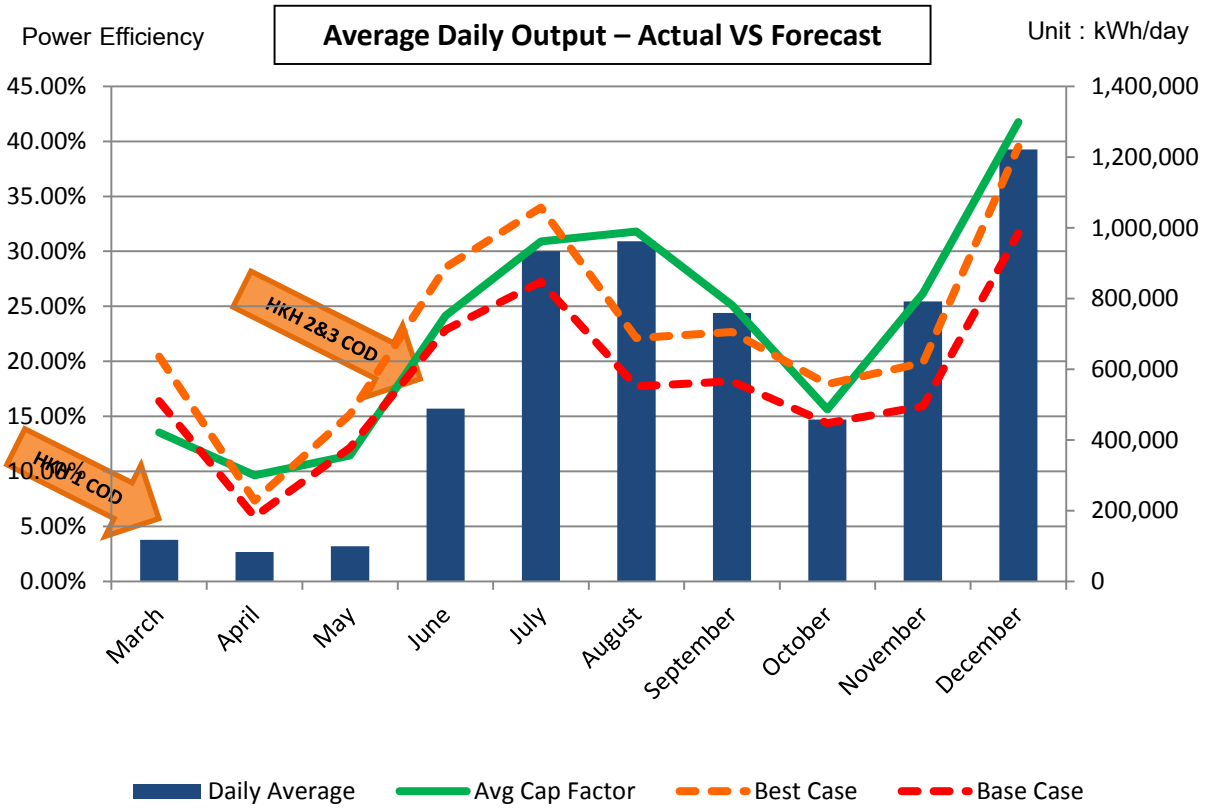
Daily Average : kWh

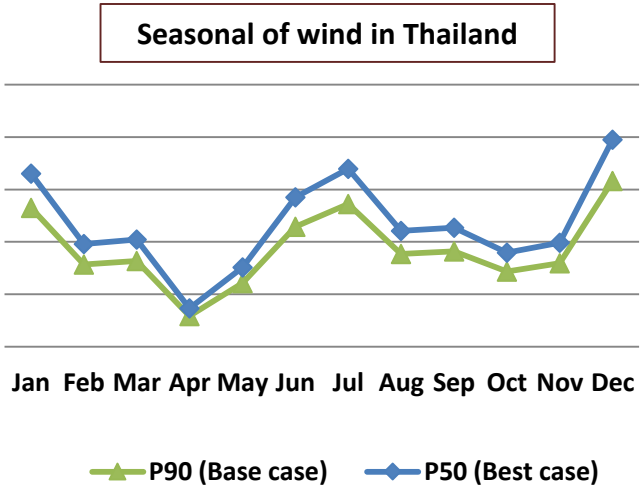



Comparing the actual production of our two solar power plants, with and without sun tracking system, the power production output has increased at 17-19%. The initial investment increased 8%

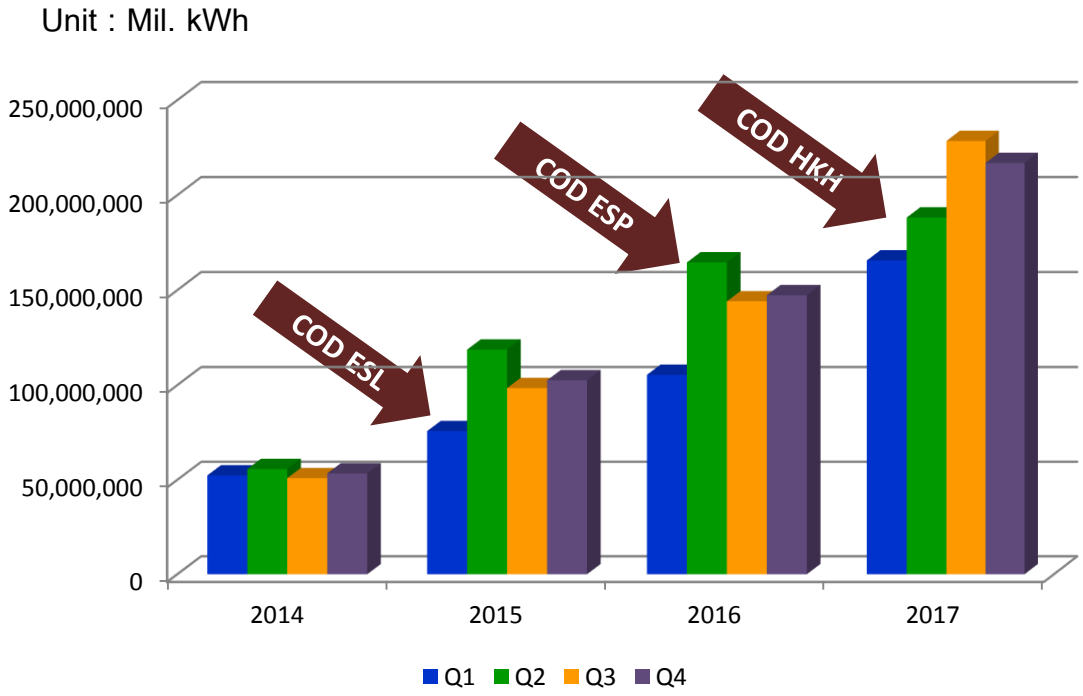
# Power production of Wind Farm 126 MW

| | |
|---|---|
| Total Power Output (3 Mar – 31 Dec 2017) | 180.9 mil. |
| Average Daily Output (Jul – 31 Dec 2017) | 854,403 kWh |
| Average Wind Speed (Jul – 31 Dec 2017) | 5.39 M/Sec. |
| Average Power Efficiency (Jul – 31 Dec 2017) | 28.56% |



