



UOP Olefins Seminar;  
Efficient Monetization of  
Natural Gas and LPG

UOP Limited – Nigel Orchard  
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[VCMStudy.ir](http://VCMStudy.ir)

## INTRODUCTION

Enabling Iran's Future Through  
Partnership and Technology

**Honeywell**  
UOP

# UOP Creates Knowledge for the Oil and Gas Industry



UOP technology makes more than 60% of the world's gasoline, 70% of its polyester and 90% of biodegradable detergents, and processes more than 40% of its LNG

## Better Economics

UOP technologies offer a high return on investment

## Continuous Innovation

Continuous technology improvement allows customer operations to remain cutting edge

## Reliability

UOP technologies are among the most widely proven in the world

## Expertise

UOP has a century-long record leading technology development for the oil and gas industry

- Process Technology
- Catalysts
- Adsorbents
- Equipment
- Services

**2,500**

Engineers and scientists



**200** with PhDs

**31** out of **36** refining technologies in use today were developed by

**UOP**

**Largest**

process licensing organization in the world



**3,000+**  
Active patents

**800+**

R&D employees



# UOP Lines of Business

**A century of experience in refining, petrochemicals and natural gas**

Innovative solutions that make customers more efficient and profitable

## Process Technology & Equipment



Technology solutions and equipment for refineries and petrochemical plants

- Transportation fuels
- Chemical feedstocks
- Additives

## Catalysts, Adsorbents & Specialties



Enables the chemical reactions that make fuels and petrochemicals

- Catalysts for refineries and petrochemical plants
- Adsorbents for separations and purification

## Gas Processing & Hydrogen



Technology solutions and equipment for natural gas and hydrogen

- Natural gas purification
- Liquids recovery and upgrading
- Hydrogen recovery and purification

## Renewable Energy & Chemicals



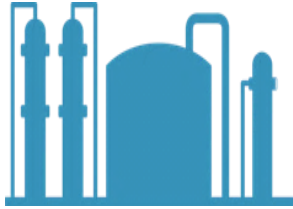
Technology to make fuels and chemicals from renewable sources

## Software Solutions



UOP/HPS software to advance project execution and improve plant operations

# Performance Materials & Technologies



Honeywell is a global leader in designing and creating high-quality performance chemicals, materials and process automation technologies

