Absolute Clean Energy Public Company Limited

Brief Company Information

March 2021

Ticker: ACE (SET100)

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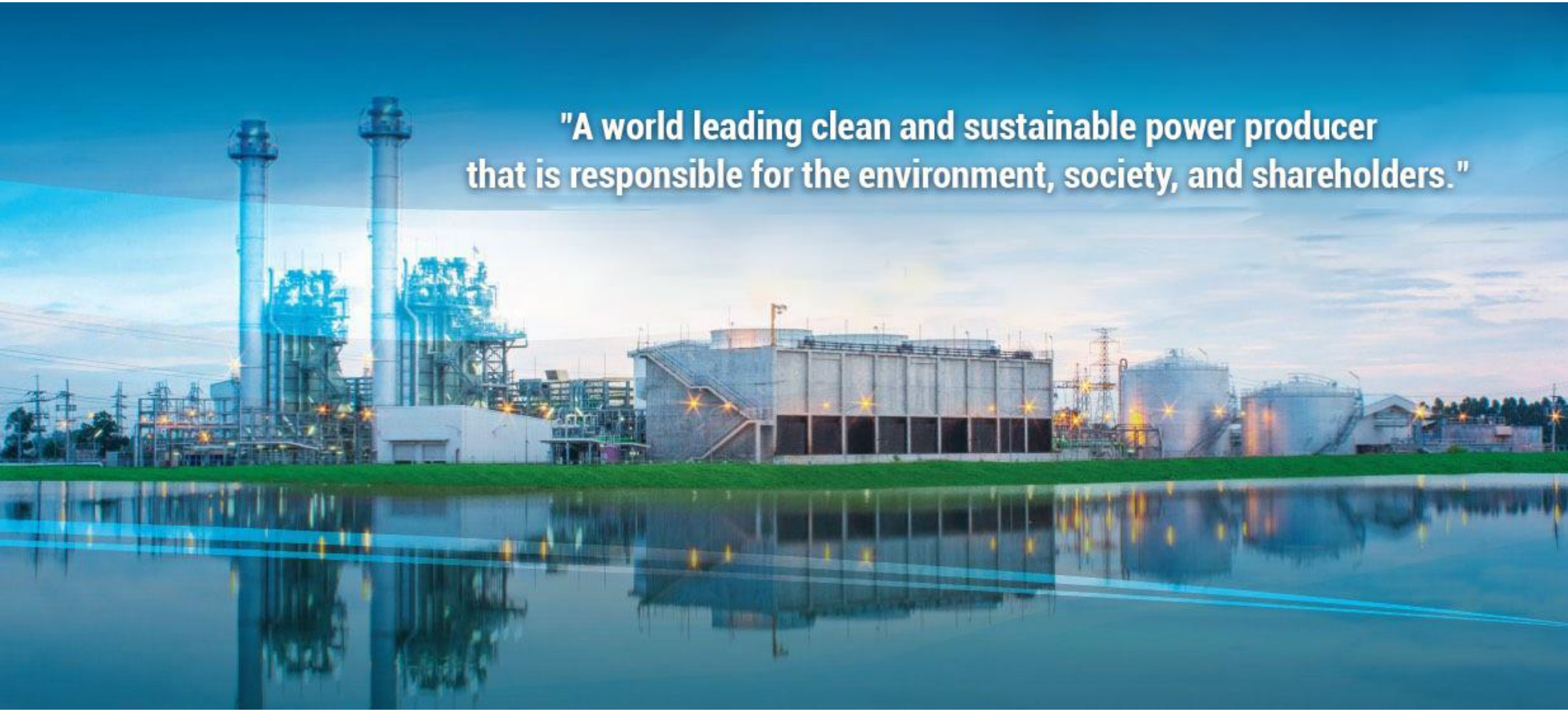
ABSOLUTE CLEAN ENERGY
PUBLIC COMPANY LIMITED

Company Overview



ACE
ABSOLUTE CLEAN ENERGY
PUBLIC COMPANY LIMITED

ACE The clean energy leader

Convert Plants and Agri-waste to Energy

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Convert Waste to Energy

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Convert Plants and Agri-waste to Energy

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Convert Waste to Energy

Convert Sunlight to Energy

ACE The clean energy leader

Who is ACE?

ABSOLUTE CLEAN ENERGY
PUBLIC COMPANY LIMITED

40 Years Strong foundation in Integrated Agricultural Industry

“To be the world practical model of Clean energy powerplant, which is responsible for environment, society, and shareholders”

“เป็นโรงไฟฟ้าพลังงานสะอาดต้นแบบของโลกที่มีความรับผิดชอบต่อสิ่งแวดล้อม สังคม และผู้ถือหุ้น”

Thailand’s Current Largest “Professional-Run” Biomass Power Producer

Thailand’s Leading Renewable Power Producer

The Green & Clean Energy Leader

ACE at a Glance

ABSOLUTE CLEAN ENERGY PUBLIC COMPANY LIMITED

Innovative Private Power Producer for Absolute Clean Energy

Strong foundation in Integrated Agricultural Industry

Abundant biomass feedstock supported by communities surrounding the power plants

Ongoing Improvement with Innovative Technology

Innovative Technology and Experienced R&D Team

ACE at a Glance

ACE
ABSOLUTE CLEAN ENERGY PUBLIC COMPANY LIMITED

Innovative Private Power Producer for Absolute Clean Energy

35+1 Power Plants/1
(19 in Operations)
439.67+9.9 MW/1

Biomass (12+14+1)/1
317.9 MW/1

Solar (5+1)
5.32 MW

MSW (2)
12.0 MW

Co-generation (1)
114.35 MW

Expected Installed Capacity
1 GW (Gross)
+36% MW CAGR/2

Remark: /1 Including APP's capacity MW of 9.9, Currently, APP's shareholders sent LOI for APP share purchase proposal to ACE
/2 Compound Annual Growth Rate in term of MW from 2019-2024

ACE's Biomass power plant (16 power plants, 317.9 MW)/1,/2

ACP1 Ban Bueng

ALCP1 Si Chiang Mai

AAPP2 Chokchai

ACP2 Phonthong

ALCP2 Sirindhorn

AAP1 Nam Phong

Remark: /1 Including APP's capacity MW of 9.9, Currently, APP's shareholders sent LOI for APP share purchase proposal to ACE
/2 Capacity MW
/3 Including UA Wittaya plc biomass power plants of 26.9 MW

- *COD 12 power plants = 116 MW*
- *Under development 4 power plants = 201.9 MW*

ACE's Biomass power plant (16 power plants, 317.9 MW)/1,/2

ACP3 Bo Ploy

AAPP1 Tanee

ABA1 Thoen

AAE Muang Korat

ABE Don Mon

SBM Muang Buriram

Remark: /1 Including APP's capacity MW of 9.9, Currently, APP's shareholders sent LOI for APP share purchase proposal to ACE
/2 Capacity MW
/3 Including UA Wittaya plc biomass power plants of 26.9 MW

- *COD 12 power plants = 116 MW*
- *Under development 4 power plants = 201.9 MW*

ACE's MSW power plant (2 power plants, 12 MW)/1

MSW Khon Kaen

MSW Krabi

Remark: /1 Capacity MW

ACE's Co-generation power plant (1 power plant, 114.35 MW)/1

AAA Chachoengsao

Remark: /1 Capacity MW

ACE's Solar power plant (6 power plants, 5.32 MW)/1

FLOATING SOLAR 1 Project
Chok Chai, Nakhon Ratchasima

SOLAR ROOFTOP 1 Project
Sri racha, Chonburi

SOLAR ROOFTOP 1 Project
(Extension), Sri racha, Chonburi

SOLAR ROOFTOP 2 Project
Chok Chai, Nakhon Ratchasima

SOLAR ROOFTOP 3 Project
Mueng, Samut Sakhon

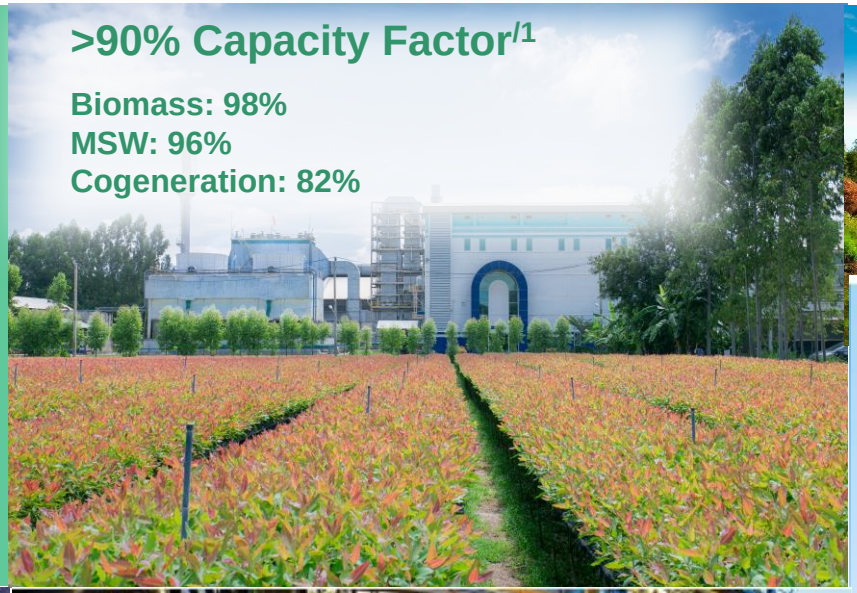
Remark: /1 Capacity MW

- *COD 3 power plants = 3.56 MW*
- *Under development 2 power plants = 1.76 MW*

ACE at a Glance

ABSOLUTE CLEAN ENERGY PUBLIC COMPANY LIMITED

Innovative Private Power Producer for Absolute Clean Energy



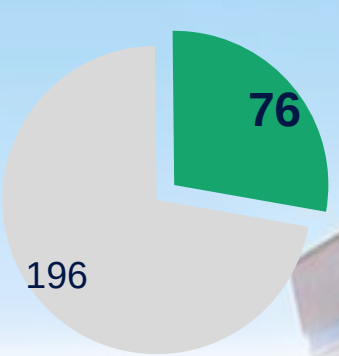
>90% Capacity Factor/1

Biomass: 98%
MSW: 96%
Cogeneration: 82%

Feedstock Burn Capability

ACE: Up to 65% moisture content/2 of mixed fuel
Others: Up to 40%

Unit : MW



ABSOLUTE CLEAN ENERGY PUBLIC COMPANY LIMITED

Largest Portion Bidding Winner in the SPP Hybrid Firm Bidding

Source: ERC, company website/annual report
Remark: /1 Average capacity of all power plant type of ACE
/2 Feedstock burn capacity for biomass power plant

Strictly Private & Confidential

ACE's Key Development Milestones

"To be the world practical model of Clean energy powerplant, which is responsible for environment, society, and shareholders"

1979[/1] (40 years ago): Shaiyo Triple A Group
Board of directors have experienced to lead rice, corns, cassavas and woodchips producer and exporter, has expertise in agriculture industry and R&D in the fast growing tree and intrigued in exploring the energy sector.

2012:
First COD of VSPP "ACP1" Biomass Power Plant

2015:
Established Absolute Clean Energy (ACE) as a Holding Company with initial paid-up capital of THB 0.5 mm.

2016:
First COD of VSPP "ALCP" MSW Power Plant

2017:
First COD of SPP "AAA" Cogeneration Power Plant

2017:
Won and secured 4 SPP Hybrid Bidding of total 93 capacity MW

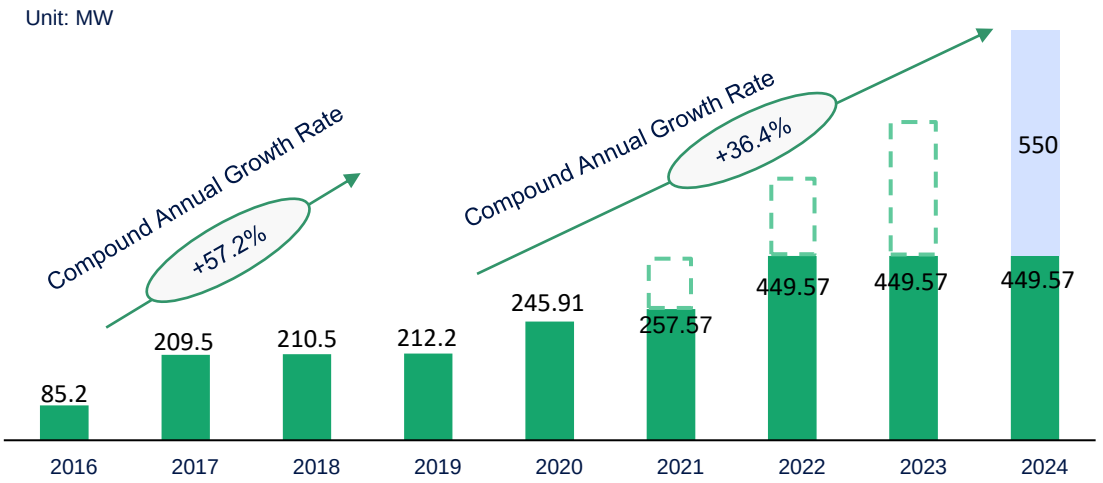
2018:
First COD of VSPP Solar Rooftop

2019:
Listed in Stock Exchange of Thailand

2022:
Estimated to COD all projects[/2](449.57 MW)[/3]

2024:
Expected to secure an installed capacity of 1,000 PPA MW and becomes Thailand's largest biomass power producer

ACE's Total Capacity MW[/3] over time



Remark : /1 http://www.saaa.co.th/SAA_ENG/home.php
/2 Estimated timeline: Currently, Arbitration result states that PEA has to return PPA to ACE and with the assumption that normally power project's construction period is approx. 2 years
/3 Including APP's capacity MW of 9.9, Currently, APP's shareholders sent LOI for APP share purchase proposal to ACE

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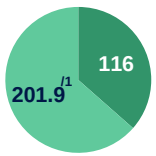
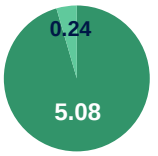
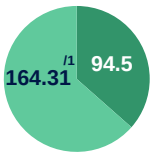
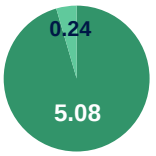
Overview of ACE's Portfolio

ACE Business Portfolio in Thailand

Power Type	Power Plant				Others
	Biomass	Co-generation	MSW	Solar	Waste Landfill
ACE's Holding Stake in Projects	100.0%	100.0%	100.0%	100.0%	100.0%
Existing + Pipeline Projects	12+14+1[/1]	1+0	2+0	4+1	1+0
Capacity MW (Total Capacity MW)	 Total: 317.9[/1]	Total: 114.35	Total: 12.0	 Total: 5.32	
PPA MW to Government & IU (Total PPA MW)	 Total: 258.81[/1]	Total: 90	Total: 8.9	 Total: 5.32[/2]	

ACE
ABSOLUTE CLEAN ENERGY PUBLIC COMPANY LIMITED

100.0%

COD:	21
Pipeline:	16[/1]
Total:	**37**[/1]

COD:	247.43
Pipeline:	202.14
Total:	**449.57**

COD:	198.48
Pipeline:	164.55
Total:	**363.03**

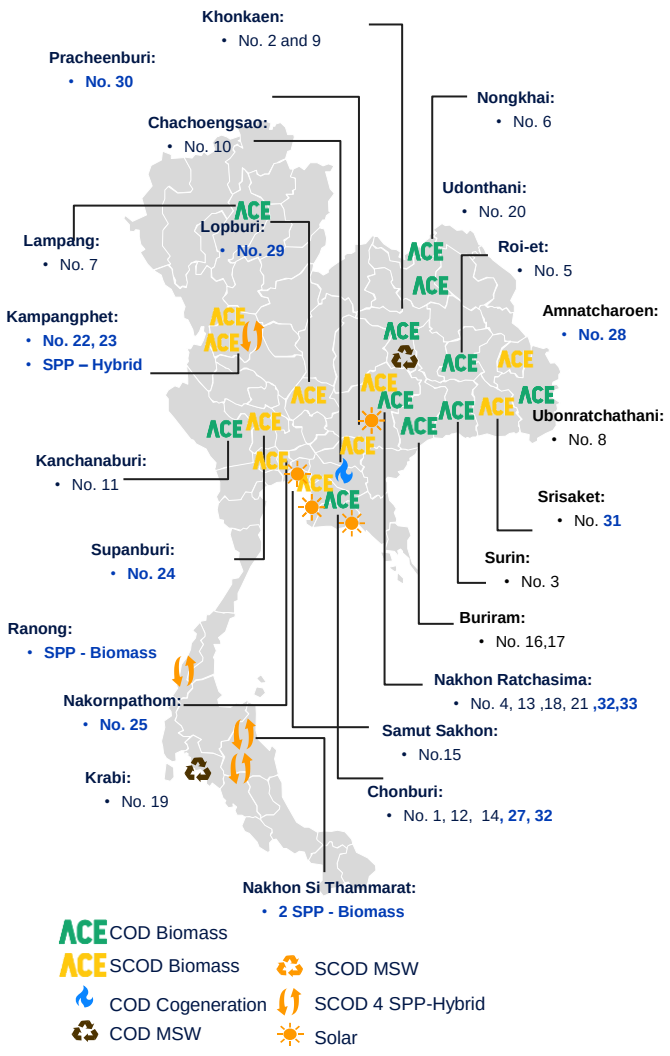
Existing Under Development + Pending for Development