# Quarterly Power Output

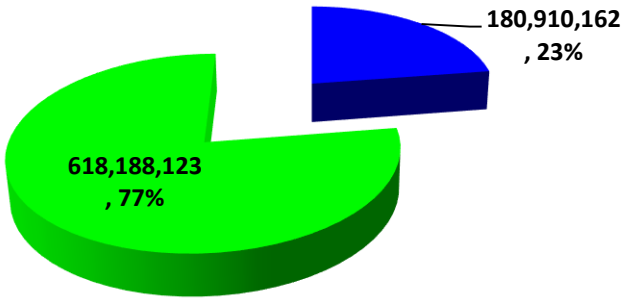



Total Contract Capacity = 404 MW

**Solar = 278 MW**

**Wind = 126 MW**

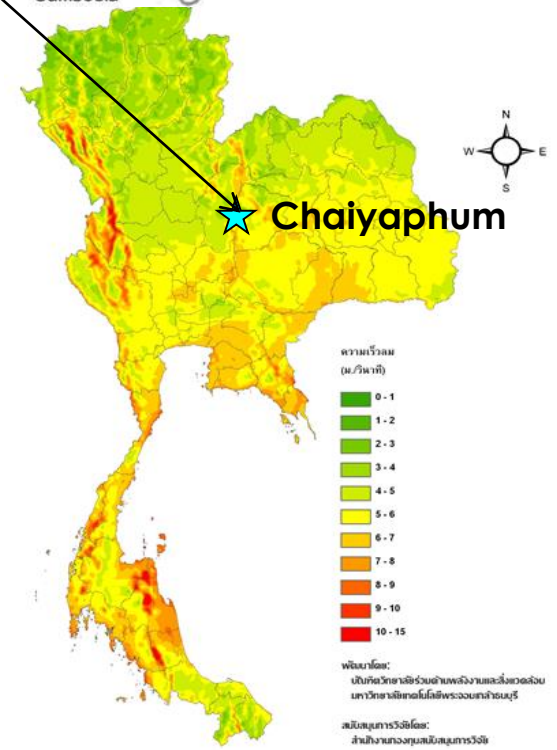
**Actual production in 2017**




- High production from Solar Power Plant is in Q2
- Power output in **Q4/2017 = 216.85 Mil. Units** produced from solar power 141.05 Mil. Units and wind power 75.80 Mil. Units
- EA's highest output was in Q3/2017 = 228.46 Mil. Units, resulted from full capacity of solar power and good performance of wind power.

# Hanuman Wind Farm 260 MW

| Sub-Project | Capacity (MW) | SCOD |
|---|---|---|
| Hanuman 1 | 45 | Q4/2018 |
| Hanuman 5 | 48 | |
| Hanuman 8 | 45 | |
| Hanuman 9 | 42 | |
| Hanuman 10 | 80 | |


- Located in Chaiyaphum province
- Current Status : During construction of foundation
- Adder 3.50 Baht/kWh for 10 years
- Project Cost : THB 20 billion
- Project Specification
  - ✓ **103 sets of Wind Turbine Generator at 2.5 MW each**
  - ✓ **Hub height 163 m.**
  - ✓ **Blade length 67 m.**
  - ✓ **Cut in wind speed = 3 m/sec**

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# Biodiesel Production

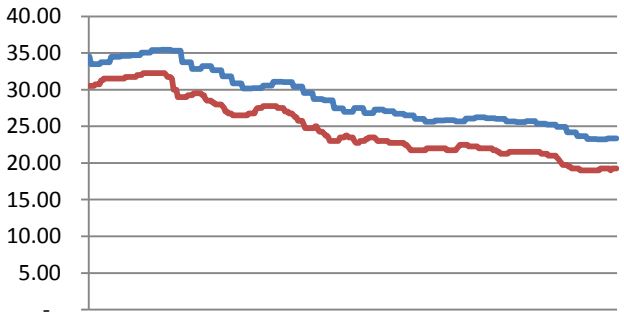
| | |
|---|---|
| **Location** | Kabinburi Industrial Estate, Prachinburi under BOI promotion & privileges |
| **Plant Capacity** | • Biodiesel 800,000 Liters per day<br>• Refined Glycerin 80 Tons per day by product) |

| Certificate | Certificate Number |
|---|---|
| RSPO Roundtable on Sustainable Palm Oil | TNI-SC-F-1201 |
| **ISO 9001 : 2008** | 53866/A/0001/UK/En (Head Office)<br>53866/A/0002/UK/En (Factory) |
| **ISO 14001 : 2015** | 79935/A/0001/UK/En |
| **OHSAS 18001 : 2007** *(Occupational Health and Safety Management System)* | 79935/B/0001/UK/En |

