

OPIS Global LPG & Naphtha Price

Assessments

Methodology and specifications

November 2024

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Introduction

OPIS has been a news and price reporting leader in the downstream refined products marketplace since 1977. We have served customers throughout the many industry segments.

OPIS benchmarks are underpinned by robust methodologies developed in consultation with market stakeholders and are in-line with market realities. Regular reviews by customers and editors ensure the benchmarks are fit for purpose and that there is an open communication channel with stakeholders. This enables the benchmarks to evolve with changing needs and market landscape.

All price assessments are subject to general methodology principles and policies found here: <u>https://www.opisnet.com/about/methodology/</u>

Pricing Methodology

Shipping and Freight

OPIS International LPG Very Large Gas Carrier (VLGC) Freight Rates

OPIS surveys a wide range of market participants to create daily LPG freight assessments for Very Large Gas Carriers (VLGC). The freight assessments are quoted in a dollar-per-metric ton basis.

Base routes:

- Ras Tanura to Chiba, Japan
- Houston to Flushing, Netherlands
- Houston to Chiba, Japan (via the Panama Canal)

While OPIS considers the bids, offers and transaction levels within a prevailing assessment cycle, market indications received outside the prevailing cycle and standard terms can also be considered in the event of an illiquid market.

Standard terms for the assessment are as follows:

- Cargo size: 46,200 metric tons, which is equivalent to the high end of 44,000 mt plus/minus 5%
- Cargo grades: 1 to 2 grades, fully refrigerated LPG
- Assessment cycle: second forward half-month cycle from the index date. For example, on August 1st, the second forward half-month cycle is the first-half of September.
- Sea margin: 5%
- Broker Commission: 1.25% while address commission is not included in the calculations.

OPIS derives from the three main VLGC assessments a Time Charter Equivalent (TCE) rate, using the basic formula: TCE (\$/day) = (VLGC Freight Rate (\$/mt) x Cargo Size (mt) – Costs (\$))/Voyage Duration. This TCE is then used to calculate rates for other routes.

OPIS produces a series of daily calculated VLGC freight assessments on specific routes in line with market practice, where the TCE's created from the main VLGC freight assessments will be used in the calculation of the targeted route.

All voyages are calculated on a round voyage basis, with the exception of Marcus Hook to Flushing, which assumes a ballast voyage to Houston following discharge at Flushing.

Vessels are assumed to load bunker fuels prior to the laden leg of the round trip, using 0.5% Very Low Sulfur Fuel Oil (VLSFO), and 0.1% Low Sulfur Marine Gasoil (LSMGO) or DMA in sulphur emissions control areas (SECA). LSMGO consumption is also assumed for power auxiliary systems at port.

Given vessels are assumed to have loaded bunker fuels for the laden leg of the voyage. The bunker fuel for the nearest load port or bunker hub is used in the calculation for the desired route.

All freight rates specify which canal is involved in the routing where relevant. The Houston to Chiba VLGC rate assumes one day laden and one day ballast at the Panama Canal. All routes assume 6 hours Notice of Readiness (NOR) at each port.

Port costs and timings are reviewed on an annual basis.

VLGC Specifications	
Deadweight Tonnage (DWT)	55,000
Gross Tonnage (GT)	49,000
Net Register Tonnage (NRT)	17,000
Length (m)	226
Beam (m)	37
Laden/Ballast Speeds (knots)	15
Laden Bunker Fuel Consumption (mt/day)	38
Ballast Bunker Fuel Consumption (mt/day)	38
Bunker Fuel Consumption in Port (mt/day)	10
Laden LSMGO Consumption (mt/day)	0.2
Ballast LSMGO Consumption (mt/day)	0.2
Port LSMGO Consumption (mt/day) Source: OPIS	0.25

VLGC Derived Routes (46	,200 mt)	
Load Port	Discharge Port	VLGC Base Rate
Houston	Ningbo	Houston-Chiba
Houston	Yantai	Houston-Chiba
Houston	Yeosu	Houston-Chiba
Houston	Tanjung Uban	Houston-Chiba
Prince Rupert	Chiba	Ras Tanura-Chiba
Houston	San Pedro	Houston-Flushing
Houston	Suape	Houston-Flushing
Houston	Mohammedia	Houston-Flushing
Houston	Lavera	Houston-Flushing