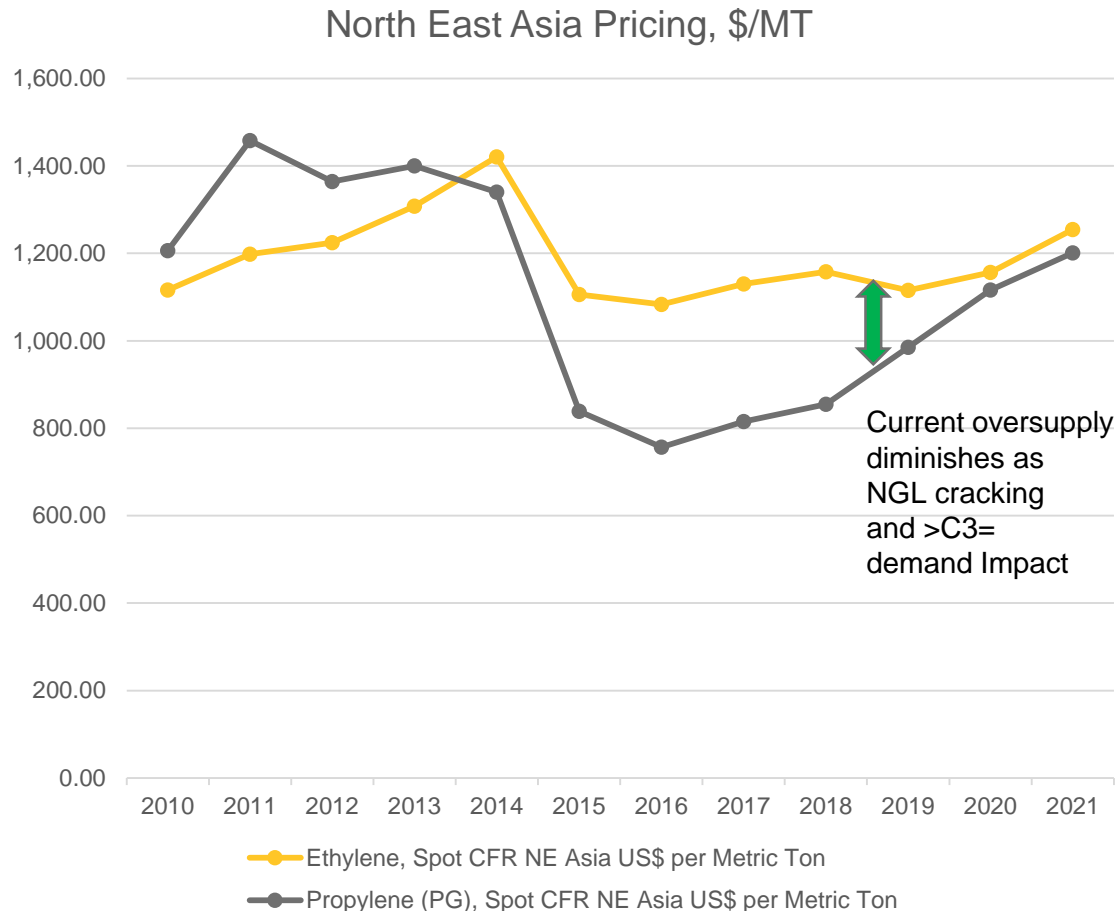
## UOP

- 31 of 36 today's refining technologies were developed by UOP
- UOP technology makes more than:
  - 40% of the world's LNG
  - 60% of the world's gasoline
  - 70% of polyester
  - 90% of biodegradable detergents
- UOP technologies offer a high ROI

## Process Solutions

- #1 in Refining & Petrochemical Automation
- Honeywell Process Solutions are installed at nearly half of the world's refineries helping to refine nearly 40 million barrels of oil a day
- Awarded Frost & Sullivan's 2014 "Main Automation Contractor of the Year"

