

Country Analysis Brief: Türkiye

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Overview

Table 1. Türkiye's energy overview, 2021

	Crude oil and other petroleum liquids	Natural gas	Coal	Nuclear	Hydro	Other renewables	Total
Primary energy production (quad Btu)	0.14	0.01	0.76	0.00		1.02ª	1.94
Primary energy production (percentage)	7.4%	0.7%	39.2%	0.0%		52.6%	100.0%
Primary energy consumption (quad Btu)	1.99	2.15	0.0	0.0		1.04ª	6.81
Primary energy consumption (percentage)	29.2%	31.6%	0%	0%		15.3%	100.0%
Electricity generation (TWh)	0.31 ^b	103.09 ^b	97.3 b	0.00	55.18	61.22	317.10
Electricity generation (percentage)	0.1%	32.5%	30.7%	0.0%	17.4%	19.3%	100.0%

Data source: U.S. Energy Information Administration, International Energy Statistics

Note: We aggregate hydroelectricity and renewables as other renewables for primary energy production and consumption. We aggregate crude oil and other petroleum liquids, natural gas, and coal fuel sources as fossil fuel-derived fuel sources for electricity generation. Quad Btu=quadrillion British thermal units, TWh=terawatthours

- In 2021, Türkiye accounted for 5% of energy production and 9% of energy consumption in OECD Europe (Table 1).
- Türkiye controls the only outlet from the Black Sea. Three-fourths of Türkiye's 4,000-mile border
 is maritime, with coastlines along the Black Sea, the Aegean Sea, and the Mediterranean Sea as
 well as the narrows that link the Black Sea and Aegean Sea. These narrows, which are
 collectively known as the Turkish straits, include the Bosporus, the Sea of Marmara, and the
 Dardanelles.
- Türkiye's Kalyon Karapinar Solar Power Plant is now the largest solar power plant in Europe and one of the top five largest in the world at 1.35 gigawatts (GW). It has been partially operating since 2022.¹
- Türkiye's first nuclear reactor with a generation capacity of 1.2 GW began operating at Türkiye's first nuclear power plant in April 2023. At full capacity, the four reactors will be able to generate 4.8 GW by end of 2026.²
- The port of Ceyhan serves as an outlet for Iraqi Kurdish oil and the rest of the region's oil and gas exports via the Baku-Tbilisi-Ceyhan (BTC) and other pipelines (Table 3 and 4). Shipments of Iraqi crude oil through the Kirkuk-Ceyhan pipeline were halted on March 25 following an arbitration court ruling by the International Chamber of Commerce that awarded the Iraqi Central Government authority over the oil exports from Kurdistan and levying a \$1.5 billion arbitration against Türkiye. Prior to the shut-in, about 450,000 barrels per day (b/d) of Iraqi oil was loaded in Ceyhan. Iraq notified Türkiye's pipeline operator BOTAŞ to resume flows from Iraq on May 13, 2023. 3,4,5

^aIncludes hydroelectricity

^bFossil fuel proportions based on BP's Statistical Review of World Energy 2022

- Türkiye will greatly increase its natural gas storage capacity from about 155 billion cubic feet (Bcf) in 2022 to more than 353 Bcf by the end of 2023. Its two primary underground storage locations are in Silivri and at Lake Tuz. 6,7
- On February 6, 2023, two earthquakes, with magnitudes of 7.8 and 7.5 on the Richter scale, occurred in the Kahramanmaras province in Türkiye. The devastating earthquakes damaged natural gas pipelines and electricity transmission lines, halting flows.⁸

