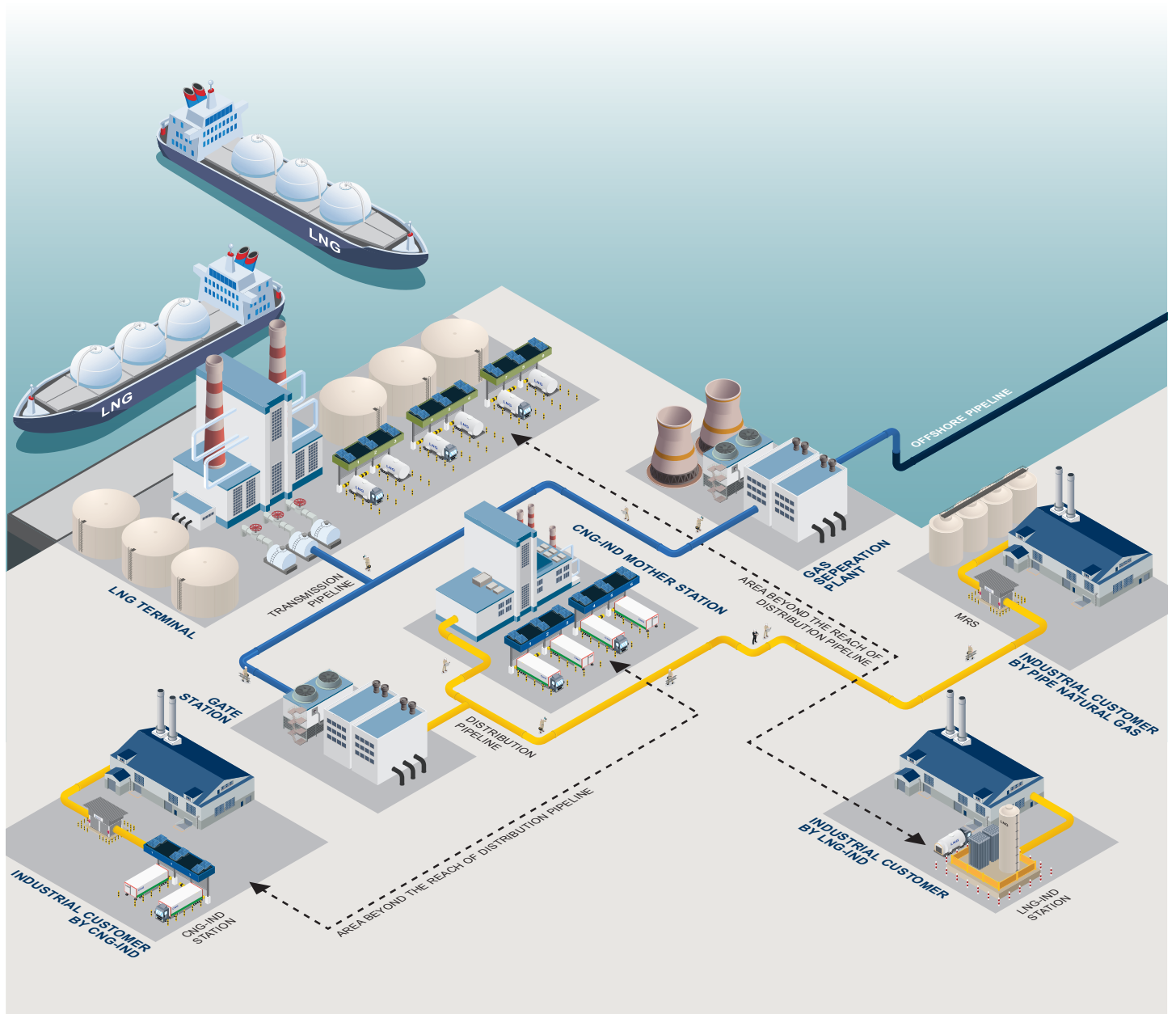
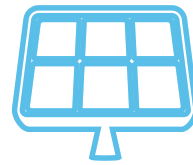


