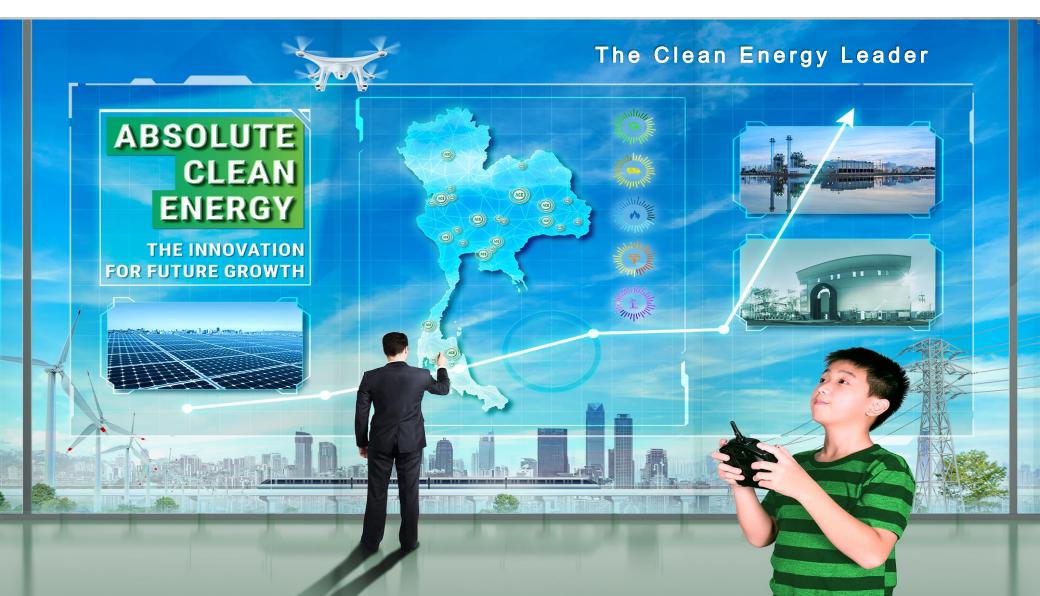


# **Industry Overview and Growth Potential**



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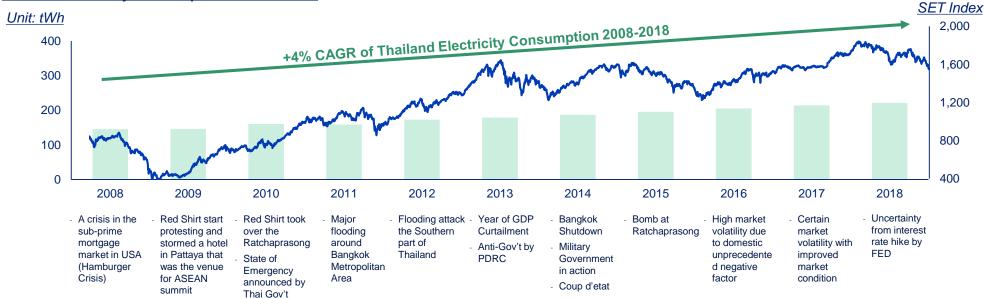
# **Electricity Consumption, Resilience Growth Throughout Country Crisis**



## Electricity consumption is gradually growing amid the country's instability



## **Thailand Electricity Consumption VS SET index**



# **Global and Domestic Trend to Support Renewable Energy**



Paris Agreement: Around 88% of the world have ratified or acceded to the Agreement. Thailand government has ratified the agreement.



World Zero Carbon: Government around the world is collaborating to aim for net zero carbon by 2050.

Sample
Approach from
Countries and
States:



Target Date: 2030 Status: In law

France



Target Date: 2050 Status: In law

#### California



Target Date: 2045 Status: Executive Order

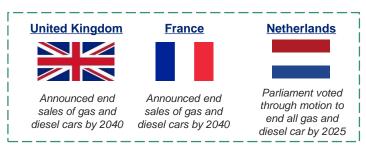
#### **United Kingdom**



Target Date: 2050 Status: In law

### **EV Revolution:**

EV trend is coming with 1) Fossil fuel vehicle bans 2) Renowned automakers are making promises on EV