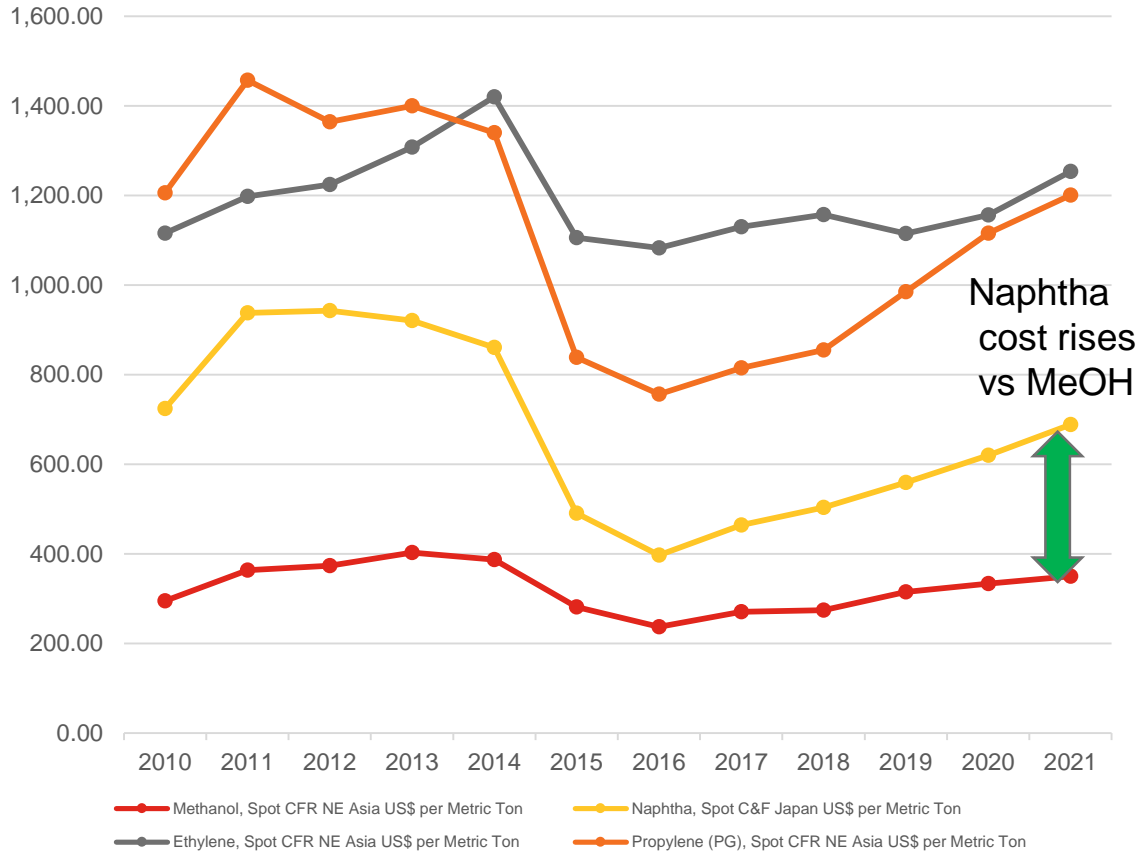
# Outlook for Light Olefins Pricing



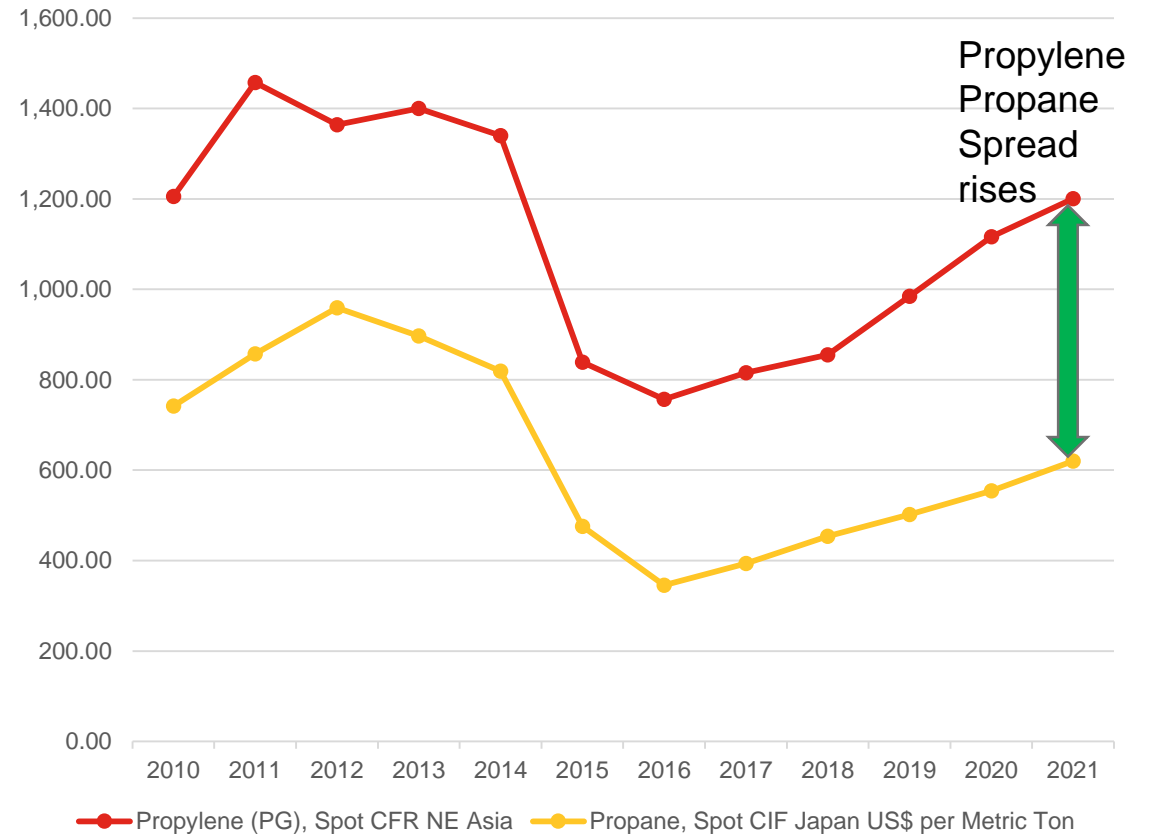
- 2015-2017
  - Propylene capacity additions come on stream at a faster rate than demand growth.
- 2018-2020
- Propylene pricing rises to Ethylene levels by 2020 due to:
  - Previous global propylene capacity overbuild outweighed by demand growth
  - Additional Asia Region Polypropylene capacity
  - Asia Region to become net exporter of polypropylene driving propylene demand & pricing up

