

# PYRAMID E&C

## Flared and Stranded Gas Solutions

- **Hydrogen units**
- **Methanol Plants**
- **Ammonia Plants**



# Our Offering

Pyramid E&C offers compact, modular solutions to monetize flared or stranded natural gas into Syngas and thereafter into Hydrogen, Methanol or Ammonia by latest generation Catalytic and Pressure Swing Adsorption (PSA) processes. Syn Gas is reformed using proprietary NICR® technology, which uses electricity to power the endothermic reaction hence eliminating open flame, associated hazards, and pollution at the installation. All the plants are containerized to prevent rust and damages during shipment. The key design features include:

Compact and Mobile



Quick Start and Stop



Six months delivery



No Flaring



Renewable power options



Low Carbon footprint



Five years Catalyst life



Containerized Shipping



Safe



No Flames



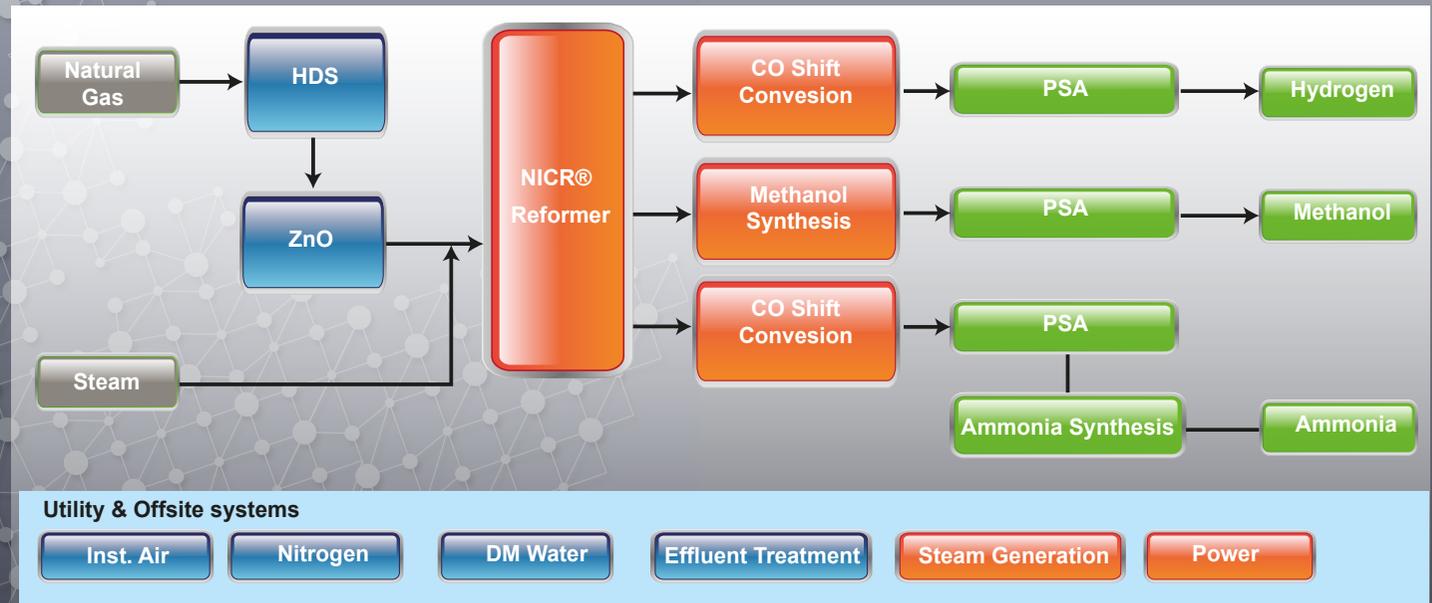
Remote Monitored



Unmanned operation

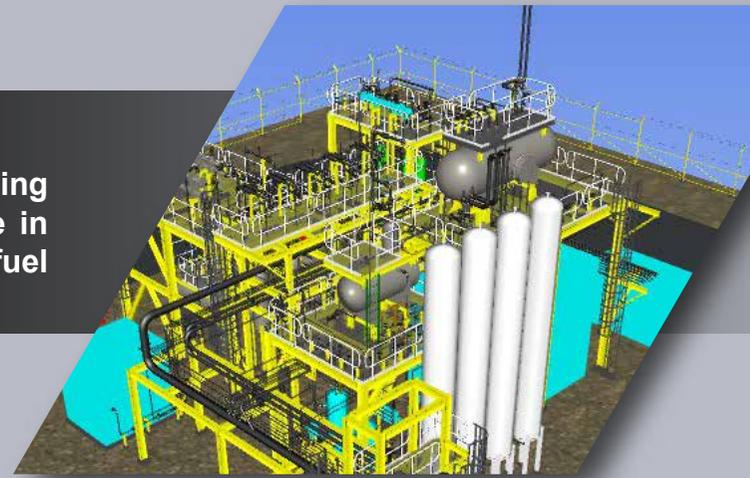


The hydrogen, methanol and ammonia plants supplied by Pyramid E&C comprise of containerized units which can be readily installed, commissioned, and operated. The plants are performance tested at our manufacturing facilities before shipping.



# HYDROGEN

Pyramid E&C offers cost-effective, small-scale plants capable of producing Hydrogen using natural gas. After purification, hydrogen gas has major usage in hydrogenation of Sulphur compounds in diesel and gasoline, as an automotive fuel itself and as building block of several downstream chemicals.