Remark: /1 Including APP's capacity MW of 9.9. Currently, APP's shareholders sent LOI for APP share purchase proposal to ACE
/2 Electricity Sale Agreement (ESA) with IU

Well-Balanced Portfolio with Diversified Locations

Assets Overview

- *Operating projects*
- ***Under development projects and Pending for development projects***



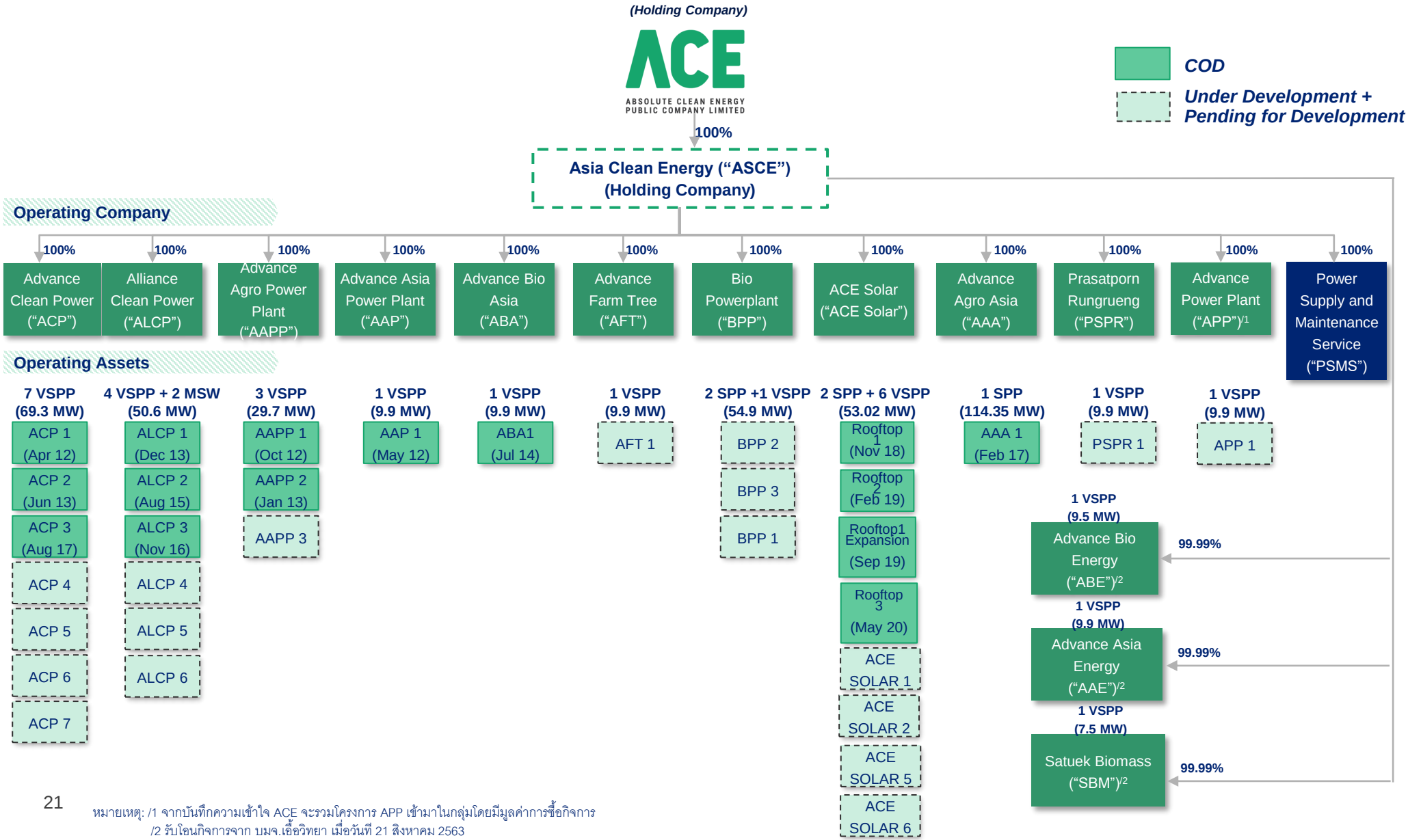
		Type	Installed / Equity MW	PPA MW	Location	COD / SCOD Date	Status
1 Existing Projects (21 Projects)	1	VSPP - Biomass	9.9	8	Chonburi	4/24/2012	COD
	2	VSPP - Biomass	9.9	8	Khonkaen	5/2/2012	
	3	VSPP – Biomass	9.9	8	Surin	10/30/2012	
	4	VSPP – Biomass	9.9	8	Nakhon Ratchasima	1/16/2013	
	5	VSPP – Biomass	9.9	8	Roi-et	6/4/2013	
	6	VSPP – Biomass	9.9	8	Nongkhai	12/26/2013	
	7	VSPP – Biomass	9.9	8	Lampang	7/9/2014	
	8	VSPP – Biomass	9.9	8	Ubonratchathani	8/14/2015	
	9	VSPP – MSW	6	4.5	Khonkaen	11/29/2016	
	10	SPP - Cogen	114.35	90	Chachoengsao	2/10/2017	
	11	VSPP – Biomass	9.9	8	Kanchanaburi	8/16/2017	
	12	VSPP – Solar Rooftop	1	1	Chonburi	11/20/2018	
	13	VSPP – Solar Rooftop	0.73	0.73	Nakhon Ratchasima	2/22/2019	
	14	1 Solar Rooftop	1	1	Chonburi	9/27/2019	
	15	1 Solar Rooftop	0.83	0.83	Samut Sakhon	1/5/2020	
	16	VSPP-Biomass	7.5	6.5	Buriram (SBM)	24/1/2006	
	17	VSPP-Biomass	9.5	8	Buriram (ABE)	6/2/2008	
	18	VSPP-Biomass	9.9	8	Nakhon Ratchasima (AAE)	11/10/2011	
	19	VSPP – MSW	6	4.4	Krabi	28/12/2020	COD
	20	Waste Landfill	N/A	N/A	Udonthani	5/1/2021	
	21	Floating Solar	1.515	1.515	Nakhon Ratchasima	31/3/21	
2 Under Development and pending for development (16 projects)		3 SPP – Hybrids 1 SPP – Hybrid	93	76.31		Within 2022	EIA process PPA signed 3
	22	VSPP – Biomass	9.9	8	Kampangphet	Within 2021	Under Construction
	23	VSPP – Biomass	9.9	8	Kampangphet	Within 2022	Under negotiation SCOD/2
	24	VSPP – Biomass	9.9	8	Supanburi	Within 2022	
	25	VSPP - Biomass	9.9	8	Nakornpathom	Within 2022	
	26	VSPP - Biomass	9.9	8	Nakhon Ratchasima	Within 2022	
	27	VSPP - Biomass	9.9	8	Chonburi	Within 2022	
	28	VSPP - Biomass	9.9	8	Amnatcharoen	Within 2022	
	29	VSPP - Biomass	9.9	8	Lopburi	Within 2022	
	30	VSPP - Biomass	9.9	8	Pracheenburi	Within 2022	
	31	VSPP – Biomass	9.9	8	Srisaket	Within 2022	Under consideration of Administrative Court
	32	VSPP – Biomass/1	9.9	8	Chonburi	Within 2022	Under negotiation SCOD/2
	33	1 Solar Rooftop	0.24	0.24	Nakhon Ratchasima	Q1 2021	Under Construction
Total Projects/MW	37		**449.57**	**363.03**			

Source: Company information as of Dec. 2020

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

/2 Estimated timeline: Currently, Arbitration result states that PEA has to return PPA to ACE and with the assumption that normally power project's construction period is approx. 2 years

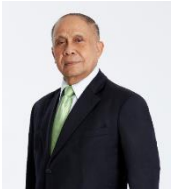
ACE's Group Structure



หมายเหตุ: /1 จากบันทึกความเข้าใจ ACE จะรวมโครงการ APP เข้ามาในกลุ่มโดยมีมูลค่าการซื้อกิจการ
/2 รับโอนกิจการจาก บมจ.เอื้อวิทยา เมื่อวันที่ 21 สิงหาคม 2563

ACE's Board of Directors

PRANAI SUWANRATH,
Independent Director
Chairman of the Board of Directors
- *Current: The Thai Red Cross- Director*
- *Ex-Chairman of the BOD, MEA*
- *Ex-Permanent secretary of the Ministry of Interior*



CHAROON INTACHAN,
Independent Director
- *Current: Office of the Council of State- Council Committee*
- *Ex-President of the Constitutional Court*
- *Ex-Secretariat of the House of Representatives- Constitution Drafting Committee*
- *Ex-Justice of The Supreme Court*
- *Ex-Justice of The Supreme Administration Court*

CHONTICHA CHITRARPORN,
Independent Director
Chairman of Audit Committee
- *Current: Advance Life Assurance- Independent Director / Chairman of the Risk Management Committee*
- *Current: Dhanarak Asset Development – Risk Management Committee*

PATCHANEE SUTHEEVITANUNT,
Independent Director
Audit Committee, Chairman of Nomination & Remuneration Committee
- *Current: Advance Life Assurance – Audit Committee*
- *Experience: Government Pension Fund- Assistant Secretary General*

NUEKRAK BAINGERN,
Independent Director
Audit Committee, Nomination & Remuneration Committee
- *Current: Advance Life Assurance- Chairman of the Audit Committee*
- *Experience: CIMBT- Executive Vice President- Operation*

JIRATHA SONGMETTA,
Director
Chairman of Executive Committee, Nomination & Remuneration Committee
- *Experience:* Double A (1991) – *Director*
- *Experience:* Thai Power Supply - *Director*
- *Experience:* 304 Industrial Park - *Director*

TANAVIJIT ANKAPIPATCHAI,
Director
CFO, Management Committee
- *Current: Inter Care & Service- Director*
- *Experience: Shaiyo AA- Executive Director*
- *Experience: Advance Agro Asia- Co-CEO*

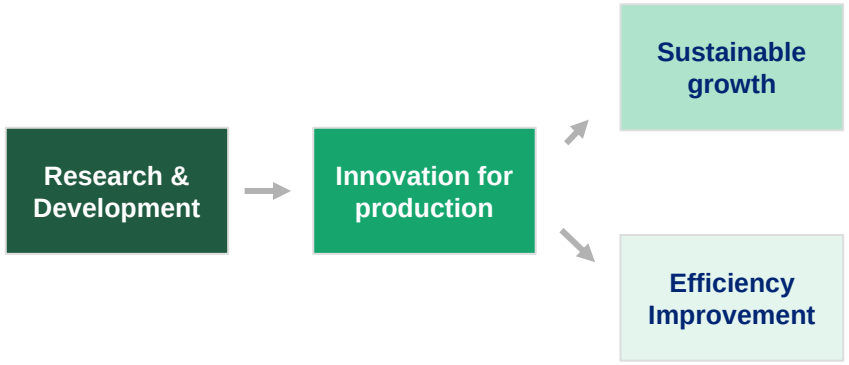
TEERAWUT SONGMETTA,
Executive Director
Chief Technology & Innovation Officer
- *Current: Songmetta Corporation- Director*
- *Experience: Advance Agro Asia- Director*

PORNMETT SONGMETTA,
Executive Director
Chief Operation Officer
- *Current: Songmetta Corporation-Director*
- *Experience:* Asia Clean Industrial Park – *Director*

TANACHAI BUNDITVORAPOOM,
Director
CEO, Management Committee
- *Current: Synergetic Auto Performance- Director/the Nomination and Remuneration Committee*
- *Experience: TISCO Securities- First Senior Vice President- Head of Investment Banking*

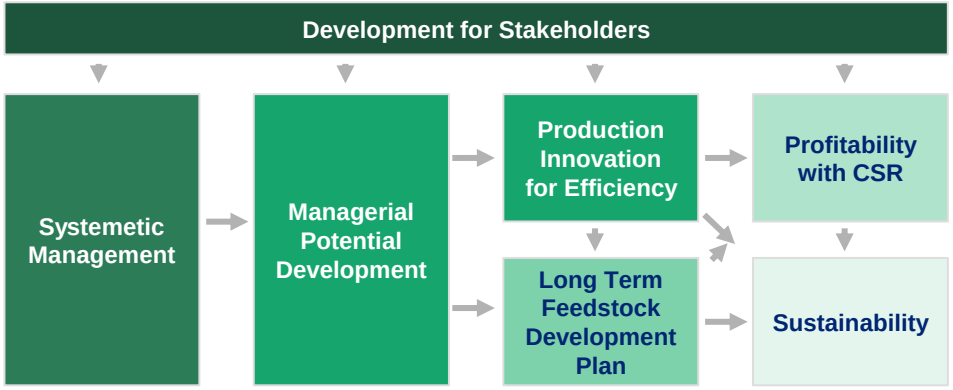
ACE's Strategy, Core Value & Competency

ACE's Core Competency

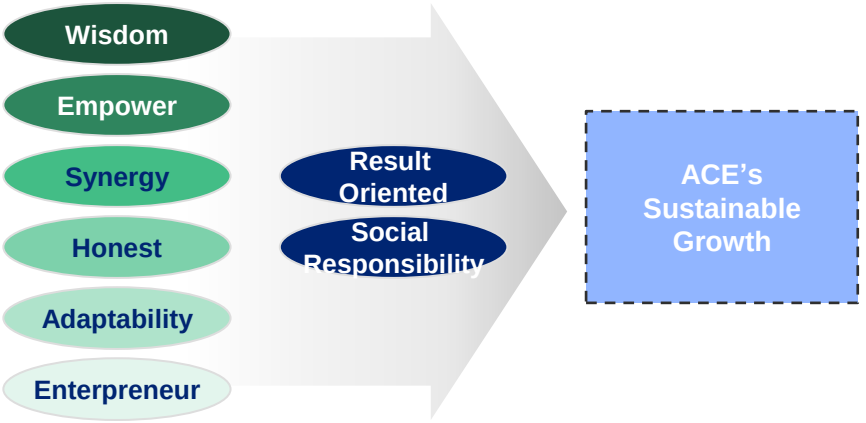


ACE's Core Value Operation

ACE's Strategy



ACE's Corporate Culture



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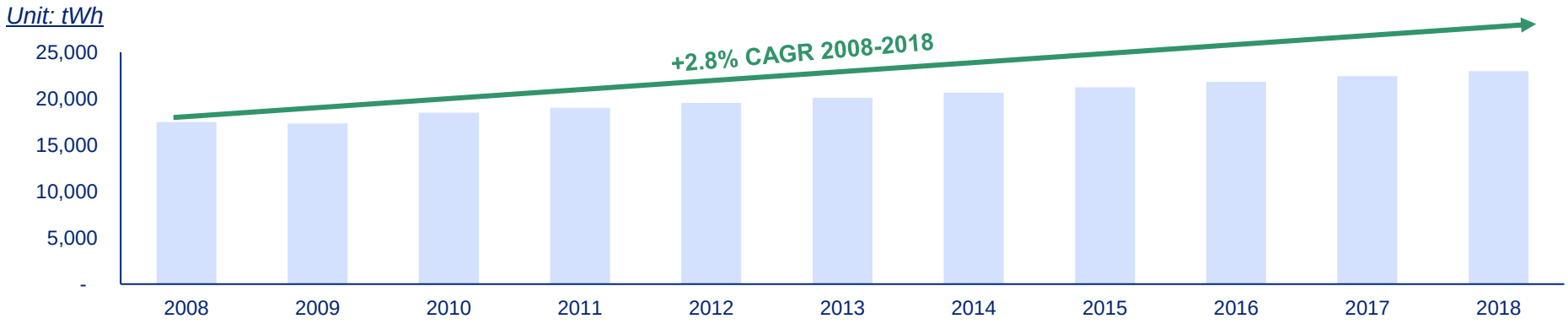
Industry Overview and Growth Potential