Flushing

Mombasa

Yarimca

Yarimca

Houston-Flushing

Houston-Flushing

Houston-Flushing

Houston-Flushing

Marcus Hook

Houston

Houston

Arzew

VLGC Port Costs & Port Times				
Port	Cost (\$)	Days Loading/Discharging	SECA Port	
Ras Tanura	12,000	2	No	
Chiba	75,000	2	No	
Houston	45,000	2	Yes	
Flushing	85,000	2	Yes	
Ningbo	40,000	2	No	
Yantai	34,500	2	No	
Yeosu	50,750	2	Yes	
Tanjung Uban	35,000	3	No	
Prince Rupert	45,000	2	Yes	
San Pedro	48,000	2	No	
Suape	36,500	2	No	
Mohammedia	120,000	2	No	
Lavera	80,000	2	Yes	
Marcus Hook	50,000	2	Yes	
Mombasa	47,000	10	No	
Yarimca	65,000	10	Yes	
Arzew	60,000	2	No	

Source: OPIS

OPIS Midsize Gas Carrier (MGC) Assessments

OPIS assesses a 12-month period charter rate for a 38,000 cubic meter (cbm) or and a 40,000 cbm for Midsize Gas Carriers (MGCs). These represents the price to fix from the previous week. The \$/month assessments for both the 38,000 cbm and 40,000 cbm are rounded to the nearest \$5,000/mt.

Submissions for the weekly assessment must be submitted by 4:00 p.m. London time on Monday.

The 12-month period MGC charter rates for the 38,000 cbm and 40,000 cbm carriers will be published on Monday, or the next publication day if Monday is a U.S. holiday.

OPIS produces a series of daily calculated freight rate for specific routes on 38,000 cbm and 40,000 cbm MGCs based on the weekly MGC 12-month period charter assessments. The day rate for an MGC includes bunker fuel and port costs. All routes are assumed to be a round voyage with a 98% cargo load of a 38,000 cbm or 40,000 cubic meter MGC. The cargo is noted as metric tons.

Vessels are assumed to load bunker fuels prior to the laden leg of the round trip, using 0.5% Very Low Sulfur Fuel Oil (VLSFO), and 0.1% Low Sulfur Marine Gasoil (LSMGO) or DMA in sulphur emissions control areas (SECA). LSMGO consumption is also assumed for power auxiliary systems at port.

Given vessels are assumed to have loaded bunker fuels for the laden leg of the voyage. The bunker fuel for the nearest load port or bunker hub is used in the calculation for the desired route.

The Houston to Lagos MGC assessments include a cost of \$75,000 for armed guards during the vessel's discharge in Lagos and for one day either side.

All routes include 6 hours Notice of Readiness per port and 12 hours bunkering per round voyage.

Fees and timings are reviewed on an annual basis. The Houston-Lagos MGC assessments do not include port costs at Lagos, which are for the charterer's account.

38,000 Cubic Meter MGC Specifications	
Deadweight Tonnage (DWT)	28,000
Gross Tonnage (GT)	25,000
Net Register Tonnage (NRT)	7,500
Length (m)	175
Beam (m)	28
Laden/Ballast Speeds (knots)	15
Laden Bunker Fuel Consumption (mt/day)	29
Ballast Bunker Fuel Consumption (mt/day)	27
Bunker Fuel Consumption in Port (mt/day)	4
Laden LSMGO Consumption (mt/day)	0.1
Ballast LSMGO Consumption (mt/day)	0.1
Port LSMGO Consumption (mt/day)	0.1

40,000 Cubic Meter MGC Specifications	
Deadweight Tonnage (DWT)	28,500
Gross Tonnage (GT)	26,250
Net Register Tonnage (NRT)	7,750
Length (m)	180
Beam (m)	29
Laden/Ballast Speeds (knots)	15
Laden Bunker Fuel Consumption (mt/day)	29
Ballast Bunker Fuel Consumption (mt/day)	27
Bunker Fuel Consumption in Port (mt/day)	4
Laden LSMGO Consumption (mt/day)	0.1
Ballast LSMGO Consumption (mt/day)	0.1
Port LSMGO Consumption (mt/day)	0.1