# Biodiesel Business

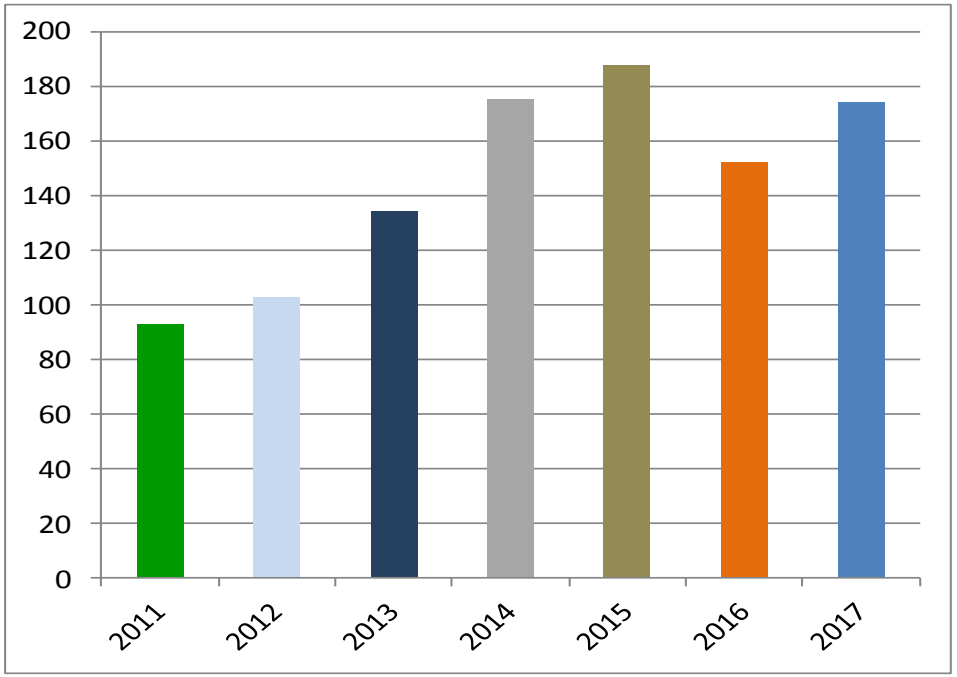
## Strong Customer Base


**Relative price of crude palm oil and B100 in 2017**



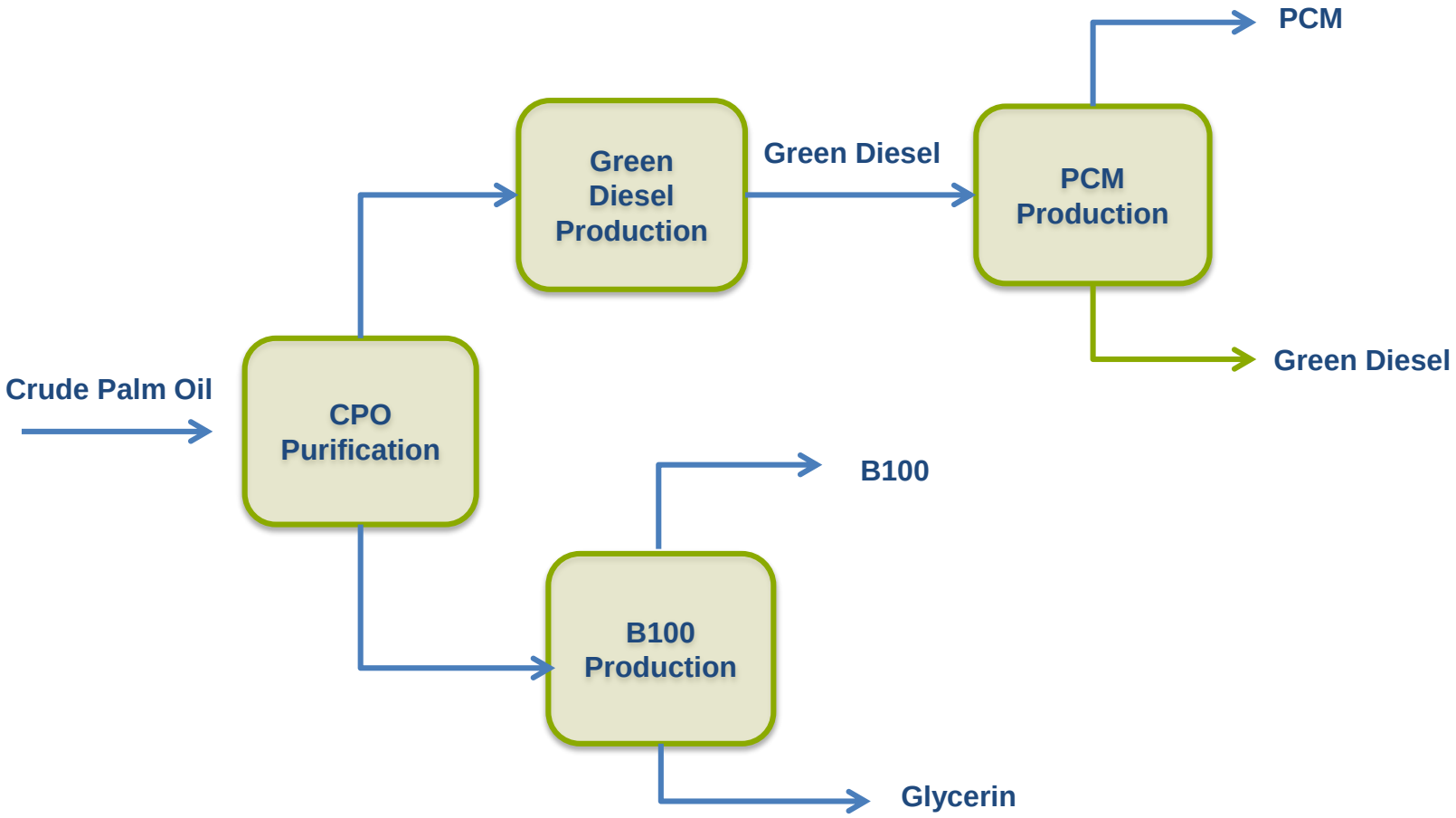

## Sales Volume of B100

**(In Million liters)**




- Blending of B100 to high speed diesel in 2017
  - 1 Jan to 7 May = 5%
  - 8 May onwards = 7%

# New Product under Biodiesel Business




Using CPO as raw material then enhance return by implementing of new production technology

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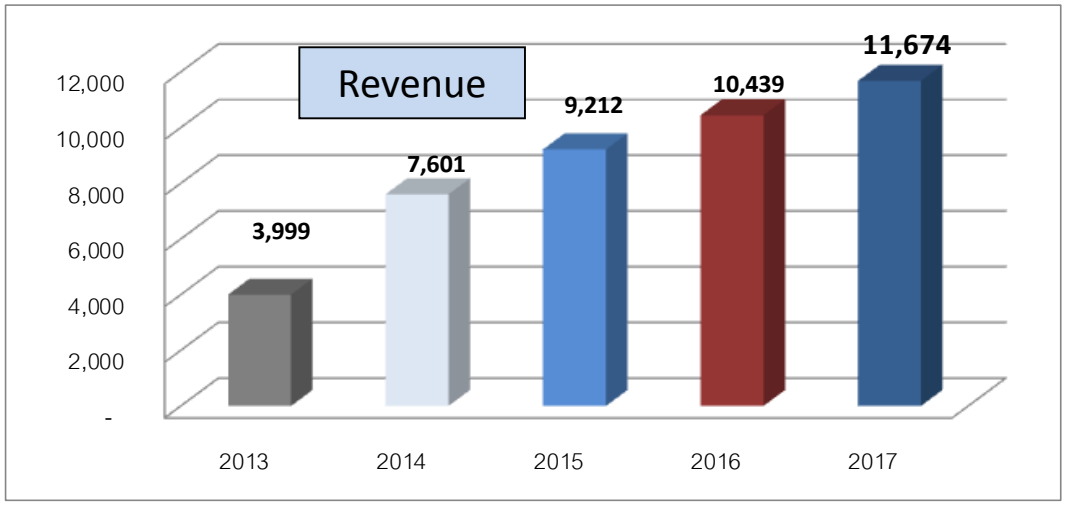
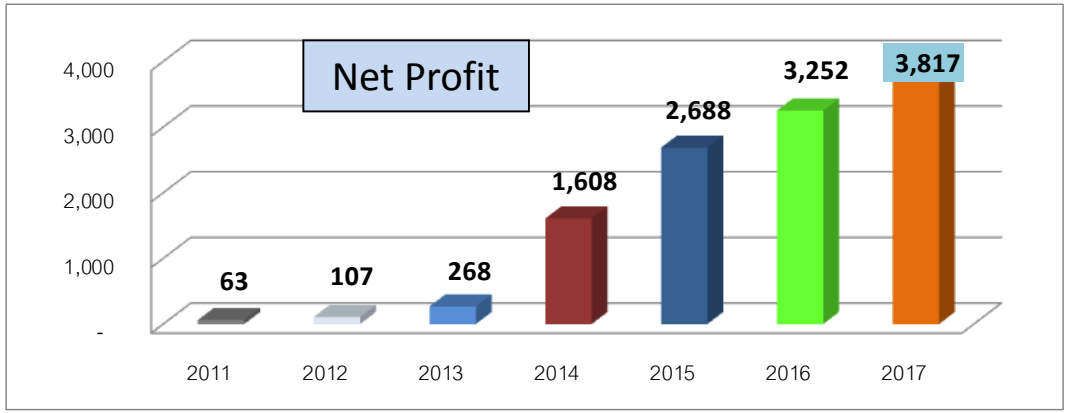
# Strong Growth in Revenue and Net Profit

THB Mil.




THB Mil.