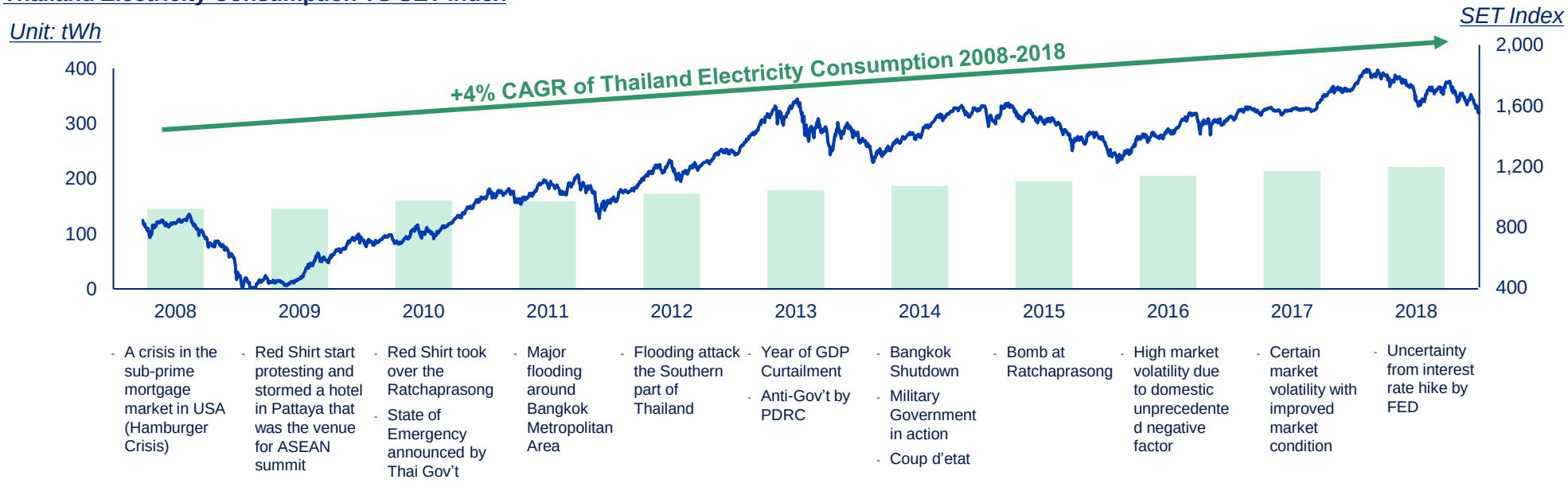
Electricity Consumption, Resilience Growth Throughout Country Crisis

Electricity consumption is gradually growing amid the country's instability

World Electricity Consumption



Thailand Electricity Consumption VS SET index



 Source : Global Energy Statistical 2018

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:

Norway

***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***

United Kingdom

Announced end sales of gas and diesel cars by 2040

France

Announced end sales of gas and diesel cars by 2040

Netherlands

Parliament voted through motion to end all gas and diesel car by 2025

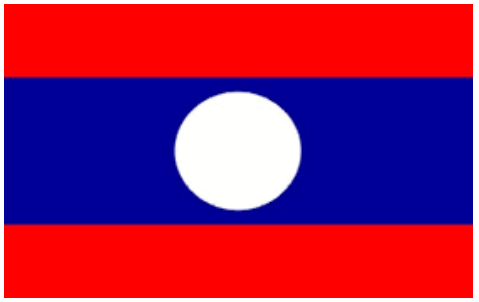
Plans to sell only 100% EV or hybrid/electric onward

Source : Paris Agreement, Climate change, Vox
UNFCC

Electricity Consumption Growth Rate

Growth: 17.90%
(2012-2020)

Cambodia



Growth: 10.50%
(2019-2030)

Laos

Growth: 19.80%
(2010-2035)

Myanmar

Growth: 12.00%
(2018-2030)

Vietnam

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

Constitution of the Kingdom of Thailand

- ✓ Section 72(5): To promote energy conservation and cost-effective use of energy, as well as to develop and support the production and use of alternative energy to enhance sustainable energy security.
- ✓ Thus, current and ongoing government policies and actions shall comply with this Section.

Reformation Plan of the Country

- ✓ Set up biomass quality and pricing standard and develop market
- ✓ Initiate database of biomass producer
- ✓ Study/develop technology to transform biomass feedstock for value added
- ✓ Encourage firm contract for biomass power plant PPA

PDP 2018 Proposal

- ✓ Recently, Ministry of Energy has informed that there could be adjustment to the PDP 2018 where renewable portion could increase even further.
- ✓ A professor from Thailand's leading institution has proposed an opinion of increasing the renewable portion up to 40%.

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
	1	2	3	4	5
	• 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 and support the growth of fuel crops in Thai agriculture. • 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 developer and operator of the zero discharge MSW power plants in Thailand.	✓ Official support from governments mean more fuel in the market for ACE.

Source : Constitution of the Kingdom of Thailand

Total Societal Impact(TSI) and Environmental, Social and Governance (ESG)

Biomass Power plant

Contribute to the Paris Agreement	Decreasing greenhouse gas emission.
Future Potential	To provide base-load to grid in place of conventional energy
Solves PM 2.5 problem at the root	• 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 complications, masks distributions and water spraying in cities, to from PM 2.5 particle. • Prevents economic loss from the decrease in tourism due to PM 2.5 problems.
Positive Economic and Societal Impact	• Additional income to farmers • Stabilize income for farmers under market uncertainty → reduce empty subsidies that the government has to give out • Distribution of revenue to grassroots : Shift from LNG imports to purchasing fuel from individual Thai farmers
GDP Contribution[/1]	1.8 Billion THB / year / 9.9 MW biomass power plant

Municipal Solid Waste (MSW) Power plant

Contribute to the Paris Agreement	Decreasing greenhouse gas emission.
Future Potential	To provide base-load to grid instead of conventional energy
Solves MSW mountain problems	Save healthcare and environmental spending for the government from problems caused by MSW in landfills

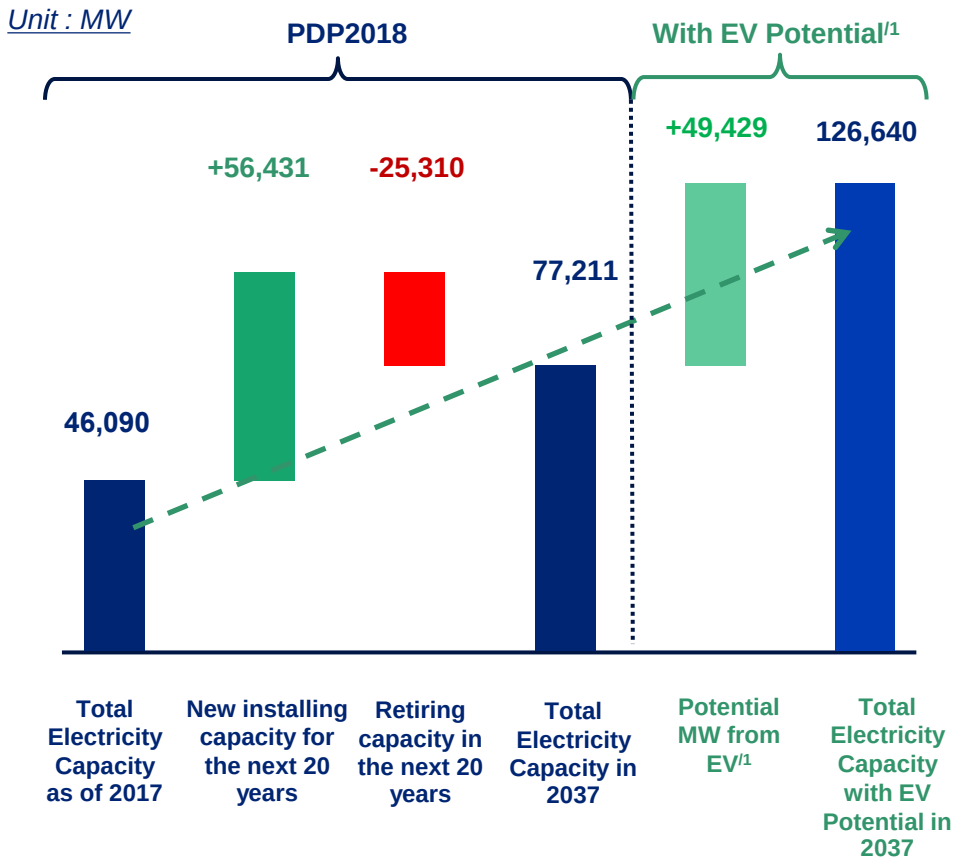
 Source: Thailand Energy Academy

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.

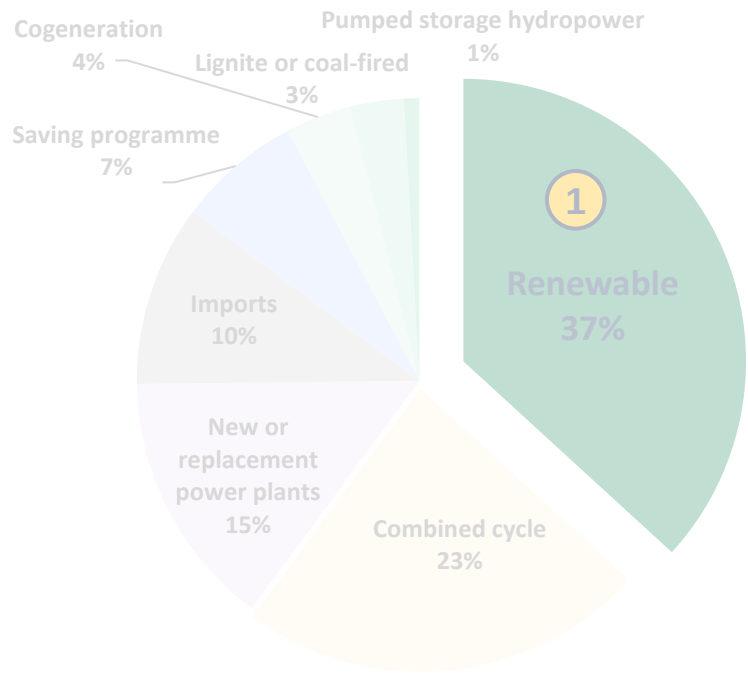
Potential MW during 2017-2037

Up to ~105,000 Potential MW within 20 years



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

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



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

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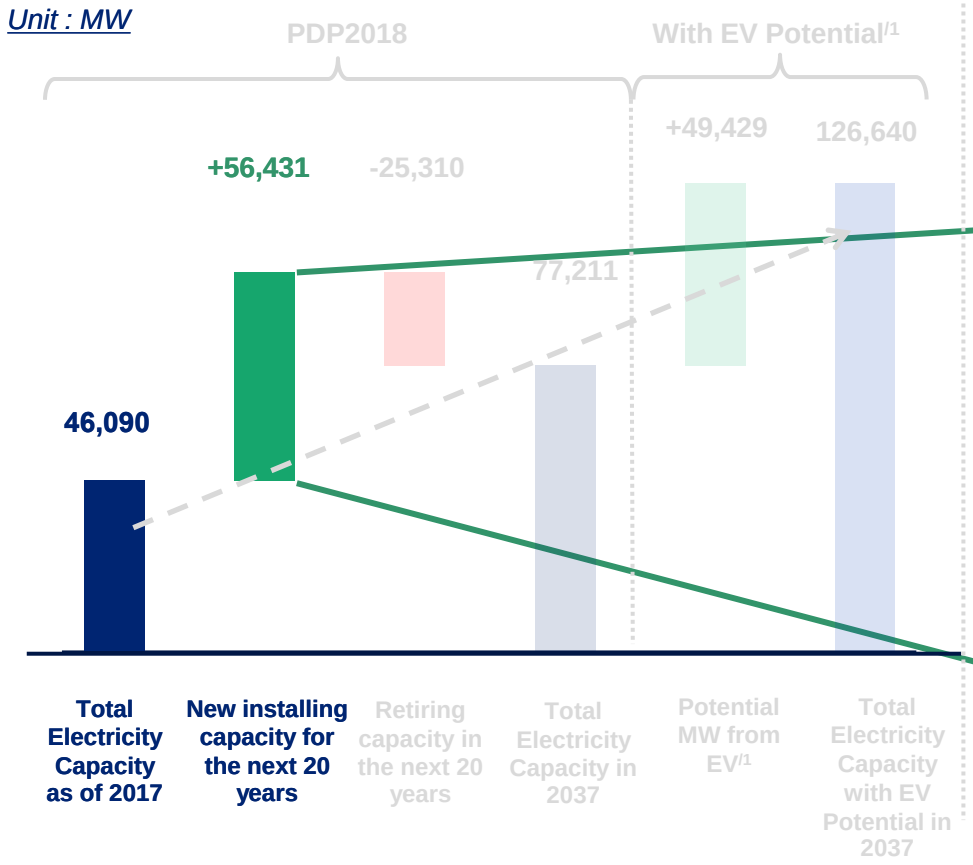

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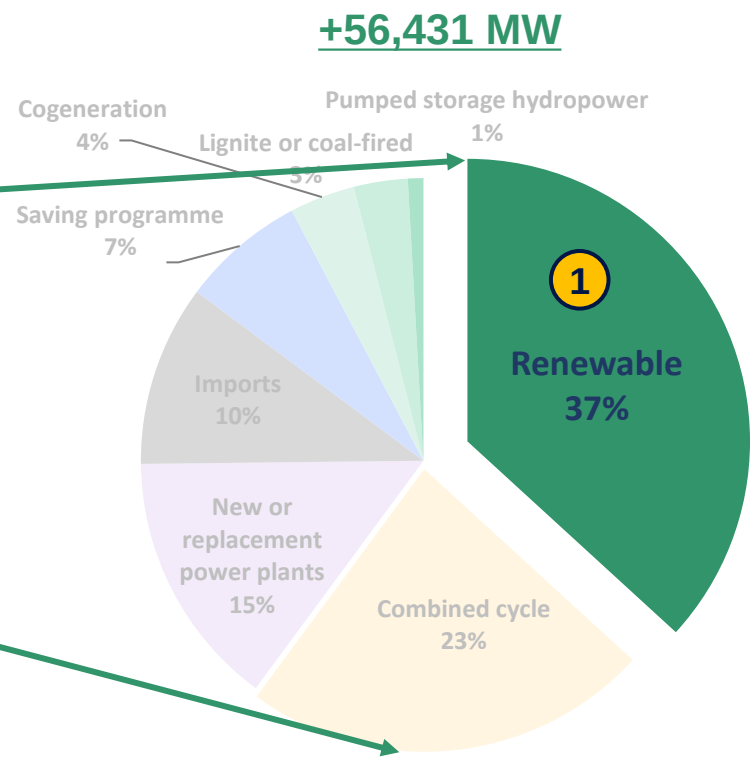


Source: Power Development Plan (PDP) 2018

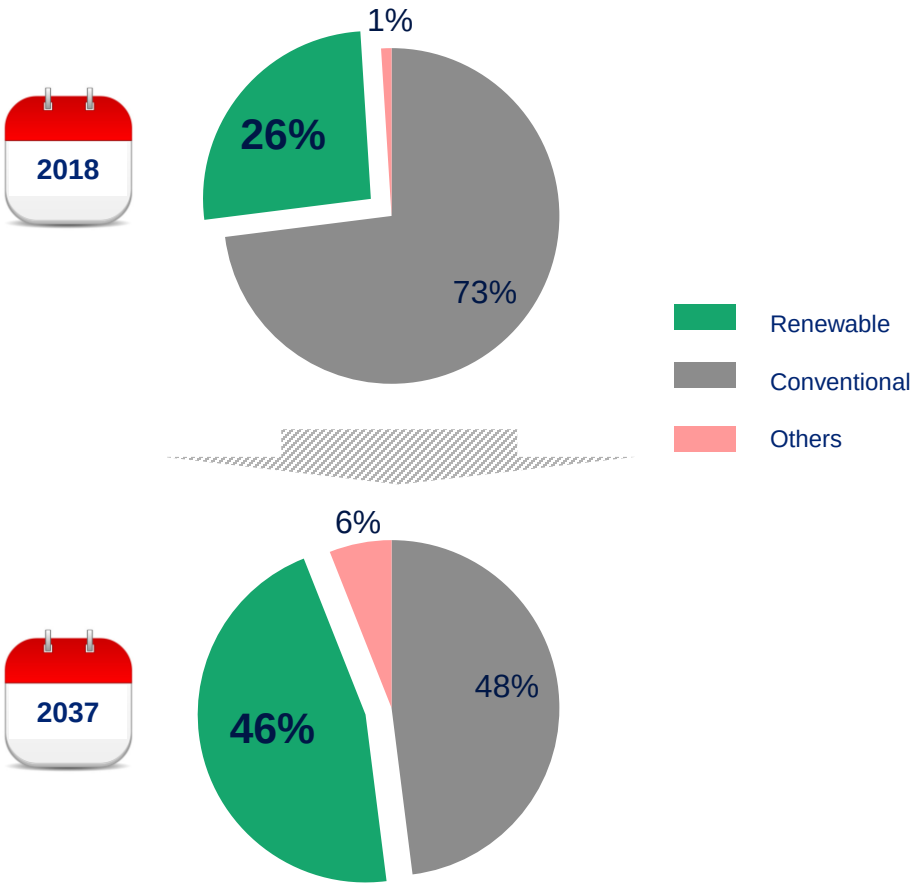
Remark: /1 Based on crude oil used for in-land transport data in 2018 (EPPO) converted into Barrel of Oil Equivalent(BOE) with 35% cusion

