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中国液化石油气期货

China LPG Futures

基础介绍 Introduction

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1. 产业概况 Industry Overview

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Industry Overview - Introduction to LPG

产业概况-LPG简介

Liquefied Petroleum Gas (LPG) consists of hydrocarbons, primarily composed of propane or butane and mixed with small amounts of propylene and butylene. It is a colorless gas at room temperature and turns into colorless, volatile liquid under pressurized or cooled conditions. LPG has the advantages of high calorific value and being relatively clean, but it also has the disadvantages of being highly flammable, explosive, and toxic.

液化石油气（Liquefied Petroleum Gas, LPG）由碳氢化合物组成，主要成分是丙烷或丁烷，混有少量丙烯、丁烯。常温下为无色气体，在加压或者降温的条件下会变成无色有挥发性的液体，具有热值高、较清洁的优点和易燃易爆、有毒的缺点。

Comparison between LPG and LNG 液化石油气和液化天然气对比

	LNG 液化天然气	LPG 液化石油气
Components 主要组成	Methane 甲烷	Propane, propylene, butane, butene 丙烷、丙烯、丁烷、丁烯
Liquefaction Conditions 液化条件	Ultra-low temperature at atmospheric pressure 常压超低温	High pressure at room temperature, low pressure at room temperature (propane -42.1°C, butane -0.5°C) 常温高压、常温低压（丙烷-42.1°C，丁烷-0.5°C）
Carbon Emissions 碳排放	2.75 Kg CO ₂ /1Kg LNG	3.15 Kg CO ₂ emissions from propane combustion of the same calorific value 同热值燃烧丙烷排放3.15 Kg CO ₂
Combustion Products 燃烧产物	Carbon dioxide and water 二氧化碳和水	Small amount of exhaust gas in addition to carbon dioxide and water 除二氧化碳和水外，有少量废气
Average low calorific value 平均低位发热量	9130 kcal/m ³	21980 kcal/m ³

Sources: CITIC Futures

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Industry Overview – LPG Components

产业概况-LPG组成

The LPG standard "GB 11174-2011" classifies LPG into commercial propane, commercial propane-butane mixture, and commercial butane based on the content of C3, C4, and C5.

不同类型液化气成分和用途不同。液化石油气标准《GB 11174-2011》根据C3、C4和C5的含量，将液化石油气分为商品丙烷、商品丙丁烷混合物和商品丁烷。

GB11174-2011

Index		Permissible range		
Physical index	Density (15°C)/(kg/m³)	Report		
		Methane	Propane mixture	Benzol
	Vapor pressure (37.8°C)/kPa	≤1430	≤1380	≤485
	C3 (volume fraction)/%	≥95		
Compositional index	C4 and above (volume fraction)/%	≤2.5		
	C3+C4 (volume fraction)/%		≥95	≥95
	C5 and above (volume fraction)/%		≤3	≤2

Components of LPG from different sources

不同来源液化石油气组成

Resource type	Component Characteristics
Imported LPG	Propane/Butane
Oilfield LPG	Propane, butane based
Refinery FCC, coking LPG (before gas separation)	Higher propylene content, others mainly butene, propane, isobutane, small amount of n-butane
Refinery FCC, coking LPG (after gas separation)	Propane liquefied gas and carbon tetra liquefied gas (main components are butene, isobutane, small amounts of n-butane)
Refinery reforming, hydrocracking liquefied gas	n-butane mainly, others mainly propane, isobutane
Carbon tetrachloride Etherified C4	Butane (isobutane-based), n-butene
Carbon tetrachloride extracted from ethylene enterprises	Butene predominates, butane about 1/3
Carbon tetrachloride after ethylene corporate ether	Butane, n-butene
Carbon tetra deep processing aromatization LPG	Propane predominates, others are mainly n-butane, isobutane
Carbon tetra deep processing alkylated LPG	Mainly n-butane
MTO mixed C4	Mainly n-butene, small amounts of isobutene, n-butane
MTP LPG	Mainly propane, isobutane, n-pentane, small amounts of isobutene, pentene

Sources: Huaon, CITIC Futures

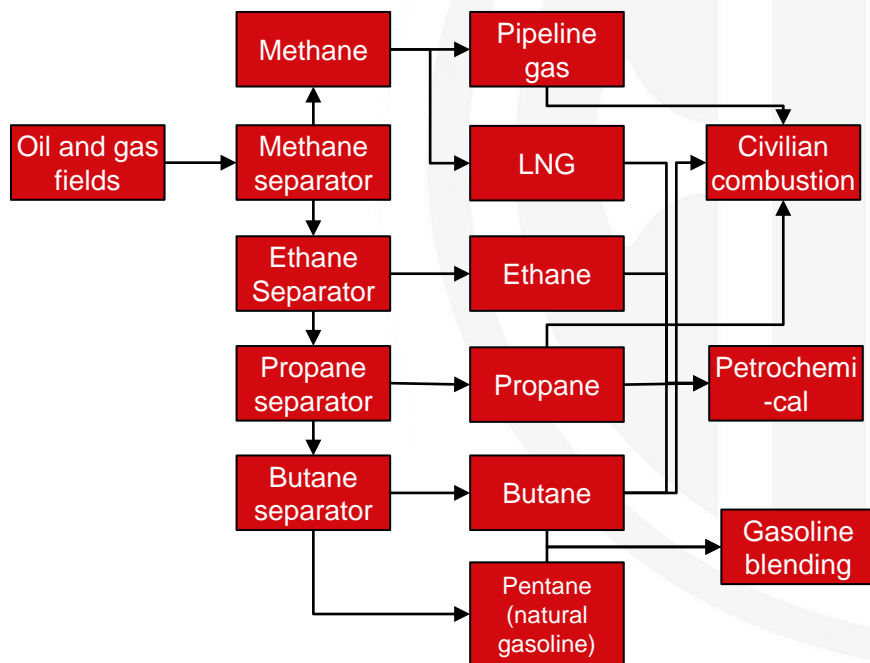
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Industry Overview - Upstream Production

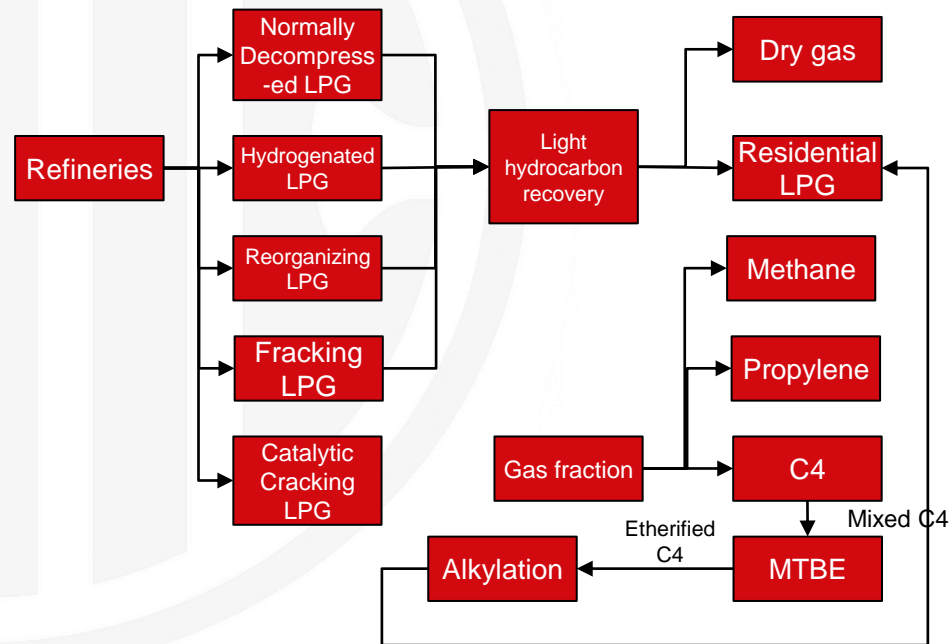
产业概况-上游生产

- LPG is divided into upstream production, midstream logistics, and downstream consumption.
- 从产业链来看，液化石油气分为上游产气、中游物流以及下游消费；
- LPG can be categorized into **associated petroleum gas** and **refinery gas**. The associated gas is primarily composed of pure gases, while refinery gas is often a mixture of gases.
- 按照来源，LPG可划分为油气田伴生气和炼厂气。伴生气多为丙烷、丁烷和异丁烷等纯气；炼厂气多为常减压、催化裂化和焦化等装置生产的混气。

Oil field gas process 油气田气工艺



Refinery gas process 炼厂气工艺



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Industry Overview - Midstream Logistics

产业概况-中游物流

LPG transportation can be divided into two types: overland and waterborne. Overland transportation can be done via railway, tank trucks, and pipelines, while waterborne transportation relies on.

液化石油气运输可分为陆上和水上两种。陆上运输可以采用铁路运输、汽车槽车以及管道运输，水上运输则依靠不同容积的槽船运输。

Transportation and storage of LPG 液化石油气运输和仓储



Sources: Internet, CITIC Futures

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Industry Overview - Midstream Logistics

产业概况-中游物流

LPG carriers by size: Very Large Crude oil Carrier(VLGC), Large Crude oil Carrier, and Pressurized Carrier;

按照载重吨，可分为超大型冷冻船、大型冷冻船和压力船；

LPG carriers by types: fully refrigerated, semi-pressurized and semi-refrigerated, and fully pressurized.

按照液化条件，可分为全冷型、半压半冷和全压；

Classification of LPG carriers 液化石油气运输船分类



半压半冷

Semi-pressurized and semi-refrigerated carriers



全冷

Fully refrigerated carriers



全压

Fully pressurized carriers

Sources: Internet, CITIC Futures

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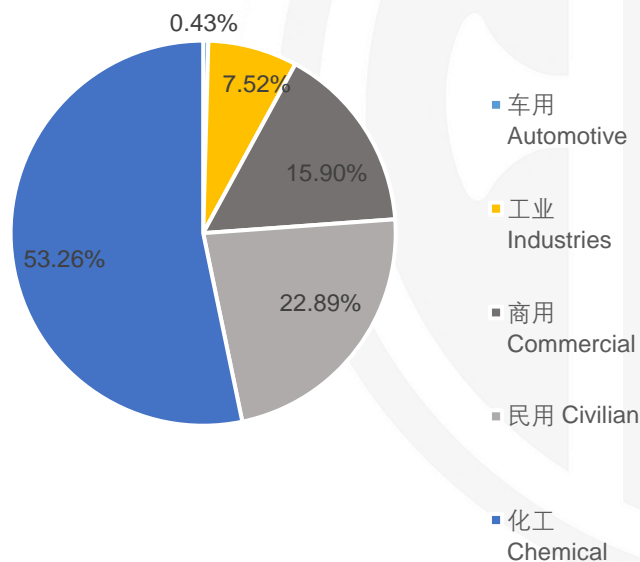
Industry Overview - Downstream Consumption

产业概况-下游消费

LPG is mainly used as fuel and chemical raw. As fuel, it serves as a source of energy for combustion, in residential and commercial catering, and vehicle fuel and industrial raw material. As chemical raw materials, LPG is primarily used for propane dehydrogenation (PDH), methyl tertiary-butyl ether (MTBE), and alkylation

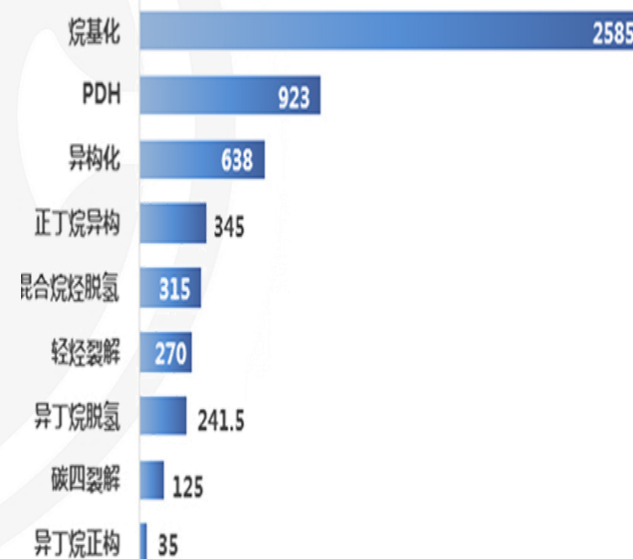
液化石油气终端用途主要为燃料及化工原料。燃料用途即作为能源用燃烧用气，主要消费终端为民用及商用餐饮，也可作为车用燃料及工业原料。化工用途以丙烷脱氢（PDH）、甲基叔丁基醚（MTBE）和烷基化为主。