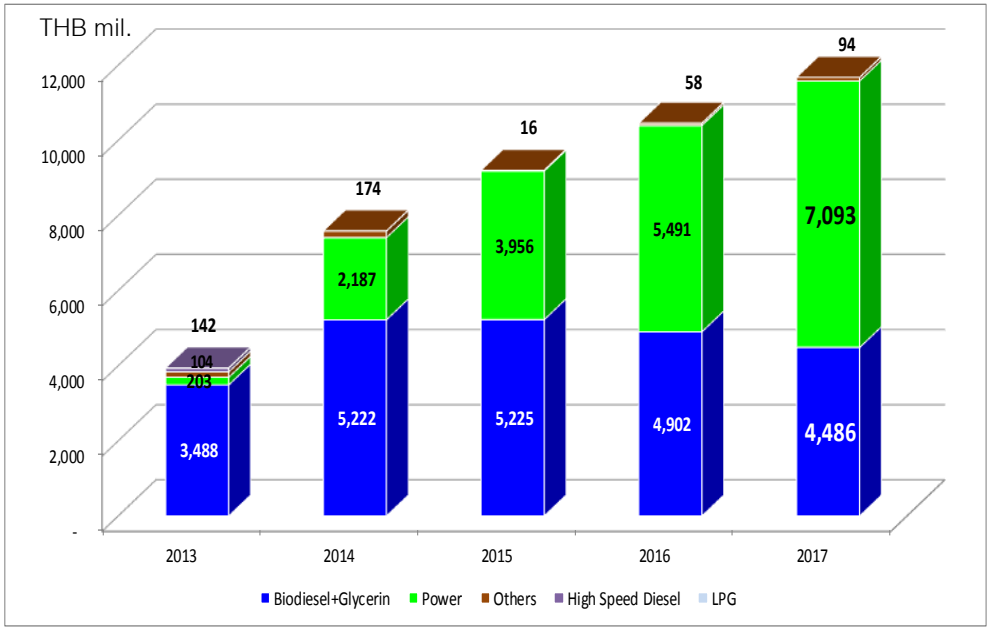

**Power Business :**
**Strong income and profit from renewable power production**

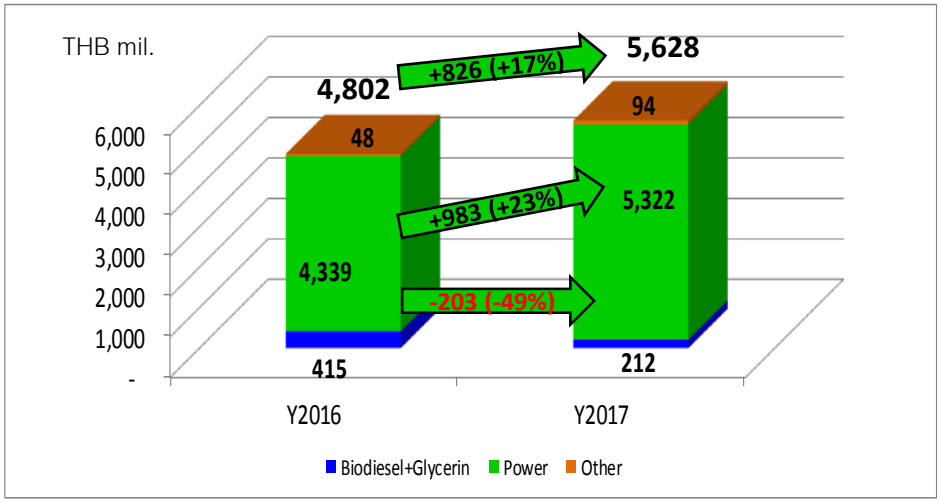
- Started operation of the first solar power plant in October 2012 with 8-MW PPA capacity
- By 2017 the total PPA capacity was 404 MW comprised of 278 MW of solar and 126 MW of wind
- Gross profit margin in Y2017 = 75% (Y2016 = 79%)
- All solar and wind PPAs are support by the government under adder scheme for 10 years

**Biodiesel Business :**
**Saturated stage and depend on the government policy in managing crude palm oil supply in the country**

- Maintain market share
- Improve efficiency and production yield
- Gross profit margin in Y2017 = 5% (Y2016 = 8%)
- Developing new product with higher margin

# Growth from Power Business with High Margin




- **In Y2017, total revenue = THB 11,674 mil. increased 12%**
- **Revenue from power business contributed from 4 Solar Power Plants (278 MW) and 3 Wind Power Plants (126 MW) with total production of 798 mil.units (+41% from Y2016)**
- **Revenue from biodiesel business decreased 9%**
- **Gross profit for Y2017 = THB 5,628 mil. (+17% from Y2016)**
- **Gross margin increased from 45.76% to be 48.21% reflected the increase of income from new power plants.**

**Power Busines : Revenue increased 29%**

- Phisanulok 90 MW solar power plant started COD on 1 April 2016
- Hadkanghan 1, 2 and 3 wind power plant for total of 126 MW started COD on 3 March, 10 June and 23 June 2017 respectively
- Average selling price of electricity unit from solar was THB 9.7 and wind was THB 6.3

**Biodiesel Business : Revenues decreased 9%**

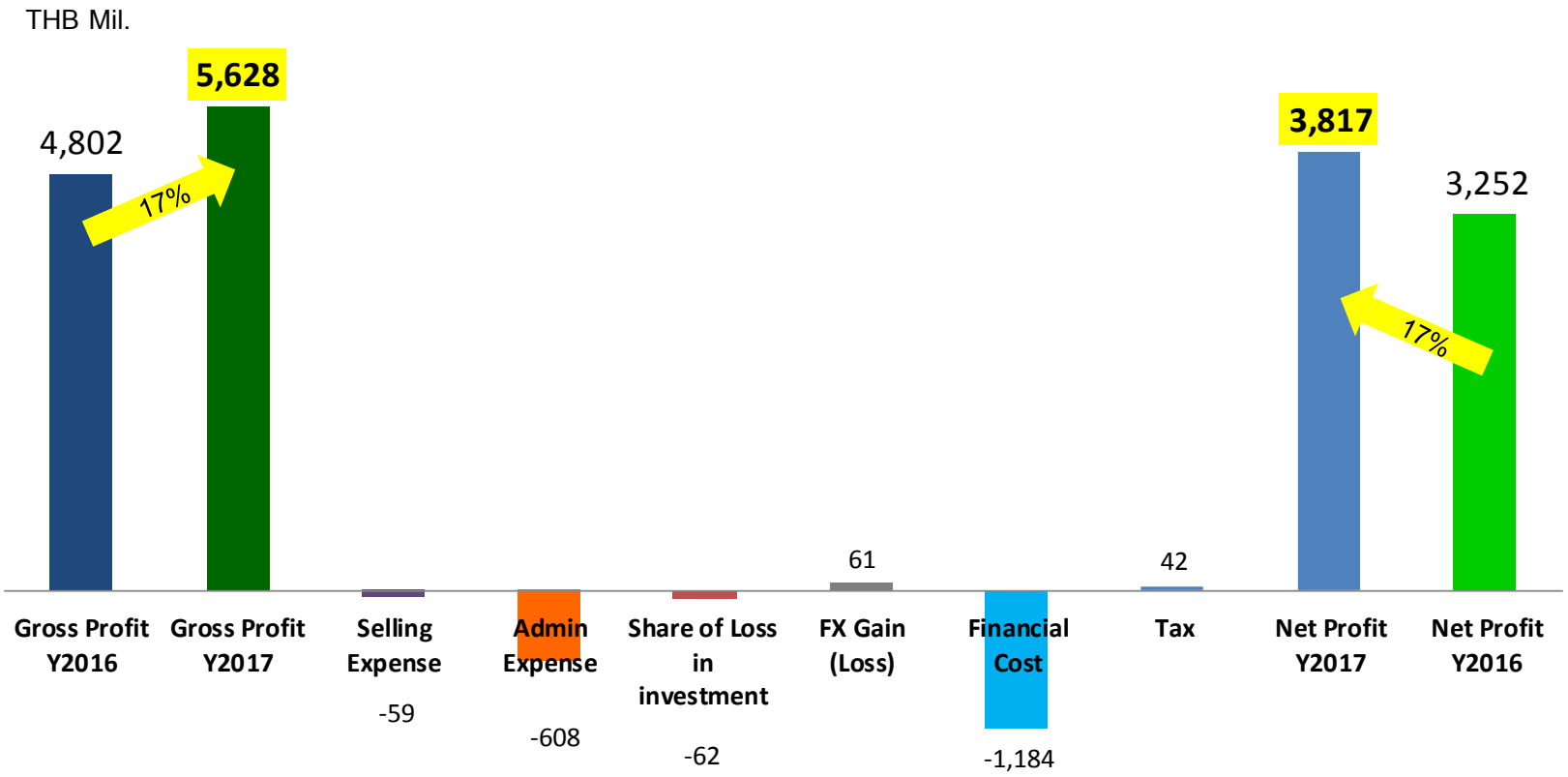
**B100 :**

- Lower of B100 selling price by 22% resulted from lower of raw material price and higher competition, though sale volume increased by 15%
- The government announced B100 proportion in high-speed diesel to be 7% since 8 May 2017 to control Palm Oil supply in the market.