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

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

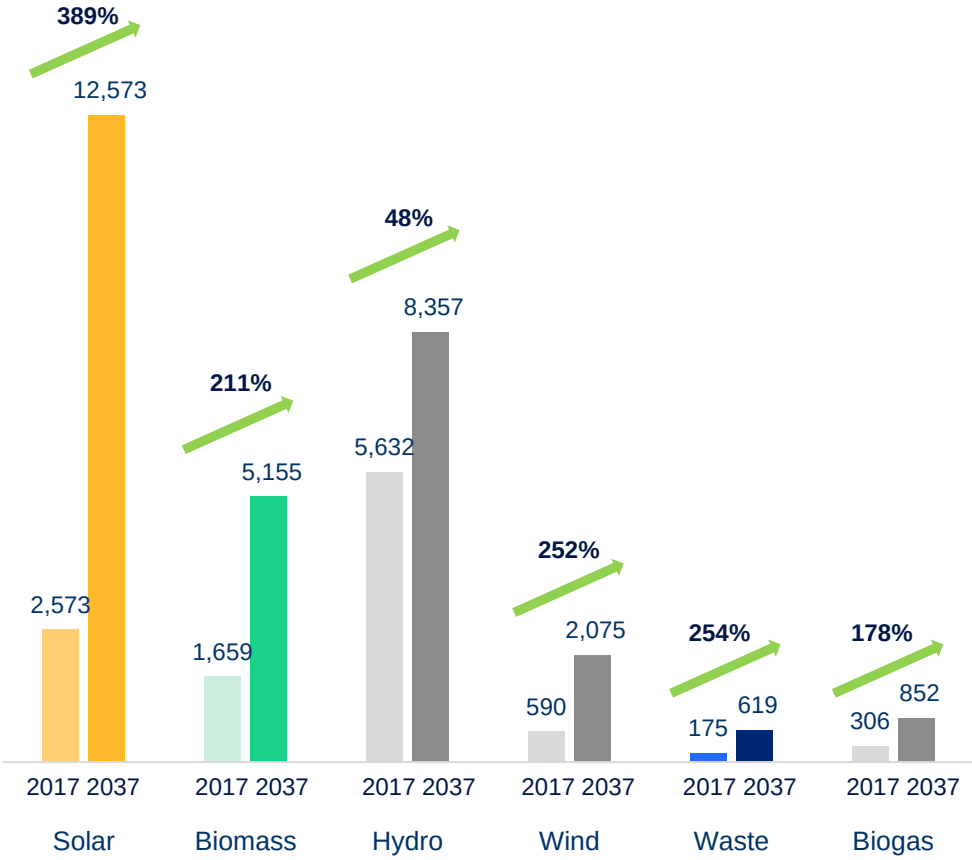
% Electricity Capacity by Source of Total Capacity for 2018 and 2037

% Installed Capacity



Electricity Capacity of Each Renewable Source for 2017 and 2037/1

Unit: MW



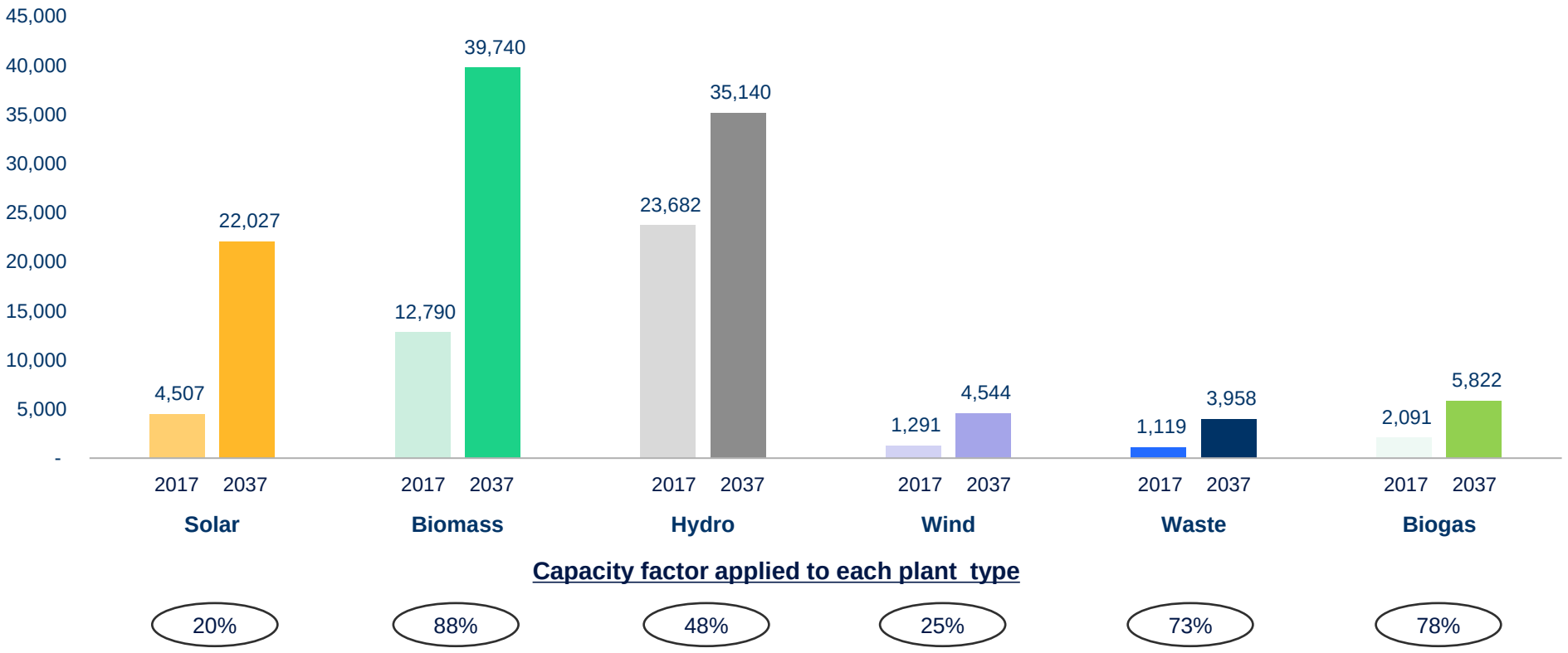
Remark : /1 Excluding retiring capacity in the next 20 years
Source: Power Development Plan (PDP) 2018

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

Electricity contribution/1 of Each Renewable Source of from 2017 to 2037/2

Unit: GWh



Capacity factor applied to each plant type

Solar	Biomass	Hydro	Wind	Waste	Biogas
20%	88%	48%	25%	73%	78%

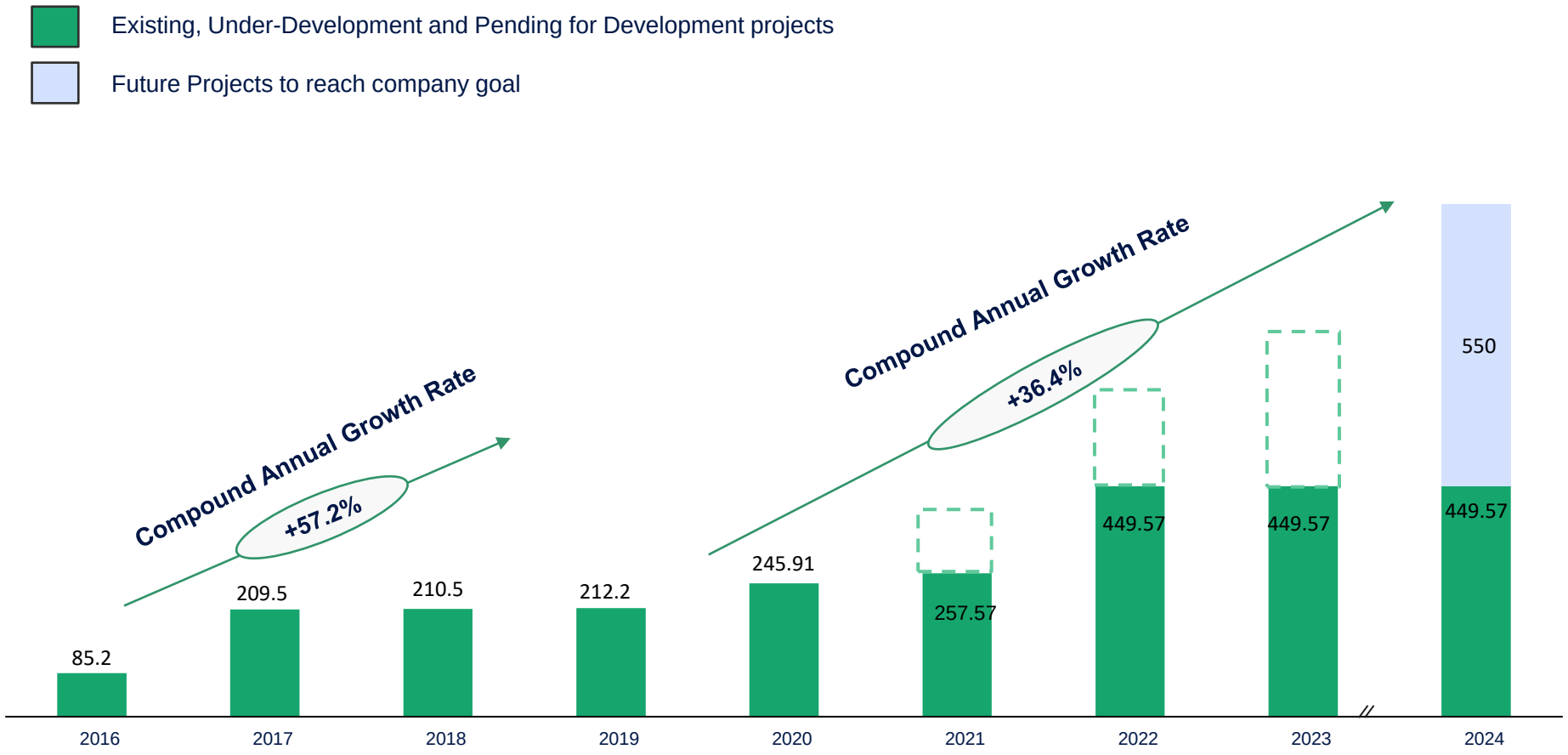
Remark : /1 Assume 365 days, 24 hours and specific capacity factor of each plant type for electricity contribution calculation
/2 Excluding retiring capacity in the next 20 years

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



Source: Power Development Plan 2018

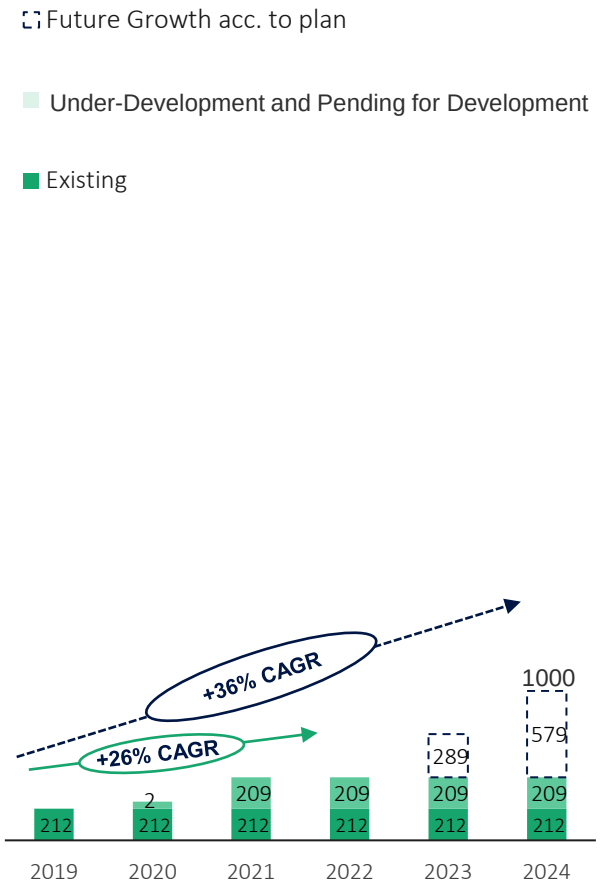
Remark: /1 Including APP's capacity MW of 9.9, Currently, APP's shareholders sent LOI for APP share purchase proposal to ACE

/2 Estimated timeline : Currently, Arbitration result states that PEA has to return PPA to ACE and with the assumption that normally power project's construction period is approx. 2 years

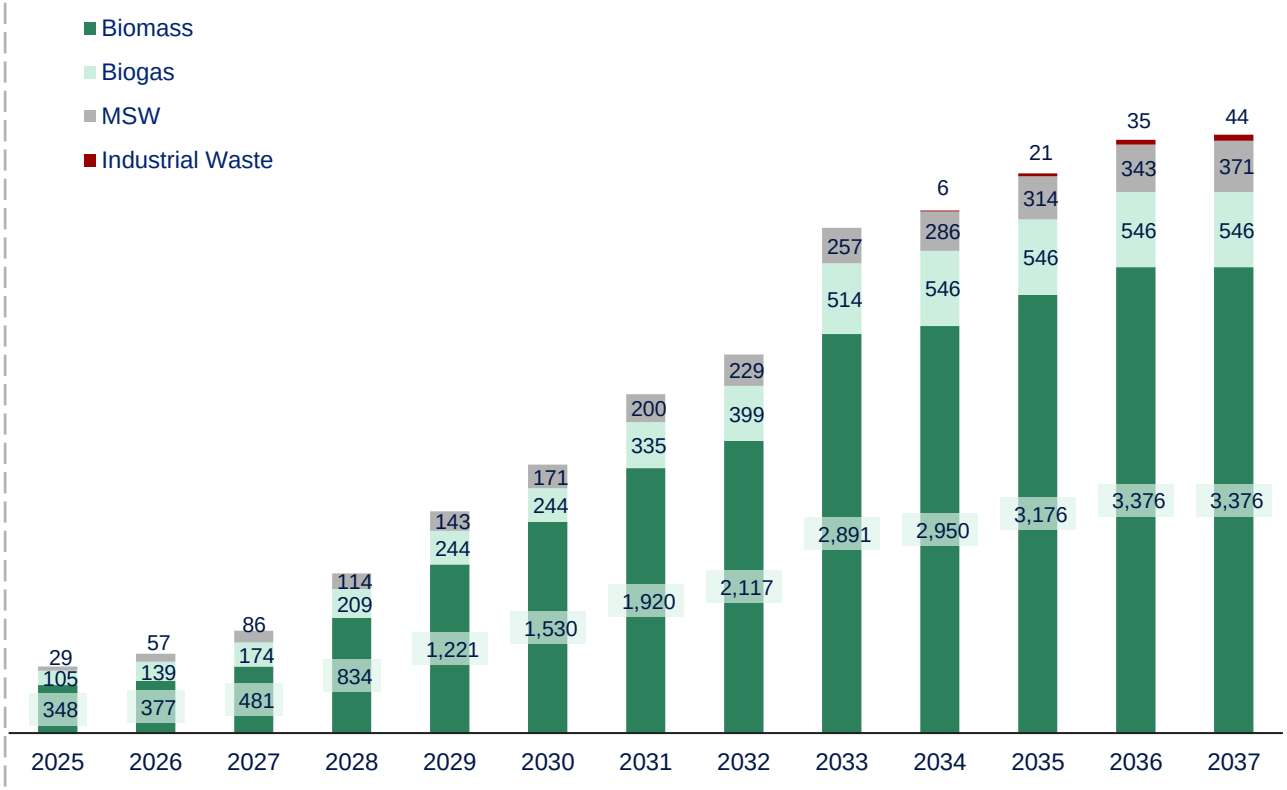
Future Growth

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



2025 – 2037 Contract Capacity MW according to PDP 2018



Source: Power Development Plan 2018

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/2 Estimated timeline : Currently, Arbitration result states that PEA has to return PPA to ACE and with the assumption that normally power project's construction period is approx. 2 years