NATURAL GAS RETAIL

ENERGY SOLUTIONS





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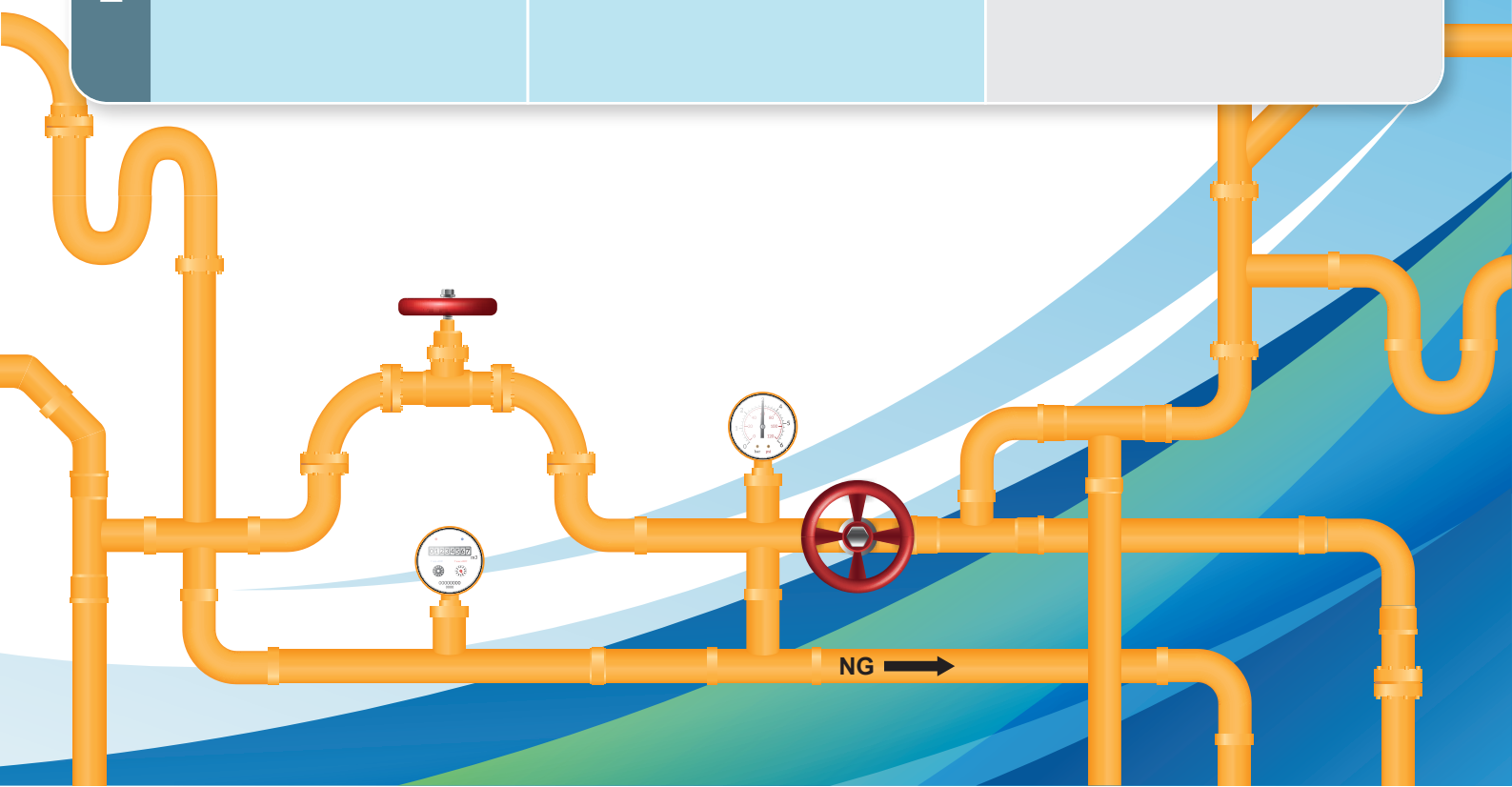
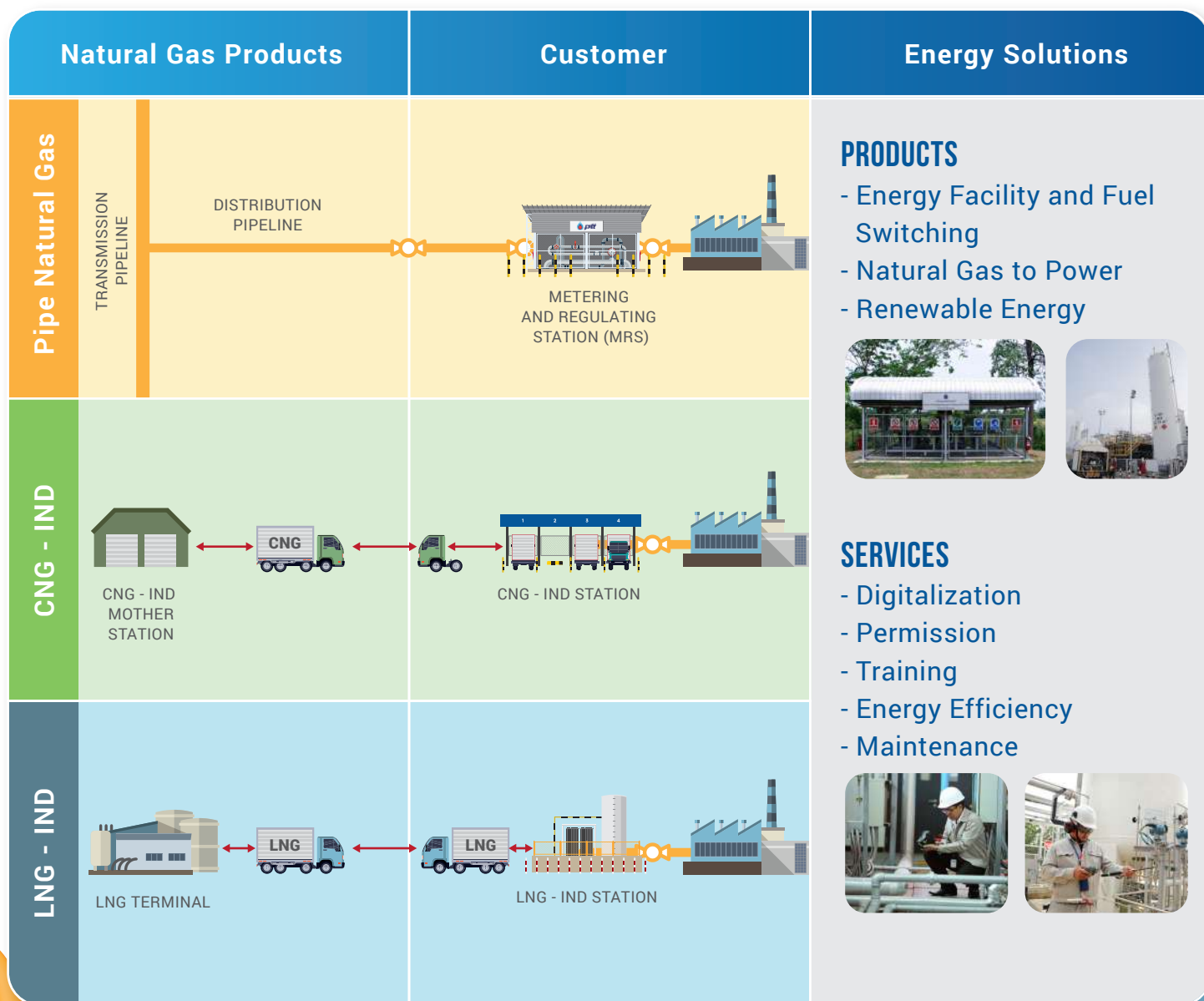
INTRODUCTION