2022 Domestic LPG Consumption Structure
2022年国内液化石油气消费结构



2021 Domestic LPG Downstream Chemical Capacity
2021年国内液化石油气下游化工产能

- Transalkylation
- PDH
- Isomerization
- N butane ISO
- Mixed alkane dehydrogenation
- Light hydrocarbon cracking
- Isobutane dehydrogenation
- C4 cracking
- N Isobutane



Sources: JLC, Oilchem, CITIC Futures

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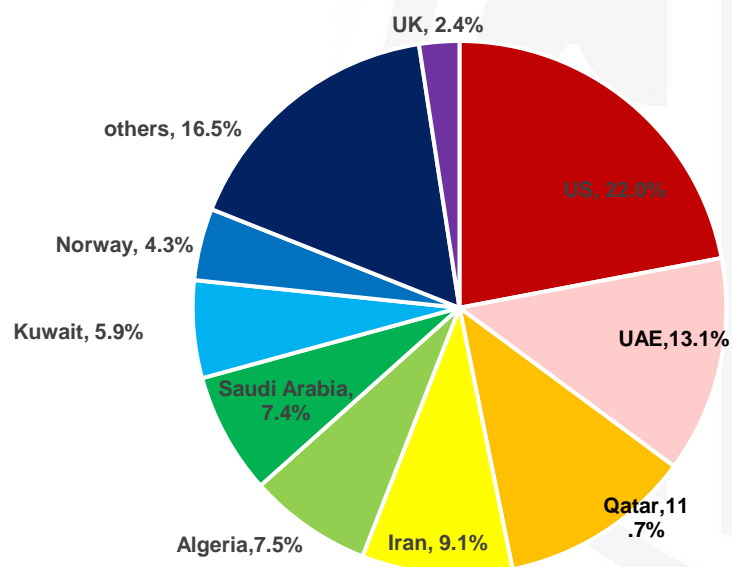
5. 价格分析 Price Analysis Framework

Global Supply and Demand - Supply

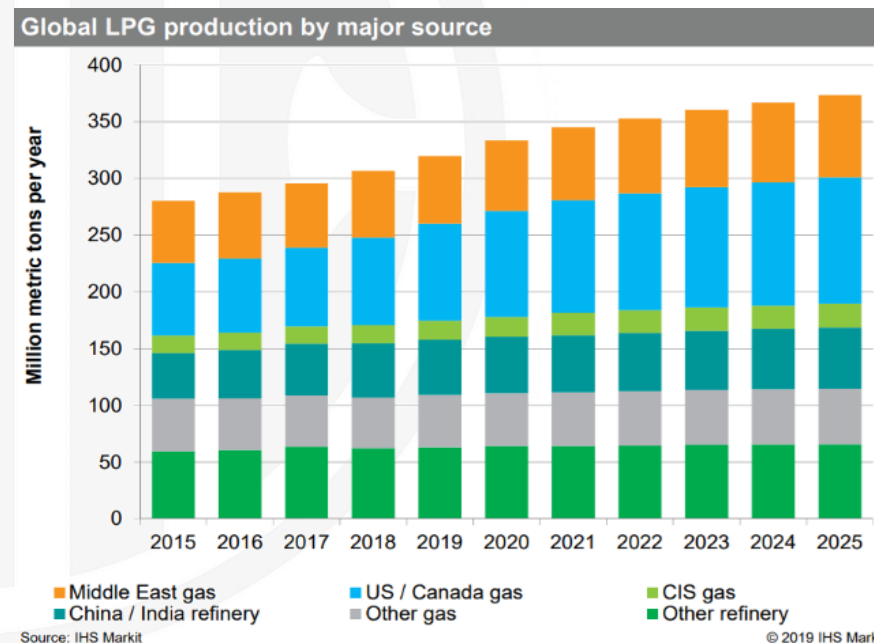
全球供需-供应

- The top two largest exporters of LPG are North America and Middle East. In 2023, U.S. accounted for about 35%, and the combined share of four Middle Eastern countries was 26%.
- 全球资源主要流出地在北美及中东。2023年，美国占比超22%，中东五国合计占比47.2%，两区域合计约七成。
- U.S. contributes the largest amount of increments to the supply of LPG globally.
- 美国是全球液化石油气的主要供应增量。

Top 10 Global Exporters in 2023
2023年全球前十大出口国



Global LPG Production by Major Source
全球液化石油气供应来源



Sources: IHS Markit, CITIC Futures

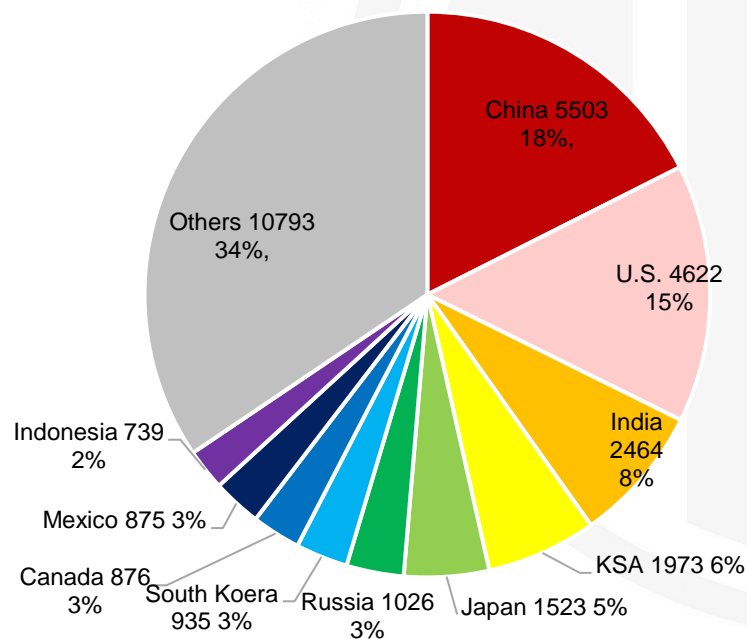
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Global Supply and Demand - Demand

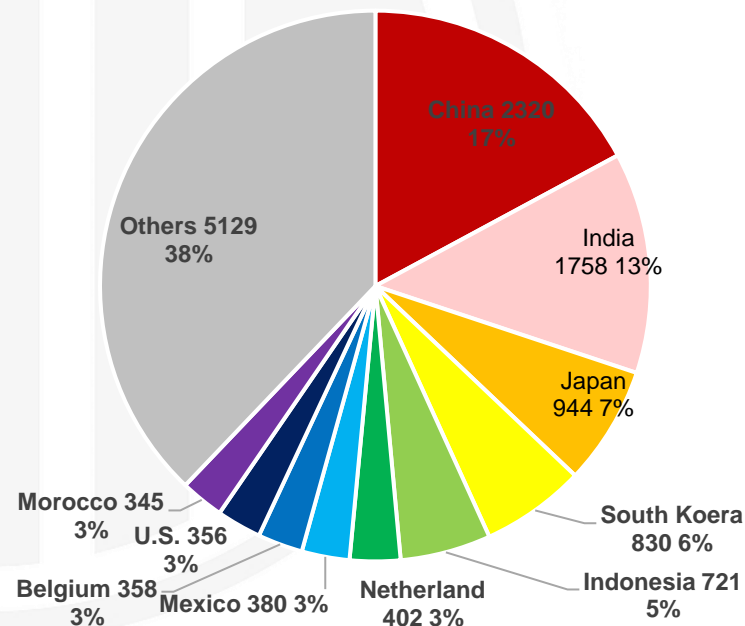
全球供需-需求

- Asia is the primary consumer, with over 45% of the consumption in 2021 contributed by Asian countries, among which China is the most major one.
- 亚洲是主要的消费区域，2021年超过45%的消费由亚洲地区贡献，其中中国是主要的消费国。
- North America contributes nearly 15% of global consumption.
- 北美地区紧随其后，贡献近15%的全球消费。

Top 10 Global Consumers of LPG in 2018
2018年全球LPG前十大消费地



Top 10 Global LPG Importers in 2021
2021年全球LPG前十大进口国



Sources: Argus, IHS Markit, CITIC Futures

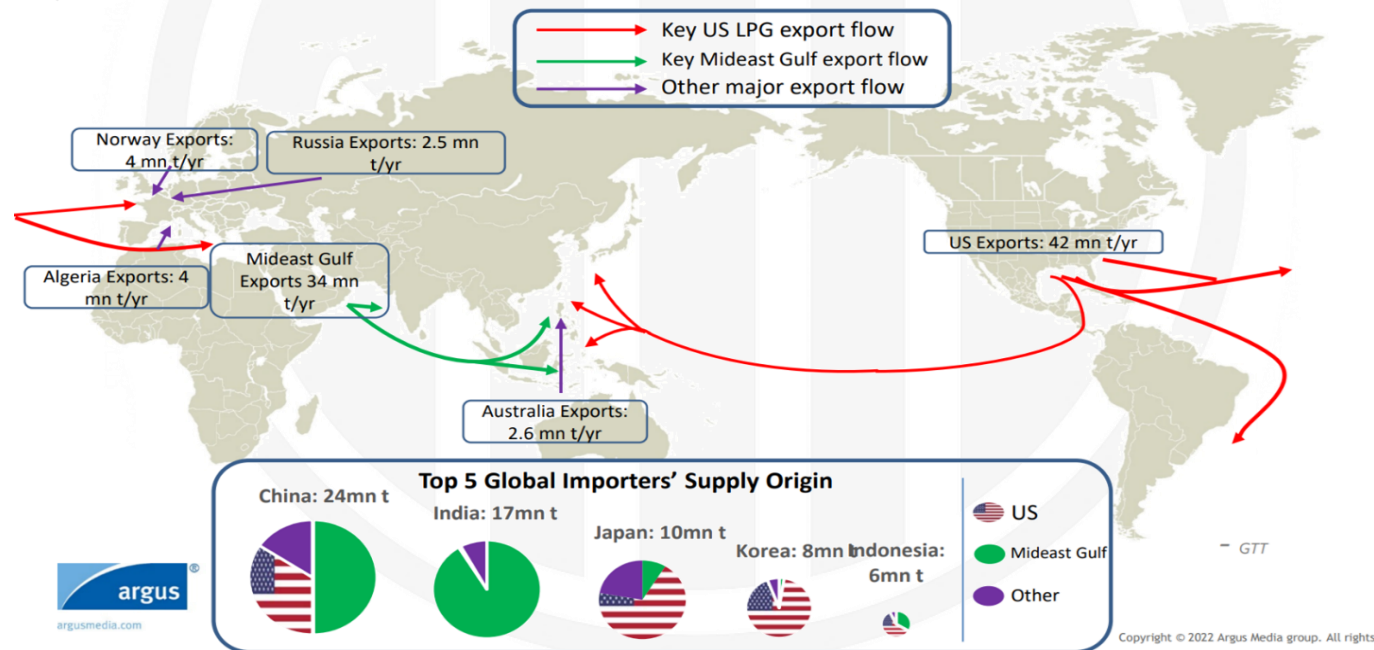
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Global Supply and Demand - Trade Flow

全球供需-贸易流向

- American resources are primarily exported to neighboring Mexico and Asian; Middle Eastern resources are mainly exported to Asia, with India being the highest
- 美国资源主要流向临近的墨西哥以及亚洲的中、日、韩和印尼；中东资源主要出口亚洲，印度比例占比最高；
- North Africa, Russia, and Norway LPG resources are mainly exported to Europe, while Australian resources are primarily exported to Asia.
- 北非、俄罗斯和挪威主要流向欧洲，澳大利亚资源主要在亚洲内部流通。