Proven by Recent Bidding

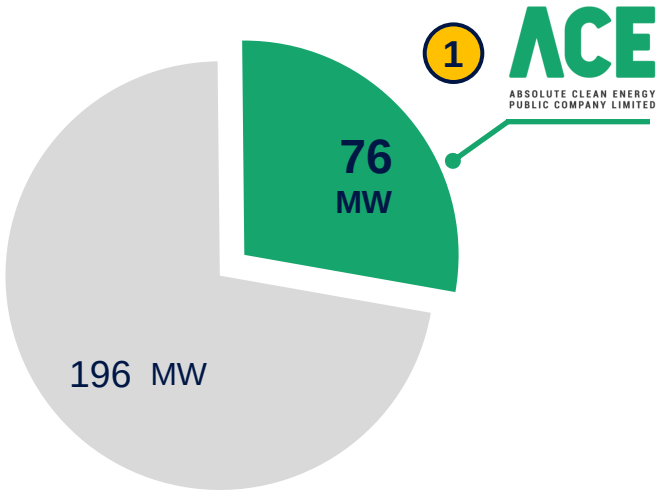
Won the largest portion of MW in the 2017 SPP Hybrid Bidding (Renewable)

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

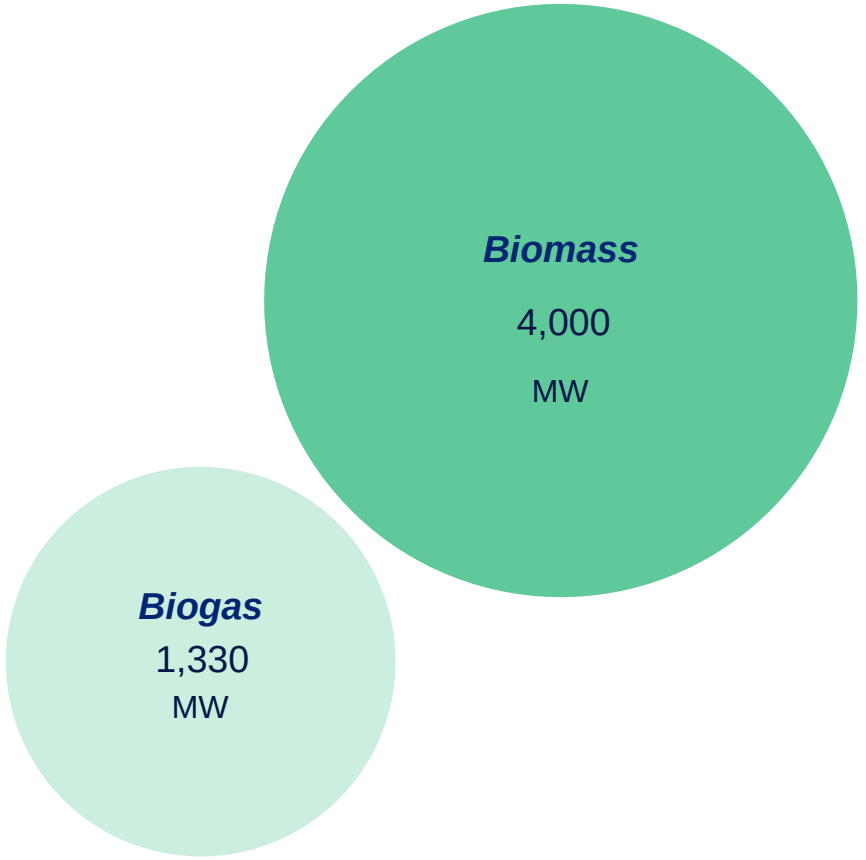


ACE

Other Bidding Winners in Biomass

Total PPA Capacity available for Bidding: 272 MW

Potential Upcoming Community Biomass/Biogas PPA/1



Total Potential Capacity available for Bidding: 5,330 MW

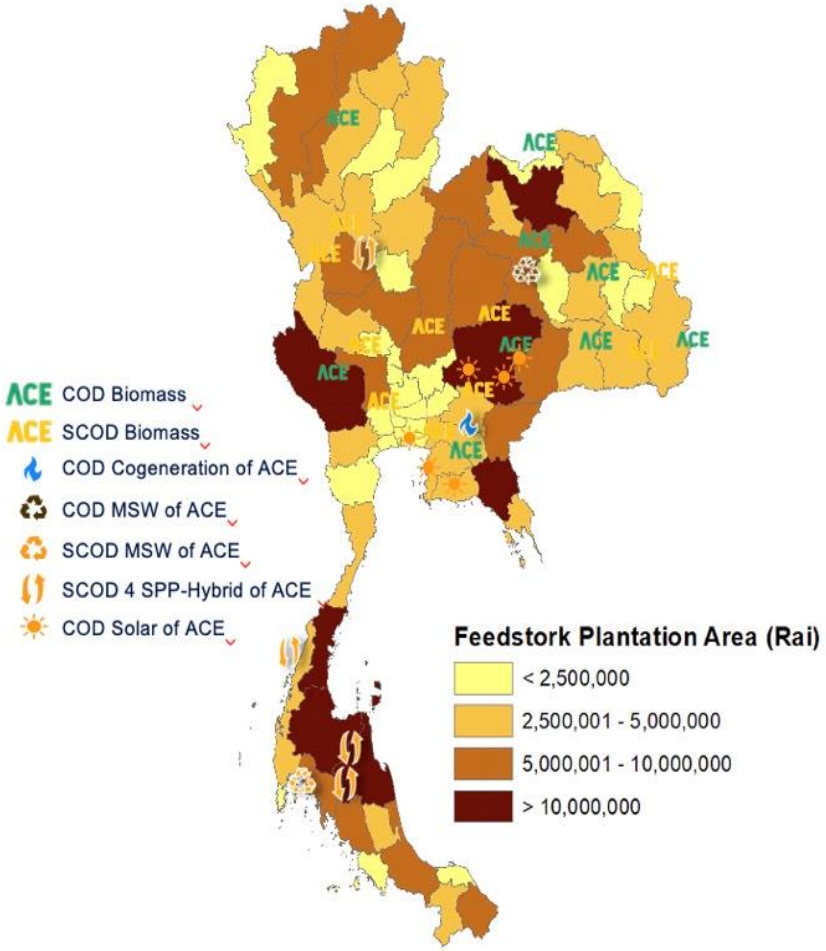
Source : ERC, PEA
/1 Community Power Plant Project Concept, PEA

Strictly Private & Confidential

Potential of Growth

Feedstock Landscape in Thailand and Sufficiency

Majority of the Company's biomass powerplants are situated in provinces with sufficient feedstock, where Company can use various type of feedstocks to support the Company's plan to reduce cost in the long run.



Province	Available Capacity (MM tons/ year)	Implied Installed MW
Regions		
North	54	2,845
South	42	2,203
Central	16	867
East	21	1,110
Northeast	76	4,034
West	13	700
Total /1	224	11,759

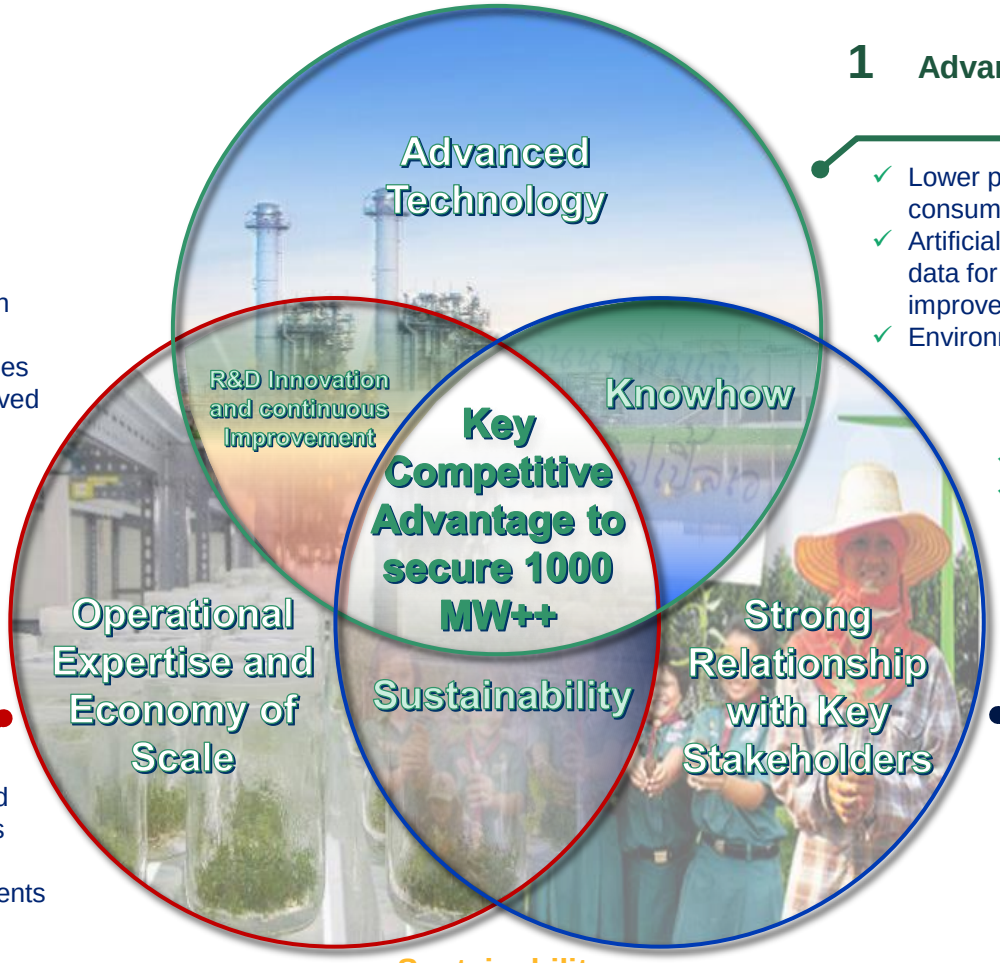
Sufficiency of feedstock in Thailand	
Implied installed capacity (MW)	11,759
COD installed MW from 2014/2 (MW)	(1,730/2)
Implied Current Available MW	10,029

Source : Land Development Department

Remark : /1 Feedstock represent rice, corn, sugarcane, palm, rubber wood and Eucalyptus and etc.
/2 Installed MW of biomass power plant in Thailand

Strictly Private & Confidential

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



R&D

- ✓ Fuel crops from major shareholders' plantation business
- ✓ New Biomass Fuel Types
- ✓ Machineries and improved design

1 Advance Technology

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

Knowhow

- ✓ Low O&M cost
- ✓ Strong & capable team of professionals ready to handle new projects.

2 Operational Expertise & Economy of Scale

- ✓ Proven track record in building and running 19 successful powerplants projects
- ✓ Continuous operational improvements
- ✓ Economy of scale
- ✓ Strong feedstock purchasing team
- ✓ Last supply chain network and efficient (over 40 years in the making)

3 Relationship with Key Stakeholder

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

Sustainability

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

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II Industry Overview and Growth Potential

III Company Core Competitive Advantages

IV Financial Highlights

V Key Takeaways

ABSOLUTE CLEAN ENERGY
PUBLIC COMPANY LIMITED

Company Core Competitive Advantages

Company Core Competitive Advantages

ABSOLUTE CLEAN ENERGY
PUBLIC COMPANY LIMITED

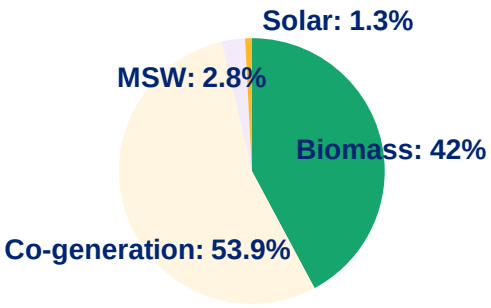
1. **Thailand's Leading Integrated Power Producer with highest growth potential** /1
2. **Proven Operational Capabilities**
3. **Secured Cash Flow Supported by PPA with EGAT/PEA**

Remark: /1 Estimated approximate MW growth during 2019-2022; Estimated MW growth of peers based on public information only

Target to Secure 1 GW Installed Capacity within 2024

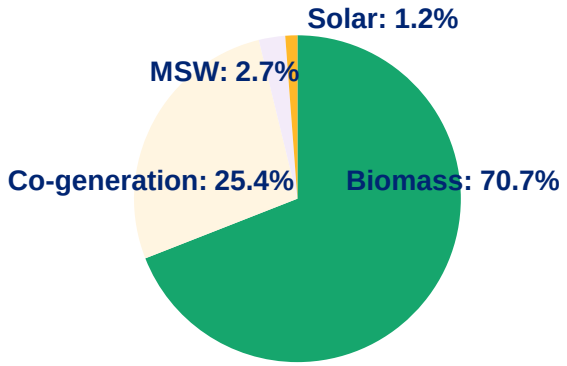
2019

COD Capacity : 212.18 MW
COD + Secure Pipeline : 421.37 MW/1



2022/1,/2

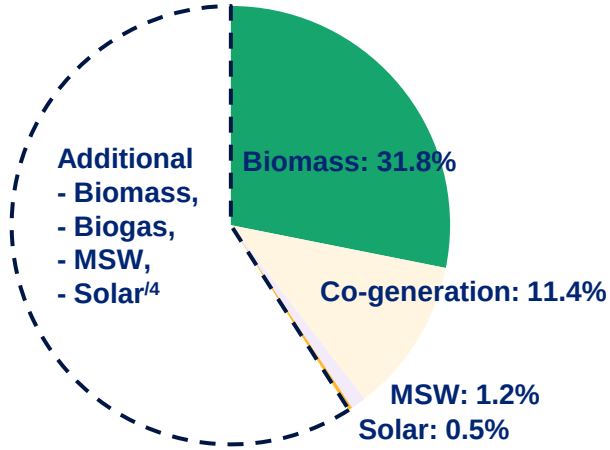
COD Capacity : 449.57 MW
COD + Secure Pipeline : 449.27+[x] MW



+28% MW CAGR
From 2019 - 2022

2024

COD Capacity : 449.57 +[x] MW
Target Capacity/3 : 1,000 MW



+36% MW CAGR
From 2019 - 2024

Remark: /1 Including APP's capacity MW of 9.9, Currently, APP's Shareholders sent LOI for APP's share purchase proposal to ACE
/2 Estimated timeline: Currently, Arbitration result states that PEA has to return PPA to ACE and with the assumption that normally power project's construction period is approx. 2 years
/3 Company Target to COD+ secure 1,000 MW within 2024
/4 Additional capacity is subject to management guidance, but will focus in renewable field.