## Standard Sizes (Hydrogen output)

- 100 NM<sup>3</sup>/hr. (0.1 MMSCFD)
- 500 NM<sup>3</sup>/hr. (0.5 MMSCFD)
- 1000 NM<sup>3</sup>/hr. (1.0 MMSCFD)

## PROCESS

Gas Treatment and Compression Natural gas is compressed and treated to remove hydrocarbon liquids, water, and acid gases.

## Reforming

The proprietary Electric Reformer (NICR®) comprises of electrically heated tubes containing Ni catalyst pellets. When steam and natural gas are passed through the tubes over the catalyst, a reaction occurs producing the synthetic gas (Syngas) made up of hydrogen and carbon monoxide. The syngas from the reformer is cooled in a waste heat recovery boiler to raise high pressure steam.



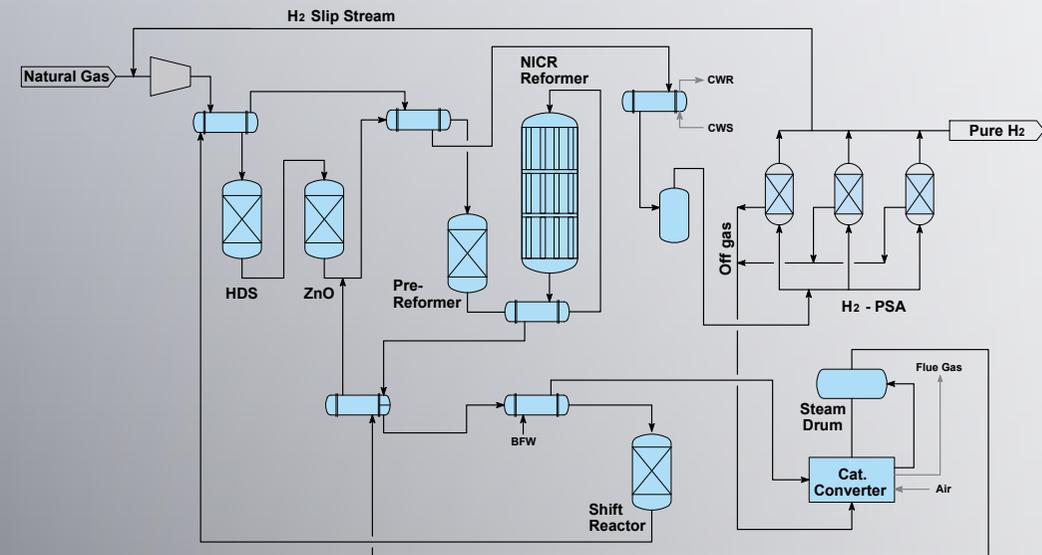
## Shift Conversion

The cooled syngas from the reformer is directed over the shift catalyst to lower the concentration of carbon monoxide in the syngas and increase the yield of hydrogen. The shift reactor converts majority of carbon monoxide and steam to hydrogen and carbon dioxide. The gases from shift converter are cooled to ambient temperature before entering the PSA unit.



## Hydrogen Purification

The mixture thus obtained is purified in Pressure Swing Adsorption (PSA) Unit. At high pressure, the off gases are adsorbed on adsorbent and pure H<sub>2</sub> is recovered in main gas stream. The off gases from PSA are released during low pressure cycle and consumed in a catalytic converter to heat incoming natural gas stream the boiler feed water (BFW) to steam.