PTT Public Company Limited (PTT) Natural Gas Retail (NGR) is the leading natural gas retailer that sell Natural Gas (NG) for industrial, cogeneration and commercial customers through distribution pipeline network stretching more than 500 km. in 14 provinces. NGR also supply Compressed Natural Gas for Industry (CNG-IND) and Liquefied Natural Gas for Industry (LNG-IND) for customers in area beyond the reach of distribution pipeline. Moreover, NGR offer the variety of energy management services

“ENERGY SOLUTIONS”.

SCAN TO SEE
**PTT NGR
INTRODUCTION
VIDEO**





01

Natural Gas Products and Standard Services



PIPE

NATURAL GAS

NGR SUPPLY NG BY DISTRIBUTION PIPELINE. WE DESIGN METERING AND REGULATING STATION (MRS) INCLUDING PIPELINE INSIDE FACTORY TO OPTIMIZE AND CONNECT WITH MACHINE BY THAI STANDARD AND REGULATION.

METERING REGULATING STATION

Type	Energy Consumption Comparison				Dimension (m)		Project Time* (Month)
	NG (MMBTUD)	LPG (Kg./Day)	Diesel (Liter/Day)	Fuel Oil (Liter/Day)	A	B	
Small	10-100	210-2,100	270-2,700	250-2,500	3.3	4.0	10
Medium	101-500	2,101-10,500	2,701-13,500	2,501-12,500	3.5	4.5	10
Large	501-1,000	10,501-21,000	13,501-27,000	12,501-25,000	4.0	5.0	10

NOTE : *Period for acquiring DOEB license and EIA/ER not included.