Company Core Competitive Advantages – Proven Operational Capabilities

Leading Biomass Power Producer in Thailand

ACE's in-house R&D capabilities results in feedstock and O&M cost reduction with the target to reduce feedstock cost approx. 5% – 15% for current plant and 24.7%-27.8% on top for pipeline plant and O&M cost reduction approx. 15% – 25% in the next 2-3 years

Professional Run

- Biggest professional-run biomass power player in Thailand
- More than 1 year continuing operation before requiring shutdown maintenance
- Advanced Technology leading to feedstock flexibility

Advanced Technology

- ACE's ability to burn various types of high moisture content biomass efficiently up to 60-65%
- Various type of biomass mix with controllable cost
- ISO 9001, 14001, OHSAS 18001

Continuing Improvement

- Target to decrease feedstock cost of **5% -15%** by 2-3 years
- Additionally, potential plant heat rate decrease of **24.70%-27.81%**/2 for pipeline plant (VSPP, SPP Hybrid)
- Target to decrease its O&M cost **15% -25%** by 2-3 years

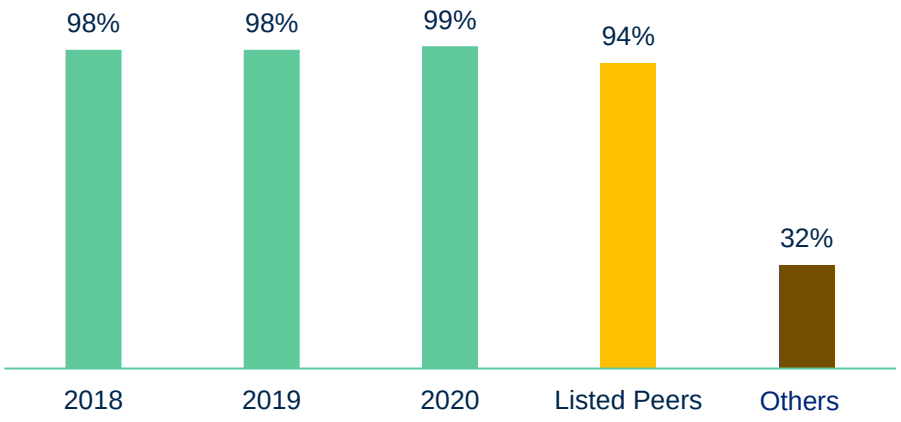
Proven Track Record

- 3 year performance track record of continued efficiency and profit margin improvement
- Proven ability to source biomass feedstock (no record of supply shortage)

Upside Potential

- Potential electricity sales of ~24 MW to IUs
- +15 operational years after PPA expire/3

Capacity Factor/1



- ✓ Biggest professional-run
- ✓ More than **1 year** continuing operation
- ✓ Ability to burn high moisture content **60%-65%**

Distinguished Efficiency

Source : Company annual report and presentation publicly available for peers' information

Remark: 1/ Selling capacity factor (Selling Electricity /(Total Operating hours * Selling Capacity))

2/ Due to new technology (high temp, high pressure turbine) and verified by third party technical advisor

3/ Third party technical report stated that general biomass powerplant has an average useful life of 25-30 years or greater in case of proper recurring maintenance

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Company Core Competitive Advantages – Proven Operational Capabilities

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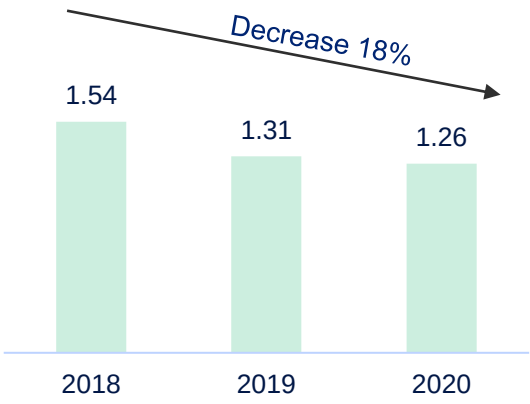
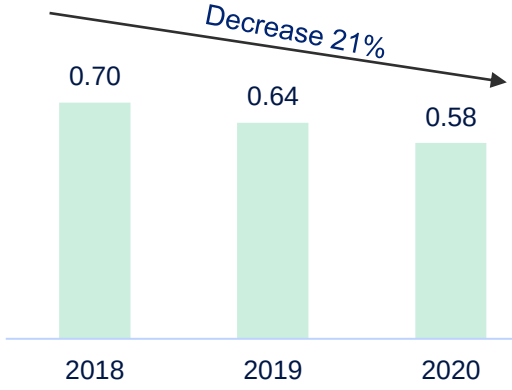
Professional Run	Advanced Technology	Continuing Improvement	Proven Track Record	Upside Potential
• Biggest professional-run biomass power player in Thailand • More than 1 year continuing operation before requiring shutdown maintenance • Advanced Technology leading to feedstock flexibility	• ACE's ability to burn various types of high moisture content biomass efficiently up to 60-65% • Various type of biomass mix with controllable cost • ISO 9001, 14001, OHSAS 18001	• Target to decrease feedstock cost of **5% -15%** by 2-3 years • Additionally, potential plant heat rate decrease of **24.70%-27.81%**[2] for pipeline plant (VSPP, SPP Hybrid) • Target to decrease its O&M cost **15% -25%** by 2-3 years	• 3 year performance track record of continued efficiency and profit margin improvement • Proven ability to source biomass feedstock (no record of supply shortage)	• Potential electricity sales of ~24 MW to IUs • +15 operational years after PPA expire[3]

Feedstock & O&M Cost

Feedstock Cost
(THB/ kWh produced)



O&M Cost
(THB/ kWh produced)



- ✓ To decrease Feedstock cost **5%-15%** by 2-3 years
- ✓ **24.70%-27.81% Plant heat rate decrease** on top for VSPP, SPP Hybrid pipeline
- ✓ To decrease O&M cost **15%-25%** by 2-3 years

Potentially Improving Margin

Remark: 1/ Selling capacity factor (Selling Electricity /(Total Operating hours * Selling Capacity))
2/ Due to new technology (high temp, high pressure turbine) and verified by third party technical advisor
3/ Third party technical report stated that general biomass powerplant has an average useful life of 25-30 years or greater in case of proper recurring maintenance

Company Core Competitive Advantages – Proven Operational Capabilities

Leading Biomass Power Producer in Thailand

ACE's in-house R&D capabilities results in feedstock and O&M cost reductions with the target to reduce feedstock cost approx. 5% – 15% for operating power plants and 24.7%-27.8% on top for power plants in the pipeline and O&M cost reduction approx. 15% – 25% in the next 2-3 years

Professional Run

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- More than 1 year continuing operation before requiring shutdown maintenance
- Advanced Technology leading to feedstock flexibility

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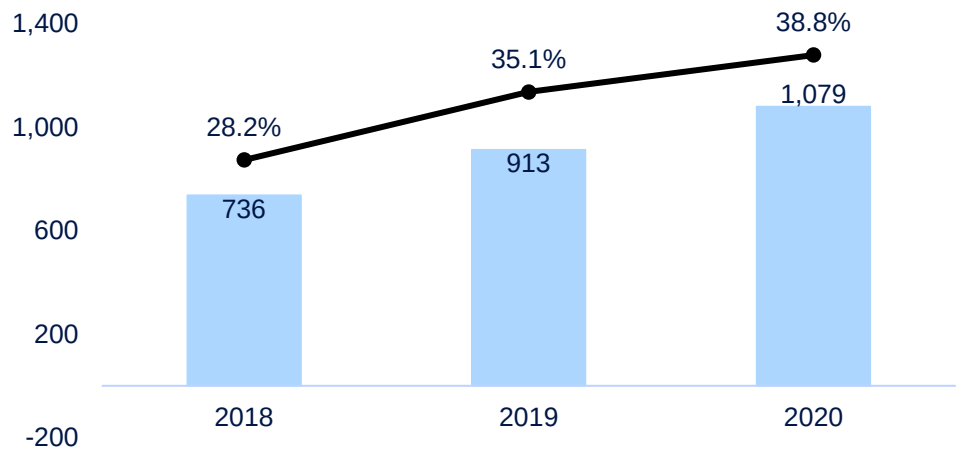
Upside Potential

- Potential electricity sales of ~24 MW to IUs
- +15 operational years after PPA expire[3]

Gross Profit and Gross Profit Margin

Unit : THB mm / (%)



- ✓ Track record with Improvement
- ✓ **~24 Potential MW** sales to IUs
- ✓ **+15 operational years**[3] after PPA

Upside potential in the near future

Remark: 1/ Selling capacity factor (Selling Electricity /(Total Operating hours * Selling Capacity))
2/ Due to new technology (high temp, high pressure turbine) and verified by third party technical advisor
3/ Third party technical report stated that general biomass powerplant has an average useful life of 25-30 years or greater in case of proper recurring maintenance

Company Core Competitive Advantages – Proven Operational Capabilities

Most Efficient Municipal Solid Waste (MSW) Power Producer in Thailand

ACE's early engagement in MSW, reputable bidding track record and renowned expertise will secure the upcoming MSW bidding opportunity

Professional Run

- Most efficient MSW power plant operator in Thailand
- Strong in-house O&M Team
- Target to decrease its O&M cost **15% -25%** by 2-3 years

Advanced Technology

- ACE's high technological plant could burn high moisture content municipal solid waste up to 80% with efficiency
- Zero discharge
- Odorless
- ISO 9001, 14001, OHSAS 18001

International Recognition

- Received 3Rs Awards in 2016 for being an environment friendly power operator.
- Thailand' Minister of Interior , Minister of Energy and government officials of other countries to visit the plant as MSW prototype

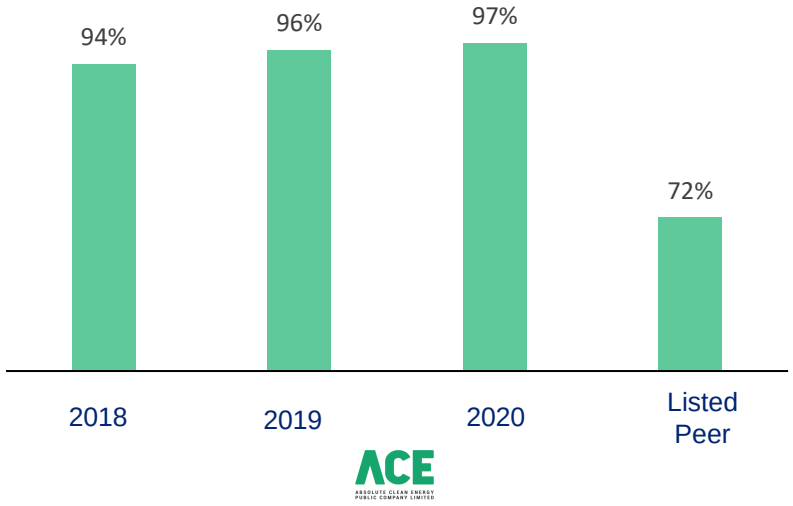
Proven Track Record

- 3 year performance track record with high efficiency and high profit margin
- Abundant supply of waste

Upside Potential

- Potential electricity sales of 0.4 MW (9% increase in excess of current PPA MW)
- Tipping fee will enhance project return (fee increase 10%/3 years)

Capacity Factor/1



- ✓ Most efficient MSW
- ✓ Ability to burn high moisture content up to **80%**
- ✓ **Zero** discharge and **Odorless**

Distinguished Efficiency and Eco friendly

Source : Company annual report and presentation publicly available for peers' information

Remark: 1/ Capacity factor (Produced Electricity /(Total Operating hours * Total Capacity)), For Selling capacity factor of 2017,2018 and 6M2019 are 98%,100% and 99% respectively.

Thailand' Minister of Interior and Minister of Energy visited KK MSW Power plant

ACE's early engagement in MSW, reputable bidding track record and renowned expertise will secure the upcoming MSW bidding opportunity

Professional Run	Advanced Technology	International Recognition	Proven Track Record	Upside Potential
• Most efficient MSW power plant operator in Thailand • Strong in-house O&M Team • Target to decrease its O&M cost **15% -25%** by 2-3 years	• ACE's high technological plant could burn high moisture content municipal solid waste (Up to 80%) with efficiency • Zero discharge • Odorless • ISO 9001, 14001, OHSAS 18001	• Received 3Rs Awards in 2016 for being an environment friendly power operator. • Thailand' Minister of Interior , Minister of Energy and government officials of other countries to visit the plant as MSW prototype	• 3 year performance track record with high efficiency and high profit margin • Abundant supply of waste	• Potential electricity sales of 0.4 MW (9% increase in excess of current PPA MW) • Tipping fee will enhance project return (fee increase 10%/3 years)

Gen. Anupong Paojinda (Minister of Interior) visited MSW power plant at 3 May 2018

Mr. Siri Jirapongphan (minister of Energy) visited MSW power plant at 12 Dec 2018

Company Core Competitive Advantages – Proven Operational Capabilities

Energy Regulatory Commission visit KK MSW Power Plant

ACE's early engagement in MSW, reputable bidding track record and renowned expertise will secure the upcoming MSW bidding opportunity

Professional Run	Advanced Technology	International Recognition	Proven Track Record	Upside Potential
• Most efficient MSW power plant operator in Thailand • Strong in-house O&M Team • Target to decrease its O&M cost **15% -25%** by 2-3 years	• ACE's high technological plant could burn high moisture content municipal solid waste (Up to 80%) with efficiency • Zero discharge • Odorless • ISO 9001, 14001, OHSAS 18001	• Received 3Rs Awards in 2016 for being an environment friendly power operator. • Thailand' Minister of Interior , Minister of Energy and government officials of other countries to visit the plant as MSW prototype	• 3 year performance track record with high efficiency and high profit margin • Abundant supply of waste	• Potential electricity sales of 0.4 MW (9% increase in excess of current PPA MW) • Tipping fee will enhance project return (fee increase 10%/3 years)

Kraisi Kanasuta (Former member of ERC) visited MSW KK powerplant

Mr. Kurujit Nakornthap Chairman of Energy Affairs Committee and Member of the National Reform Steering Assembly (NRSA)visited MSW KK powerplant

Company Core Competitive Advantages – Proven Operational Capabilities

Sri Lanka' Supreme Ambassadors visit KK MSW Power Plant

ACE's early engagement in MSW, reputable bidding track record and renowned expertise will secure the upcoming MSW bidding opportunity

Professional Run	Advanced Technology	International Recognition	Proven Track Record	Upside Potential
• Most efficient MSW power plant operator in Thailand • Strong in-house O&M Team • Target to decrease its O&M cost **15% -25%** by 2-3 years	• ACE's high technological plant could burn high moisture content municipal solid waste (Up to 80%) with efficiency • Zero discharge • Odorless • ISO 9001, 14001, OHSAS 18001	• Received 3Rs Awards in 2016 for being an environment friendly power operator. • Thailand' Minister of Interior , Minister of Energy and government officials of other countries to visit the plant as MSW prototype	• 3 year performance track record with high efficiency and high profit margin • Abundant supply of waste	• Potential electricity sales of 0.4 MW (9% increase in excess of current PPA MW) • Tipping fee will enhance project return (fee increase 10%/3 years)

H.E.Mrs.Kshenuka Dhireni Senewiratne (Sri Lanka's Supreme Ambassdor) visited MSW KK powerplant at 11 Dec 2018

Company Core Competitive Advantages – Proven Operational Capabilities

Bangladesh's Minister visit KK MSW Power Plant

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H.E.Mrs.Kshenuka Dhireni Senewiratne (Sri Lanka's Supreme Ambassador) visited MSW KK powerplant at 11 Dec 2018

Md. Tajul Islam (Minister of Local Government and Rural Development) visited MSW KK powerplant at 16 Feb 2019

Khon Kaen MSW Power Plant visited by numerous Regional Municipal and government agencies

Environmental Inspection Division Team visited MSW KK powerplant

Indonesia Vice President Deligation visited MSW KK powerplant

Director-General of the Department of Local Administration visited MSW KK powerplant

Director-General of the Pollution Control Department visited MSW KK powerplant

Deputy Director-General of the Department of Local Administration visited MSW KK powerplant

Amnat Charoen Governor visited MSW KK powerplant

Khon Kaen MSW Power Plant visited by numerous Regional Municipal and government agencies

Phuket Municipal visited MSW KK powerplant

Udonthani Municipal visited MSW KK powerplant

Executive Committee of local administrative organization from Surat Thani visited MSW KK powerplant

Management team from Choomporn Municipal

Nonsira, Khon Kaen Municipal visited MSW KK powerplant

Management team from Roi Et Municipal

Khon Kaen MSW Power Plant visited by numerous Regional Municipal and government agencies

Management team from Maha Sarakham Municipal

Board of Directors, Ministry of Energy and Ministry of Local Administration from Bangladesh visted MSW KK powerplant

Local government leaders from Songkhla province visited MSW KK powerplant in order to solve the local waste issues

Management team from Krabi Municipal

Municipal team team from Udonthani

Municipal team team from Banpai, Khon Khaen

Krabi MSW Power Plant official opening ceremony

Krabi MSW Power Plants official opening ceremony

Company Core Competitive Advantages – Proven Operational Capabilities

Most Efficient MSW Power Producer in Thailand

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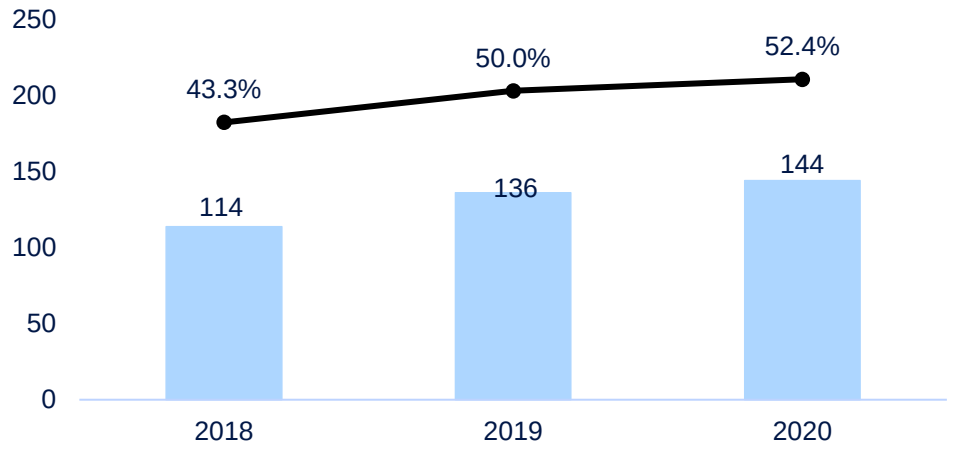
Gross Profit and Gross Profit Margin