Global trade flows of LPG in 2021 2021年LPG全球贸易流向



Sources: Argus, CITIC Futures

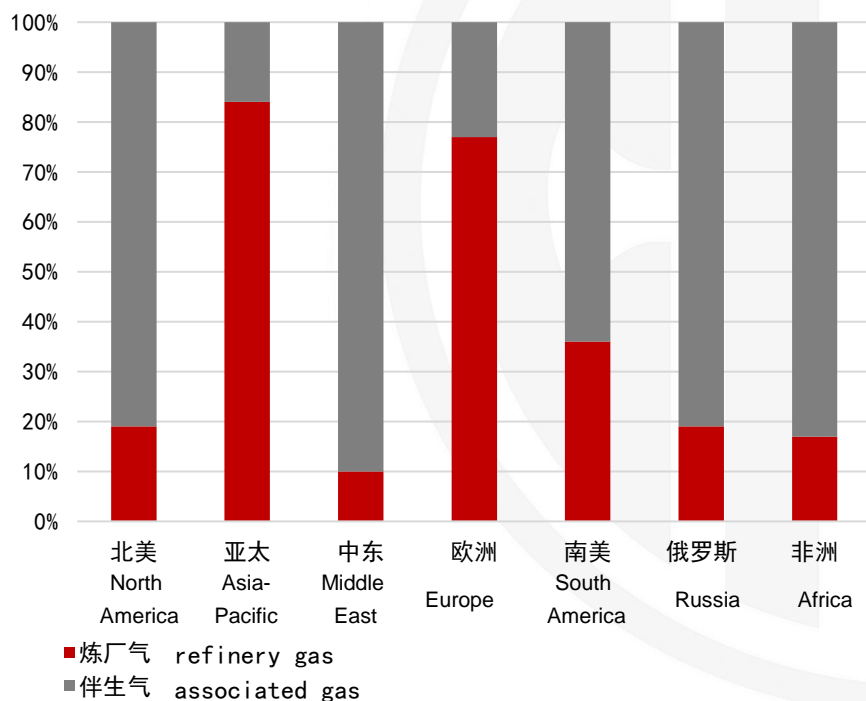
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Global Supply and Demand – Supply and Demand Structure

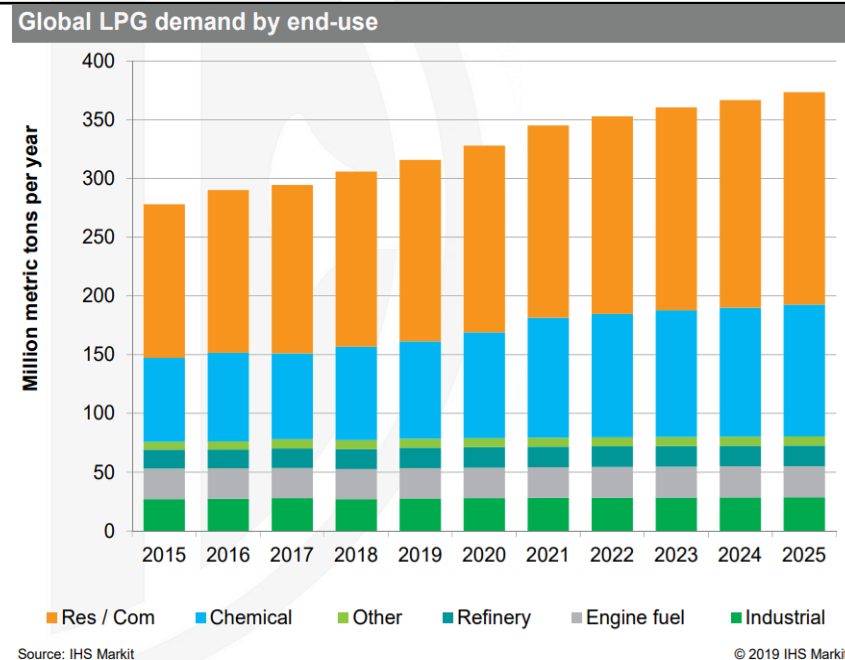
全球供需-供需结构

- Asia primarily supplying refinery gas while the Middle East and North America mainly supplying associated gas.
- 供应结构不同，亚洲以炼厂气为主，中东、北美以伴生气为主。
- Globally, LPG is mainly used as fuel, and LPG as chemical raw materials continuously increases.
- 全球来看，燃料用途仍是LPG的主要用途，化工消费量不断增加。

Global LPG supply structure in 2018
2018年全球LPG供应结构



Global LPG demand structure
全球LPG需求结构



Sources: Argus, IHS Markit, CITIC Futures

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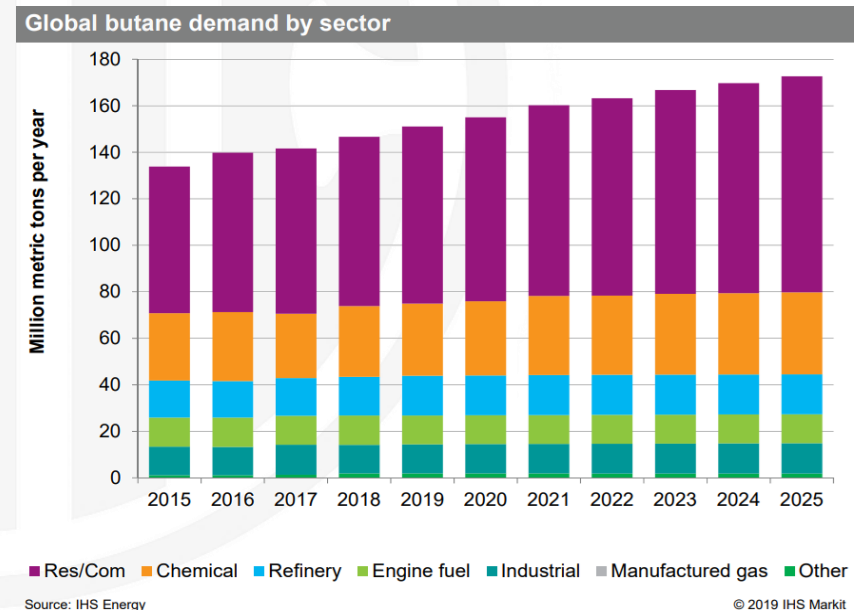
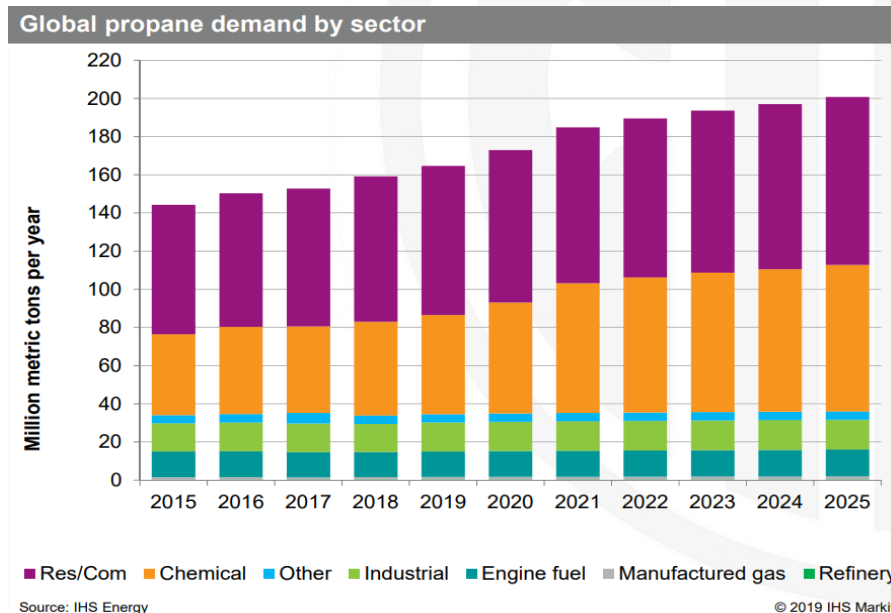
Global Supply and Demand – Propane and Butane Demand Structure

全球供需-丙、丁烷需求结构

- The growth in demand for propane is mainly driven by its use in chemical industry due to installment of PDH units. On the other hand, the primary purpose of propane as fuel is to regulate pressure; excessive propane content results in inefficient combustion.
- 丙烷需求的增长主要来自化工用途，一方面是因为全球PDH装置的投产，另一方面是因为丙烷作为燃料时主要目的是调节压力，丙烷含量太多反而不经烧。
- The increase in demand for butane is primarily driven by fuel requirements.
- 丁烷的需求增长主要来自于燃料需求。

Global propane demand structure 全球丙烷需求结构

Global butane demand structure 全球丁烷需求结构



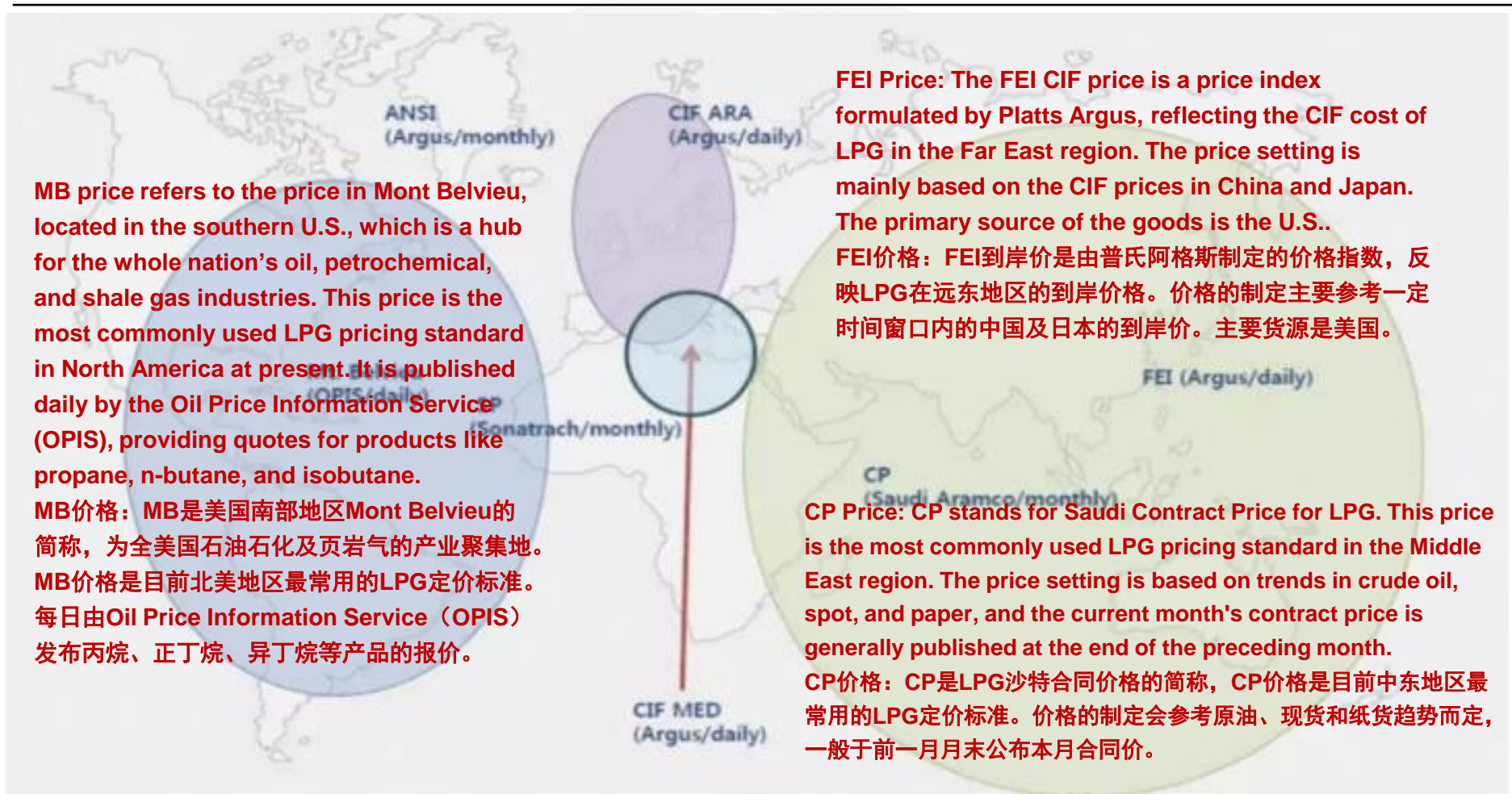
Sources: IHS Markit, CITIC Futures

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Global Supply and Demand - Pricing Benchmarks