Petroleum and Other Liquids

- Türkiye's proved oil reserves, which are primarily located in the southeastern provinces of Batman and Adiyaman and the northwestern region of Turkish Thrace, were 371 million barrels as of January 1, 2023.⁹
- On December 12, 2022, Türkiye's President Recep Tayyip Erdogan announced Türkiye Petrolleri Anonim Ortaklığı's (TPAO) discovery of 150 million barrels of oil reserves, valued at \$12 billion, in Gabar Mountain (this discovery is not included in the January 2023 reserves estimate). During the first half of December 2022, TPAO drilled six wells with a cumulative production of over 840,000 barrels.¹⁰ TPAO anticipates producing an estimated 25,000 b/d with an additional 12 wells in 2023.¹¹
- State-owned TPAO is the primary exploration and production entity in Türkiye. TPAO has
 preferential rights in petroleum exploration and production, and any foreign involvement in
 upstream activities is limited to joint ventures with TPAO.
- As of January 1, 2023, Türkiye had six refineries with a combined processing capacity of over 826,000 b/d. Türkiye Petrol Rafinerileri AŞ (Tüpraş) operates four of the six refineries and accounts for 71% of the total refining capacity, and Ersan Petrol Sanayi AŞ and STAR Rafineri AŞ collectively hold 243,000 b/d of refining capacity.¹²
- Ersan Refinery in Kahramanmaras province is Türkiye's newest refinery. It was built near the Baku-Tbilisi-Ceyhan (BTC) and BOTAŞ Kirkuk-Ceyhan pipelines and 75 miles from the Ceyhan oil terminal to economically access crude oil supply and meet petroleum product needs. 13
- Türkiye imports nearly all of its petroleum and other liquids. Less than 9% of Türkiye's demand for petroleum and other liquids was met with domestic production in 2022 (Figure 1).

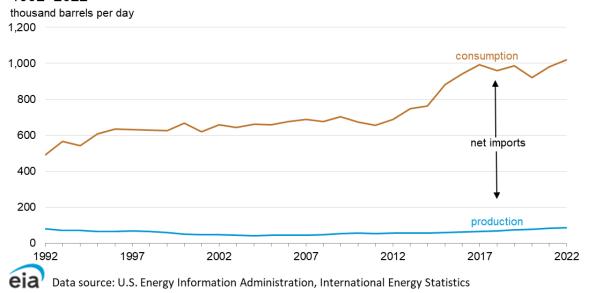


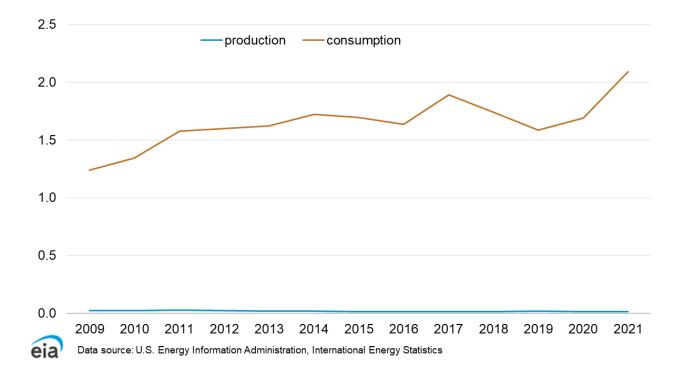
Figure 1. Türkiye petroleum and other liquid fuels production and consumption, 1992–2022

Natural Gas

- Türkiye's proved natural gas reserves were 111 billion cubic feet (Bcf) of as of January 1, 2023. 14
- Turkey produced 13.9 Bcf of dry natural gas in 2021, the lowest production since 2017 (Figure 2).
- On December 26, 2022, Türkiye announced the discovery of a 2 trillion cubic feet (Tcf) reserve in the Caycuma-1 field. In addition, Türkiye revised its reserves estimate for the Sakarya field from 19 Tcf to 23 Tcf.¹⁵ Türkiye's Black Sea reserves are now estimated to hold 25 trillion cubic feet (Tcf) of natural gas.¹⁶ These reserves are not included in the previously mentioned total estimate.
- In 2023, Türkiye aims to add 134 exploration wells and 73 production wells to the 94 exploration wells and 56 production wells that were drilled in the Black Sea in 2022. Sustained plateau production from the Black Sea could begin in 2027–28.¹⁷
- Türkiye's natural gas market is open to competition. However, BOTAŞ, a vertically integrated firm, dominates the natural gas sector. In addition to building and operating Türkiye's natural gas infrastructure, BOTAŞ accounted for 1.88 Tcf (95%) of Türkiye's natural gas imports, 1.87 Tcf of total natural gas sales domestically, and about 21 Bcf of natural gas exports in 2022. 18,19
- Türkiye's natural gas demand is seasonal, and demand peaks in the winter months when natural gas use for power generation and space heating is highest.
- Historically, Türkiye has depended on natural gas imports to meet domestic demand (Figure 2).
 However, current plans include increasing domestic production, particularly in the Black Sea, to decrease the dependence on imports. According to TPAO, the related infrastructure, including wells, marine transmission lines, and onshore natural gas facilities, is nearly complete.²⁰