Plans to sell only 100% EV or hybrid/electric onward



# **Electricity Consumption Growth Rate**



**Growth: 17.90%** (2012-2020)



**Growth: 10.50%** (2019-2030)





**M**yanmar



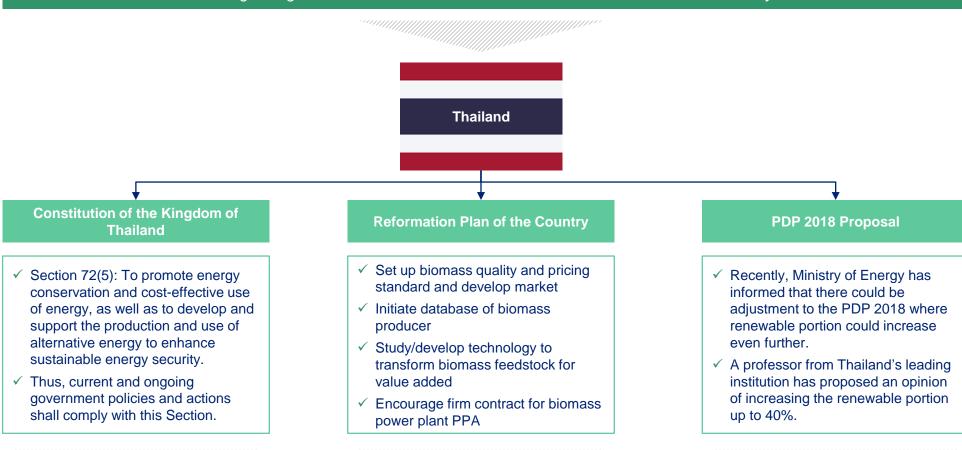
**Growth: 12.00%** (2018-2030)

# International and Domestic Trend to promote and support Renewable Energy



## **Paris Agreement**

Set a global goal to reach zero carbon emissions in the second half of the century



Global and domestic trend are in the same direction to promote and support "Renewable Energy"

# Constitution of the Kingdom of Thailand, 20 years National Strategy, Country Reformation and Government Commitment to Support Renewable Energy



According to Constitution of the Kingdom of Thailand, Section 6 Number 5: Thailand will develop and support the production and usage of renewable energy for the security and sustainability of the future of Thai energy

#### Bio – Circular Green Economy

#### Peer to peer

#### CO2 emission and PM 2.5

#### **Solving MSW crisis**

# Contract farming for fuel crops

Government will develop and support the creation of Bio-Circular Green Economy. Allowing communities and farmers to partake in the creation of power and electricity. Develop a middle platform for buying and selling of electricity (P2P). Decrease CO2 emission

 Solve PM 2.5 problem at the source  Support systematic, hygienic, and proper management of Municipal Solid Waste (MSW).



 Develop contract farming for fuel crops.

- Increase in megawatts from Biomass and Biogas power plants.
- ACE can sell left over capacity directly to user.
- ✓ Biomass power plant is the solution to PM 2.5 problem by buying agricultural waste from farmers and therefore prevents the farmers from burning the waste in their fields.
- ACE is a model and leader in the operation of MSW power plant in Thailand with the ability to process 80% moisture content waste as well as being the only zero discharge MSW power plant in Thailand.
- Official support from governments mean more fuel in the market for ACE.

25

# Total Societal Impact(TSI) and Environmental, Social and Governance (ESG) \(\bigcap \bigcap \b

## **Biomass Powerplant Contribute to the Paris Agreement** Decreasing Greenhouse Gas Emission. To provide base-load to grid instead of conventional energy **Future Potential** Saves government's spending on putting down forest fires and farm fires Saves government's spending on PM 2.5 related health problems such as respiratory Solves PM 2.5 problem at the root complications, masks distributions, water spraying in cities, etc. Prevents economic loss from the decrease in tourism due to PM 2.5 problem Additional income to farmers Stabilize income for farmers under market uncertainty $\rightarrow$ reduce empty subsidies that government **Positive Economic and Societal** have to give out Stabilize electricity price preventing electricity price from increasing in the future **Impact** Distribution of revenue to grassroots: Shift from expensive LNG imports to purchasing fuel from Thai farmers 1.8 Billion THB / year / 9.9 MW biomass power plant GDP Contribution/1 **MSW Powerplant Contribute to the Paris Agreement** decreasing Greenhouse Gas Emission. **Future Potential** To provide base-load to grid instead of conventional energy