全球供需-定价基准

Global LPG pricing benchmarks LPG全球定价基准



Sources: Argus, CITIC Futures

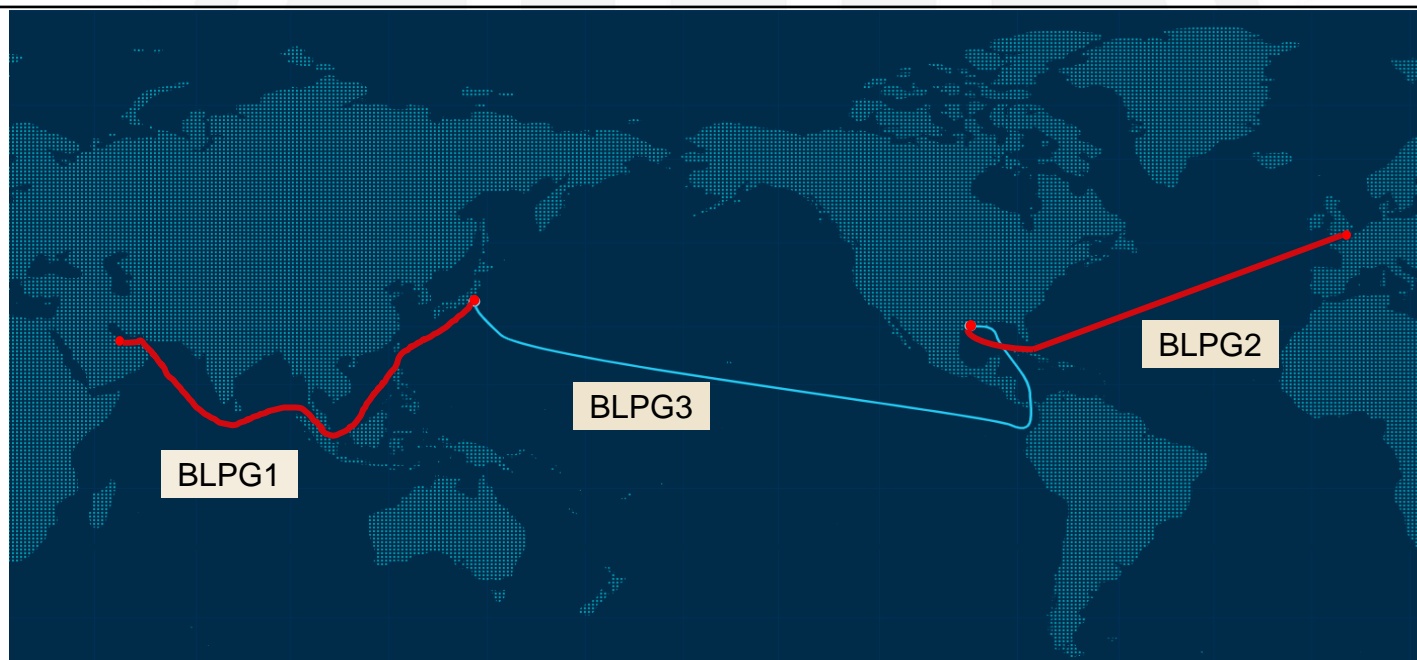
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Global Supply and Demand - International Routes

全球供需-国际航线

- BLPG1: Middle East Gulf (Ras Tanura) to Japan (Chiba);
- BLPG1:中东海湾（拉斯坦努拉）至日本（千叶）；
- BLPG2: Gulf Coast Ports. (Port of Houston) to Netherland (Flushing);
- BLPG2:美湾（休斯顿）至荷兰（Flushing）；
- BLPG3: Gulf Coast Ports. (Port of Houston) to Japan (Chiba);
- BLPG3:美湾（休斯顿）至日本（千叶）；

LPG International Route of the Baltic Exchange 波罗的海交易所LPG国际航线



Sources: Baltic Exchange, CITIC Futures

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China Supply and Demand - Supply

中国供需-供应

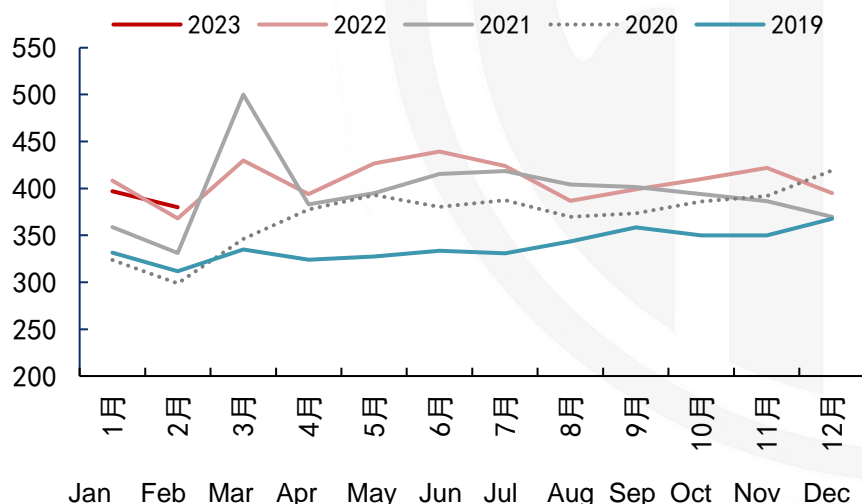
China domestic LPG production is used for refinery self-use and commodity sales. In 2022, LPG production was 49.03 million tons, with 22.33 million tons used by refineries and 26.7 million tons as commodities.

国内液化气产量去向包括炼厂自用和外放商品。2022年，液化石油气产量4903万吨，炼厂自用2233万吨，外放商品量2670万吨，商品量占比约54.5%。

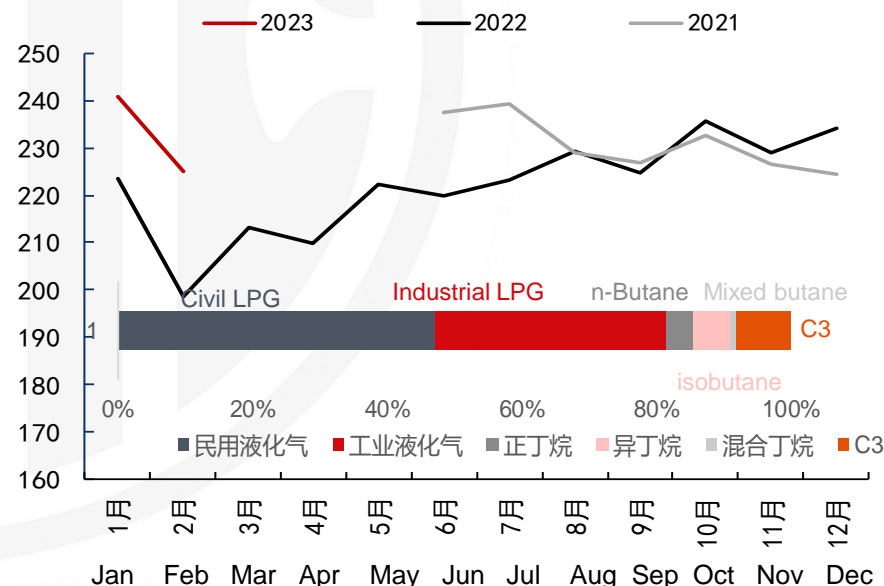
Residential LPG constitutes the largest proportion. In 2022, residential LPG accounted for 47%, industrial LPG accounted for 34.5%, and the rest was propane and butane.

外放商品中民用液化气占比最多。2022年，民用液化气占外放商品量的比重为47%,工业液化气为34.5%，其余为丙烷和丁烷。

China LPG production (ten thousands tons)
中国液化石油气产量（万吨）



China LPG Commodity Volume (ten thousands tons)
中国液化石油气商品量（万吨）



Sources: Oilchem, CITIC Futures

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China Supply and Demand - Import

中国供需-进口

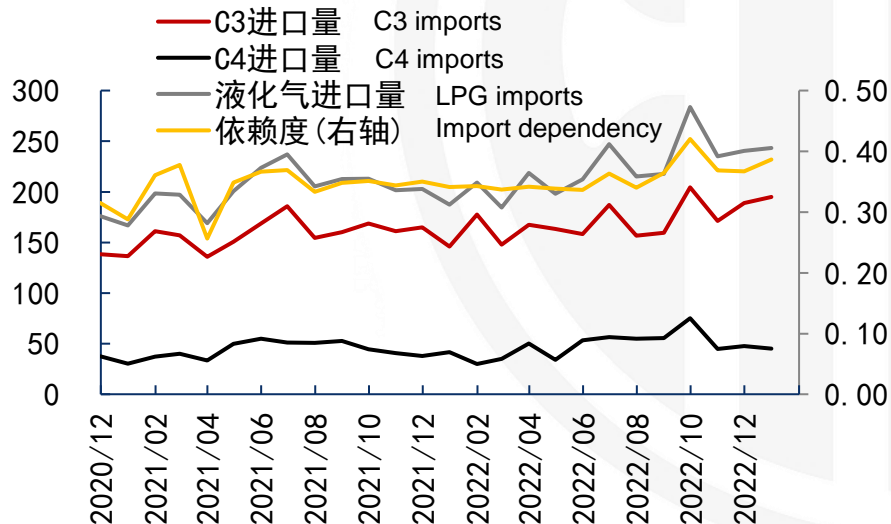
The import of LPG is primarily pure propane and butane. In 2022, LPG imports amounted to 27.05 million tons, with propane accounting for approximately 76.8% and butane about 21.6%.

进口液化石油气以丙烷和丁烷纯气为主。2022年，进口2705万吨，丙烷占比约76.8%，丁烷占比约21.6%。

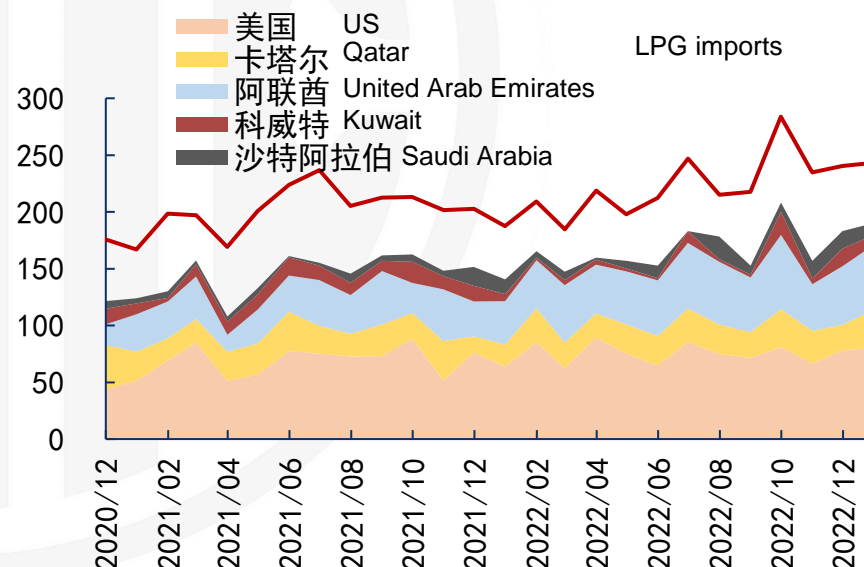
The U.S. and the Middle East are the main exporters. In 2022, China imported 9.16 million tons of LPG from the U.S. , 33.9% of the total, while 11.2 million tons from the Middle East.

美国和中东是主要的进口来源地。2022年，自美国进口量为916万吨，占比33.9%，中东进口量为1120万吨。

China LPG imports (10,000 tons) by type
中国液化石油气进口情况 (万吨)



China LPG imports (10,000 tons) by country
中国液化石油气进口 (万吨)



Sources: GACC, CITIC Futures

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China Supply and Demand - Demand

中国供需-需求

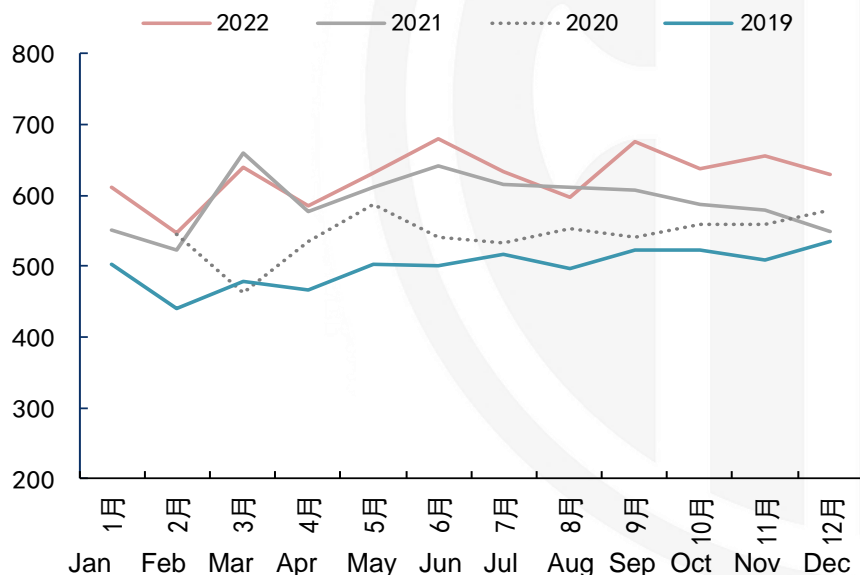
China dependency on LPG imports is about 35%. In 2022, China apparent consumption of LPG was 75.21 million tons, with a net import volume of 26.18 million tons.