# Why are On-purpose Routes to Olefins Attractive

MeOH, Naphtha, C2=, C3= Pricing  
North East Asia Pricing, \$/MT



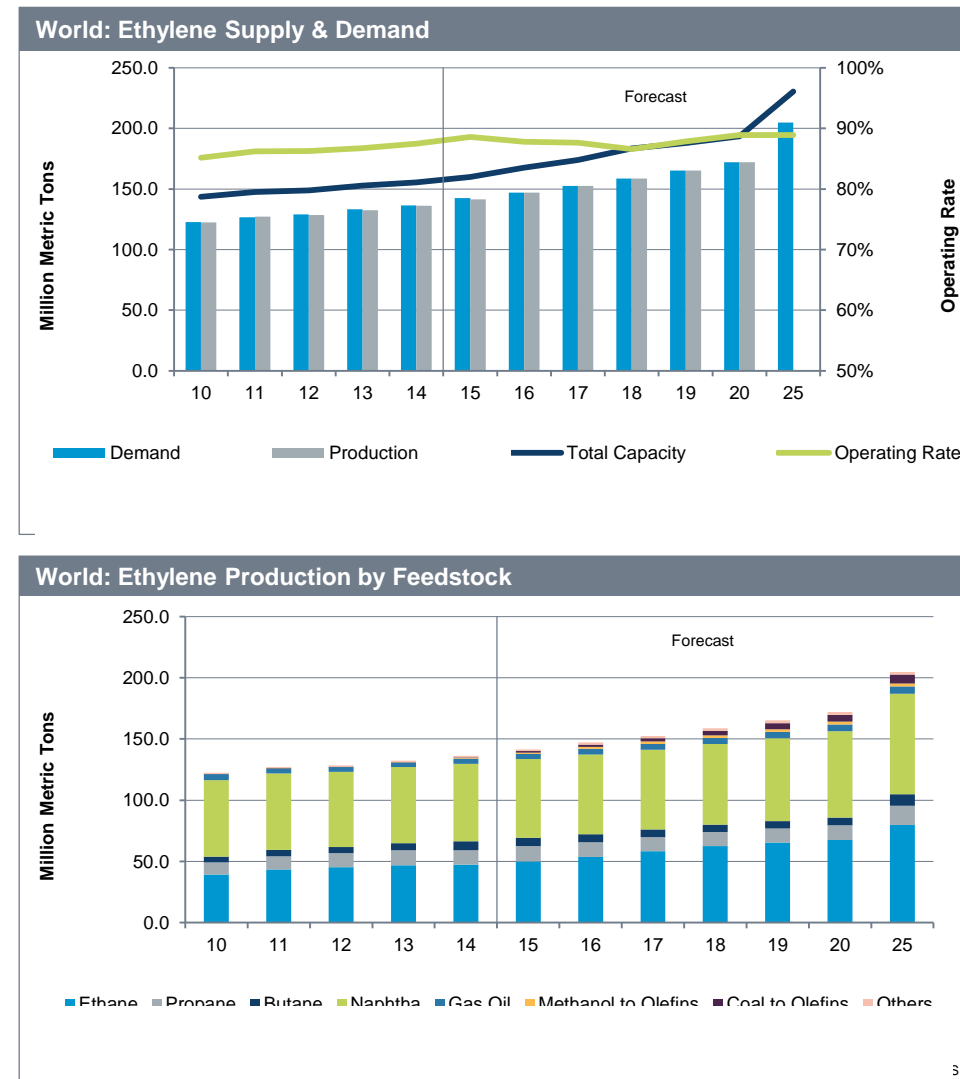
Propane / C3= Price spreads  
North East Asia Pricing, \$/MT