# METHANOL

The modular plants for producing methanol using natural gas are a great option for stranded gas monetization as product can be trucked. Methanol can be used as automotive fuel, hydrate preventive agent, industrial solvent, and building block for formaldehyde, MTBE, acetic acid, DME etc.

## Standard Sizes (Methanol Production)

- 25 TPD
- 50 TPD
- 100 TPD

## Process

### Gas Treatment and Compression

Natural gas is compressed and treated to remove hydrocarbon liquids, water, and acid gases.

## Reforming

The reforming process comprises of the proprietary Electric Reformer (NICR®) using electrically heated tubes filled with Nickel catalyst pellets. The steam and natural gas are heated to high temperature passed through the tubes to produce synthetic gas (Syngas). The hot syngas from the reformer is cooled by exchanging heat with the incoming natural gas stream.

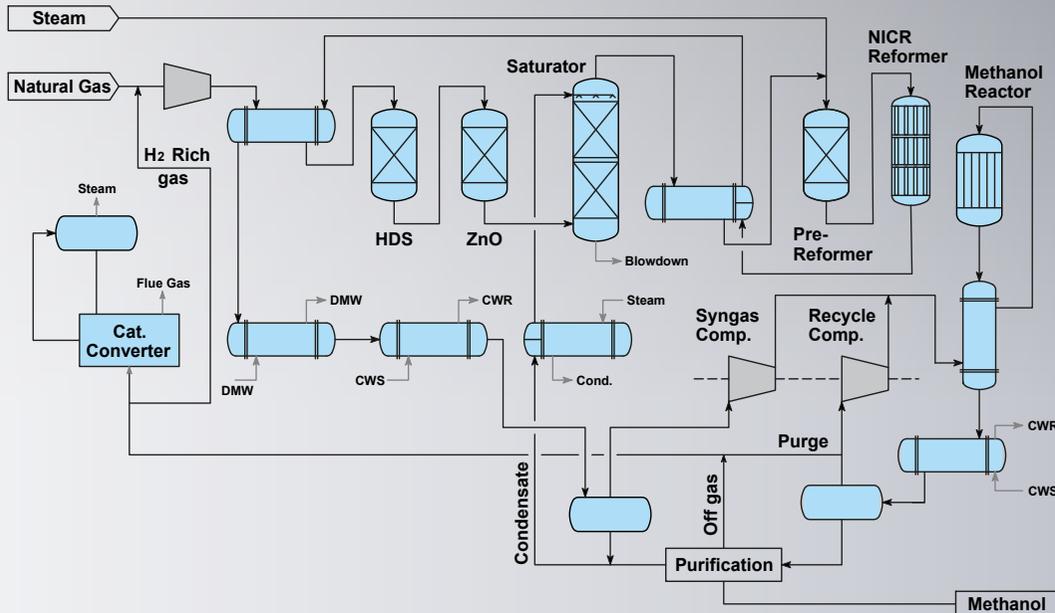
## Methanol Synthesis

The cooled Syngas is then compressed and sent to methanol converter where conversion of syngas into methanol takes place. The methanol thus produced contain small amounts of water, dissolved gases and byproducts and needs to be purified. Synthesis is an exothermic reaction and hence operated under low temperature and high-pressure conditions.

## Methanol Purification

The raw methanol from the converter is evaporated using the heat from gases exiting the reformer and separated from rest of the components by Pressure Swing adsorption.

The off gases from the methanol purification unit are consumed in a catalytic converter to heat the boiler feed water (BFW) to steam.



# AMMONIA

Pyramid E&C offers cost-effective, small-scale ammonia production plants using steam reforming of natural gas and nitrogen. The low-cost plant is a profitable option for monetizing natural gas as global demand for ammonia is increasing for usage as fuel, fertilizer, hydrogen carrier as well as refrigerant.



## Standard Sizes (Ammonia Production)

- 25 TPD
- 50 TPD
- 100 TPD

## PROCESS

Gas Treatment and Compression

Feed Gas is compressed and treated to remove natural gas liquids, water and acid gases.

### Reforming

The steam reforming process is carried out in the proprietary Electric Reformer (NICR®) using electrically heated tubes filled with Nickel catalyst pellets. An Air separation plant is used for providing oxygen required for partial oxidation of natural gas and nitrogen for ammonia synthesis converter. The hot syngas from the reformer is cooled in a series of heat exchangers to recover heat.