Source: OPIS

38,000 Cubic Meter MGC Derived Routes		
Route	Cargo Grade	Cargo Size (mt)
Houston-Tuxpan	Propane	21,700
Houston-Jorf Lasfar	Propane	21,700
Houston-Jorf Lasar	Butane	22,300
Houston-Flushing	Propane	21,700
Houston-Flushing	Butane	22,300
Marcus Hook-Flushing	Propane	21,700
Marcus Hook-Flushing	Butane	22,300
Houston-Lagos	Butane	22,300
Houston-Abidjan	Butane	22,300

Source: OPIS

40,000 Cubic Meter MGC Derived Routes

Cargo Grade	Cargo Size (mt)	
Propane	22,800	
Propane	22,800	
Butane	23,500	
Propane	22,800	
Butane	23,500	
Propane	22,800	
Butane	23,500	
Butane	23,500	
Butane	23,500	
	Propane Propane Butane Propane Butane Propane Butane Butane	Propane22,800Propane22,800Butane23,500Propane22,800Butane23,500Propane22,800Butane23,500Butane23,500Butane23,500

Source: OPIS

MGC Port Costs & Port Times

Port	Cost (\$)	Days Loading/Discharging	SECA Port	
Houston	26,000	1	Yes	
Marcus Hook	35,600	1	Yes	
Jorf Lasfar	34,000	1.5	No	
Flushing	45,000	1	Yes	
Tuxpan	53,000	1	No	
Lagos	N/A	4	No	
Abidjan	102,000	9	No	

Source: OPIS

EU ETS Cap-at-the-Port (EU CAP) Costs

An estimated EU ETS Cap-at-the-Port (EU CAP) price has been calculated for freight rate calculations on routes originating in the US and delivering in Europe. This will be applicable on voyages starting from January 2025 and will become increasingly stringent over the next few years, to encompass other GHG omissions.

The OPIS \$/mt non-jurisdictional EU CAP has been applied for voyages that originate outside of the EU and destined for ports of discharge which are located within the EU. This price premium is calculated on fuel consumption on both the laden and ballast legs from Houston into ports in Flushing and Lavera, and additionally calculated on in port consumption of conventional marine fuels. The total value of this CAP premium on the round voyage is then divided by the intake of the respective vessel sizes trading on these routes in order to calculate a \$/mt equivalent on these routes.

For the MGC assessments, OPIS calculates the EU ETS CAP price by taking an average of both propane and butane parcel sizes.

More information on the OPIS EU CAP methodology can be found at https://www.opisnet.com/about/methodology/#marine_europe

North America LPG & Naphtha Spot Pricing

LPG

OPIS FOB US Resale Differential assessments are reported as a differential range (cts/gal) to OPIS Mont Belvieu non-TET (EPC) propane and OPIS Mont Belvieu non-TET (EPC) normal butane on the day. Resale differentials are also known as spot terminal fees in industry practice.

Half-month cycles roll at the new calendar month and at mid-month.

Editors survey a range of market participants and assessments will be based on executed deals, bid-offer levels and netbacks to the Far East and Northwest Europe. Editors confirm and record deals done between 9:00 a.m. and 2:00 p.m. U.S. Eastern time.

• OPIS FOB USGC Propane Resale Differentials (cts/gal)

OPIS assesses partial and up to a full size Very Large Gas Carrier (VLGC) of fully-refrigerated propane loading FOB at U.S. Gulf Coast terminals (Enterprise, Targa, Nederland and Freeport) for two forward half-month cycles. Specification is export-grade low-ethane propane (maximum 2% ethane).

- OPIS FOB USGC Normal Butane Resale Differentials (cts/gal) OPIS assesses partial and up to a full size Very Large Gas Carrier (VLGC) of fully-refrigerated normal butane loading FOB at U.S. Gulf Coast terminals (Enterprise, Targa, Nederland and Freeport) for two forward half-month cycles. Specification is export-grade normal butane (maximum 0.35% propane and maximum 6% isobutane).
- OPIS FOB USEC Propane Resale Differentials [cts/gal] OPIS assesses partial and up to a full size Very Large Gas Carrier (VLGC) size cargoes of fully-

refrigerated propane loading FOB at the U.S. East Coast terminal (Marcus Hook) for the forward halfmonth cycle. Specification is export-grade low-ethane propane (maximum 2% ethane).