# Ethylene markets continue balanced

- Global Ethylene markets are healthy:
  - **Demand growth, 3.7%**
  - Current utilization ~88%
  - Demand and production aligned over period
- North East Asia and US are largest producers but Middle East investment propels them into third place.
- Investment in feedstock advantaged regions will displace traditional production (eg Europe)
- **NGL feedstock usage growing due to Shale**
- Growth at slightly higher than GDP in developed due to middle class expansion

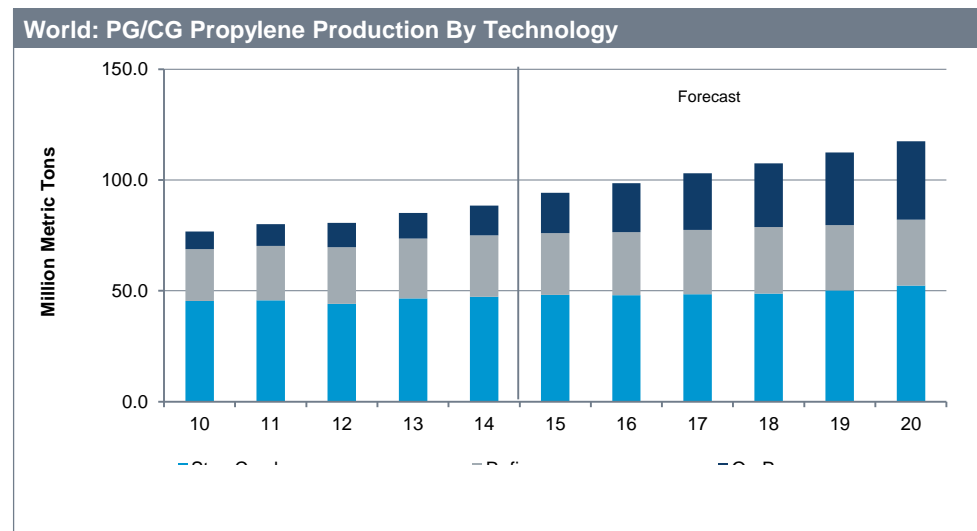
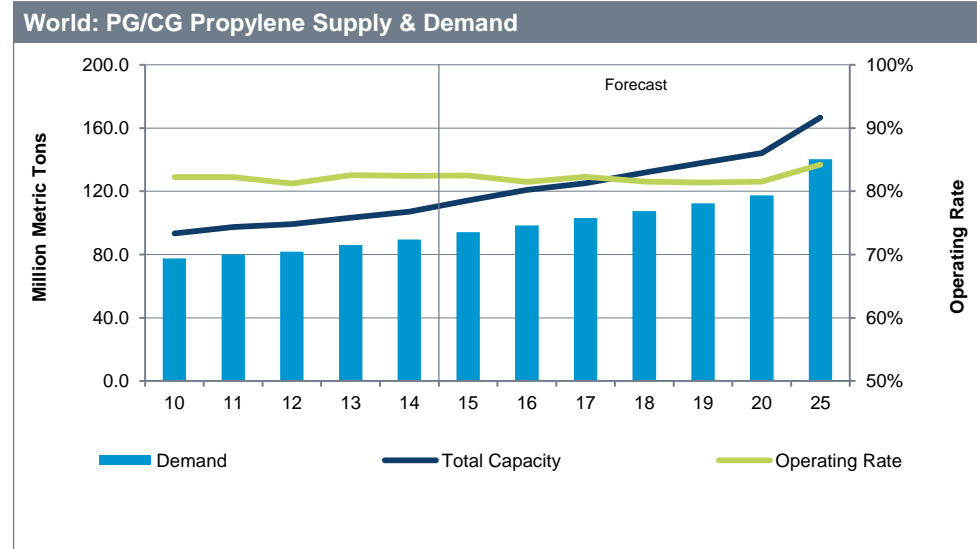
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**Middle Eastern production dominates and NGL use increases**