 Recent additions to natural gas storage capacity in Silivri increased from 113 Bcf to 162 Bcf and at Lake Tuz from 42 Bcf to 191 Bcf. Türkiye's natural gas storage capacity will account for 20% of consumption, according to Türkiye's Energy and Natural Resources Minister.^{21,22}

Figure 2. Türkiye's dry natural gas production and consumption, 2009–2021 trillion cubic feet



Coal

- Türkiye's coal reserves were approximately 13 billion short tons as of January 1, 2023.
 Subbituminous and lignite cumulatively account for 95% of all Türkiye's coal reserves.²³
- Türkiye is ranked the fourth-largest lignite producer in the world behind China, Indonesia, and Germany.
- The Zonguldak Basin, located between Ereğli and Amasra on the Black Sea coast, accounts for all
 of Türkiye's hard coal production. The Afşin-Elbistan Basin, located in southeastern Anatolia, is
 Türkiye's most important lignite basin. Other key lignite basins include the Soma Basin, the
 Tunçbilek Basin, and the Beypazarı Basin.²⁴
- In 2021, Türkiye's coal production met 78% of domestic coal demand (Figure 3), and coal accounted for 39% of primary energy production (Table 1).

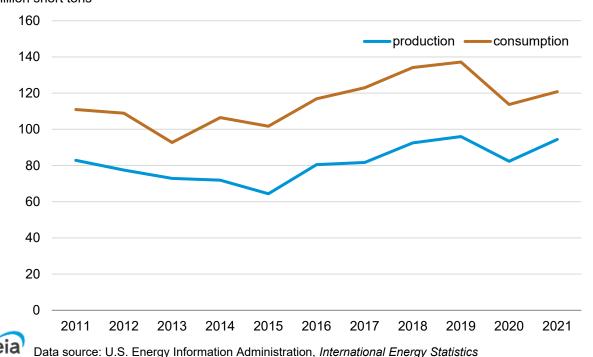


Figure 3. Türkiye's coal production and consumption, 2011–2021 million short tons