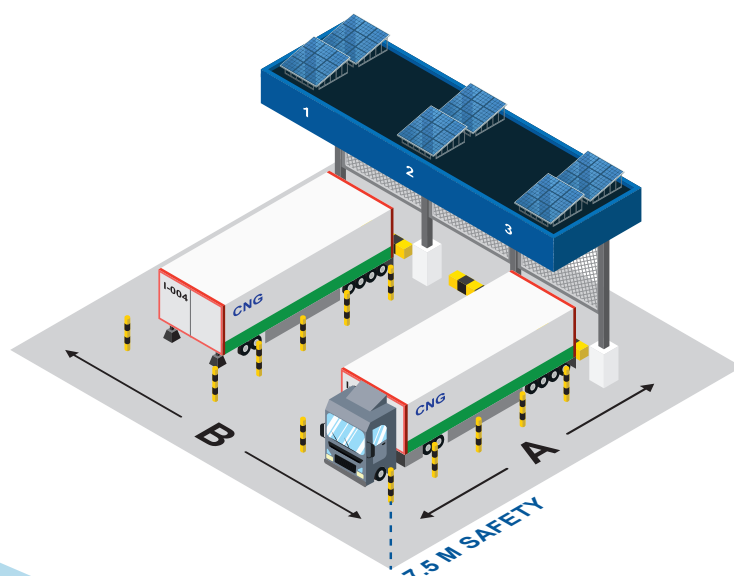
CNG-IND STATION

COMPRESSED NATURAL GAS FOR INDUSTRY (CNG-IND)

NGR SUPPLY NG BY CNG-IND SYSTEM. WE DESIGN CNG-IND STATION INCLUDING PIPELINE INSIDE FACTORY TO OPTIMIZE AND CONNECT WITH MACHINE BY THAI STANDARD AND REGULATION.

Type	Energy Consumption Comparison					Dimension (m)		Project Time* (Month)
	NG (MMBTUD)	CNG (Ton/Day)	LPG (Kg./Day)	Diesel (Liter/Day)	Fuel Oil (Liter/Day)	A	B	
Small	10-300	1-6	210-6,300	270-8,100	250-7,500	15.0	27.5	7
Standard	301-700	6-15	6,301-14,700	8,101-18,900	7,501-17,500	15.0	32.5	7

NOTE : *Period for acquiring DOEB license not included.



LIQUEFIED

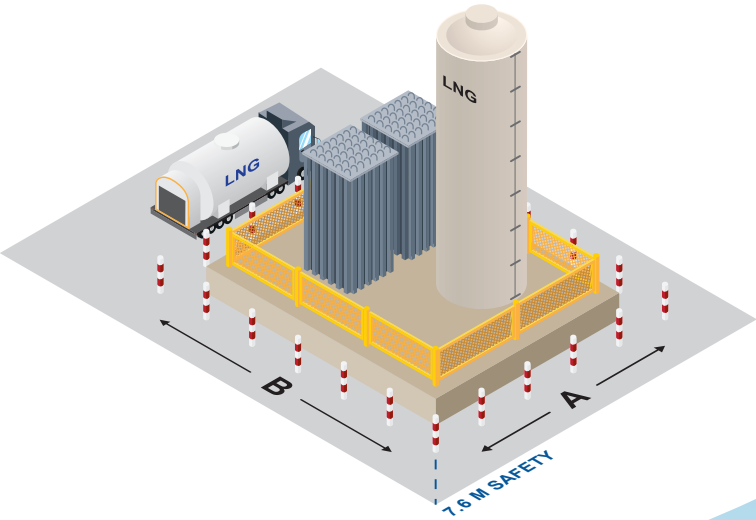
NATURAL GAS FOR INDUSTRY (LNG-IND)

NGR SUPPLY NG BY LNG-IND SYSTEM. WE DESIGN LNG-IND STATION INCLUDING PIPELINE INSIDE FACTORY TO OPTIMIZE AND CONNECT WITH MACHINE BY THAI STANDARD AND REGULATION.



Type	Energy Consumption Comparison					Dimension (m)		Project Time* (Month)
	NG (MMBTUD)	LNG (Ton/Day)	LPG (Kg./Day)	Diesel (Liter/Day)	Fuel Oil (Liter/Day)	A	B	
Small	10-300	0.2-6	210-6,300	270-8,100	250-7,500	6	10	7
Medium	301-500	6-10	6,301-10,500	8,101-13,500	7,501-17,500	9	10	7
Large	501-1,000	10-20	10,501-21,000	13,501-27,000	7,501-17,500	10	10	7

NOTE : *Period for acquiring DOEB license not included.