# Propylene market remains very attractive

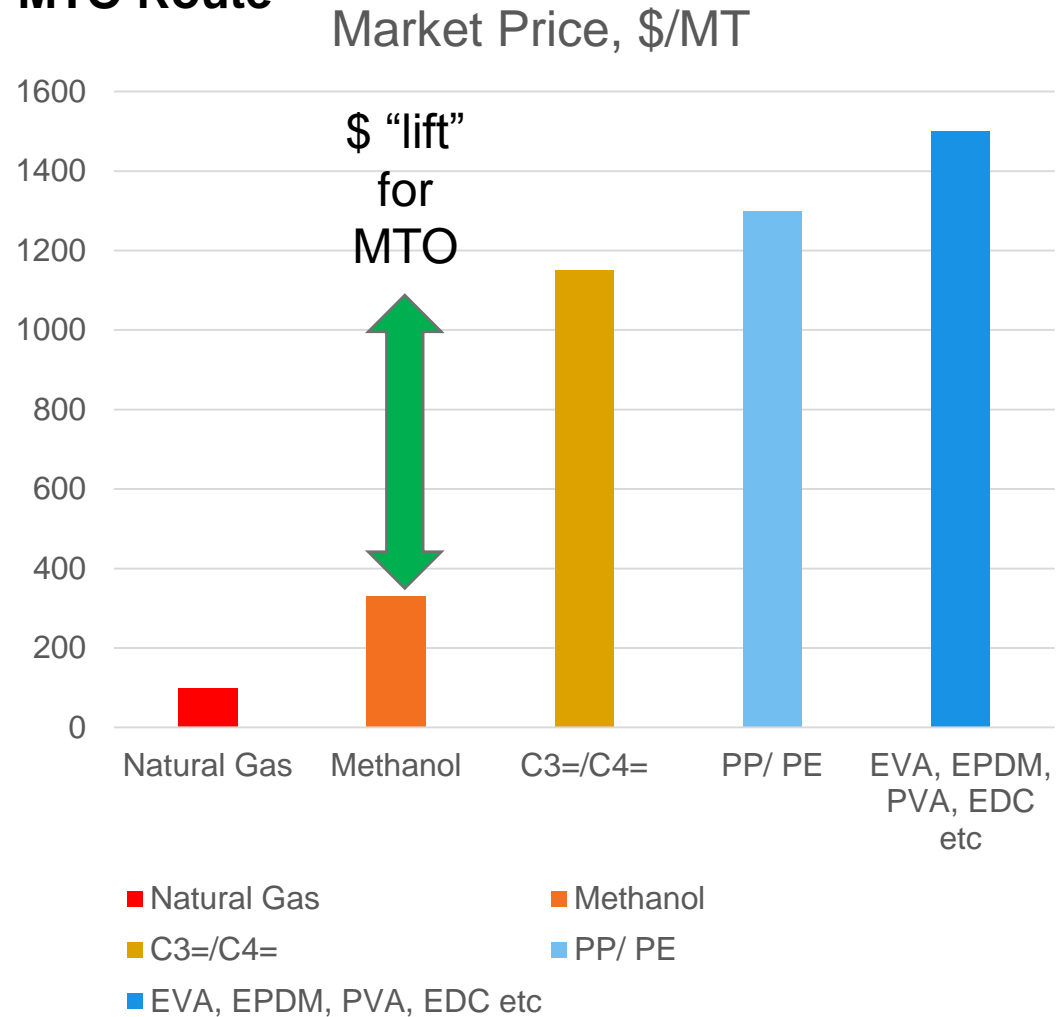
- On a global basis, propylene markets are healthy
  - Demand growth, 4.5%
  - Current utilization ~82%
  - Demand growth begins to exceed capacity gains by 2019
- **Steam cracking propylene supply weakens**
- **Increase in Light cracker feedstocks reduces C3= from steam crackers.**
- **On-purpose technology** has grown rapidly and now has a significant share of the market (~20%)
- Natural Gas Liquids offer profitable route to on-purpose propylene
- Growth higher than C2= due to increase rate of new product applications