**Pure Glycerin :**

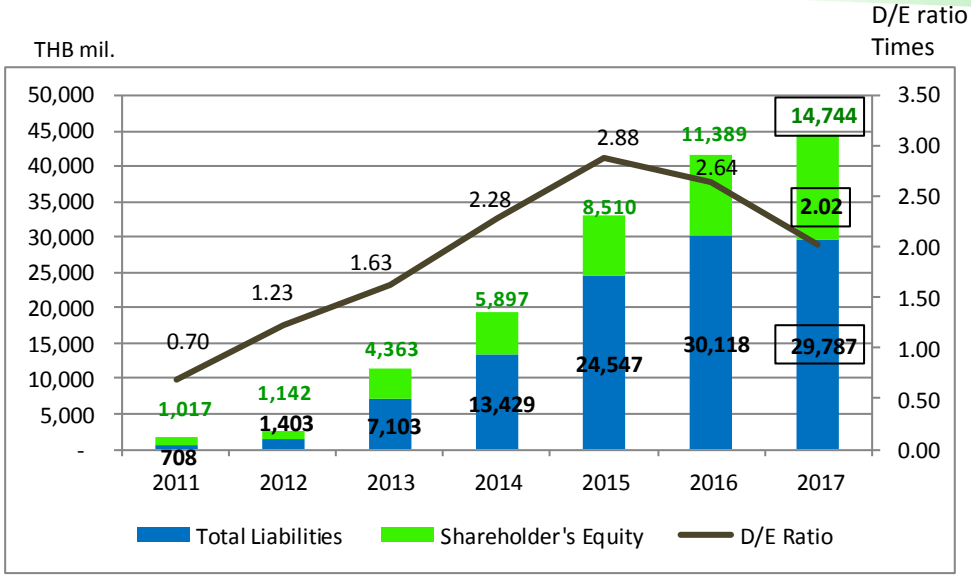
- Selling price increased by 40% and sale volume increased by 13% resulted from strong demand

# Effects on Y2017 Net Profit

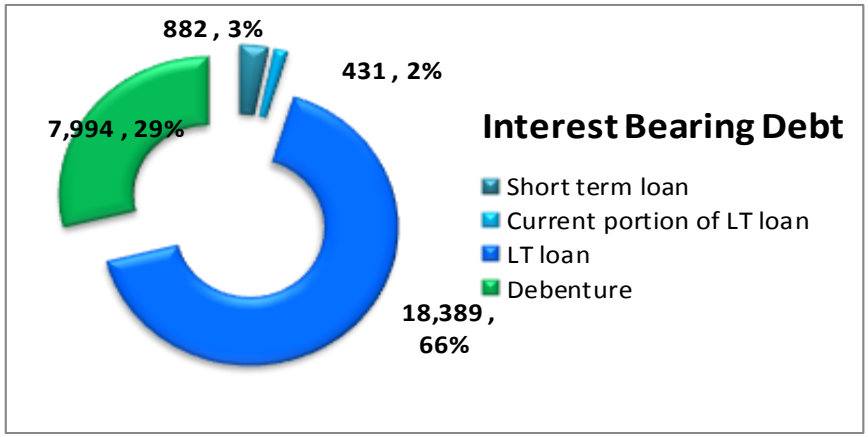



- Administrative expenses, for Y2017 was THB 608 mil, increase THB 198 mil (or 48%) due to the increase of personnel expenses , directors remuneration expenses, financial service fees and operating expenses of wind power plant.
- Financial costs for Y2017 was THB 1,184 mil, increase THB 189 mil (or 19%) due to completion of 126-MW wind power plants. Hence, the financial cost incurred thereafter shall be recorded as expense.

# Capital Structure




**Total Asset as of 31 Dec 2017 = THB 44.530 bil.**




| | |
|---|---|
| 2012 | - Oct : COD of **ESLO**, 8 MW solar power plant |
| 2013 | - Dec : COD of **ESN**, 90 MW solar power plant |
| 2014 | - Construction of **ESL**, 90 MW solar power plant which started COD in Feb 2015 |
| 2015 | - Construction of ESP, 90 MW solar power plant which started COD in Apr 2016<br>- Construction of HKH, 126 MW wind power plant which started COD in Mar and Jun 2017 |
| 2016 | - Jul : Issued THB 8 bil. bond to refinance project loan of ESLO + ESN and investing in new project with interest rate at 2.22% to 2.37% |
| 2017 | - COD of HKH wind power plant , 126 MW in March and June<br>- Construction of HNM wind power plant, 260 MW to be complete within Q4/2018<br>- Amend project loan of ESL+ ESP + HKH for the total of THB18,000 mil. Change interest rate from floating at 3.30-4.37% to be fixed at average of 3.60% and reschedule principle payment to start from Dec 2020 and interest payment to be every 6 month. |

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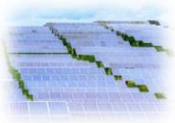
# Our Growth and New Business





- Bio Diesel
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    - Nakornsawan
    - Lampang
    - Phitsanulok
  - Wind Power
    - Songkhla
    - Nakhonsithammarat
    - Chaiyaphom
- Energy Storage
  - Amita Technologies Inc. Taiwan
  - New Company 50 GW Factory
- EV Charging
  - Energy Mahanakorn Co., Ltd.
  - Shenzhen Growatt Power Technology
- R&D Center

# EV Charging station business

Our charging station network will cover the whole country for more than 1000 stations within two years. *(100 stations in Jan 2018)*

E ANYWHERE


Fully operated via mobile application and online system

High standard charging station and available for any EV car

IEC INTERNATIONAL ELECTROTECHNICAL COMMISSION

CE

CHARGING STATION

# EA Anywhere
# Electric for Any Cars

https://www.eaanywhere.com

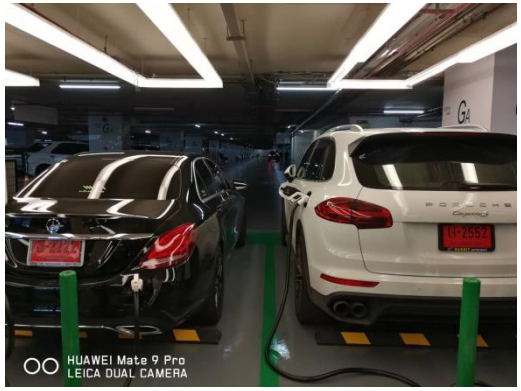
Three phase AC charging pile series products, mainly provide fast charging service to those EVs equipped with 3 phase onboard charger, besides single phase AC charging. Compare to DC charging station, which has the advantages of less investment, smaller land occupation, charging fast and good quality. Be compatible to the communication protocol of latest version of EU standard.