STANDARD SERVICES

WE PROVIDE STANDARD SERVICES FOR MRS, CNG-IND STATION AND LNG-IND STATION AS BELOW.

- FUEL SWITCHING AUDIT
- INTRODUCTION OF NG TRAINING
- SAFETY AUDIT
- START UP AND COMMISSIONING AUDIT
- ENERGY EFFICIENCY AUDIT
- GAS UTILIZATION PROBLEM SOLVING
- STATION MAINTENANCE
- NATURAL GAS SAFETY ROAD SHOW



02 | Energy Solutions



ESP PRODUCTS AND SERVICES

NGR ARE PROUD TO PRESENT THE VARIETY OF ENERGY SOLUTIONS PROVIDER (ESP) PRODUCTS AND SERVICES.

ESP PRODUCTS

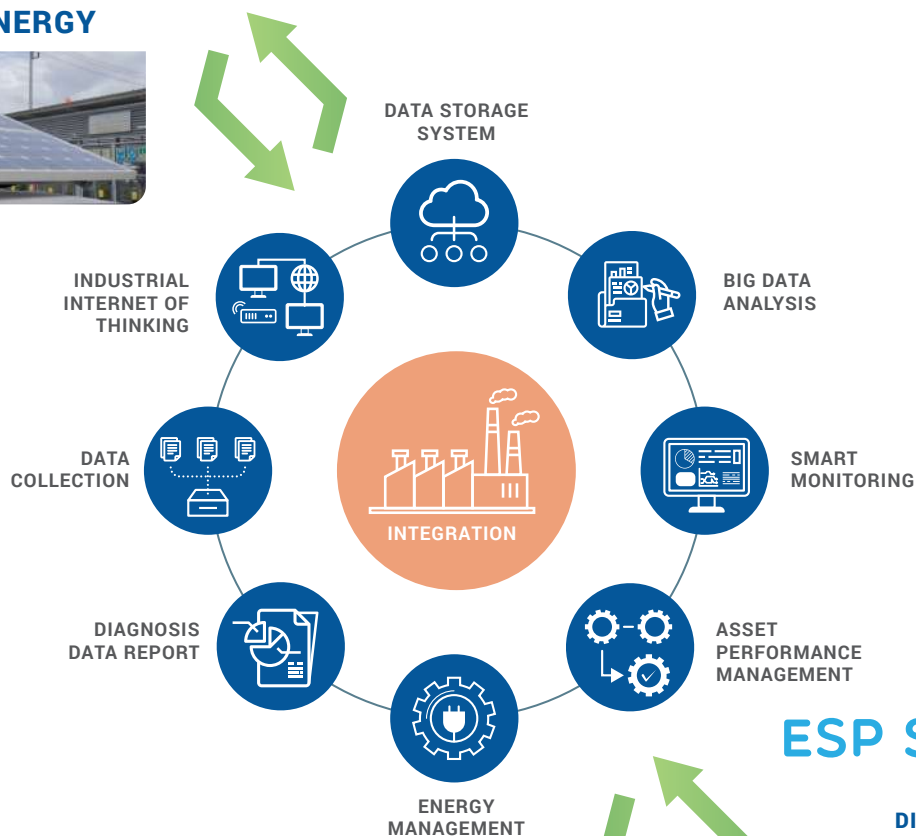
ENERGY FACILITY AND FUEL SWITCHING



NATURAL GAS TO POWER



RENEWABLE ENERGY



ESP SERVICES

DIGITALIZATION



PERMISSION



TRAINING



ENERGY EFFICIENCY



MAINTENANCE



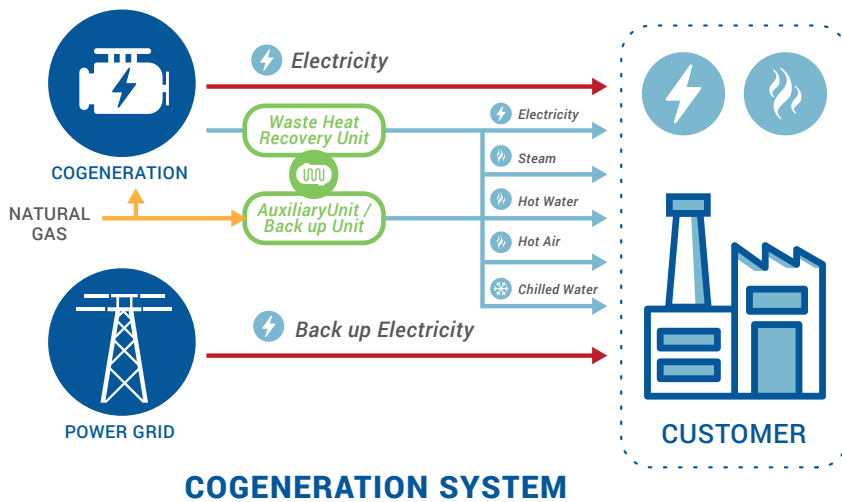
ESP PRODUCTS

ENERGY FACILITY AND FUEL SWITCHING

WE DESIGN AND CONSTRUCT, BASED ON THAI STANDARD AND REGULATION, ENERGY FACILITY SYSTEM AND ALSO PROVIDE GAS FUEL SWITCHING SERVICE CAUSING EFFICIENCY AND COST SAVING.



SCAN TO SEE
ENERGY FACILITY
AND FUEL SWITCHING
VIDEO



NATURAL GAS TO POWER

WE PROVIDE POWER GENERATION AND ENERGY MANAGEMENT SOLUTION USING COGENERATION SYSTEM.

GAS-FIRED GENERATOR

(GAS ENGINE AND GAS TURBINE)