- OPIS FOB Western West Coast (WC) Canada Propane Resale Differentials [cts/gal] OPIS assesses Very Large Gas Carrier (VLGC) size cargoes of fully-refrigerated propane loading FOB at the Western Canadian terminal (Prince Rupert) for the forward half-month cycle. Specification is export-grade low-ethane propane (maximum 2% ethane).
- OPIS FOB USEC 38K and 40K CBM Differentials (cts/gal) OPIS assess resale differentials for the 38,000 cubic meter and 40,000 cubic meter MGCs of semirefrigerated propane loading FOB at the U.S. East Coast terminal (Marcus Hook).

OPIS FOB USGC, FOB USEC and FOB WC Canada resale prices as expressed in \$/mt, is calculated by the sum of OPIS Mont Belvieu non-TET (EPC) propane and normal butane assessments and the OPIS FOB Resale Differential.

More information on OPIS Mont Belvieu spot pricing methodology can be found at <u>https://www.opisnet.com/about/methodology/#ngl-spot-pricing</u>

Naphtha

Domestic 40N+A heavy naphtha, domestic full-range naphtha and offshore naphtha are all assessed as differentials (cts/gal) to USGC waterborne unleaded.

In the absence of reported spot market activity, domestic full-range naphtha and offshore naphtha typically are assessed as differentials to domestic 40N+A heavy naphtha, and the resulting values are shown as differentials to USGC waterborne unleaded.

• Domestic 40N+A (Heavy) Naphtha

Values for domestic 40 N+A heavy naphtha reflect material with 38-44 N+A, an initial boiling point of 150-160 Degrees F., an end point of 350-380 Degrees F., +20 minimum color, a maximum RVP of 4.0 lbs., 3 parts per million maximum nitrogen, 500 parts per million maximum sulfur, and an API gravity of 56-60.

• Domestic Full-Range Naphtha

Values for domestic full-range naphtha reflect material with 36-40 N+A, an initial boiling point of 100-120 Degrees F., a 10% distillation of 130-160 Degrees F., an end point of 350-380 Degrees F., +20 minimum color, an RVP of 4.5-6.5 lbs., 3 parts per million maximum nitrogen, 500 parts per million maximum sulfur, and an API gravity of 60-64.

• Offshore Naphtha

Offshore 40 N+A naphtha assessments tend to reflect offshore naphtha grades with high N+A content (44-48) but with full-range qualities such as an initial boiling point of 100-120 Degrees F., an RVP of 4.5 lbs. or higher, and an API of 60 or higher.

Paraffinic Naphtha

Assessments reflect 50,000-bbl barge volumes delivered on the U.S. Gulf Coast within 5 days from date of publication.

Sour paraffinic naphtha is assessed as a differential to OPIS Mont Belvieu non-TET natural gasoline and is reported in dollars per metric ton.

Assessment is typically reflective of material with the following specifications: 65 minimum paraffin content, 84 maximum API gravity, 500 ppm maximum sulfur, 13.0-lb. maximum RVP, 50 ppm maximum oxygenates, 50 ppb maximum lead, 10 ppb maximum arsenic, 5 ppb maximum mercury, 1 ppm maximum H2S in liquid, and +20 minimum Saybolt color.

OMBD and Delivered LPG Price Assessments

OPIS assesses a series of Mont Belvieu Delivered (OMBD) prices for VLGCs and the MGCs category from Houston to various ports around the world. The delivered prices incorporate the OPIS Mont Belvieu assessment in addition to the spot terminal fees and the cost of freight.

In addition, OPIS assesses delivered prices for voyages from the USEC, Mideast Gulf, WC Canada and Algeria.

OMBD prices are denoted via the Cape of Good Hope and via the Panama Canal where applicable.