LPG进口依赖度约35%。2022年，我国液化石油气表观消费量7521万吨，净进口量为2618万吨。

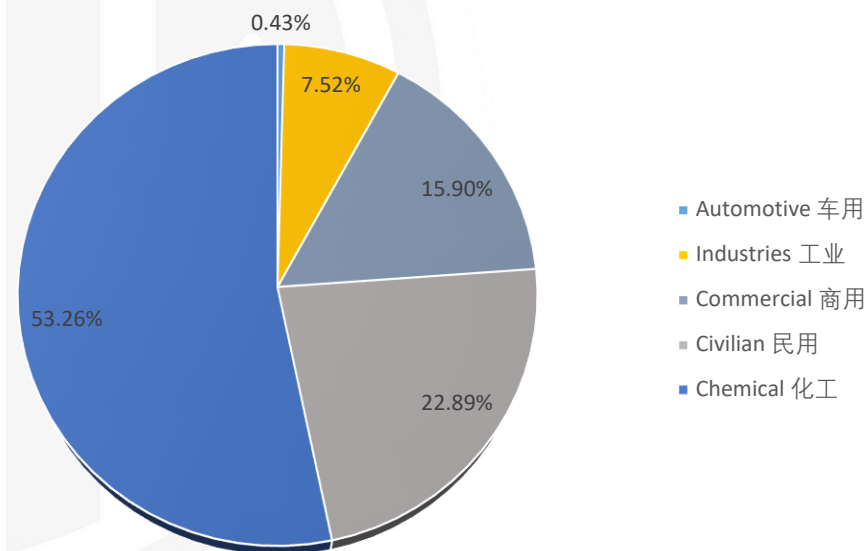
Chemical purpose use accounts for a large proportion, the proportion in 2022 was 53.26%.

化工用途占比较多。2022年，我国液化石油气化工用途占比53.26%。

Apparent consumption of LPG in China (ten thousands tons)
中国液化石油气表观消费量（万吨）



Demand structure of LPG in China
中国液化石油气需求结构



Sources: JLC, Oilchem, CITIC Futures

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China Supply and Demand - Trade Flow

中国供需-贸易流向

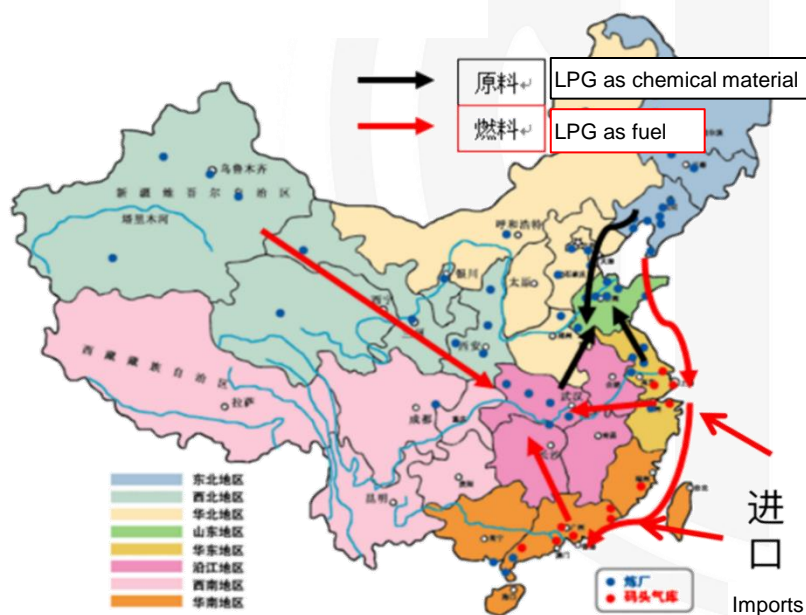
LPG as fuel: Flows from coastal regions such as South China and East China to inland areas; LPG as chemical material: flows from various regions to Shandong province;

燃料用LPG：从华南、华东等沿海地区流向内陆；化工用LPG：从各地向山东集中；

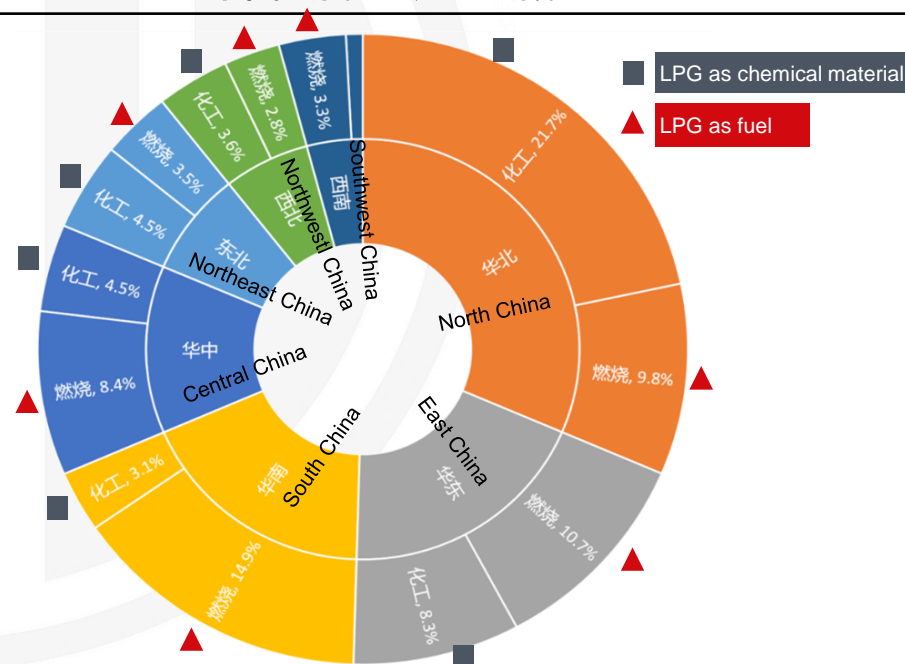
South China and East China are net outflow regions; North China and Central China are net inflow regions.

华南、华东等地净流出；华北、华中净流入

China LPG Trade Flow Map
中国LPG贸易流向图



China LPG Consumption Structure by Region
中国不同区域LPG消费结构



Sources: JLC, Oilchem, CITIC Futures

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LPG: Correlation Analysis

LPG: 相关性分析

The correlation of LPG prices with crude oil is much greater than that with natural gas. The price of imported gas has the highest correlation with overseas propane prices.

LPG价格与原油的相关性远大于天然气。进口气价格与海外丙烷价格相关性最高。

	WTI	NYMEX natural gas NYMEX天然气	MB propane MB丙烷	CP propane price forecast CP丙烷预测价	FEI propane FEI丙烷	Propane CFR-East China 丙烷CFR华东	Propane CFR-South China 丙烷CFR华南	Sinopec Guangdong 广东石化	Sinopec Shanghai 上海石化	LPG main contract LPG主力
WTI	1.00									
NYMEX natural gas NYMEX天然气	0.60	1.00								
MB propane MB丙烷	0.84	0.43	1.00							
CP propane price forecast CP丙烷预测价	0.71	0.22	0.90	1.00						
FEI propane FEI丙烷	0.75	0.29	0.88	0.98	1.00					
Propane CFR-East China 丙烷CFR华东	0.73	0.26	0.87	0.97	1.00	1.00				
Propane CFR-South China 丙烷CFR华南	0.73	0.26	0.87	0.97	1.00	1.00	1.00			
Sinopec Guangdong 广东石化	0.67	0.26	0.73	0.87	0.88	0.88	0.88	1.00		
Sinopec Shanghai 上海石化	0.62	0.26	0.58	0.59	0.63	0.62	0.63	0.75	1.00	
LPG main contract LPG主力	0.88	0.57	0.84	0.78	0.81	0.79	0.79	0.70	0.70	1.00

Sources: Wind, CITIC Futures

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3. 中国供需 China Supply and Demand

4. 期货合约 China Futures Contract

5. 价格分析 Price Analysis Framework

Futures Contract - Contract Specification

期货合约-合约简介



Trading and delivery unit: 20MT/Lot; minimum tick size: 1 CNY/MT; last trading day: the last but three trading day of the contract month.

交易和交割单位为20吨/手；最小变动价位1元/吨;最后交易日为合约月份倒数第4个交易日；

LPG contract specification LPG合约简介

交易品种 Product	Liquefied Petroleum Gas 液化石油气
交易单位 Trading Unit	20 MT/Lot 20吨/手
报价单位 Price Quote Unit	CNY/MT 元（人民币）/吨
最小变动价位 Minimum Tick Size	1 CNY/MT 1元/吨
涨停板幅度 Daily Price Limit Range	上一交易日结算价的4% 4% of last settlement price
合约月份 Contract Months	1、2、3、4、5、6、7、8、9、10、11、12月 Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, Dec
交易时间 Trading Hours	上午9:00-11:30，下午13:30-15:00，以及交易所规定的其他交易时间 9:00 - 11:30 a.m., 1:30 - 3:00 p.m., Beijing Time, and other trading hours announced by DCE
最后交易日 Last Trading Day	合约月份倒数第4个交易日 The last but three trading day of the contract month
最后交割日 Last Delivery Day	最后交易日后第3个交易日 The 3rd trading day after the last trading day
交割等级 Deliverable Grades	大连商品交易所液化石油气交割质量标准（F/DCE PG001-2020） Liquefied Petroleum Gas Delivery Quality Standard of DCE (F/DCE PG001-2020)
交割地点 Delivery Point	大连商品交易所液化石油气指定交割仓库 The delivery warehouses of liquefied petroleum gas designated by DCE
最低交易保证金 Minimum Trading Margin	合约价值的5% 5% of the contract value
交割方式 Delivery Form	实物交割 Physical delivery
交易代码 Ticker Symbol	PG
上市交易所 Listed Exchange	大连商品交易所 DCE

Sources: Wind, CITIC Futures

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Futures Contract - Delivery

期货合约-交割品



The standard delivery product is residential liquefied gas, with pure propane having a discount of 100 CNY/MT; pure butane and high-purity gas have a discount of 150 CNY/MT; deliveries are not allowed for compositions with C3 > 60% and < 95%.

