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INTRODUCTION

PTT Public Company Limited (PTT) Natural Gas Retail (NGR) is the leading natural gas retailer that sells 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 areas beyond the reach of distribution pipeline. Moreover, NGR offer the variety of energy management services "ENERGY SOLUTIONS".
### Natural Gas Products

- **Pipe Natural Gas**
  - Distribution Pipeline
  - Metering and Regulating Station (MRS)

- **CNG - IND**
  - CNG - IND Mother Station
  - CNG - IND Station

- **LNG - IND**
  - LNG Terminal
  - LNG - IND Station

### Customer

This section is not fully visible in the image provided.

### Energy Solutions

**PRODUCTS**
- Energy Facility and Fuel Switching
- Natural Gas to Power
- Renewable Energy

**SERVICES**
- Digitalization
- Permission
- Training
- Energy Efficiency
- Maintenance
01 Natural Gas Products and Standard Services
PIE 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.

<table>
<thead>
<tr>
<th>Type</th>
<th>Energy Consumption Comparison</th>
<th>Dimension (m)</th>
<th>Project Time* (Month)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NG (MMBTU/D)</td>
<td>LPG (Kg./Day)</td>
<td>Diesel (Liter/Day)</td>
</tr>
<tr>
<td>Small</td>
<td>10-100</td>
<td>210-2,100</td>
<td>270-2,700</td>
</tr>
<tr>
<td>Medium</td>
<td>101-500</td>
<td>2,101-10,500</td>
<td>2,701-13,500</td>
</tr>
<tr>
<td>Large</td>
<td>501-1,000</td>
<td>10,501-21,000</td>
<td>13,501-27,000</td>
</tr>
</tbody>
</table>

NOTE: *Period for acquiring DOEB license not included.
CNG-IND STATION

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.

<table>
<thead>
<tr>
<th>Type</th>
<th>Energy Consumption Comparison</th>
<th>Dimension (m)</th>
<th>Project Time* (Month)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NG (MMBTU/Day)</td>
<td>CNG (Ton/Day)</td>
<td>LPG (Kg./Day)</td>
</tr>
<tr>
<td>Small</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10-300</td>
<td>1-6</td>
<td>210-6,300</td>
</tr>
<tr>
<td>Standard</td>
<td>301-700</td>
<td>6-15</td>
<td>6,301-14,700</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Type</th>
<th>Energy Consumption Comparison</th>
<th>Dimension (m)</th>
<th>Project Time* (Month)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NG (MMBTU/D)</td>
<td>LNG (Ton/Day)</td>
<td>LPG (Kg./Day)</td>
</tr>
<tr>
<td>Small</td>
<td>10-300</td>
<td>0.2-6</td>
<td>210-6,300</td>
</tr>
<tr>
<td>Medium</td>
<td>301-500</td>
<td>6-10</td>
<td>6,301-10,500</td>
</tr>
<tr>
<td>Large</td>
<td>501-1,000</td>
<td>10-20</td>
<td>10,501-21,000</td>
</tr>
</tbody>
</table>

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
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 and Training**

**Energy Efficiency and Maintenance**
ESP PRODUCTS

ENERGY FACILITY AND FUEL SWITCHING

We design and construct energy facility system by Thai standard and regulation also fuel switching machine to gas fuel with efficiency and cost saving.

ENERGY FACILITY AND FUEL SWITCHING

We provide power generation and energy management solution by cogeneration system.

NATURAL GAS TO POWER

We provide power generation and energy management solution by cogeneration system.

GAS-FIRED GENERATOR
(GAS ENGINE AND GAS TURBINE)

- Directly generate electricity from mechanical power
- Produce hot 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.

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

<table>
<thead>
<tr>
<th>Power Size</th>
<th>Natural Gas Consumption</th>
<th>Dimension (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NG (MMBTUD)</td>
<td>CNG (Ton/Day)</td>
</tr>
<tr>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>1 MW</td>
<td>222</td>
<td>5</td>
</tr>
<tr>
<td>2 MW</td>
<td>445</td>
<td>10</td>
</tr>
<tr>
<td>3 MW</td>
<td>681</td>
<td>15</td>
</tr>
</tbody>
</table>
WE OFFER SOLAR POWER FACILITY SYSTEM IN PRIVATE POWER PURCHASE AGREEMENT (PRIVATE PPA) OR ENGINEERING PROCUREMENT CONSTRUCTION (EPC) MODEL.

CUSTOMER BENEFIT

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

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

CUSTOMER SAVING

SOLAR PANELS
- Produce electricity from sunlight
  ~ 20% efficiency
- Top brand in Tier 1 Bloomberg NEF
- Linear power warranty 25 years
- Average production 4.5 hrs./day
- DC current

SOLAR GRID-TIE INVERTER
- DC to AC current conversion ~ 98% efficiency
- Power grid synchronization
- Solar panel efficiency optimization
- Real-time monitoring
- Anti-islanding protection

POWER TRANSFORMER
- Voltage regulation

DIGITAL ELECTRICITY METER
- Solar energy measurement
ESP SERVICES

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

ENERGY SOLUTIONS PLATFORM
- Energy Consumption
- Maintenance
- Report
- World Trend
- Other
- Other

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
- Yearly testing
- 5-year term testing
- DOEB standard
- Regulation document list
- Credence

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

ENERGY EFFICIENCY

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
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