VLGC OPIS Mont Belvieu Delivered Assessments	Other VLGC Delivered Assessments
South China (Houston – Ningbo)	USEC to Northwest Europe (Marcus Hook – Flushing)
East China (Houston – Yantai)	Mideast Gulf to Japan (Ras Tanura – Chiba)
South Korea (Houston – Yeosu)	Algeria to Turkey (Arzew – Yarimca)
Indonesia (Houston – Tanjung Uban)	WC Canada to Japan (Prince Rupert – Chiba)
Japan (Houston – Chiba)	
Northwest Europe (Houston – Flushing)	
Caribbean (Houston – San Pedro)	
Brazil (Houston – Suape)	
Morocco (Houston – Mohammedia)	
West Mediterranean (Houston – Lavera)	
Turkey (Houston – Yarimca)	
East Africa (Houston – Mombasa)	

MGC Mont Belvieu Delivered Assessments	Other MGC Delivered Assessments
Mexico (Houston – Tuxpan)	USEC to Northwest Europe (Marcus Hook – Flushing)
Morocco (Houston – Jorf Lasfar)	
Northwest Europe (Houston – Flushing)	
Nigeria (Houston – Lagos)	
Cote d'Ivoire (Houston – Abidjan)	

Middle East LPG & Naphtha Spot Pricing

LPG

• FOB Arab Gulf Propane and Butane

FOB Arab Gulf assessments reflect refrigerated propane or butane of cargo size 44,000-46,000 mt loading from major ports in the Middle East in the following calendar month from publication date.

The FOB Arab Gulf Propane and Butane assessments are derived from the prompt month Saudi Contract Price (CP) swap and the respective FOB Arab Gulf Premium/Discount.

The FOB Arab Gulf Premium/Discount assessments reflect the respective cash differential against the prompt month Saudi CP swap for propane and butane loading during the assessment period.

Naphtha

- FOB Arab Gulf LR1 Physical Naphtha and FOB Arab Gulf LR2 Physical Naphtha are assessed as freight netbacks from the CFR Japan Physical Naphtha assessment for a 55,000 mt and 75,000 mt cargo respectively.
- FOB Arab Gulf LR1 Physical Naphtha Premium/Discount reflects the cash differential against FOB Arab Gulf LR1 Physical Naphtha for cargoes loading from major ports in the Middle East 20-40 days forward.

Asia LPG & Naphtha Spot Pricing

LPG

CFR Japan Propane, Butane and LPG (11:11)

Specifications for CFR Japan and Far East assessments are based on the prevailing CFR Far East LPG Forward Contract for refrigerated propane, butane or LPG (11:11) of cargo size 22,000-23,000 mt delivering to Tokyo Bay, Japan.

Far East propane and LPG (11:11) are assessed for cargoes delivering in three half-month cycles, starting 25 days forward.

The CFR Japan physical assessments for propane and LPG (11:11) reflect cargoes delivering 25-40 days forward and are derived from the time-weighted average of the half-month cycle assessments

The CFR Japan butane assessment is derived from the LPG (11:11) and propane assessments.

Far East propane and LPG (11:11) Premium/Discount reflect the cash differential for cargoes delivering in each half-month cycle. The pricing basis is the respective same-month Far East swap value.

• OPIS Asia CFR South China Propane, Butane and LPG (11:11)

Specifications for CFR South China assessments follow the prevailing industry-accepted CFR Far East LPG forward contract for refrigerated propane, butane, or LPG (11:11, i.e. evenly-split ratio) of 22,000-23,000 mt delivering to ports in South China.

CFR South China for propane, butane and LPG (11:11) are assessed for cargoes delivering 25-40 days forward to South China.

Naphtha

• CFR Japan

Specifications for CFR Japan assessments are based on the latest CFR Far East Open Specification Form Naphtha Contract (OSN) with a minimum paraffin content of 65%.

CFR Japan Open Spec Naphtha is assessed for 25,000 mt-size cargoes delivering in three half-month cycles of 30-45 days forward, 45-60 days forward and 60-75 days forward. The half-month cycles are rolled twice every month -- on the first publication day of the month and the first publication day after the 15th.

CFR Japan Physical Naphtha is a calculated assessment covering the second (45-60 days) and third (60-75 days) half-month cycles and is derived from the low and high of these two cycles.

CFR Japan Premium/Discount reflects the cash differential against CFR Japan Physical Naphtha for cargoes delivering into Japan within the first and second half-month cycles

• CFR Korea

Specifications for CFR Korea assessments reflect naphtha of 25,000 mt cargo size with merchantable quality largely similar to CFR Japan Open Spec Naphtha but with a minimum paraffin content of 70% and for delivery into Daesan.

CFR Korea Physical Naphtha covers the first and second half-month cycles and derived from the CFR Korea Premium/Discount and the CFR Japan Physical Naphtha assessments.