标准交割品为民用液化气，纯丙烷贴水100元/吨；纯丁烷和高清洁气贴水150元/吨；C3>60%且<95%不允许交割。

Standard deliverables 标准交割品

项目 Item	要求 Criteria
密度 (15°C) / (kg/m3) Density (15°C) / (kg/m3)	报告 To be reported
蒸气压 (37.8°C) / kPa Vapor pressure (37.8°C) / kPa	≤1380
组分 Constituent: C3烃类组分 (体积分数) /% C3 hydrocarbon constituent (volume fraction) /% (C3+C4) 烃类组分 (体积分数) /% (C3+C4) hydrocarbon constituent (volume fraction) /% C5及C5以上烃类组分 (体积分数) /% C5 and above hydrocarbon constituent (volume fraction) /%	≥20 & ≤60 ≥95 ≤3.0
残留物 Residue: 蒸发残留物 (mL/100mL) Evaporated residue (mL/100mL) 油渍观察 Oil stain observation	≤0.05 Pass 通过
铜片腐蚀 (40°C, 1h) / 级 Copper corrosion (40°C, 1h) / degree	≤1
总硫含量 (mg/m3) Total sulfur content (mg / m3)	≤343
硫化氢 (需满足下列要求之一) Sulfuretted hydrogen(satisfying one of the following requirements): 乙酸铅法 Lead acetate method 层析法/(mg/m3) Chromatography / (mg / m3)	None无 ≤10
游离水 Free water	无 None

Premiums/discounts for quality difference of substitute products 非标升贴水

No.	项目 Item	贴水 (元/吨) Discount (CNY/MT)
1	同时满足下述指标要求: If satisfying all the following requirements: (1) 蒸气压 (37.8°C) ≤485 kPa vapor pressure (37.8°C) ≤485 kPa (2) 组分 constituent: C3烃类组分 (体积分数) ≤5% C3 hydrocarbon constituent (volume fraction) ≤5% (C3+C4) 烃类组分 (体积分数) ≥95% (C3+C4) hydrocarbon constituent (volume fraction) ≥95% C5及C5以上烃类组分 (体积分数) ≤2.0% C5 and above hydrocarbon constituent (volume fraction) ≤2.0%	-150
2	同时满足下述指标要求: If satisfying all the following requirements: (1) 蒸气压 (37.8°C) ≤1380 kPa vapor pressure (37.8°C) ≤1380 kPa (2) 组分 constituent: C3烃类组分 (体积分数) > 5%且 < 20% C3 hydrocarbon constituent (volume fraction) > 5% and < 20% (C3+C4) 烃类组分 (体积分数) ≥95% (C3+C4) hydrocarbon constituent (volume fraction) ≥95% C5及C5以上烃类组分 (体积分数) ≤3.0% C5 and above hydrocarbon constituent (volume fraction) ≤3.0%	-150
3	同时满足下述指标要求: If satisfying all the following requirements: (1) 蒸气压 (37.8°C) ≤1430kPa vapor pressure (37.8°C) ≤1430kPa (2) 组分 constituent: C3烃类组分 (体积分数) ≥95% C3 hydrocarbon constituent (volume fraction) ≥95% C4及C4以上烃类组分 (体积分数) ≤2.5% C4 and above hydrocarbon constituent (volume fraction) ≤2.5% C5及C5以上烃类组分 (体积分数) 不做要求 C5 and above hydrocarbon constituent (volume fraction) - no requirement	-100

Sources: JLC, Oilchem, CITIC Futures

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Futures Contract – Delivery

期货合约-交割方式

LPG, on top of the one-time delivery and futures-to-spot delivery, has introduced rolling delivery, which requires the participating buyers and sellers possess qualifications for the production, operation, and use of LPG.

LPG在一次性交割以及期转现交割制度基础上，增加滚动交割方式，同时要求参与交割的买卖双方持有LPG生产、经营和使用资质。

Rolling Delivery: During the period from the first trading day of the delivery month to the day before the last trading day, the seller who holds the standard warehouse receipts and the delivery month orders can initiate the process. The exchange then organizes the matching of buyer and seller to complete the delivery within the specified time. This method is initiated by the seller and responded to by the buyer.

滚动交割: 交割月第一个交易日至最后交易日的前一交易日期间，由持有标准仓单和交割月单的卖方客户主动提出，并由交易所组织匹配买卖双方在规定时间内完成交割的交割方式，由卖方发起，买方响应。

One-time Delivery: After the last trading day of the contract, the exchange organizes all holders of open contracts to carry out the delivery.

一次性交割: 在合约最后交易日后，交易所组织所有未平仓合约持有者进行交割的交割方式。

LPG Futures Delivery Method
LPG期货交割方式



Sources: DCE, CITIC Futures

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Delivery Warehouses, Fees and Regulation

期货合约-交割仓库、费用和制度变更

Delivery across the entire factory, with the factory warehouse issuing credit warehouse receipts. The factory warehouses are mainly distributed in the coastal areas of East China and South China, and Shandong region.

全厂库交割，厂库出具信用仓单。厂库主要分布在华东、华南沿海和山东地区。

Delivery-related costs include delivery handling fees, storage fees, factory warehouse demurrage, in-and-out warehouse fees, commodity inspection, and sampling fees.

交割相关费用：交割手续费、仓储费、厂库滞纳金、入出库费用、商检和取样费。

Regional distribution of warehouses 厂库分布



Delivery fees 交割费用

LPG	
Delivery deposit 交割预报定金率	30 CNY/MT 30元/吨
Delivery handling fees 交割手续费	0 CNY/MT 0元/吨
Storage fee 仓储费标准	1 CNY/MT/Day 1元/吨/天
Late fee for factory and warehouse 厂库滞纳金	6 CNY/MT 6元/吨
Sampling and inspection fees 取样与检验费	ceiling price 实行最高限价

Sources: Wind, DCE, CITIC Futures

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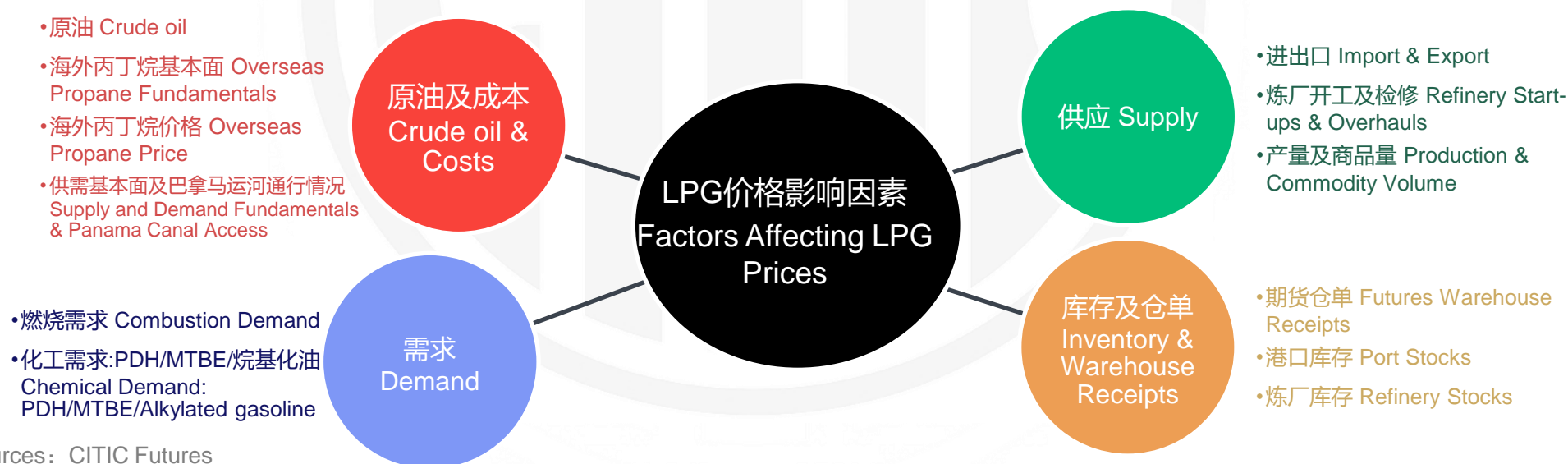
5. 分析框架 Analysis Framework

LPG: Path of Price Transmission

LPG: 价格影响因素

LPG prices are affected by crude oil prices, import costs, supply and demand, inventories and warehouse receipts, with crude oil price changes having the most direct impact on LPG prices. Supply, demand and inventories determine the level and trend of the LPG-to-crude oil crack spread in each region. Freight costs additionally affect the import cost of LPG from the Far East and China. Domestic LPG futures have a large number of delivery targets, which requires additional consideration of the minimum deliverable price and the impact of the number of warehouse receipts.

LPG价格由原油价格、进口成本、供需、库存及仓单共同影响，原油价格变动对LPG价格影响最为直接。供需和库存决定各地区LPG对原油裂解价差的水平及走势。运费额外影响远东及中国LPG的进口成本。国内LPG期货交割标的较多，需额外考虑最低可交割品价格和仓单数量影响。



Sources: CITIC Futures

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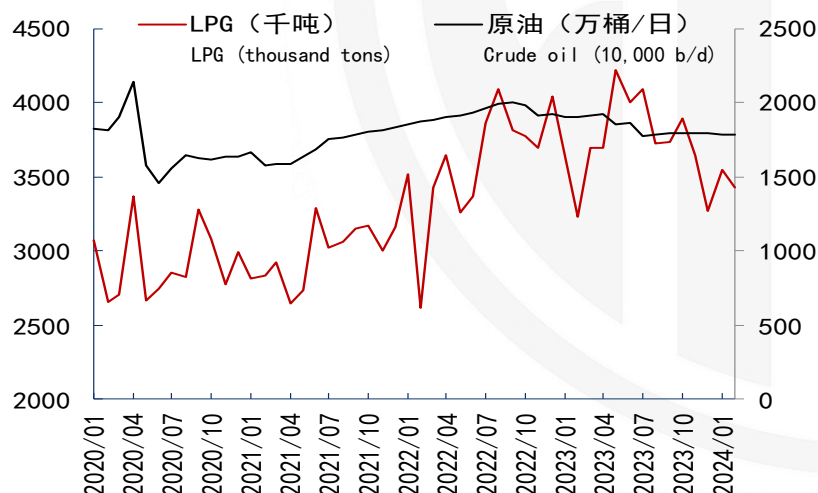
LPG: Middle East Exports & CP Official Prices

LPG: 中东出口及CP官价

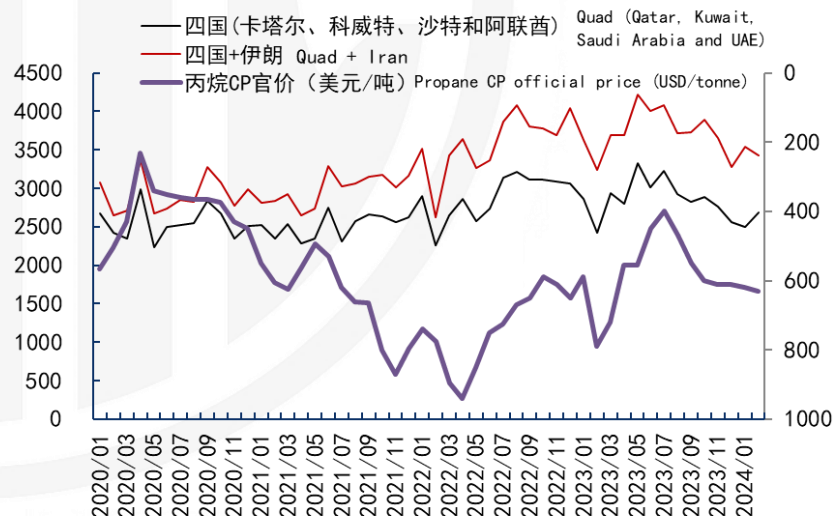
Saudi Aramco publishes the official contract price for propane (CP Price) exporting for the following month at the end of each month, which is the main pricing benchmark for LPG in the Middle East. There is a positive correlation between LPG exports and crude oil production in the Middle East over the long run. Apart from Iran, the major LPG exporting countries in the Middle East are Qatar, Kuwait, Saudi Arabia and the UAE. There is a strong negative correlation between the LPG export volume of the above four countries and the Saudi Aramco CP price.