IEC INTERNATIONAL ELECTROTECHNICAL COMMISSION

CE

CHARGING STATION

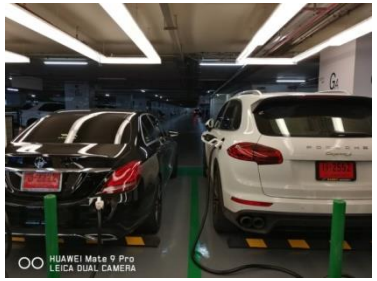
*Now available at Siam Paragon, Siam Center and many more is coming*

# EA Anywhere
# Electric for Any Cars

https://www.eaanywhere.com

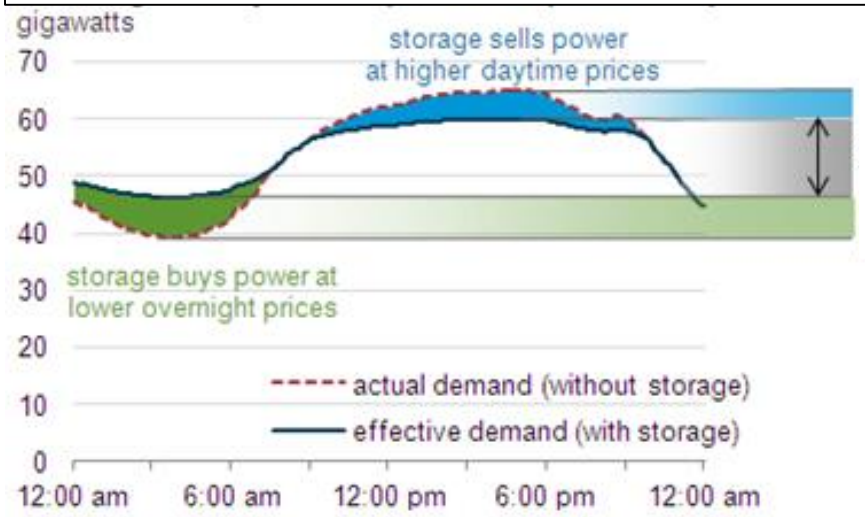
*Now available at Siam Paragon, Siam Center, CDC and many more is coming*




# Start investing in energy storage business : Amita Technologies Inc.


# Advantage of Grid Power Storage

**Flattening the daily load shape, 24-hour period example**




**Less capacity is required to meet peak demand**

**Smaller range of energy supply is needed**

**Higher minimum demand allows more plants to operate at maximum efficiency**

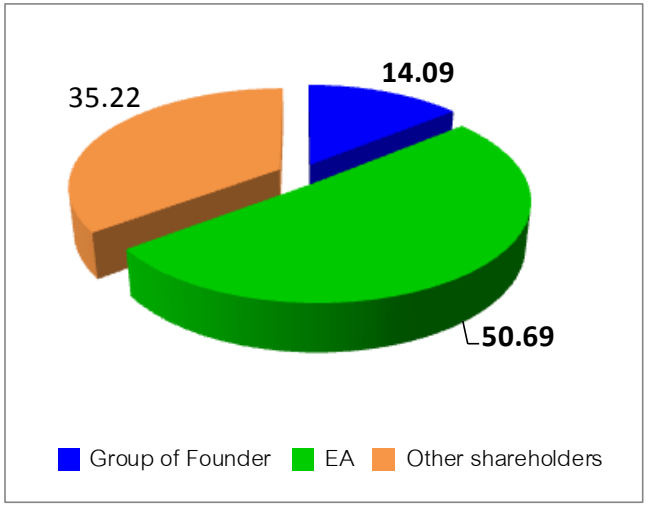
*Source: U.S. Energy Information Administration.*

EA supports FTI to engage TDRI to study the introducing of Power Storage in Power Grid System. The research paper will be finished within Q2/2018.

# Start investing in energy storage business : Amita Technologies Inc.

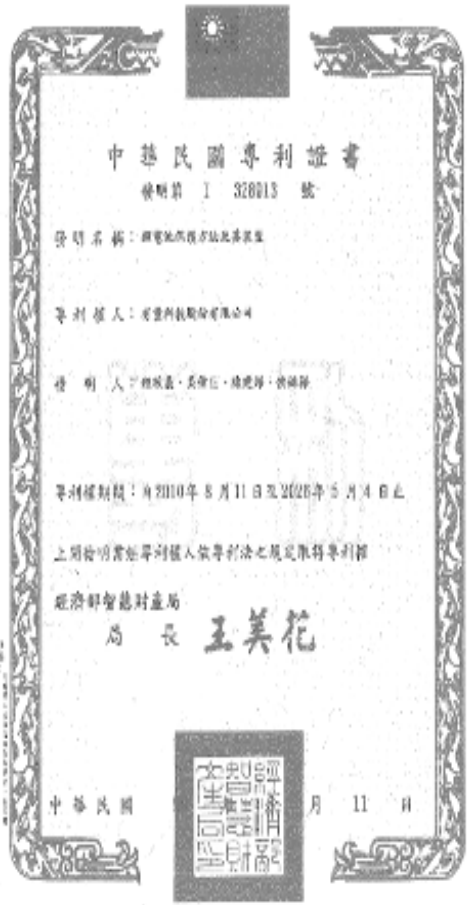
- Amita Technologies Inc. was established in March 2000 by Dr. Jim Cherng on lithium-ion power battery with strong material science research and long test data accumulation.

- Main Businesses
  - High Power Battery for EV, E-Scooter, Power Plant
  - OEM (Original Equipment Manufacturer)
  - PDCA- Post Dry Cell Battery
  - Turnkeys of High Technology Battery Factory for EV
    - ✓ Bejing Phase 1 : 250 MWh – already completed
    - ✓ Bejing Phase 2 : 2 GWh – during construction
- **Current production capacity and capability** : 44Ah power battery cell or over <u>500MWh</u> per year
- **Shareholders structure** : Currently, EA holds 50.69% and in the process of VTO of acquire up to 69.99%
- **Main Clients** : UPS Units, Power Bank, Power Tools, Battery- powered Vehicles, and Energy Storage
  - Europe: EV (Electric Vehicle)
  - Taiwan: E-Scooter
  - Japanese: ESS (Energy Storage Systems)
  - China: Turnkey :



