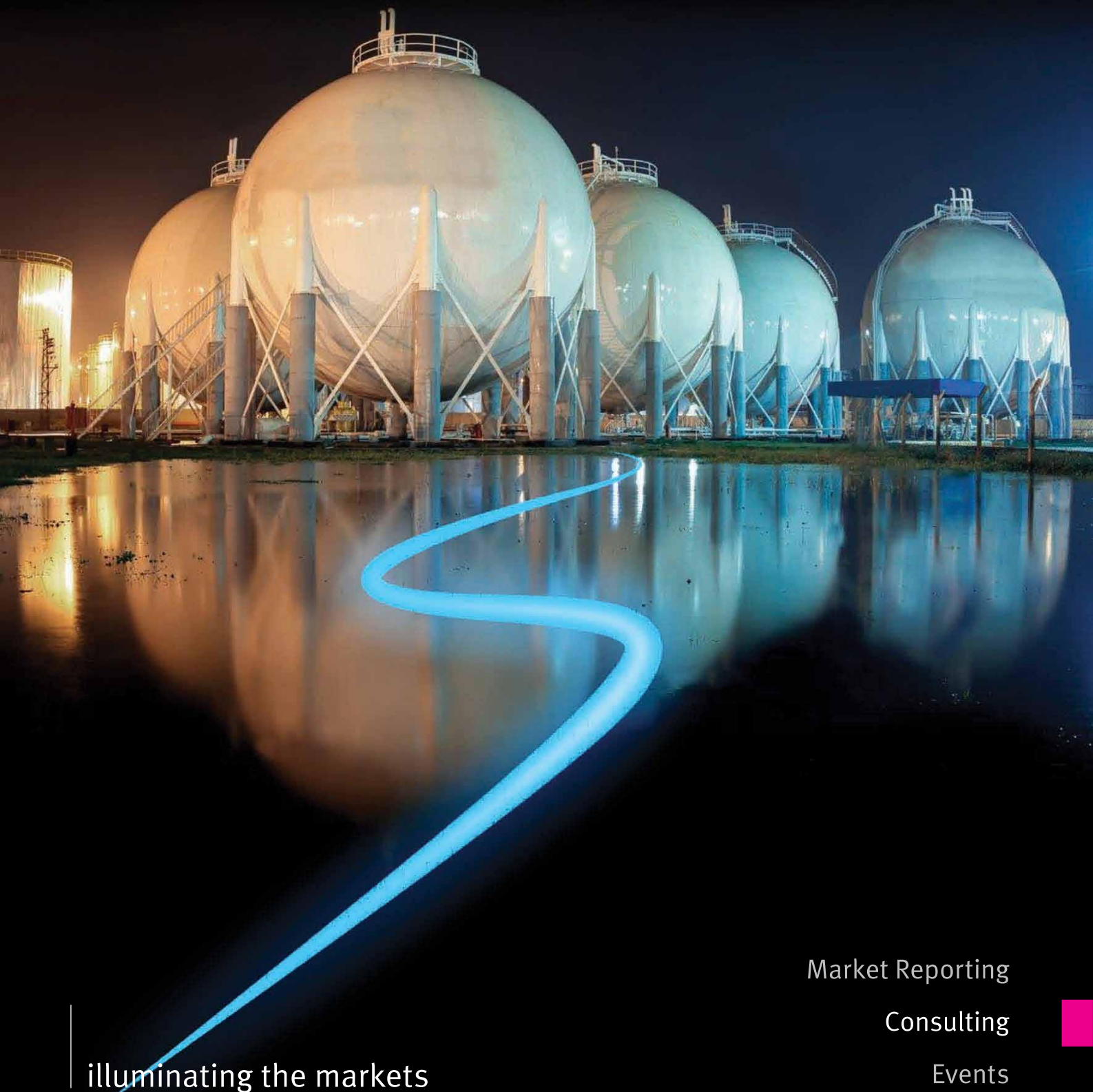


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# Argus LPG Annual 2017

LPG fundamentals and international prices: A 10 year forward view

Part of the Argus Analytics - LPG Service



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## ARGUS LPG ANALYTICS TEAM

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### David Appleton, Editor - Argus LPG Annual

David Appleton is a Senior Analyst at Argus, specializing in LPG markets. He is responsible for delivery of the global and European LPG statistical reviews which Argus publishes in partnership with WLPGA and AEGPL each year. He is also the editor of the Argus LPG Outlook, deputy editor of Argus LPG World, and manages Argus Analytics - LPG Service, a long-term fundamentals and price forecasting product. Prior to joining Argus, David spent six years at the European LPG Association, where in his role as public affairs manager, he promoted and defended the interests of the downstream European LPG sector in the Brussels energy policy sphere. David holds a BscEcon in Politics and Economics and a Masters in International Development.

### Jonty Richardson

Jonty graduated from the University of Cambridge with a degree in Land Economy, focusing on macro and micro economics, statistics and environmental policy. He is a member of the fundamentals team within Argus Consulting with a focus on crude and refined products. Jonty has extensive experience working with both excel yield modelling tools and linear programming. Since joining Argus he has assisted on the development of a supply/demand disequilibrium crude price forecasting model, compiled what is now the Argus Consulting Refinery Database and built a number of supply and demand models that underpin Argus oil product forecasts.