- Directly generate electricity from mechanical power
- Produce waste heat as by-product
- High reliability
- High fuel efficiency



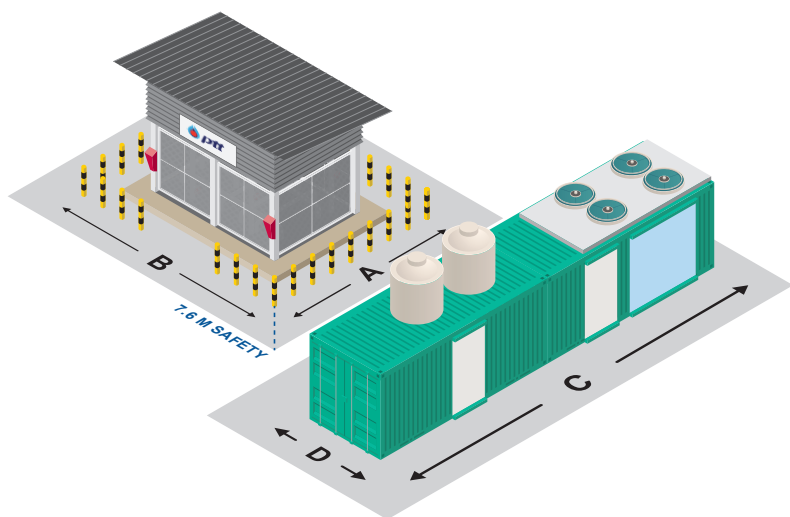
HEAT RECOVERY UNIT

- Steam: Heat recovery steam generator
- Hot water
- Hot air
- Chilled water : Absorption chiller
- High reliability
- Improve fuel efficiency



NATURAL GAS TO POWER

WE PROVIDE POWER GENERATION
FACILITY MODELS AS BELOW.



NATURAL GAS TO POWER STATION AND STANDARD SERVICES

STANDARD SERVICES

- Fuel switching audit
- Introduction of NG training
- Safety audit
- Start up & commissioning audit
- Energy efficiency audit
- Gas utilization problem solving
- Station maintenance
- Natural gas safety road show

Power Size	Natural Gas Consumption			Dimension (m)							
	NG (MMBTUD)	CNG (Ton/Day)	LNG (Ton/Day)	MRS		CNG-IND Station		LNG-IND Station		Generator Station	
				A	B	A	B	A	B	C	D
1 MW	222	5	4	3.3	4.0	15.0	27.5	6.0	10.0	16.0	11.0
2 MW	445	10	9	3.5	4.5	15.0	32.5	9.0	10.0	26.0	15.0
3 MW	681	15	13	4.0	5.0	-	-	10.0	15.0	26.0	15.0



SOLAR SYSTEM RENEWABLE ENERGY

WE OFFER SOLAR POWER FACILITY SYSTEM IN PRIVATE POWER PURCHASE AGREEMENT (PRIVATE PPA) OR ENGINEERING PROCUREMENT CONSTRUCTION (EPC) MODEL.