### Shift Conversion

The cooled syngas from the reformer is directed over the shift catalyst to lower the concentration of carbon monoxide in syngas and increase the yield of hydrogen. The gases from shift converter are cooled before entering the purification unit.

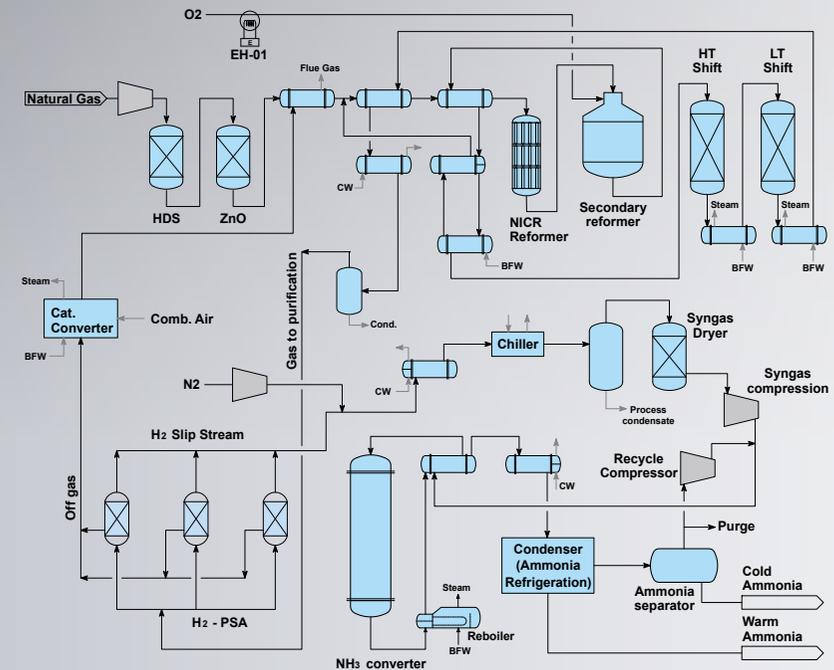
### Purification

A Pressure Swing Adsorption unit is employed to separate hydrogen from syngas. The off gases from the PSA unit are consumed in a catalytic converter to heat incoming natural gas stream.

### Ammonia Synthesis

The purified hydrogen is mixed with nitrogen in desired proportion, compressed and fed to ammonia synthesis reactor consisting of two stage fixed beds with intermediate cooling. The product gas from the synthesis converter is cooled by incoming syn gas natural gas and condensed to get liquid ammonia.

The off gases from PSA are released during low cycle and consumed in a catalytic converter to heat the boiler feed water (BFW) to steam.



# PYRAMID E&C

## About Pyramid E&C

Pyramid E&C is an international engineering company having core competence of supplying Technology, Products and Solutions for Conventional and Renewable hydrocarbon processing facilities. Our centers of excellence in US and India have capabilities of Research, Prototype Development, Manufacturing, Automation and Modular fabrication up to 1000 tons. We specialize in fast track deliveries by using standard plant configurations and modularization.

Pyramid E&C engineering and project management centers in Houston, London, UAE, and India have delivered 700 projects worldwide since 1995, supporting our customers in all stages of development, from feasibility studies through financial engineering, manufacturing, supply, project management, installation, commissioning and operation of facilities.

### Web Contact

URL : [www.pyramidenc.com](http://www.pyramidenc.com)

Enquiry : [sales@pyramidenc.com](mailto:sales@pyramidenc.com)

Americas & Caribbean  
**Houston, USA**

#### Pyramid E&C LLC.

1255 Enclave Parkway  
Suite 102  
Houston TX 77077  
USA

**Anant Bajpai**

+1 713 429 5499

Middle East & Africa  
**Dubai, UAE**

#### Pyramid E&C FZE

48 BurjGate Tower  
Level 20  
Dubai  
United Arab Emirates

**Prakash Pardasani**

+971 4 518 2635

Europe & Russia  
**Newbury, United Kingdom**

#### Pyramid E&C LTD.

Dominion House  
Kennet Side, Newbury  
RG14 5PX  
United Kingdom

**Manj Duhra**

+44 16357 22014

Asia Pacific  
**Mumbai, India**

#### Pyramid E&C LTD.

4th Floor, Hamilton 'A' Wing  
Hiranandani Business Park  
Thane, Mumbai - 400 607  
India

**Harshad Shah**

+91 22 4038 1000