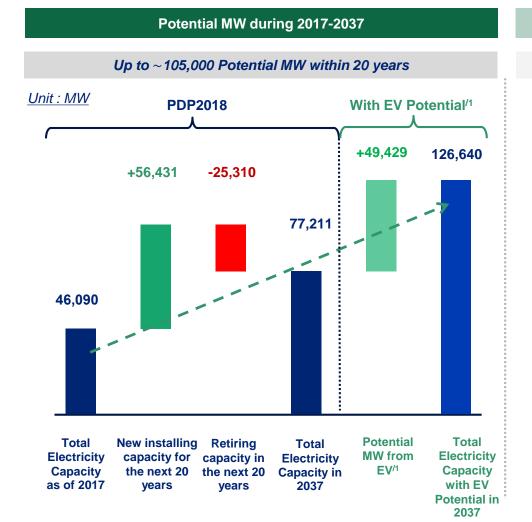
Save healthcare and environmental spending for government from problems caused by MSW in landfills

**Solves MSW mountain problems** 

# Renewable Energy Contribute Largest Portion (37%) of Increased Capacity

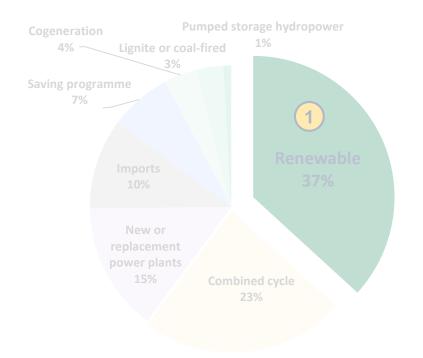


According to the Power Development Plan (PDP) 2018 hearing, Renewable Energy is targeted to contribute the largest portion, or 37%, of the total new increased capacity by 2037.



PDP 2018 New Installing Capacity for the Next 20 Years (MW)

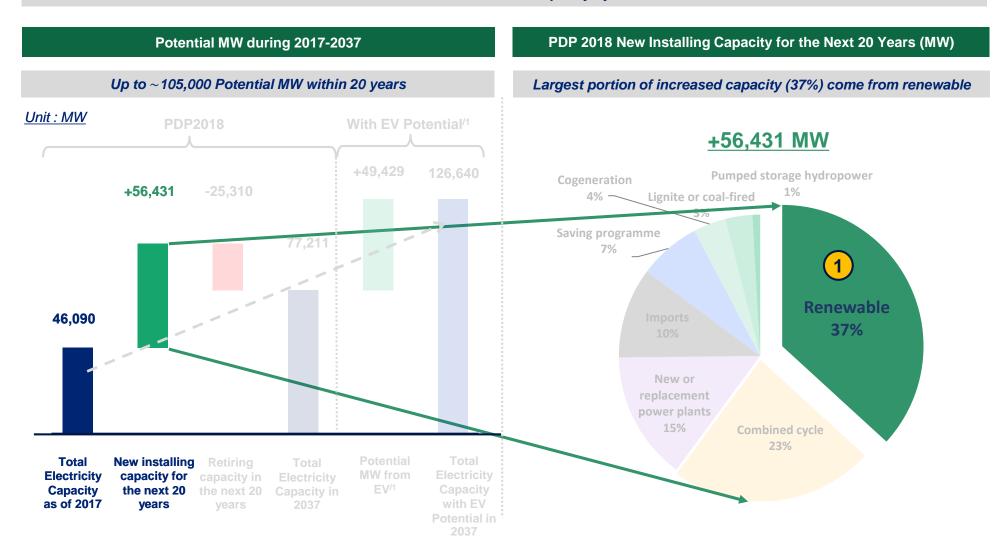
Largest portion of increased capacity (37%) come from renewable



# Renewable Energy Contribute Largest Portion (37%) of Increased Capacity



According to the Power Development Plan (PDP) 2018 hearing, Renewable Energy is targeted to contribute the largest portion, or 37%, of the total new increased capacity by 2037.