沙特阿美每月底公布次月丙丁烷出口CP官价，是中东LPG的主要计价基准。中东地区LPG出口量与原油产量在长周期上存在正相关性。除伊朗外，中东主要的LPG出口国家是卡塔尔、科威特、沙特和阿联酋。上述四国的LPG出口量与沙特阿美CP官价存在较强负相关性。

Exports versus crude oil production in five countries
五国出口量与原油产量对比



Middle East LPG Exports vs. CP Official Prices
中东LPG出口与CP官价对比



Sources: LSEG Workspace, Vortexa, CITIC Futures

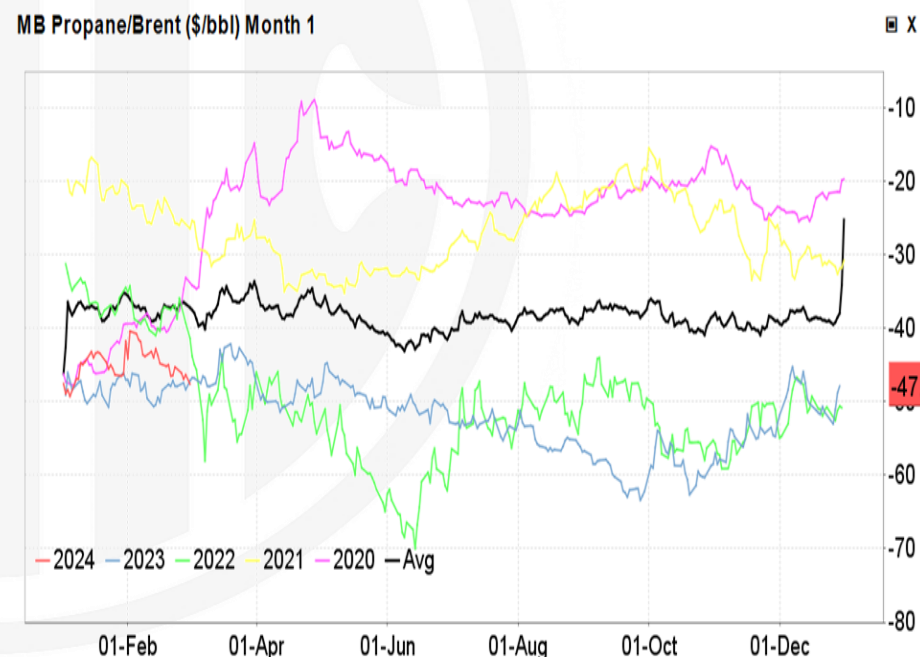
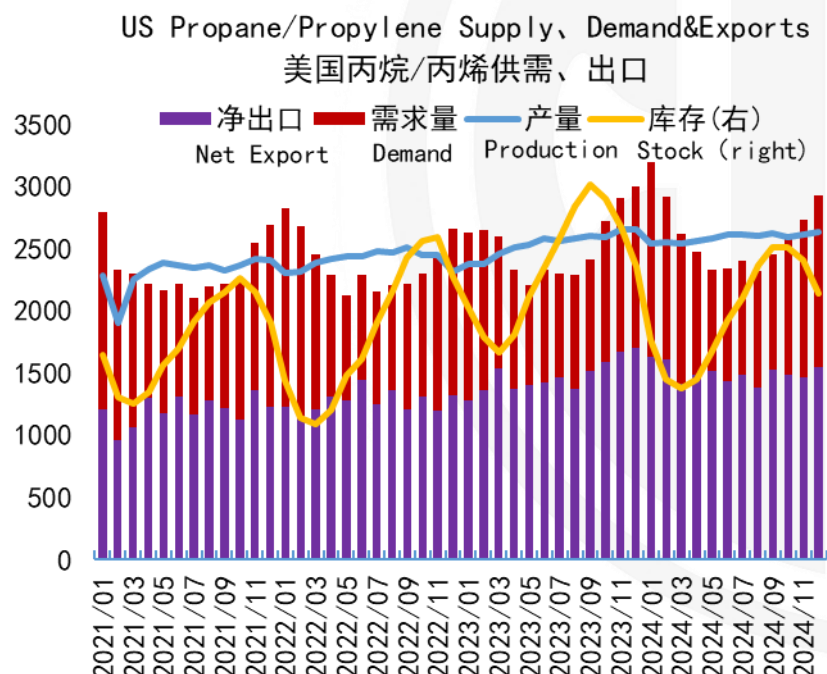
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LPG: U. S. Supply and Demand & MB Prices

LPG: 美国供需及MB价格

Both NGLs production and propane production in the U.S. have achieved large increases in the past. There is a clear off-peak season in the US, with April-September being the off-season and October-March being the peak season. The U.S. must export to resolve the domestic surplus capacity. MB prices in the U.S. Gulf region are mainly affected by U.S. fundamentals, weather and port loading.

由于美国油气产量和NGLs分离率的提升，过去美国NGLs产量和丙烷产量均实现较大增幅。美国国内存在明显的淡旺季，4-9月为消费淡季，10月-次年3月为消费旺季。美国必须通过出口来化解国内富余产能。美湾地区MB价格主要受到美国基本面、天气及装港情况的影响。



Sources: EIA, LSEG Workspace, CITIC Futures

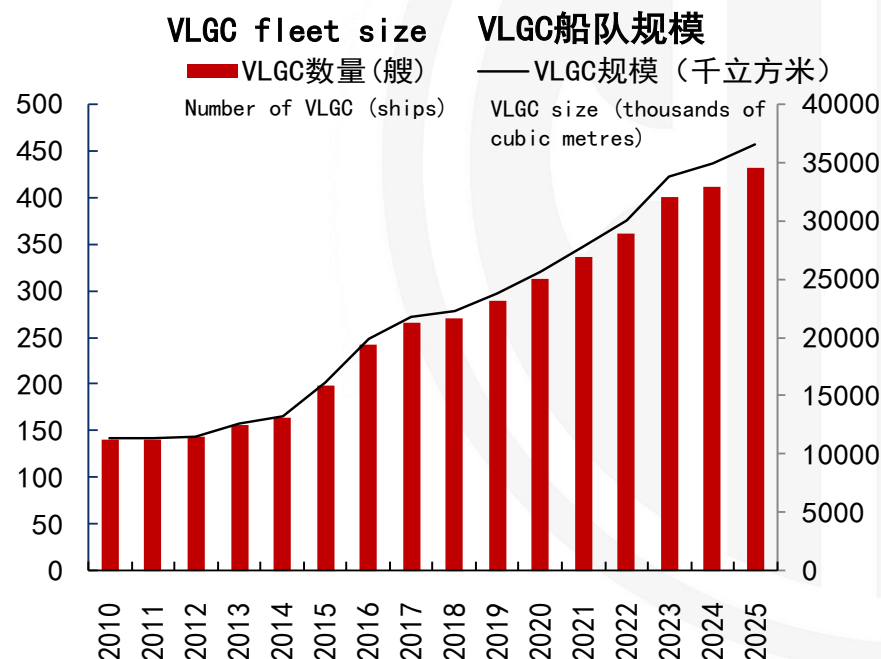
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LPG: Factors affecting VLGC freight prices

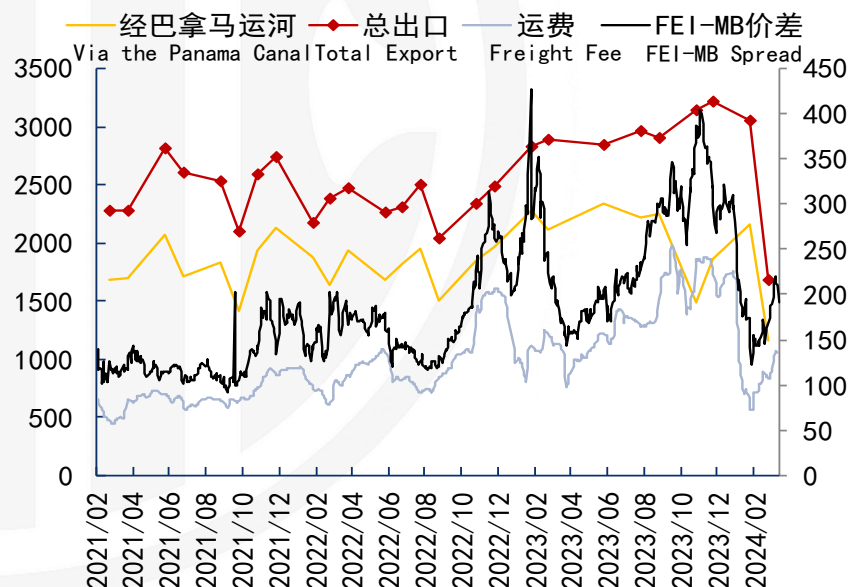
LPG: VLGC运费价格影响因素

VLGC freight rates have an important influence on domestic LPG CIF costs. VLGC freight rates are mainly affected by supply and demand fundamentals in the tanker market. The loading port shipment volume can be used as a demand indicator to analyze VLGC freight rates.

VLGC运费国内LPG到岸成本的重要影响因素。VLGC运费主要受到油轮市场供需基本面影响。装港发运量可作为分析VLGC运费的需求指标。



US Gulf to Asia Pacific Shipments vs BLPG3 Freight Rates
美湾至亚太发运量与BLPG3运费对比



Sources: LSEG Workspace, Vortexa, CITIC Futures

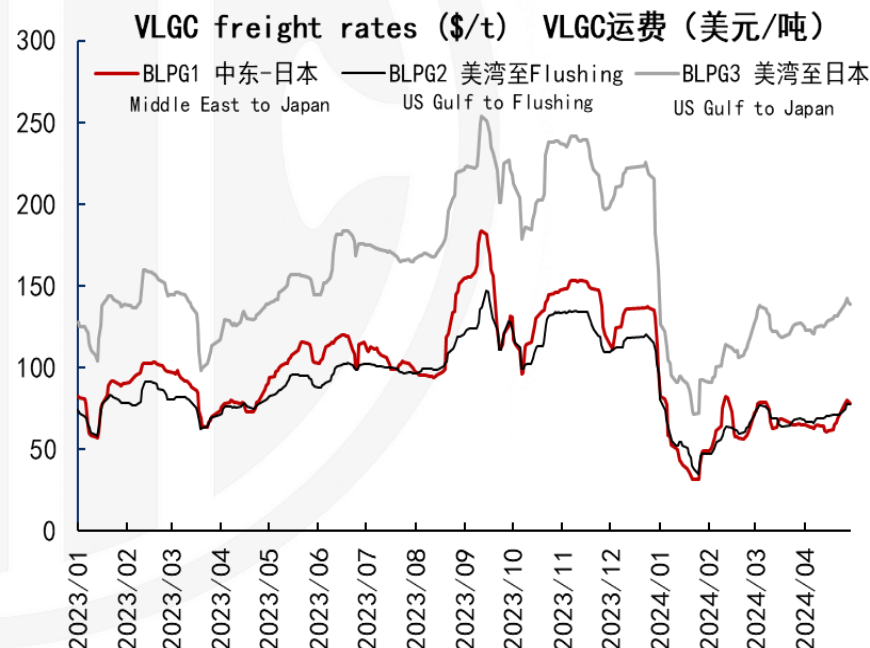
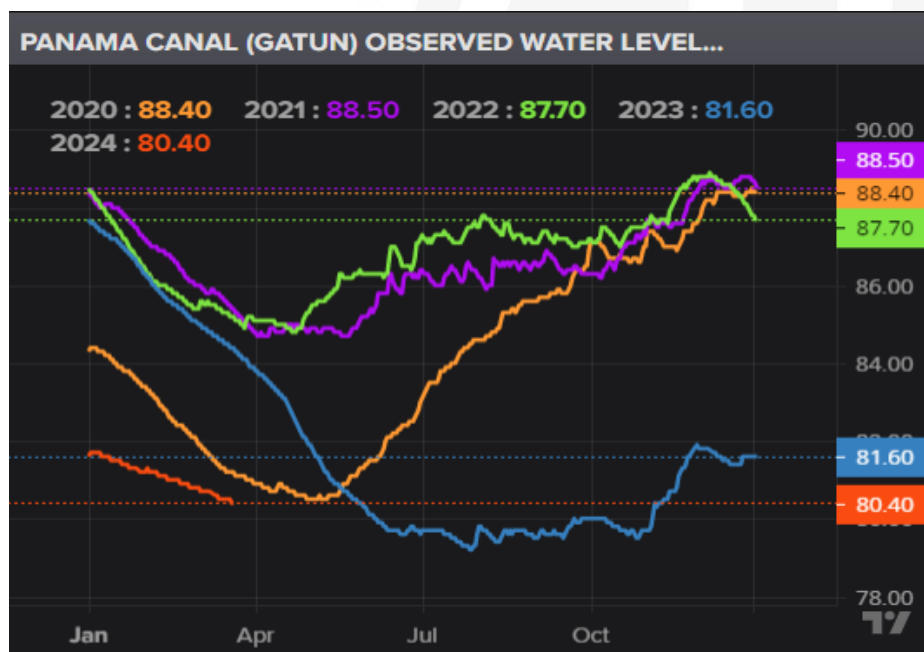
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LPG: Factors affecting VLGC freight prices

LPG: VLGC运费价格影响因素

Freight rates on major overseas routes are highly interconnected. The BLPG3 route through the Panama Canal is the most economical route, so Panama Canal water levels and access have a significant impact on the freight market. In 2023, BLPG3 freight rates climbed sharply due to the drought in the Panama Canal and the canal authorities' policy of restricting access.