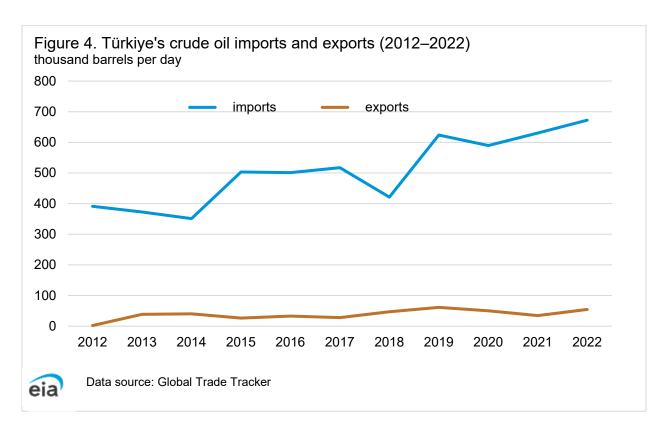
Electricity

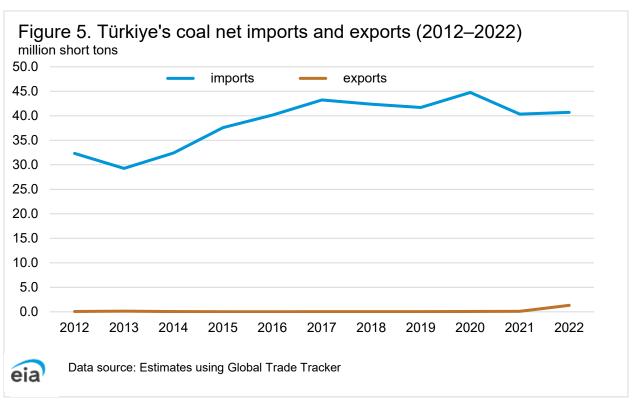
- In 2021, Türkiye generated 317,101 gigawatthours (GWh) and maintained an installed generation capacity of 101 GW. Renewables, with 53% of Türkiye's total capacity, accounted for the highest share in 2021 and continued to grow relative to fossil fuel capacity, which was at 47% in 2021 and consisted of predominately natural gas and coal.²⁵
- Fossil fuels, natural gas and coal, made up 63% of Türkiye's total electricity generation. The state-owned Electricity Generation Company (EÜAŞ) remains the largest electric generation company in Türkiye, accounting for about 16% of the country's electric generation as of the end of 2021. The remaining generation comes from independent power producers and firms given special state concessions to build and operate power plants. The wholesale electricity market in Türkiye is also open to private companies; however, the state-owned Turkish Electricity Trading and Contracting Company (TETAŞ) accounted for more than 40% of the market in 2015 and merged with EÜAŞ in 2018. 26,27,28
- Türkiye launched the 1.35 GW Kalyon Karapinar Solar Power Plant, Europe's largest and one of the top five globally, in the central province of Konya's Karapinar district. The \$1 billion plant can power 3 million kilowatthours (kWh) of electricity annually with its 3.2 million solar panels. The Turkish government plans to expand generation capacity to 2 GW.²⁹
- Transmission and distribution services are separate (unbundled) from generation and marketing services. The Turkish Electricity Transmission Company, Türkiye's state-owned enterprise Turkish Electricity Transmission Corporation (TEIA\$), owns and operates the transmission system. Türkiye has 21 electric distribution regions, all of which have been operated by private companies since 2004.³⁰

- Türkiye's nuclear power plant, Akkuyu, started operating in April 2023 from its first, 1.2 GW reactor. Three additional reactors are planned at the Akkuyu nuclear power plant that will be online by the end of 2026 and will reach approximately 4.8 GW of capacity. Once fully commissioned, the power plant will provide 35 billion kWh, an estimated 10% of electricity demand. Türkiye is working with Russia's state-owned firm Rosatom State Nuclear Energy Corporation on all its current nuclear projects.^{31,32}
- Türkiye and Rosatom are in initial negotiations for the Sinop nuclear power plant that would have 4.5 GW of capacity, but negotiations with EÜAŞ for the İğneada power plant with Rosatom have been delayed. South Korea has also submitted a preliminary proposal to build four APR-1400 reactors in an undisclosed location.³³