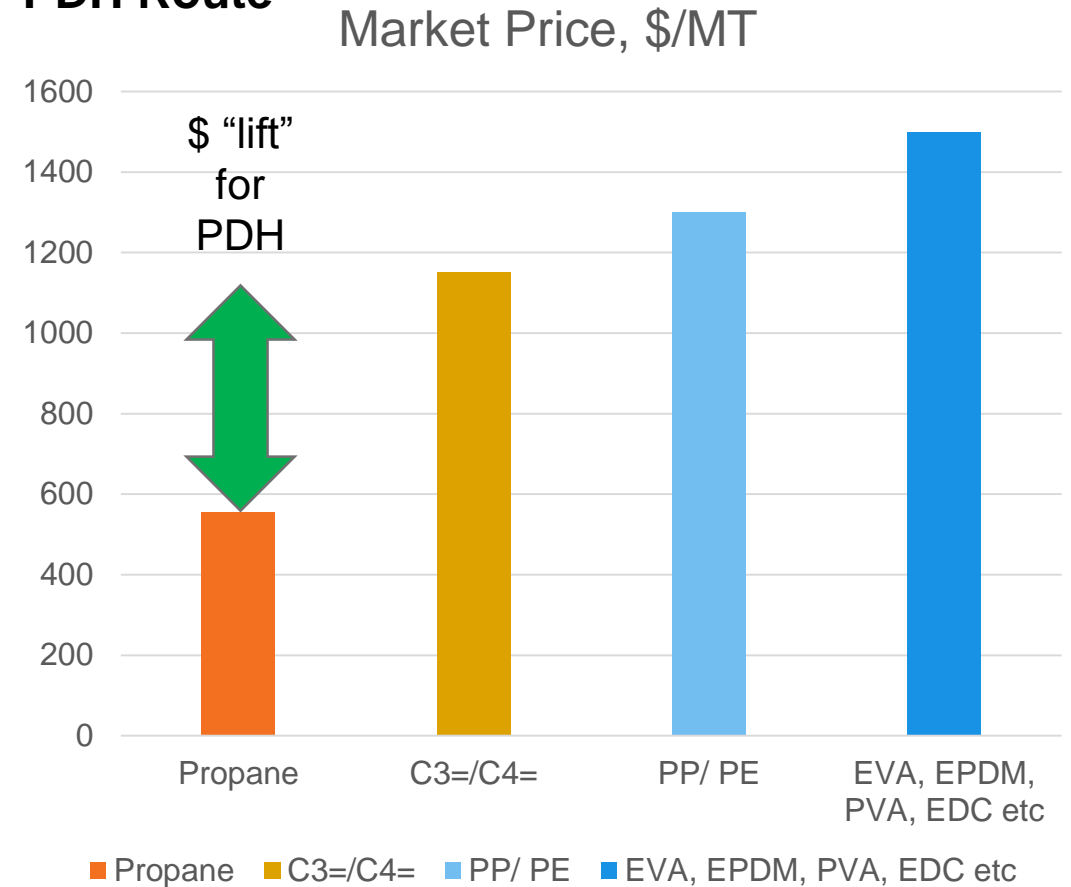


# Value chain uplifts

## MTO Route

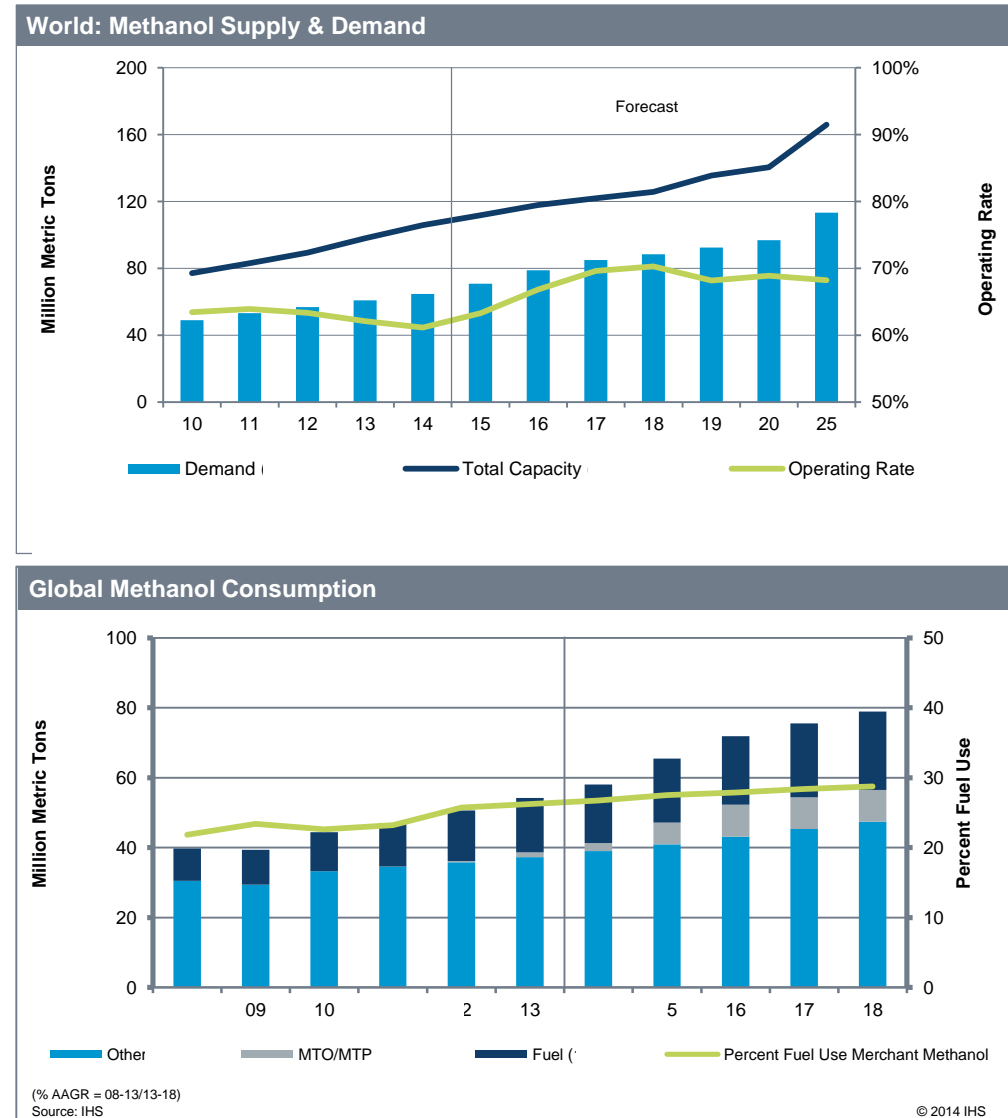


## PDH Route



# Methanol demand shifting to new applications

- Real methanol market globally is very small
- Uses are
  - Chemicals production eg Formaldehyde, Acetic Acid, Methyl Methacrylate,
  - Fuels blending – eg MTBE, Biodiesel
  - MTO Feedstock
- Annual demand growth varies greatly by application:
  - Traditional chemicals 1-2%
  - Fuels 4-5%
  - MTO 9-10%
- Market price for Methanol does not grow in the same way as the olefin price



# Iran – Gas and LPG availability

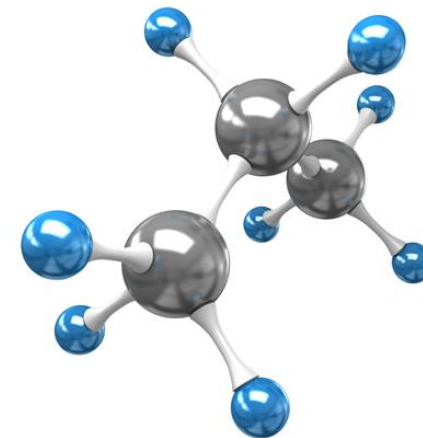
## GAS

- Iran is rich in
  - Gas
  - Condensate
  - Oil
- Global gas price will limit LNG export
- Gas will continue to be available at advantaged pricing to ensure utilisation



## LPG

- 2015
  - Condensate production 493K b/d
  - NGL production 215K b/d
- 2016 forecast
  - Condensate production 599K b/d
  - NGL production 215K b/d
- Continuing increase in C3/C4 Production
  - Assuliyah 20 trains produce up to 2000MT/SD of Propane each. Propane is abundant



# Agenda

*Introduction*

Nigel Orchard

*Iran Market Drivers*

Siamak Adibi – FGE

*Propane Utilization – Oleflex™*

Kevin Whitehead

*Gas Monetisation – Advanced MTO*

Richard Smith

*Integrated Process Automation* E.Alepochoritis & P.Millette

*Honeywell in Iran*

Frans van Deursen