Unit : THB mm / (%)



- ✓ Track record with Improvement
- ✓ **~0.4 Potential MW** sales to IUs
- ✓ Additional **Tipping fee** enhance return

Upside potential in the near future

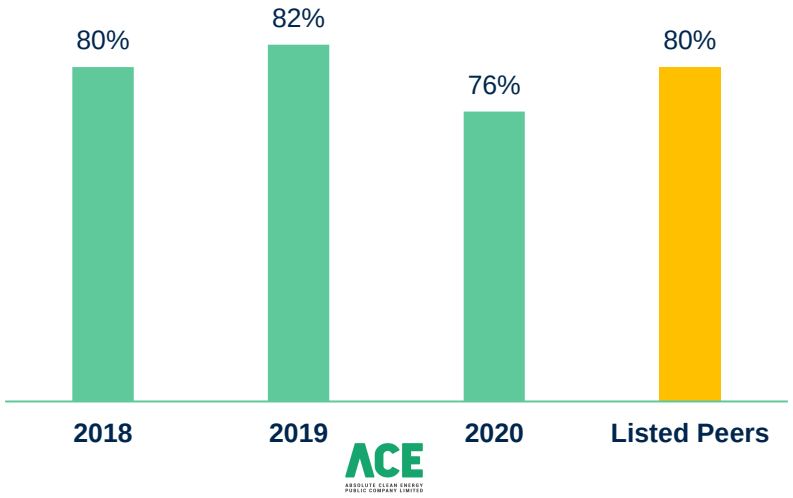
Company Core Competitive Advantages – Proven Operational Capabilities

Competitive SPP Co-Generation Power Producer

Defensive scheme of Co-Generation Power Plant would help balance risk scheme of company's powerplant portfolio

Professional Run	Advanced Technology	Continuing Improvement	Proven Track Record	Upside Potential
• One of the most efficient SPP Co-Generation powerplant operator in Thailand	• ACE's high technological to control and manage plant according to EGAT demand • ISO 9001, 14001, OHSAS 18001	• Strong in-house O&M Team • Target to decrease its O&M cost **15% - 25%** by 2-3 years	• 3 year performance track record with high efficiency and competitive margin • Cost pass-through scheme could result in stable margin • Long term gas purchase contract with PTT	• Potential sales to IUs of ~20 MW • Potential steam sales from IUs for more than 100,000 tons/year • +25 operational years after PPA expire /2

Capacity Factor/1



- ✓ One of the most efficient SPP Co-Gen
- ✓ Strong in-house O&M
- ✓ To decrease O&M cost of **15%-25%** by 2-3 years

Balance company risk profile

Remark: 1/ Selling capacity factor (Selling Electricity /(Total Operating hours * Selling Capacity))
2/ Third party technical report stated that general natural gas powerplant has an average useful life of 30 -60 years

Company Core Competitive Advantages – Proven Operational Capabilities

Competitive SPP Co-Generation Power Producer

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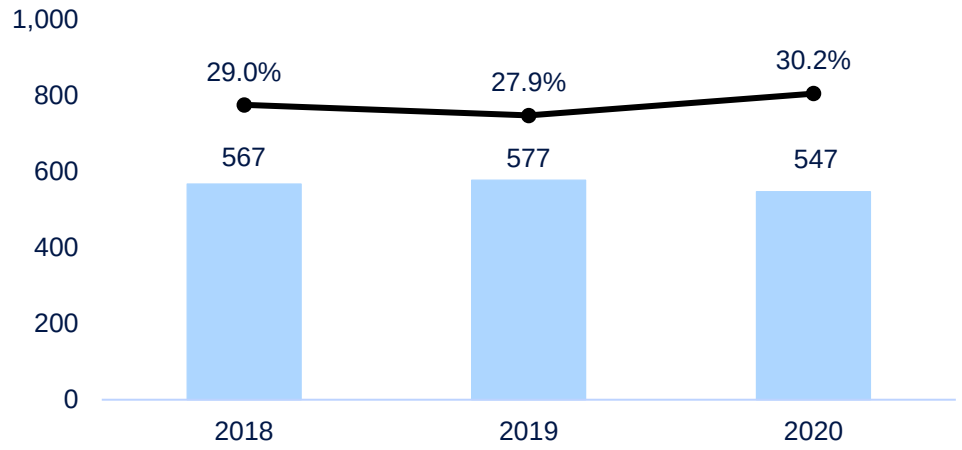
Gross Profit and Gross Profit Margin

Unit : THB mm / (%)

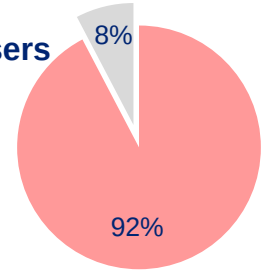
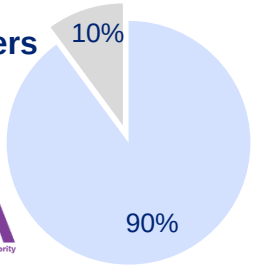
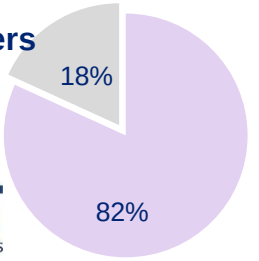


- ✓ Track record with stable margin
- ✓ ~20 Potential MW sales to IUs
- ✓ **+25 operational years/2** after PPA

Upside potential in the near future

Secured Cash Flow Supported by PPA with EGAT/PEA

Reliable revenue source with high efficiency and controlled cost can guarantee cash flow to the company

	Biomass	MSW	Co-Generation
2022 Revenue Contribution	Industrial Users  EGAT Power for Thai Happiness, PEA Provincial Electricity Authority	Industrial Users  PEA Provincial Electricity Authority	Industrial Users  EGAT Power for Thai Happiness
Availability Factor[/1] *Capacity Factor[/1]*	AF : 92% *CF : 98%*	AF : 95% *CF : 96%*	AF : 100% *CF : 82%*
Feedstock Sufficiency	• ~10,000 MW available • Feedstock development plan	• MSW service agreement with government	• Long term purchase agreement with PTT
Feedstock Cost Control	Controllable	No feedstock Cost	Cost pass-through
Upside Potential	✓ Potential Sales to IUs ✓ ~15 operation years after PPA[/2]	✓ Tipping fee ✓ Potential Sales to IUs	✓ Potential Sales to IUs ✓ ~25 operation years after PPA[/3]
Result	**Secured cashflow with upside potential**		

Remark: 1/ AF and CF of 2019
2/ Third party technical report stated that general biomass powerplant has an average useful life of 25-30 years or greater in case of proper recurring maintenance
3/ Third party technical report stated that general natural gas powerplant has an average useful life of 30-60 years

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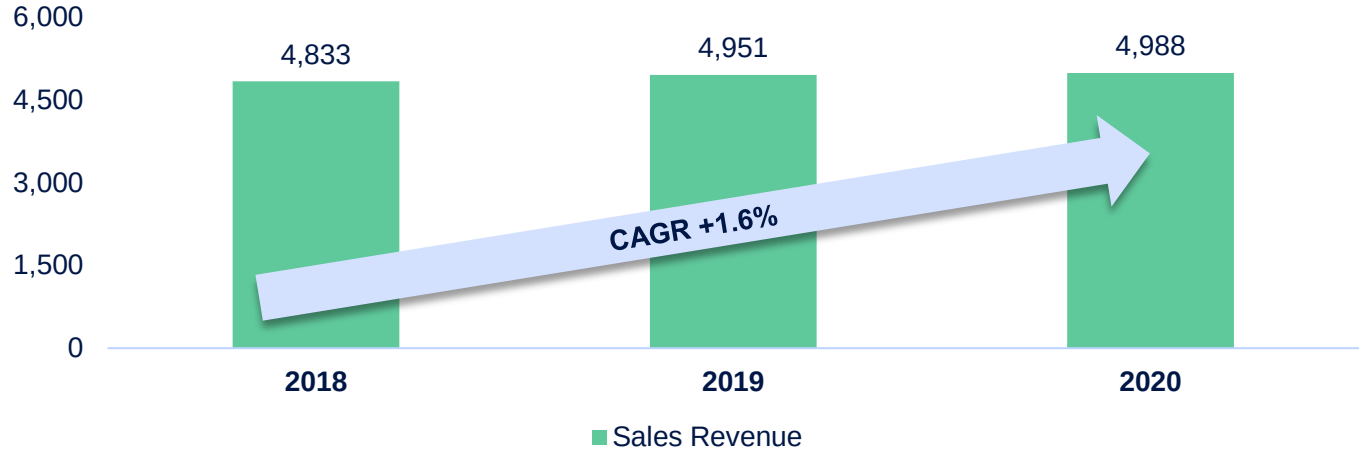
ABSOLUTE CLEAN ENERGY
PUBLIC COMPANY LIMITED

Financial Highlights

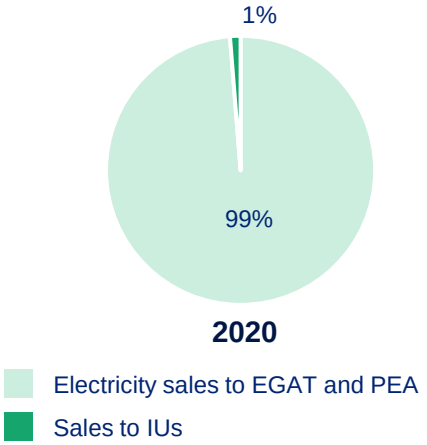
Financial Highlights

Robust Revenue Growth with Diversified Revenue Mix

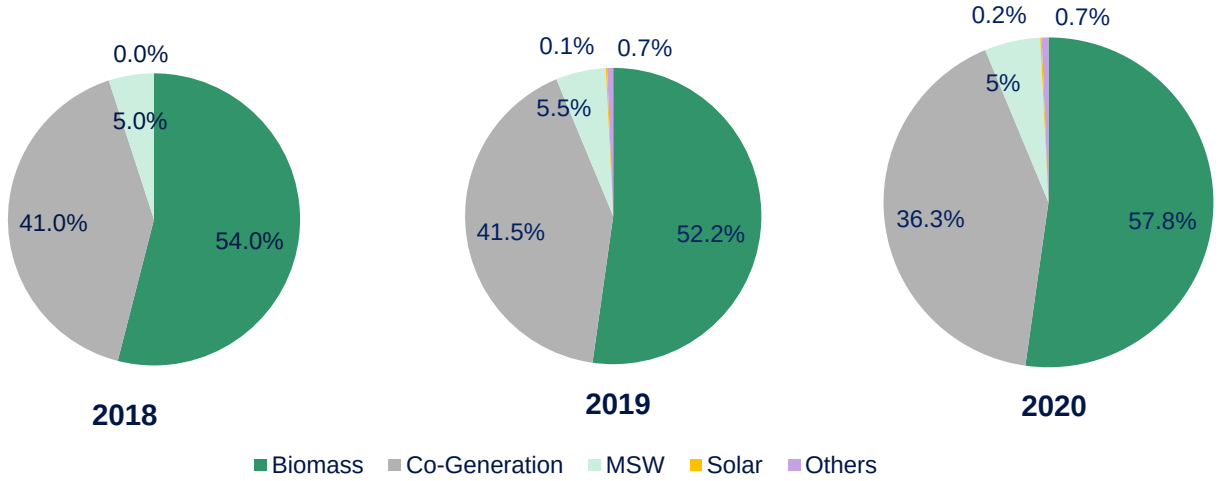
Revenue/1



Revenue Breakdown by Customer



Revenue Breakdown by Type of Power Plant



Key Observation

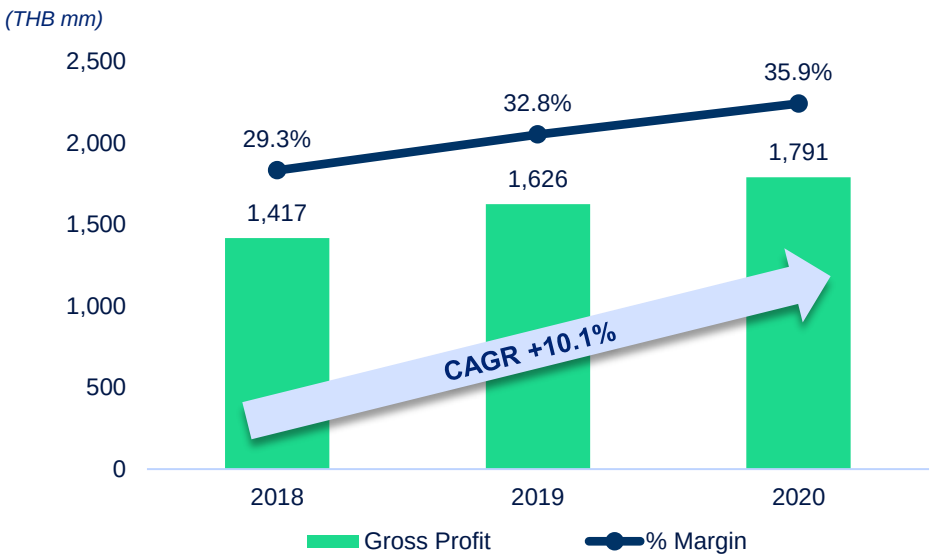
- ACE's Revenue increase at significant rate of **8% each year**
- **Biomass and co-generation** accounts for the majority of ACE's revenue at 52% and 42% respectively.
- ACE's primary source of revenue is secured by **EGAT and PEA.**

Remark: /1 Exclude revenue from construction cost under concession agreement and other revenue

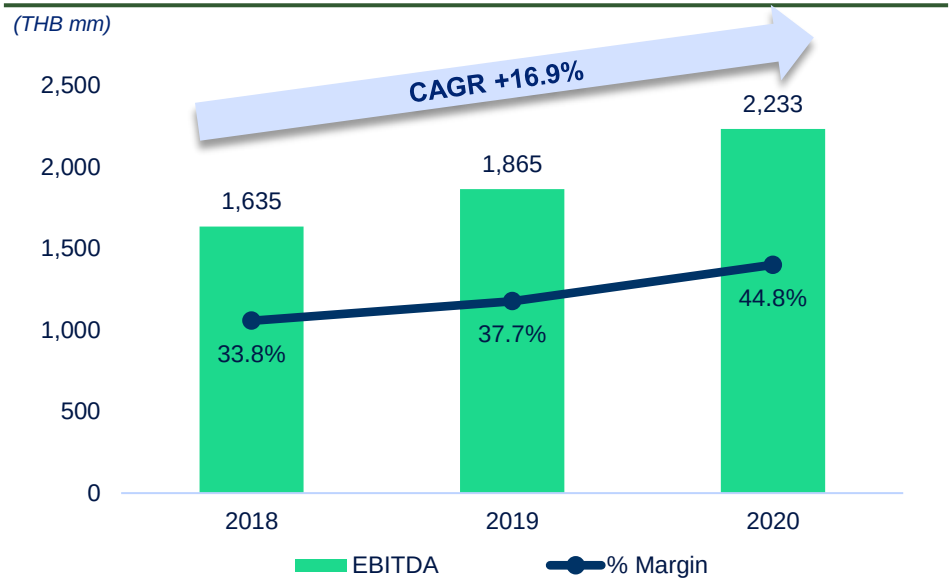
Robust Financial Performance

Financial track record shows strong and consistent revenue, EBITDA and net profit growth with continuous margin expansion.