海外主要航线运费价格联动性较高。BLPG3航线途径巴拿马运河为最经济航线，因此巴拿马运河水位和通行情况对运费市场影响巨大。2023年，由于巴拿马运河干旱和运河当局实行通行限制政策，BLPG3运费大幅攀升。



Sources: LSEG Workspace, CITIC Futures

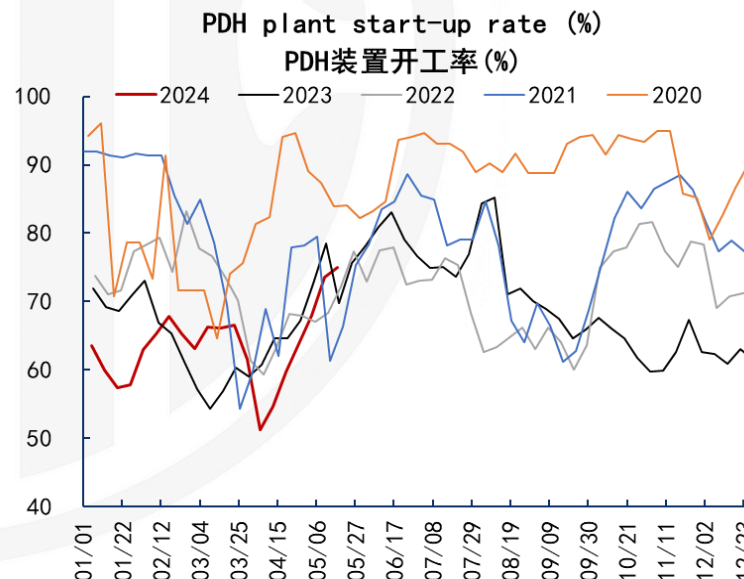
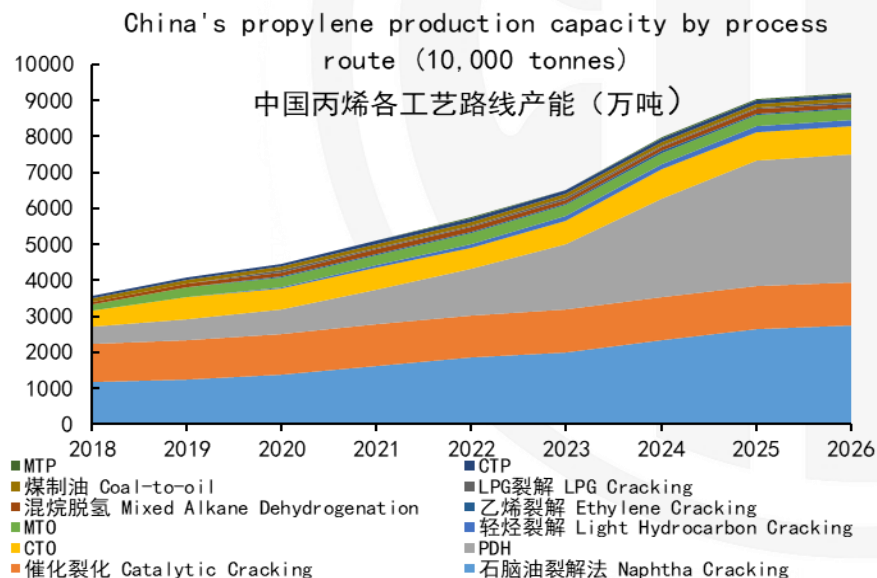
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LPG: China PDH plant capacity and demand

LPG: 中国PDH装置产能及需求

China's PDH units have expanded their capacity significantly in recent years, and have been the main destination for costly imported propane. Changes in its start-up rate directly affect the demand for imported propane, and the start-up rate is directly related to PDH profits. In recent years, as domestic polypropylene volatility is substantially lower than LPG volatility, so most of the profit fluctuations have cost side contribution. The middle of the year is generally the off-season for global LPG combustion consumption, and PDH profit level is at a relatively high position during the year.

中国PDH装置近年来大幅扩张产能，已经成本进口丙烷的主要去向。其开工率变化直接影响进口丙烷需求，而开工率又与PDH利润直接相关。近年来，由于国内聚丙烯波动率大幅低于LPG波动率，因此利润波动大部分有成本端贡献。年中一般为全球LPG燃烧消费淡季，PDH利润水平处于年内相对偏高位置。



Sources: Oilchem, CITIC Futures

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LPG: Market anchors minimum deliverable price

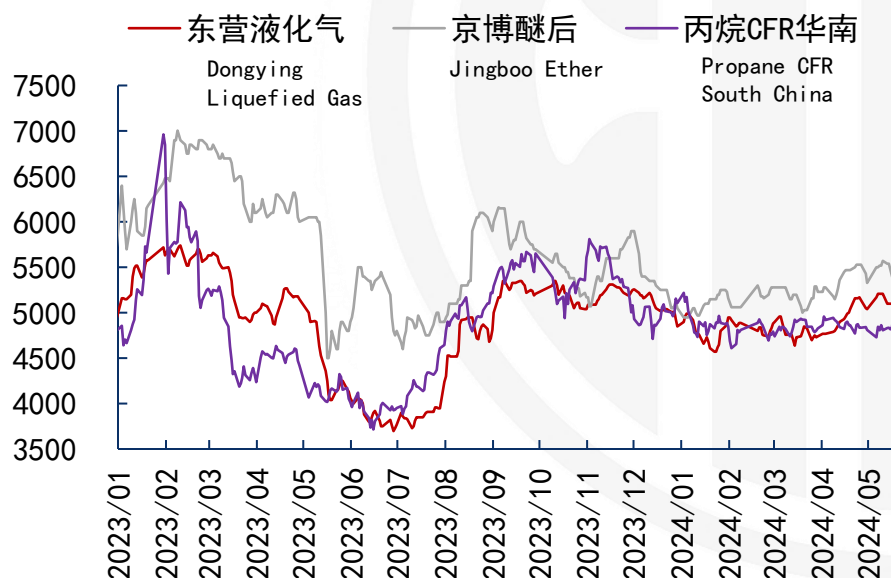
LPG: 盘面锚定最低可交割品价格

DCE PG futures have a wide range of deliverables, the standard deliverable is civil gas, but industrial gas and imported propane and butane are also deliverable. Usually, the PG futures market is anchored to the lowest deliverable price or basis spread.

大商所PG期货交割品较多，标准交割品为民用气，但工业气及进口丙丁烷也可交割。通常PG期货盘面锚定最低可交割品价格或基差。

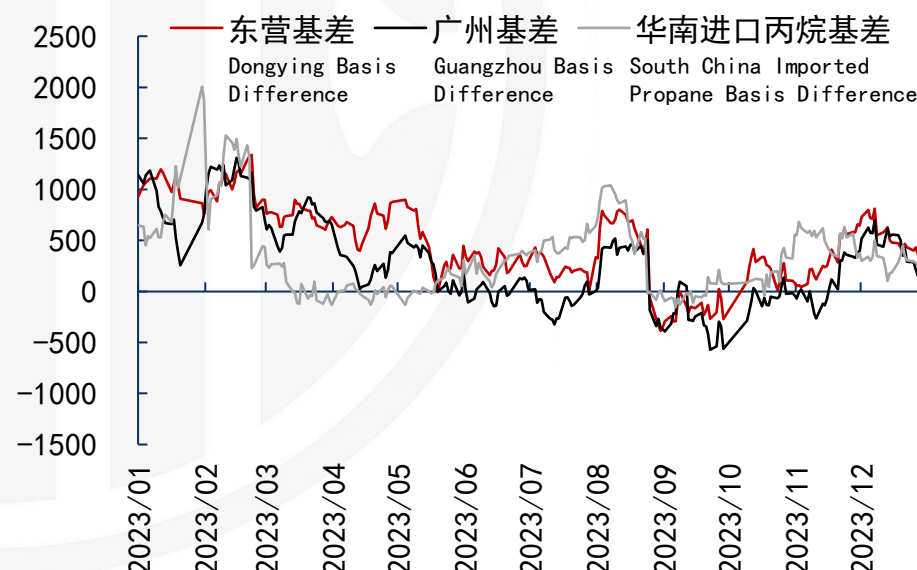
Deliverable price (yuan/tonne)

可交割品价格(元/吨)



Basis Difference Between Residential Gas & Imported Propane (yuan/tonne)

民用气及进口丙烷基差(元/吨)



Sources: Oilchem, CITIC Futures

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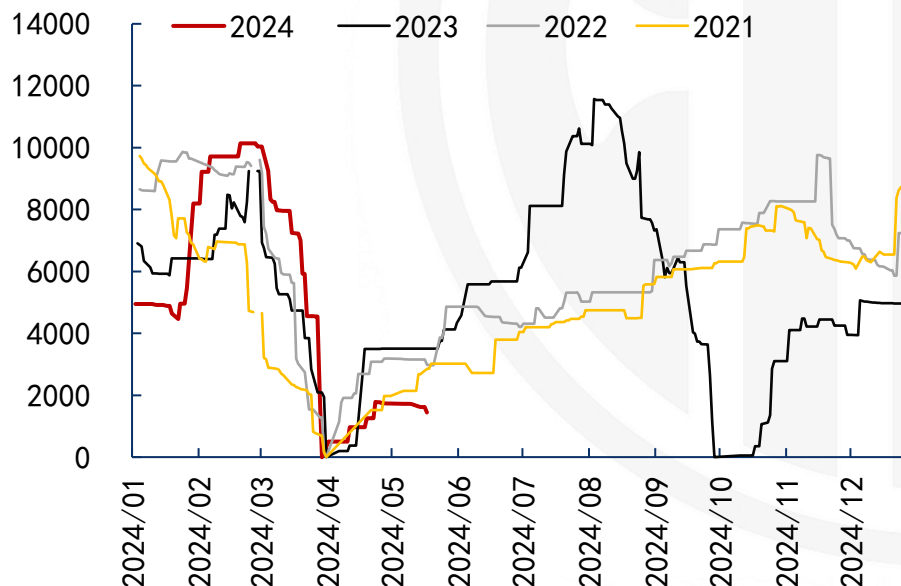
LPG: Rules significantly affect warehouse receipts and delivery

LPG: 仓单和交割受规则影响较大

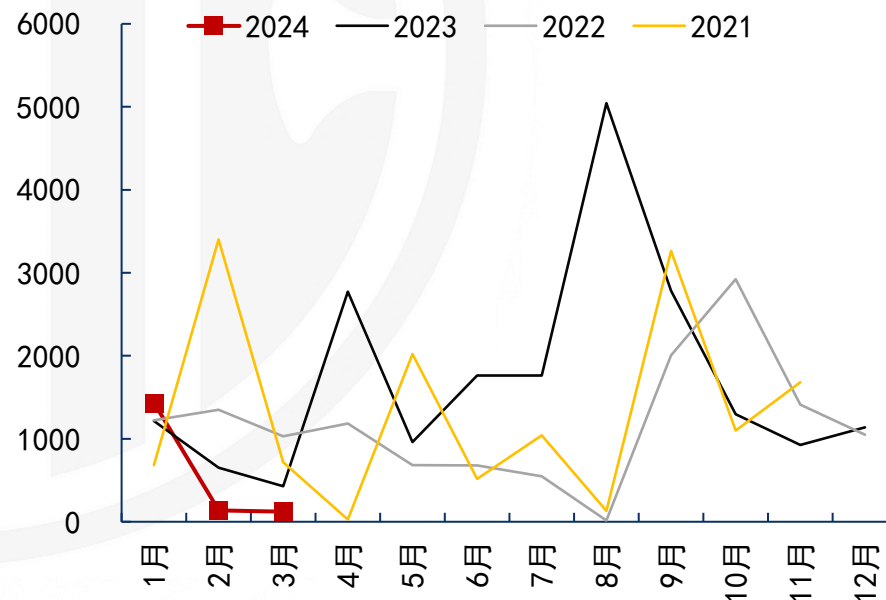
In 2022 and before, the Daxiangshang stipulates that warehouse receipts are centrally cancelled out of the warehouse after March each year. 2023 and after, the September contract is added. Therefore, under the rules, the number of warehouse receipts and deliveries show obvious seasonality.

2022年及之前，大商所规定每年3月之后仓单集中注销出库。2023年及之后，新增9月合约。因此，在规则约束下，仓单和交割数量呈现明显的季节性。

China LPG Futures Position Volume (Lots)
中国液化石油气期货仓单量(手)



China LPG Futures Delivery Volume (Lots)
中国液化石油气期货交割量(手)



Sources: DCE CITIC Futures

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中国液化石油气期货 China LPG Futures

基础介绍 Introduction

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