Energy Trade

- Türkiye's total electricity imports totaled 2.3 kWh and exports stood at 4.2 kWh in 2021.
- Türkiye imported 72% more crude oil in 2022 than in 2012 (Figure 4). Türkiye's customs data do not provide the origin of the crude oil, but Russia, Iraq, Azerbaijan, and Kazakhstan have in the past exported significant volumes to Türkiye via pipeline and via tanker. Türkiye exported about 55,000 b/d in in 2022.³⁴
- Türkiye is a net importer of natural gas, importing 1.9 Tcf and exporting 20.5 Bcf in 2022 (Figure 6). Türkiye's natural gas imports came from Russia (39%), Iran (17%), Azerbaijan (16%), and the United States (10%) (Figure 6).
- Türkiye exported 40.7 million short tons of coal in 2022 (Figure 5). Russia (21.7 million short tons) and Colombia (11.6 million short tons) were the largest importers of coal products from Türkiye in 2022, while the United States was the fourth-largest importer at 1.9 million short tons
- Türkiye is a net importer of crude oil, liquefied natural gas (LNG), and petroleum products.
 Seaborne imports consisted of 37% (623,000b/d) crude oil and condensate, 34% (571,000 b/d) clean petroleum products, 4% (70,000 b/d) dirty petroleum products, and 25% (416,900 b/d) LNG while almost all seaborne exports consisted of refined petroleum product (288,000 b/d).
- Russia was the largest source of crude oil, LNG, and petroleum products (60% crude oil and 37% refined oil products) in aggregate to Türkiye, representing 34% of Türkiye's seaborne imports, while the United States accounted for the second-most crude oil, LNG, and petroleum product imports, at 13% of total imports. Of the U.S. imports, 73% were LNG, and 27% were clean petroleum products.³⁶
- Türkiye is one of the primary transit countries for pipelines between Europe, Russia, and the Middle East (Tables 2 and 3).
- As Russia's flows to Europe have declined since early 2022, Türkiye, has become a more
 important route for oil and natural gas flows to Europe from Central Asia and the Middle East
 primarily via pipelines such as the BTC, TANAP, TAP, and CPC (Tables 2 and 3). However,
 pipelines that transport Russia's natural gas, such as the Turkish Stream and Blue Stream have
 also gained importance, underscoring Türkiye's role as an international hub for oil and natural
 gas flows.





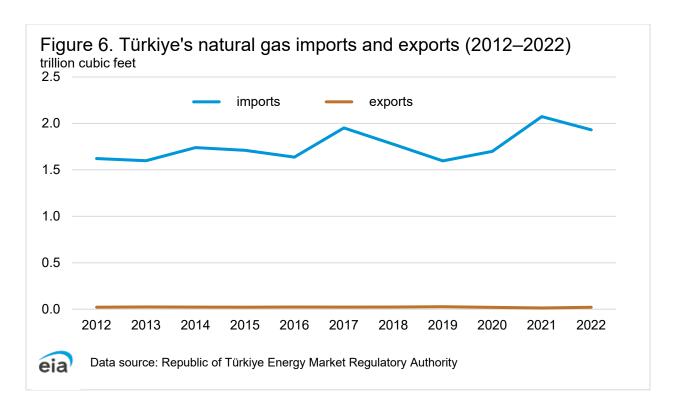
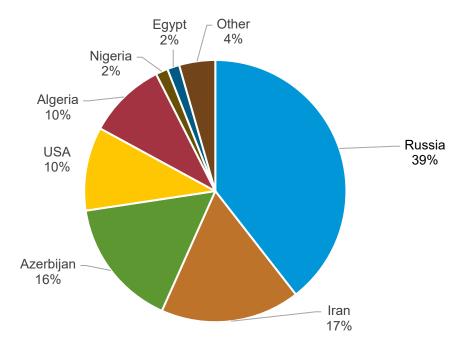