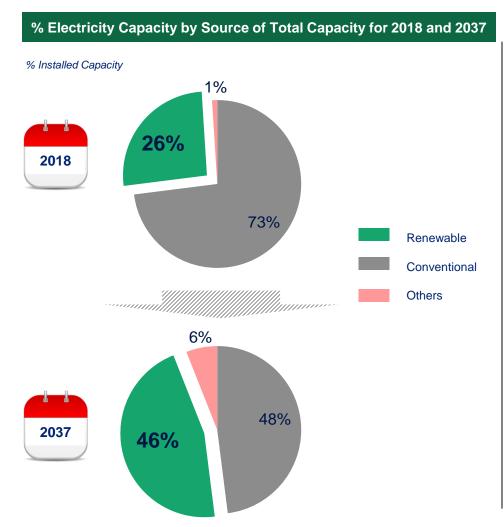


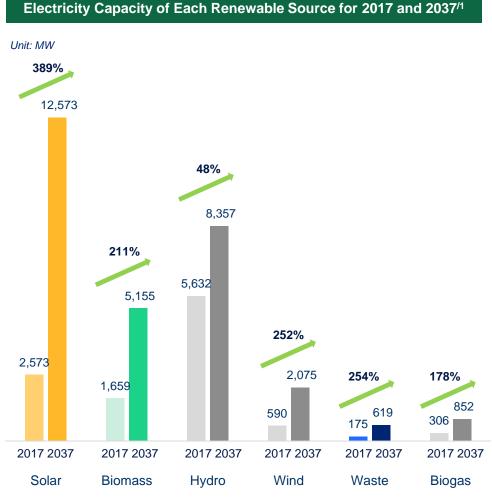
<sup>28</sup> Source: Power Development Plan (PDP) 2018
Remark: /1 Based on crude oil used for in-land transport data in 2018 (EPPO) converted into Barrel of Oil Equivalent(BOE) with 35% cusion

# Renewable Energy will provide 46% of Thailand's Electricity by 2037



## Renewable energy portion will move from 26% in 2018 to 46% in 2037



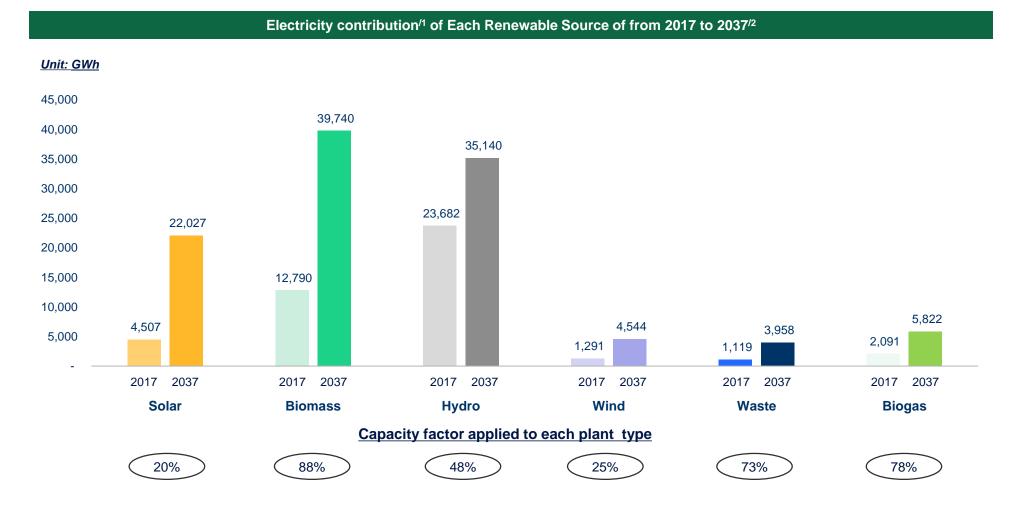


29 Remark: /1 Excluding retiring capacity in the next 20 years Source: Power Development Plan (PDP) 2018

# Biomass: The largest renewable energy contributor in Thailand



Looking at GWh contribution to grid, Biomass is the largest contributor to renewable energy growth in Thailand



Remark: /1 Assume 365 days, 24 hours and specific capacity factor of each plant type for electricity contribution calculation

/2 Excluding retiring capacity in the next 20 years **Source**: Power Development Plan (PDP) 2018

Average capacity factor of each power type from EGAT, EIA

# **ACE's Historical, Current and Future Growth**

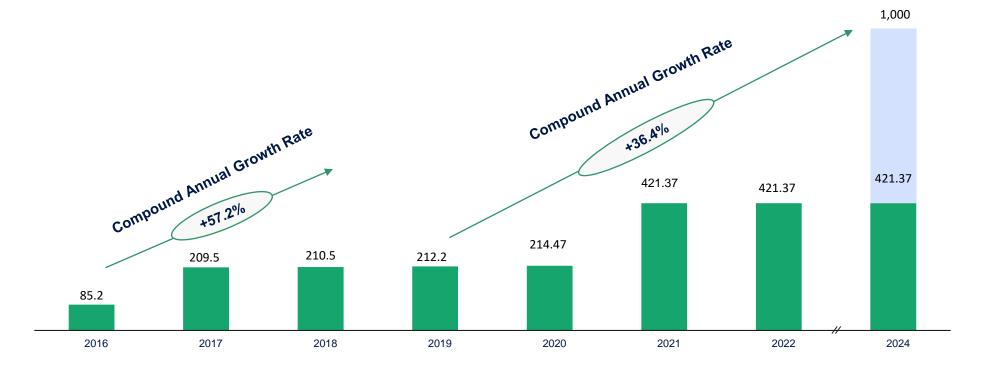


Continuous growth with existing PPA along with future potential growth supported by favorable government renewable energy policy