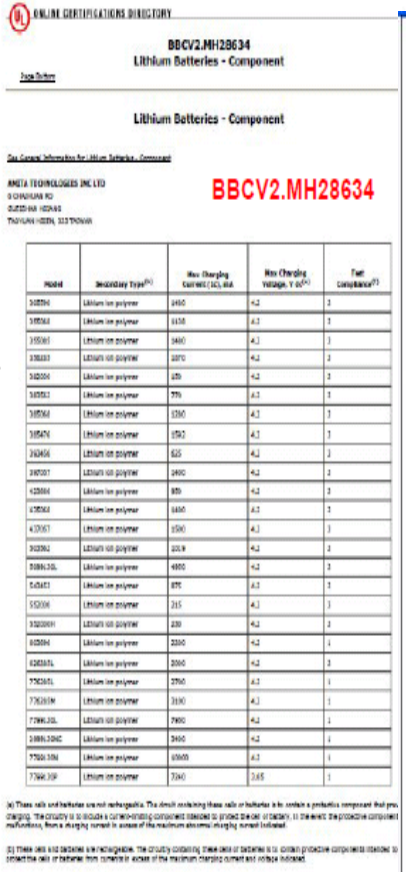
# Patents & Certificates

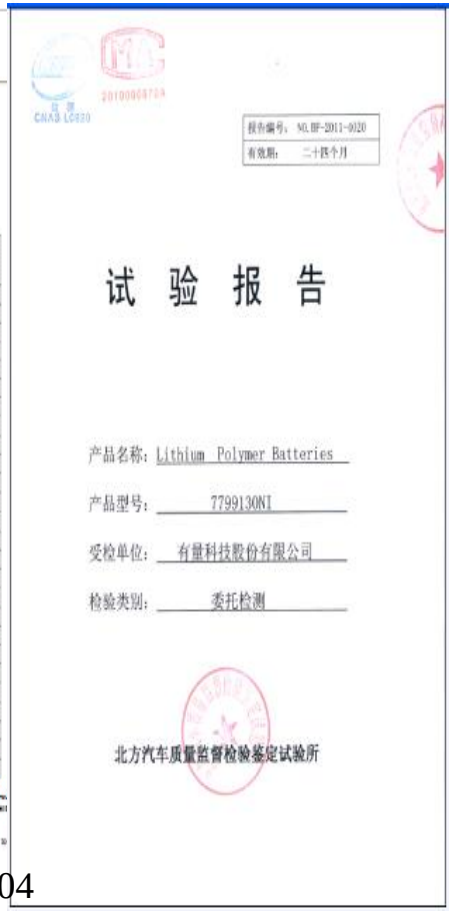

TUV Battery Product Safety Award




23 Cases/Taiwan


28 Cases
CN/US/UK/KR




UL safety certified since 2004
IEC safety certified since 2012

QC-T 743 (China) certified in 2011
EV battery cell safety

# Summary of Lithium-based Batteries

Amita Technologies Inc.

| Chemistry | Lithium Cobalt Oxide (LCO) | Lithium Manganese Oxide (LMO) | Lithium Nickel Cobalt Aluminum Oxide (NCA) | Lithium Iron Phosphate (LFP) | Lithium Nickel Manganese (NMC) | Lithium Titanate (LTO) |
|---|---|---|---|---|---|---|
| Cycle life (ideal) | 500–1000 | 300–700 | 500 | 1,000–2,000 | 1,000–2,000 | 3,000–10,000 |
| History | 1991 (Sony) | 1996 | 1999 | 1996 | 2008 | 2008 |
| Applications | Mobile phones, tablets, laptops, cameras | Power tools, medical devices, powertrains | Medical, industrial, EV (Tesla) | Stationary with high currents and endurance | E-bikes, medical devices, EVs, industrial | UPS, EV, solar street lighting |
| Comments | High energy, limited power. Market share has stabilized. | High power, less capacity; safer than Li-cobalt; often mixed with NMC to improve performance. | Highest capacity with moderate power. Similar to Li-cobalt. | Flat discharge voltage, high power low capacity, very safe; elevated self-discharge. | High capacity and high power. Market share is increasing. Also NCM, CMN, MNC, MCN | Long life, fast charge, wide temperature range and safe. Low capacity, expensive. |

*Source :www.batteryuniversity.com*

# 50 GWh Energy Storage Factory

**2017-2018**

**Phase I :**
**Start developing of 1 GWh worth THB 2 bil.**
**+Infrastructure THB 2 bil.**

**H1/2019**

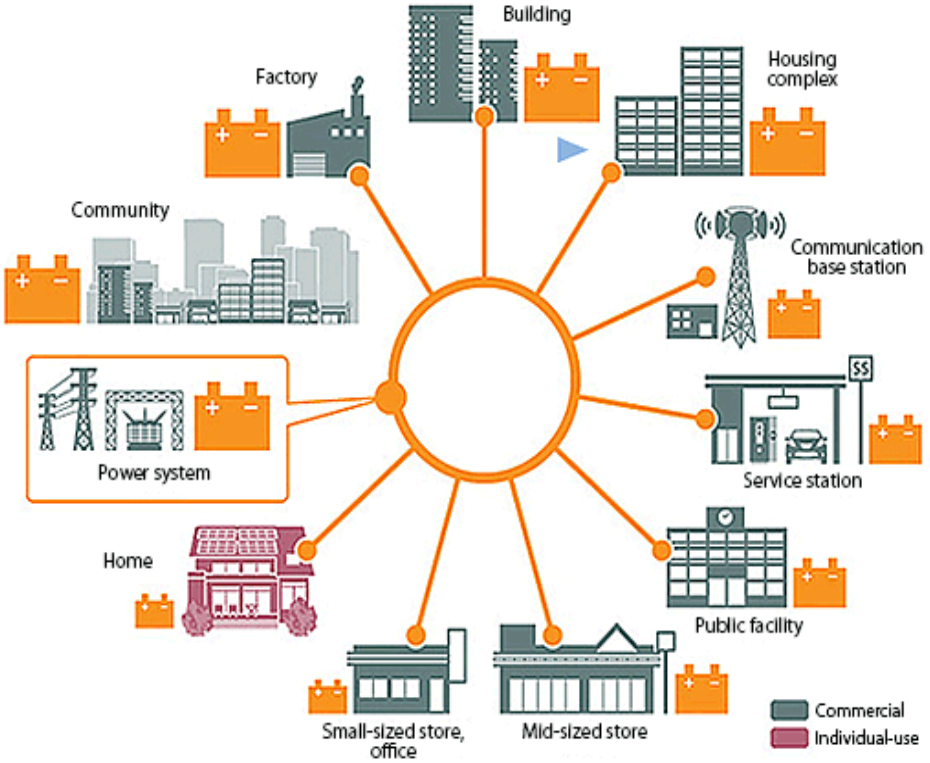
**Phase I :**
**Start commercial operation**

**2021**

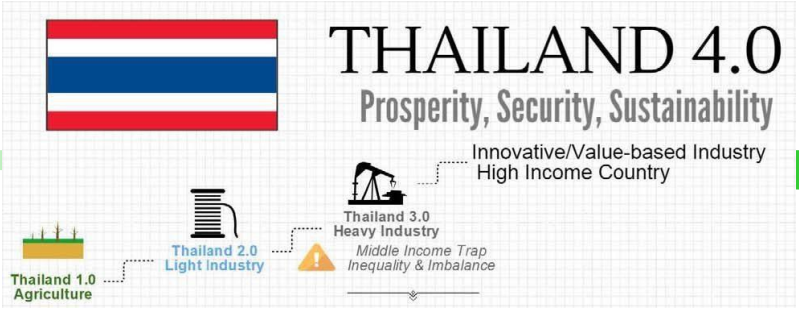
**Phase II :**
**Start commercial operation of 49 GWh worth THB 98 bil.**

**The production in Phase I at 1 GWh will be served to power plant to stabilize production and distribution both domestically and internationally.**

**The production in Phase II to reach to total of 50 GWh will cover to other industries including EV.**

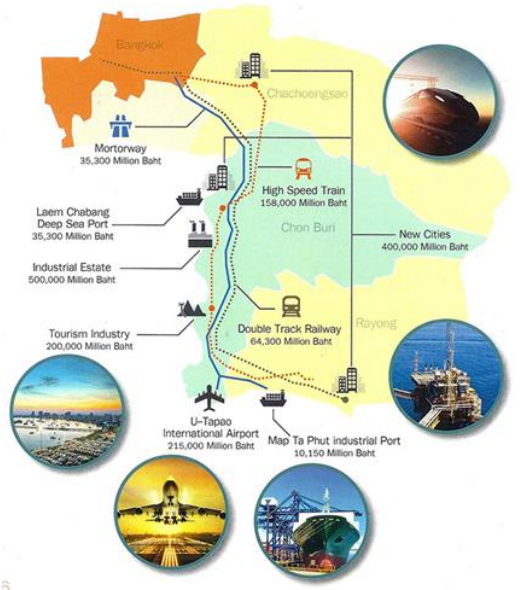


# EA's 50 GWh energy storage factory is strongly supported by the government.




MOU signing between the Federal of Thai Industries (FTI) and Industrial Estate Authority of Thailand (IEAT) to support EA's Energy Storage Factory as the Quick-win Project under Thailand 4.0 model.
The factory is targeted to be located in the EEC