Gross Profit and Gross Profit margin/1



EBITDA/2 and EBITDA margin/1



Key Observation

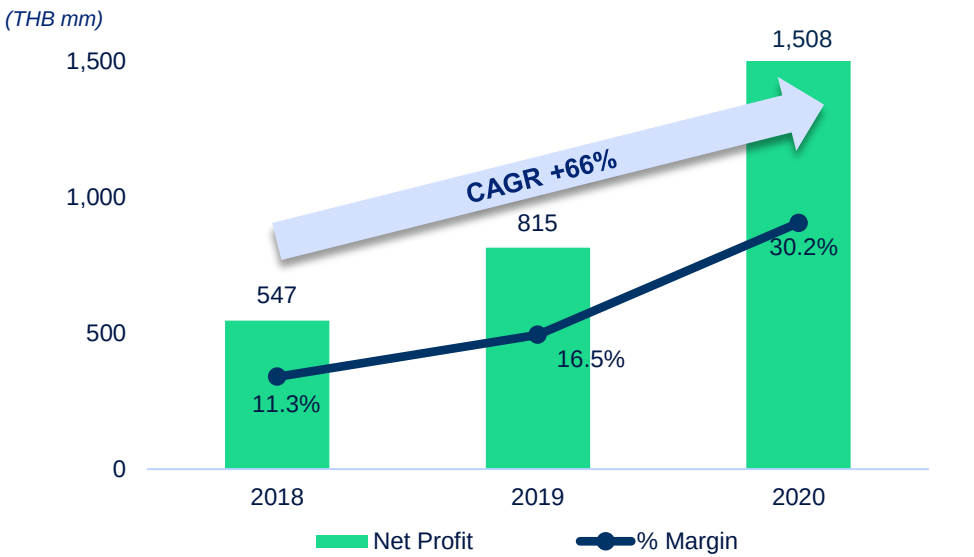
- ACE's gross profit increase at significant CAGR of 20% (2018-2020),
- Both group's profit and margin improved over time although slight increase in COD MW
  - as the Group achieved in 1) increasing efficiency in generating electricity (longer operating hours) and 2) decreasing both feedstock cost and operating cost
- EBITDA and its margin significant increase in 2020 due to increase in GP Biomass.

Remark: */1 Margin divided by sale and service revenue (not including construction revenue)
/2 EBITDA is calculated from net income + tax+ interest +depreciation/amortization+ other non cash items

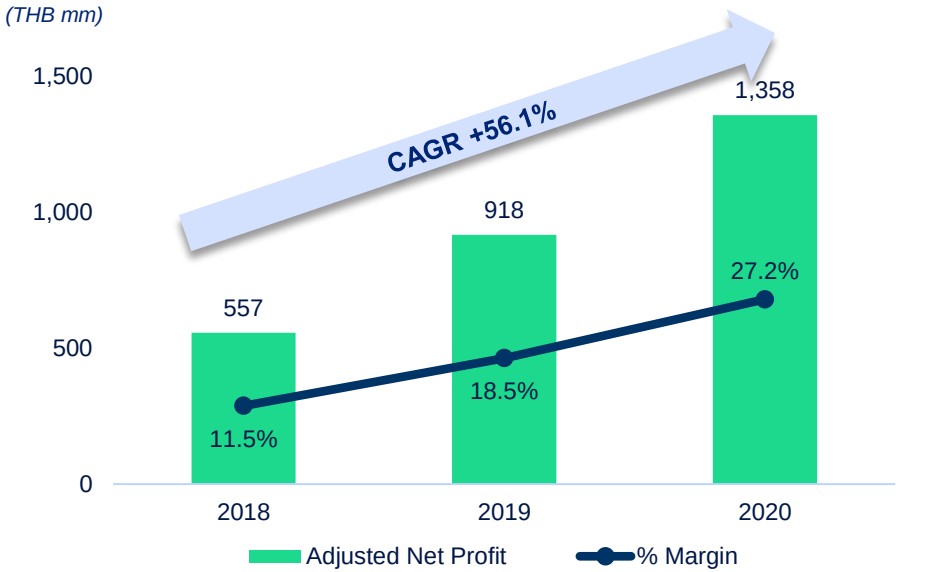
Robust Financial Performance

Financial track record shows strong and consistent revenue, EBITDA and net profit growth with continuous margin expansion.

Net Profit and Profit margin/1



Adjusted Net Profit/2 and Net Profit Margin/1



Exchange rate (THB/USD)	32.2848	29.9767	29.9767	29.8674	29.8674
	YE 2018	YE 2019	Q4'19	Q4'20	YE 2020

Key Observation

- Since Net profit of ACE generally include unrealized gain/loss from exchange rate from financial lease of (co-generation powerplant) which may be mislead if THB/USD exchange rate fluctuate overtime
- Adjusted net profit excluding such unrealized item would reflect actual profitability of the Company , The adjusted net profit trend shows the significant increase in term of absolute amount and margin over time
- For 2020 , there are gain from insurance claim totaling THB 172 mn. and exchange rate , and loss on forward contract from applying TFRS 9 and others totaling THB -12 mn.

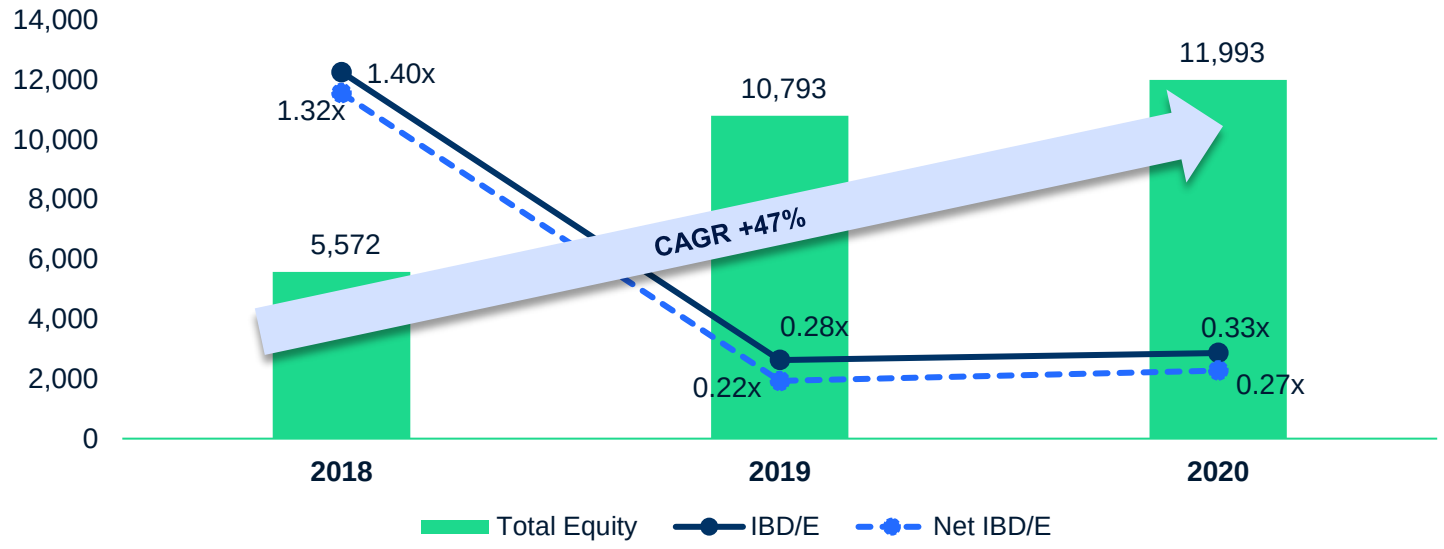
Remark: */1 Margin divided by sale and service revenue (not including construction revenue)
/2 Adjusted net profit calculated from Net income – FX gain/(loss) – insurance claim – forward contract gain (applied in Q1'20) and other non recurring items

ACE Outstanding Debt and Leverage Ratio

ACE's Leverage Ratio

Unit: THB mln	December 31		
	2018	2019	2020
Current Interest-bearing debt	1,166	1,084	842
Non-Current Interest-bearing debt	6,632	1,911	3,106
Total interest-bearing debt	7,798	2,995	3,948
Cash equivalent and restricted cash	429	571	760
Net Interest-bearing debt	7,369	2,424	3,188
Equity (THB mln)	5,572	10,793	11,993

Unit : THB mln



Strictly Private & Confidential

Strong Financial Position to Accelerate growth

ACE's Interest Expense

Unit: THB mln	December 31		
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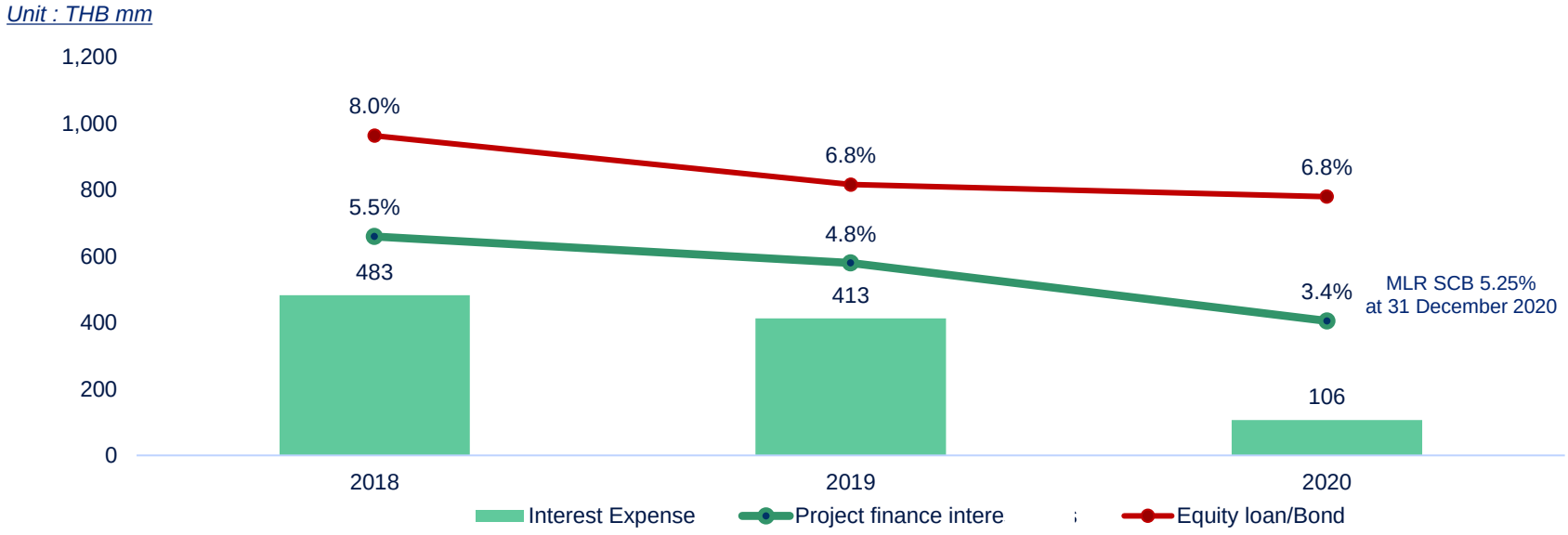
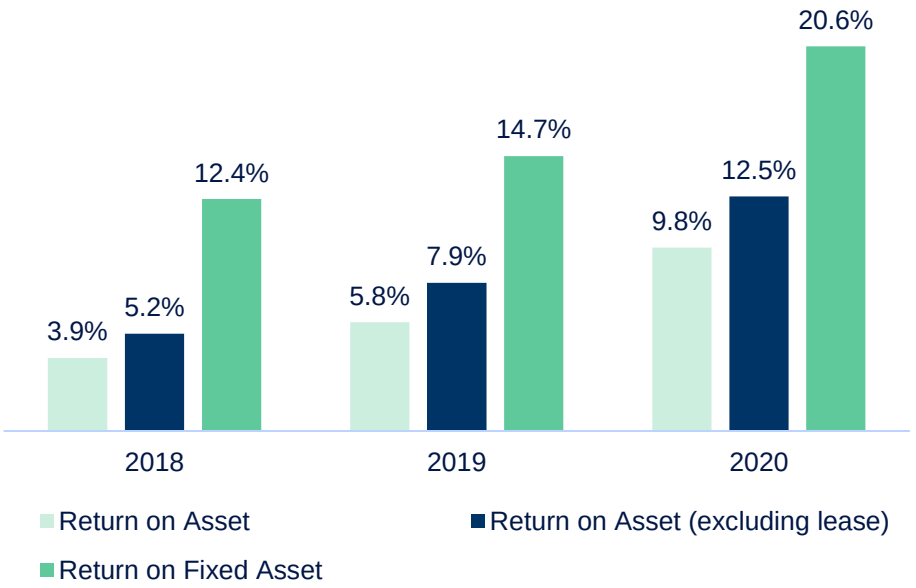
Total interest-bearing debt	7,798	2,995	3,948
Equity (THB mln)	5,572	10,793	11,993

- **ACE's effective interest rate also decreased from time to time and significantly decrease after listed in SET**

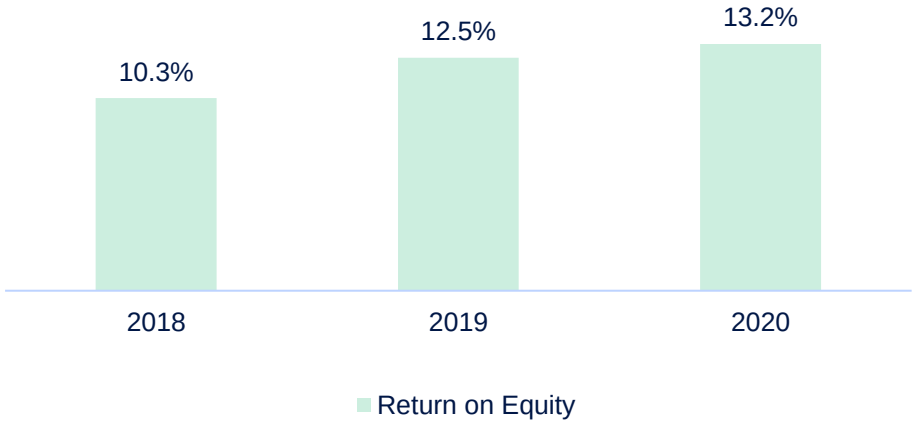


Profitability Ratio

Return on Asset



Return on Equity



Remark: Return on Asset calculated from net income / average total assets
Return on Asset (exclude lease) calculated from net income / average total assets exclude lease
Return on Fixed Asset calculated from (net income + depreciation) / average total fixed assets

Notable Additional Information

1. **General biomass powerplants have an average useful life of approximately 25-30 years[/1], 30-60 years[/1] for co-generation powerplant and 25-30 [/1] years for MSW powerplant**

2. **ACE's powerplants located in strategic land owned by itself could result to the upside potential from land value at the end of its operating period[/2]**

Unit: THB mm (unless stated otherwise) as of 31 Dec 2020	COD	Pipeline
Land Area (ไร่ งาน ตร.ว.)	1,494-1-87.4	1,351-2-63.4
Land Value	**1,900.20**	
Land Improvement	**421.91**	
Total Land Value after improvement	**2,322.11**	

3. **Potential Receivables from Government in the amount of THB 3,901.25 mm[/2]**

4. **Revenue from selling left over capacity to Industrial User**
   - **VSPP Biomass**
   - **Co-Gen SPP**
   - **MSW**

5. **Possibility to double capacity on the available land bank adjacent to the existing power plants according to Town Planning Law**

Remark: 1/ third party technical advisor report with assumption that recurring maintenance will be executed properly
2/ Approximate claim due to FiT 58/59 issue of biomass powerplant. Currently, the case is under consideration of Central Administration Court.

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Key Takeaways

"ACP1" VSPP Banbueng Project

Key Takeaways

ACE's Key Strengths and Opportunities

ABSOLUTE CLEAN ENERGY PUBLIC COMPANY LIMITED

1 Thailand's Leading Integrated Power Producer with Highest Growth Potential

- Largest and fast growing Biomass Power Producer supported by PPA with PEA in Thailand
- No. 1 Renewable Power Producer in Thailand in terms of Equity MW Growth

2 World Megatrend

- "Electrification" Era
- Global & Thailand Commitment to Zero Carbon which implies the rise of renewable energy
- Biomass is one of the most reliable renewable energy that can replace the base load provided by conventional energy.
- ESG Business

3 Continuous Growth from Projects in the Pipeline and Future

- Power Plant's PPA with exceptional tariff rate
- Better technology which leads to higher efficiency and less feedstock / kWh
- Economy of Scale resulting in lower CAPEX, OPEX, and SG&A
- Appreciation of THB potentially leads to lower CAPEX
- 28% share in the latest biomass power plant bidding

4 Efficient Operational Capabilities with Continuous Improvement

- Lower Feedstock and O&M cost which leads to higher margin
- Stronger creditworthiness which leads to lower financing cost
- Peer-to-Peer Electricity Trading which leads to additional electricity sales

5 Low Downside Risk

- Secured Demand & Cashflow (Long term Power Purchase Agreement with the Government)
- Proven Operational Excellence & Feedstock Management
- Our business model commits to the greater good and has a positive Total Societal Impact (TSI)

Strictly Private & Confidential

ABSOLUTE CLEAN ENERGY
PUBLIC COMPANY LIMITED

Thank You

For further inquiry

www.ace-energy.co.th

Email : ir@ace-energy.co.th