## Existing and Pipeline of Company's MW/1,/2

Existing, Under-Development and Pending for Development projects

Future Projects to reach company goal

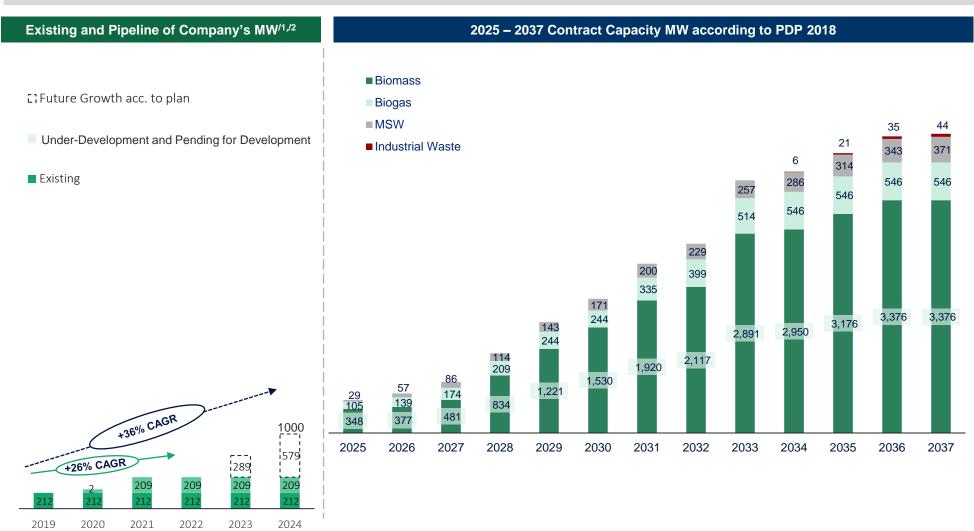


Source: Power Development Plan 2018

## **Future Growth**



Continuous growth with existing PPA along with future potential growth supported by favorable government renewable energy policy



Source: Power Development Plan 2018

Remark: /1 Including APP's capacity MW of 9.9, Currently, APP's shareholders sent LOI for APP share purchase proposal to ACE

# **Proven by Recent Bidding**



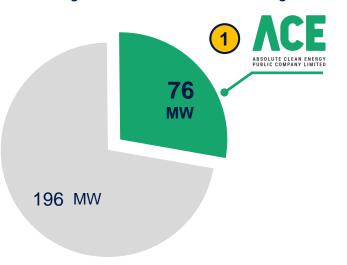
## Won the largest portion of MW in the 2017 SPP Hybrid Bidding (Renewable)

## 2017 Biomass Bidding

Largest bidding winner out of 42 candidates in the 2017 SPP Hybrid Bidding (Renewable)

Unit : MW

ACE got 28% share in Biomass bidding winner





**Total PPA Capacity available for Bidding: 272 MW** 

**Biomass** 2,997 MW **Biogas** 1,128 MW

Potential Upcoming Community Biomass/Biogas PPA/1

**Total Potential Capacity available for Bidding: 4,125 MW** 

Source: ERC, PEA

# ACE's 3 Core Value Represent Competitive Advantage to Secure New PPAs



## **Key Competitive Advantages of ACE to Win The Bidding**

R&D

✓ Potential Fuel Crops from Major Shareholders' plantation business

√ New Biomass Fuel Types

Machinery and Powerplant Design

## 2 Operational Expertise & **Economy of Scale**

- ✓ Proven track record in building and running 13 projects
- √ Continuous operational improvement
- ✓ Economy of scale
- √ Strong feedstock purchasing team

Advanced Technology

R&D Innovation

and continuous

**Operational** 

**Expertise** and

**Economy of** 

Scale

Key Improvement Competitive Advantage to secure 1000 MW++

Sustainability

Strong Relationship with Key Stakeholders

Knowhow

**Advance Technology** 

- Lower plant heat rate = less fuel consumption by up to 30%
- ✓ Artificial Intelligence, IoTs and Big data for cost control and improvement
- Environmental friendly

## **Knowhow**

- Low O&M cost
- Big & strong Professional Teams get ready to handle New Projects.

## Relationship with Key Stakeholder

- Major shareholders' plantation business can support long-term feedstock development plan
- ✓ Strong & long-term relationship with community and farmers
- ✓ Strong relationship with lender

## Sustainability

- Feed stock security
- √ Financial security
- ✓ Community support