### Francis Osborne

Francis is directly responsible for the Argus forecast on LPG from gas processing and, as head of forecasting, for all forecasted oil datasets produced by Argus Consulting Services. Francis has extensive experience of oil and energy forecasting and consulting and over the years has worked for a number of the leading consultancy companies, including Petroleum Economics Ltd., EMC - Energy Market Consultants Ltd., KBC Advanced Technology, WoodMackenzie and ICIS. During his career he has worked extensively in both the upstream and downstream sectors of the oil industry, covering the full value chain from crude production through to refining and developing forecasts and forward looking analysis of market fundamentals, prices and margins. He has also worked in natural gas forecasting as well as coal and power.

### Nick Black

Nick is Principal (LPG) at Argus Media as well as editor of the bi-monthly publication Argus LPG World.

He has over 20 years of experience in the LPG industry, including being the launch editor of *Argus International LPG*. Prior to *Argus*, Nick was a broker in the oil industry. He holds an MA in English Literature from Oxford University.

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## METHODOLOGY

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### Historical Figures

Argus used a combination of national and international sources, and contacts supplied by its global network combined with supply and demand models to assess and validate historical figures. These figures are subject to further revision which are reflected in quarterly updates to the Argus Analytics Excel add-in.

### Supply Forecast

#### LPG from gas processing

Production represents the sum of output from existing gas processing capacity, production from new investments and projects and in the long term, estimated production from future reserves to be discovered in the future. Yet to find (YTF) reserves that will underpin NGL production through the longer term are sourced from national sources and also international bodies such as the USGS. The rate at which YTF resource potential is added to proved reserves depends on the anticipated level of exploration and development activity in each country. If no information is available it is assumed that the proportion of NGL produced as LPG in the future will be in line with current levels.

#### LPG from crude oil refining

Refinery production of LPG is assumed to remain constant at the most recent reported level for all countries that are not forecast to undergo changes to the refinery capacity that would impact LPG production. This assumes constant utilisation rates and minimal changes to refinery processing at existing facilities. This test is applied for all countries, except those that are operating at historically low utilisation rates caused by extenuating circumstances. For countries that are forecast to undergo relevant capacity changes, the following methodology was used to forecast production.

The key variable in determining how refinery production of LPG will change in the future is refinery capacity additions. The Argus refinery project forecast gives a comprehensive picture of how the global refining sector is set to change over the coming decade and represents the Argus view of 'firm' capacity additions over the forecast period, covering over 400 different refinery projects. The inclusion of firm projects in the base case was decided using value judgments regarding the likelihood of each project. Parameters for the decision included the stage in the planning process, any information regarding permits or credit obtained for the project and the stability in the area that the project is taking place.

Historic and forecast refinery capacities are inputted, alongside national crude slates, into Argus' proprietary excel yield model. The excel yield model optimises the use of intermediate feedstocks within each regional refinery complex and calculates yields of 17 different product, including LPG, on an annual basis..

### Demand Forecast

The demand forecast begins with a solid foundation of historic data, covering consumption of all oil products across more than 15 sectors on a national basis from 1975 to the present day. The first step of the forecasting process then uses the historic relationship between GDP and total energy consumption in each sector and GDP growth forecasts on a \$PPP basis (Source: IMF) to establish a base forecast for energy demand in the future. Observing trends in energy intensity that respond to the shift to alternative fuels and increased efficiencies or climate policy then inform how that relationship changes over time. The model then calculates the percentage contribution of each oil product to total energy consumption in each sector. This stage requires consideration of the price competitiveness of different products, environmental policy/regulation and changes in fashions and trends domestically to establish the consumption of each product in each sector.

Further to this default methodology that is applied across all sectors, certain sectors that are dependent on more tangible variables receive more in depth consideration. Petrochemical consumption is forecast using expected steam cracker capacity additions and assumed feedstock flexibilities on a cracker by cracker basis using Argus' comprehensive database of petrochemical production facilities. The same methodology used to determine refinery fuel consumption, with refinery capacity additions translating to proportional increases in refinery fuel consumption. Road transport demand is forecast using



a standalone transport model, comprising of national vehicle fleets, registrations by type and average fuel efficiencies.

All of the energy consumption forecasts are adjusted further based on knowledge and understanding of specific market dynamics that relate to LPG such as market structure, logistics (both actual and planned), total addressable market size, and specific regulatory measures or incentives.

## Notes and Definitions

### Production

- Refinery production: LPG produced from the refining of crude oil. This generally does not include LPG produced in one refinery unit and then transformed into another refined product, though in some countries, estimations have been made to quantify the amount of LPG used in this way, and are reflected on the consumption side in “Other non-energy”.
- Gas Processing Production: LPG produced as the result of the processing of natural gas liquids found in gas streams or associate gas in oil deposits.

### Trade

- Imports: Historical only
- Exports: Historical only
- Pre-trade balance: The forecast surplus or deficit of a given country in a given year before trade.

### Demand

- Residential: Use of LPG in the household sector - normally as either a heating (space/water) or cooking fuel.
- Agricultural: Use of LPG in the farming sector - either as a heating fuel or for crop-drying or other agricultural processes
- Industrial: Use of LPG in industrial processes or as a heating fuel for industrial installations. Power generation is included in this sector as is the use of LPG in non-road mobile machinery, such as forklifts.
- Commercial: Use of LPG as a heating or cooking fuel in hotels, restaurants and public buildings
- Transport: Use of LPG as a fuel for road-using vehicles
- Refinery fuel: Use of LPG as an energy sources for firing furnaces in refineries It is assumed that for countries where the usage of LPG as a refinery fuel is “0”, that there may be usage but that this figure is netted out on the production side of the balance.
- Petrochemical: Use of LPG as a feedstock in the production petrochemical products in steam cracking and propane/butane dehydrogenation.
- Other non-energy consumption: Use of LPG in the production of other chemical or refined products, where such a figure is available or assessable.