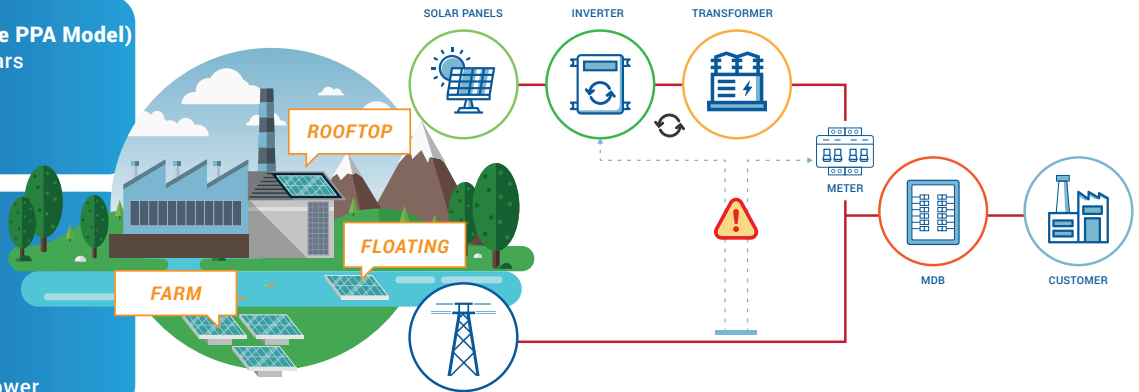
CUSTOMER BENEFIT

A : PTT Investment (Private PPA Model)

- Contract period: 15-20 years
- Project lifetime: 25 years
- Zero investment
- Discounted energy charge

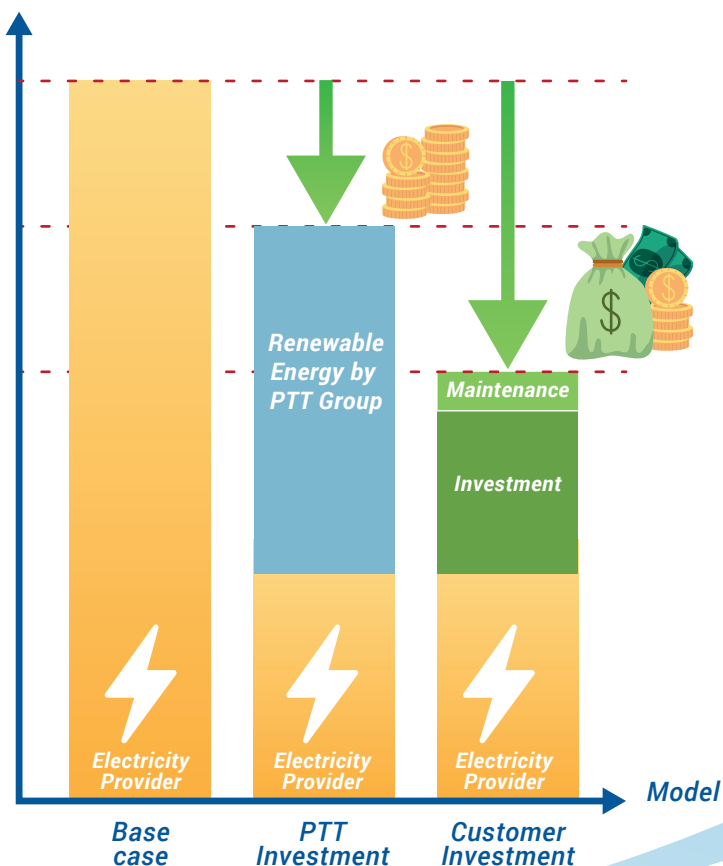
B : Customer Investment (EPC Model)

- Project lifetime: 25 years
- Full investment with BOI privilege
- O&M expense
- Fully benefit from solar power