*MOU signing ceremony on 11 Apr 2017*

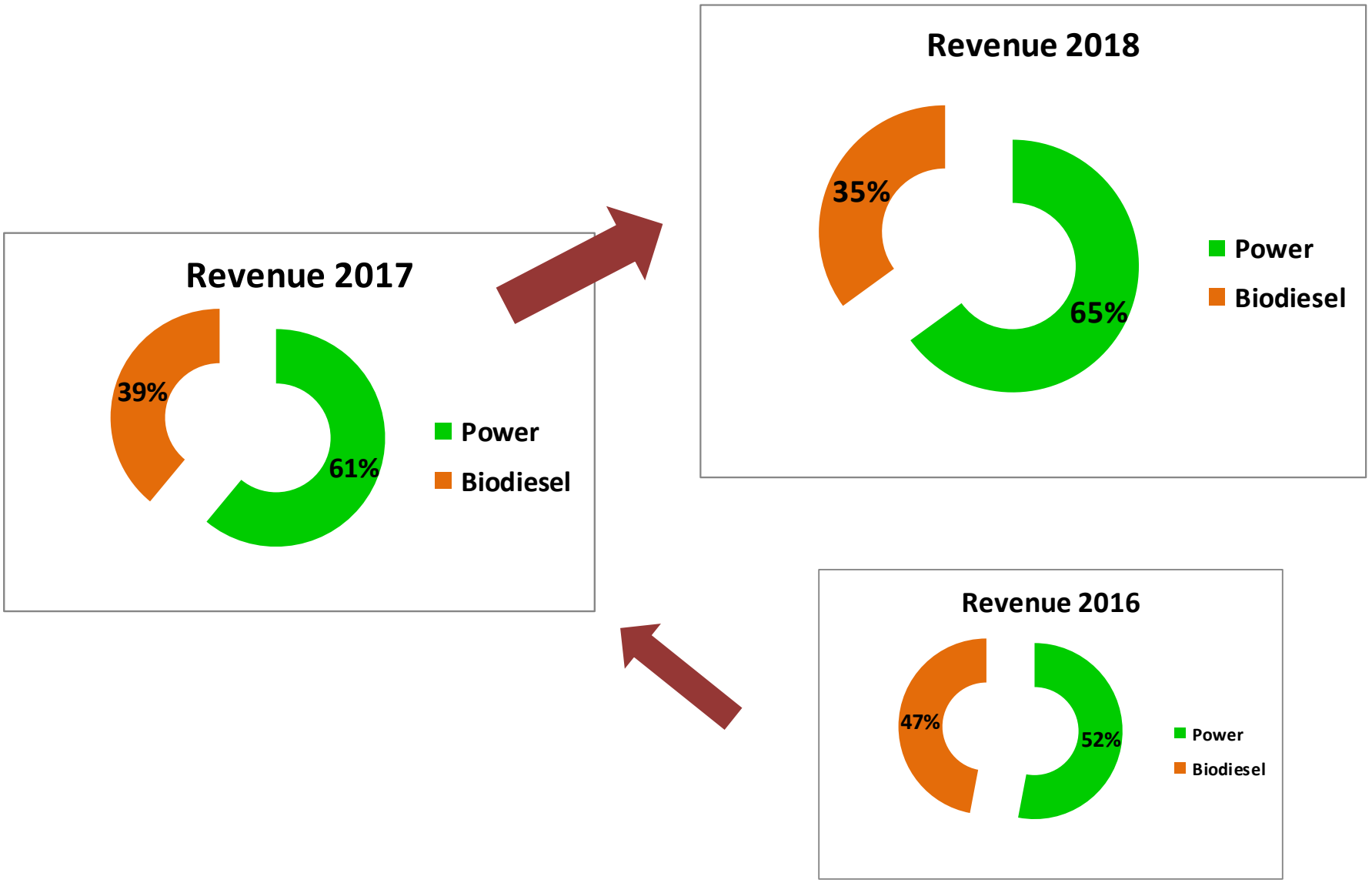



MOU signing between the Industrial Technology Research Institute (ITRI), EA and Amita, Taiwan to co-develop new technology of battery with high safety for EA's new battery factory, the 50 GWh factory

ITRI, a nonprofit R&D organization of Taiwan, has played a vital role in Taiwan's economic growth, strengthen capabilities of multidisciplinary innovation and cooperation with international partners all over the world.

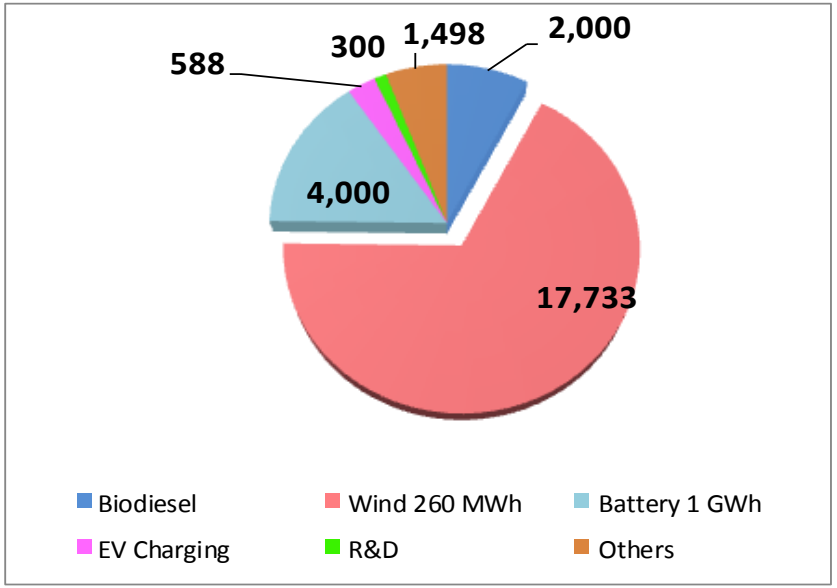
*MOU signing ceremony on 30 May 2017*

# Revenue Structure



# Investment Plan for 2018-2019 = THB 26,100 Mil.

| Investment Plan | THB mil. | |
|---|---|---|
| Biodiesel Business (including Expansion and Green Diesel) | 2,000 | To be completed in 2019 |
| Hanuman Project 260 MWh | 17,700 | To be completed and COD in Q4/2018 |
| Energy Storage Phase I : 1 GWh (including infrastructure) | 4,000 | To be completed in Q2/2019 |
| EV Charging | 600 | Installation of 1000 stations will be completed in 2018 |
| R&D | 300 | Battery / Green Diesel / Other New Businesses |
| Others | 1,500 | (Acquiring AMITA Shares + Other Group Budget) |



# Energy Absolute PCL

## Our Vision

A leader in alternative energy business, by using the modern technology and environmentally friendly for the best benefit of consumers, shareholders, partners and fairness to employees.

# THANK YOU