CFR Korea Premium/Discount reflects the cash differential against CFR Japan Physical Naphtha for cargoes delivering into Daesan within the first and second half-month cycles

FOB Singapore

FOB Singapore Physical Naphtha is assessed as a freight netback from the first half-month cycle (30-45 days) for CFR Japan Open Spec Naphtha. The freight netback assumes a 30,000 mt cargo on a medium range tanker with a port charge of \$0.05/bbl. OPIS applies a 9 bbl to 1 mt conversion factor for this assessment.

Europe LPG & Naphtha Spot Pricing

LPG

• OPIS Propane CIF ARA

The OPIS CIF ARA Propane assessment considers cargoes for 10-25 days forward delivery, basis Flushing, and in the volume range of 19,000 – 24,000 metric tons to capture the majority of bids, offers and deals. The grade, quality, delivery and nomination terms remain based on the prevailing industry-accepted forward contract, such as the TOT contract. Positions referencing alternative forward delivery contracts will be considered if the dates fall into the 10-25 day forward delivery range.

Assessments consider physical spot deals and swaps transacted between 4:00-4:30 p.m. London time.

Physical bids must have a minimum 5-day delivery date range and offers a maximum 5-day delivery date range entirely within the 10-25 days forward delivery period, basis Flushing.

Deals, bids and offers that carry a minimum 50% fixed price component will be considered for the purpose of price discovery.

Deals, bids and offers, which carry additional requirements that may be seen as restrictive, are not considered for pricing assessments.

In the absence of reference month swap deals transacted on the above platforms between 4:00 p.m.-4:30 p.m. London time, OPIS will consider bids and offers levels for the reference month swap, in addition to spread trades linked to the reference month swap during this time period. Editors will also canvass market sources for a value for the reference month swap.

For bids, offers and deals that carry a naphtha-related floating price component for the balance or next month, the floating value will be derived from swap deals transacted and close values on credible trading platforms and by surveying market participants for the 4:30 p.m. London time close naphtha swap value.

When the 10-25 days forward delivery period crosses two calendar months, OPIS will roll forward the reference month swap considered in its assessment when eight days of the delivery period fall in the second month

NWE Butane

Butane prices are for field grade mixed butane cargoes above 4,000 metric tons delivered 10-25 days forward basis CIF ARA.

• FOB Med Propane and Butane

In the Mediterranean, OPIS assesses field grade and refinery grade propane and butane FOB basis Lavera 5-15 days forward. The assessment considers cargo sizes of 1,500 metric tons and above.

Naphtha

• NWE Naphtha

The physical flat price assessment is based on public physical spot deals transacted between 4:00-4:30 p.m. London time.

The OPIS CIF NWE Naphtha Settle Price assessment, will bring forward the roll of the reference month swap considered, when the 10-25 days forward delivery period crosses two calendar months.

OPIS will roll the Naphtha CIF NWE reference month swap when eight days of the delivery period fall into the second month. This will change from the existing reference month roll, which takes place on the 25th of each month.

OPIS assesses naphtha CIF NWE swaps, including multiple mini-swaps, based on a straight average of swaps, including multiple mini-swaps, seen cleared/concluded via credible trading platforms inside the 4:00-4:30 p.m. London timeframe. The method is to ensure complete validation and disclosure of price, volume and time traded. Swaps below 2kt and Mini Swaps below 20 lots (2kt) will be excluded.

The physical differential for open spec material or paraffinic grades — premium, parity or discount — will be applied to the current day's physical price assessment. The assessment considers these differentials until the market demonstrates otherwise. In the absence of any demonstration of a change on the day, the differentials will remain unchanged.

The assessment is rounded to the nearest 25 cents.

• LVN and OSN Differential Assessment

OPIS assesses naphtha physical CIF NWE value-to-market by canvassing the market on a full-day basis for the Open Spec and for Paraffinic grade (LVN) naphtha (basis min 80% paraffins). Once assessed, the differentials are applied to the physical price assessment for the day to arrive at the outright levels for LVN and OSN.

Forward Curves

OPIS aggregates London close-of-business swap data from broker reports to help make up its Forward Curves. Editors may exclude data that falls outside what is considered the normal range. Reports received after that time may be evaluated for market perspective but will not be automatically included in the forward market range.

The cut-off for data submissions is 7:00 p.m. London time.

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