CUSTOMER SAVING

Energy Cost



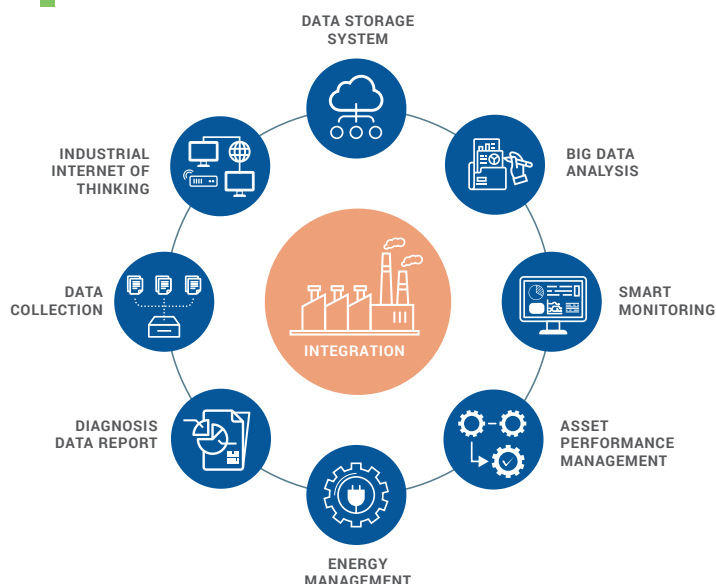
CUSTOMER BENEFIT	PRIVATE PPA MODEL	EPC MODEL
INVESTMENT	FREE	BY CUSTOMER
CONTRACT DURATION	10 – 20 YEARS	-
SAVING FROM SOLAR SYSTEM	ELECTRICITY CHARGE DISCOUNT	FREE OF ELECTRICITY CHARGE
PAYBACK PERIOD	IMMEDIATELY	< 5YEARS
WARRANTY	FREE (ALONG CONTRACT DURATION)	2 YEARS INSTALLATION WARRANTY
OPERATION AND MAINTENANCE SERVICES	FREE (ALONG CONTRACT DURATION)	BY CUSTOMER (OR ADDITIONAL SERVICE FROM PTT GROUP)
SYSTEM OWNERSHIP	TRANSFER TO CUSTOMER AT THE END OF CONTRACT.	CUSTOMER OWN THE SYSTEM SINCE COD*

*COD. Or "Commercial Operation Date", is the day that the system becomes fully operational and can begin generate the power.

ESP SERVICES

DIGITALIZATION

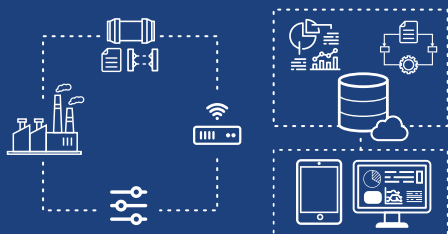
WE IMPROVE ENERGY MANAGEMENT SYSTEM BY DIGITAL TECHNOLOGY.



INDUSTRIAL HEALTH CHECK

- Energy consumption monitoring
- Energy trend monitoring
- Malfunction alert
- Data log report
- Machine maintenance guideline
- IoT connection
- Maintenance plan
- User-friendly

DIAGNOSIS THE DATA TO BETTER PERFORMANCE



IoT:

- Design
- Installation
- Data analysis
- Maintenance
- Application



RIGHT INFORMATION



RIGHT TIME



RIGHT PEOPLE



PERMISSION

WE OFFER CONSULTANCY AND PERIODIC TESTING REQUIRED FOR REGULATORY PERMIT/ LICENSE.

FULL SERVICE FOR DOEB LICENSE PERMISSION

- Annual test
- 3 – year term testing
- 5 – year term testing
- Renewal DOEB NG license
- Provide regulation document check list
- License fee included



SCAN TO SEE
PERMISSION
VIDEO



TRAINING

WE OFFER VITAL TRAINING
COURSES:

- NG utilization and efficiency
- DOEB NG worker
- DOEB pipeline operation worker
- Emergency exercise

SCAN TO SEE
TRAINING
VIDEO



ENERGY EFFICIENCY

WE PROVIDE ENERGY AUDIT AND CONSULTANCY AS REQUIRED BY LAW AND OFFER TAILOR-MADE SOLUTIONS TO IMPROVE ENERGY EFFICIENCY WITH/WITHOUT IOT TECHNOLOGY



SCAN TO SEE
ENERGY EFFICIENCY
VIDEO

CORRECTIVE AND PREVENTIVE MAINTENANCE

- Equipment function test
- Equipment calibration
- Pipeline repair
- CP design and inspection
- Gas leak detection by IR camera
- Corrosion protection by PTT Gunnim



SCAN TO SEE
CORRECTIVE AND PREVENTIVE
MAINTENANCE
VIDEO







CONTACT US

NATURAL GAS DISTRIBUTION MARKETING DEPARTMENT
PTT PUBLIC COMPANY LIMITED



555 VIBHAVADI RANGSIT ROAD,
CHATUCHAK, BANGKOK 10900



02-537-3235-9



02-537-3257-8



pttngr@pttplc.com



<https://pttngr.pttplc.com>

LINE OFFICIAL ACCOUNT
@PTTNGR