Figure 7. Türkiye's natural gas imports by country, 2022



Data source: Republic of Türkiye Energy Market Regulatory Authority

Table 2. Türkiye's major natural gas pipelines

Facility (status)	Capacity (Tcf per year)	Total length (miles)	Supply regions	Destination	Details
Trans Balkan natural gas pipeline (Operating since 1987)	0.5	Over 600	Russia through Ukraine and Moldova primarily via the Shebelinka- Dnipropetrovsk- Kryvyi Rih- Rozdilna-Izmail (SDKRI) Gas Pipeline	Sofia, Bulgaria and Istanbul, Türkiye	It transits Romania and Bulgaria. Physical reversed flows were utilized for the first time in 2022 to Moldova, although reversed virtual flows first shipped to Ukraine in 2015 because Russia favors Turkstream. ^{37, 38, 39}
Tabriz- Dogubayazit/Ankara (Operating since 2001)	0.5	1,600	Tabriz, Iran	Türkiye	Flows were halted or diminished in early 2022 and 2023. 40, 41
Blue stream (Operating since 2003)	0.6	750	Russia	Türkiye via the Black Sea	Russia reported record-high exports via Blue Stream in 2021. ⁴²
South Caucuses Pipeline (SCP) (Operating since 2007; expanded in 2018)	0. 9 (originally 0.3)	430	Azerbaijan	Georgia to Türkiye (TANAP)	It follows the route of the BTC oil pipeline from Azerbaijan through Georgia to the TANAP.
Interconnector Türkiye- Greece-Italy (Operating since 2007)	0.4	180	Azerbaijan, Russia, and Iran	Greece	The Türkiye-Greece interconnector started operations in 2007; little progress has been made on extending the line through Greece and to Italy.
Arab Gas Pipeline (AGP) (First section operating since 2003; Syria- Türkiye segment TBD)	0.4	630	Egypt	Jordan, Lebanon, Syria, and Türkiye	An extension to allow deliveries to Türkiye and Europe is planned. 43
Nabucco pipeline (Türkiye-Austria pipeline) (Canceled 2013)	1.1	2,400	Azerbaijan (formerly Iran)	Georgia, Türkiye (via TANAP), and Southeast Europe (via Bulgaria)	It was canceled due in part to Azerbaijan's preference for TAP. 44, 45
Trans-Anatolian Pipeline (TANAP) (Operating since 2019)	0.6	1,150	Azerbaijan (SCP)	Türkiye and Europe via Greece (TAP)	It is Türkiye's longest pipeline. The Bulgaria Nabucco pipeline extension was canceled, and there are plans to expand to 1.1 Tcf.

Facility (status)	Capacity (Tcf per year)	Total length (miles)	Supply regions	Destination	Details
Trans Adriatic Pipeline (TAP) (Operating since 2020)	0.4	540	Azerbaijan via TANAP and SCP	Italy, Bulgaria (via IGB), and Southeast Europe	Construction is underway to expand to 0.7 Tcf capacity; it was built mainly to carry natural gas from Azerbaijan via the SCP expansion and TANAP. The Greece-Bulgaria bridge (IGB) was recently completed. ⁴⁶
Turkish Stream - line 1 and 2 (Operating since 2020; expansion proposed)	1.1 (0.6 each)	570	Russia	Türkiye and Bulgaria	Türkiye is currently the only source of natural gas from Russia outside of Ukraine with no flow from Yamal-Europe and Nord Stream. ^{47, 48}
Persian gas pipeline (Canceled)	1.4	2,100	Iran	Southeast Europe via Türkiye	It is a former plan to expand flows from Iran to Europe.
Iraq-Türkiye (Proposed; potentially canceled)	0.4–0.7		Northern Iraq	Türkiye and Southeast Europe	Türkiye continues to negotiate with the Kurdish Regional Government and the Iraqi government; although no agreement has been reached, BOTAŞ has begun extending the domestic natural gas transmission system to the Iraqi border.
Interconnector Türkiye- Bulgaria (ITB) (Operating since 2022)	0.1		Azerbaijan (via TAP and TANAP)	Bulgaria	Bulgaria has been importing more natural gas from Azerbaijan than Russia, which was previously its nearly sole source. 49
Eastring (Proposed)	Up to 1.4	500	Slovakia and Northeast Europe	Southeast Europe and Türkiye	It would be open access, under EU regulations, and would run from eastern Slovakia, across Hungary and Romania, connecting to an upgraded Trans Balkan line in Romania or Bulgaria. 50
South Stream (Canceled)	2.2	560 (offshore)	Russia	Türkiye and Southeast Europe	It was canceled in late 2014 and replaced with Turkish Stream.

Data source: U.S. Energy Information Administration, Country Analysis Turkey, 2017;

Note: Tcf=trillion cubic feet and – is not applicable

Table 3. Türkiye's major crude oil and condensate pipelines

Facility (status)	Capacity (million b/d)	Total length (miles)	Supply regions	Destination	Details
Baku-Tbilisi- Ceyhan (Operating since 2006)	1.2	1,100	Azerbaijan and Kazakhstan	Türkiye to Ceyhan oil port ^a	It is used as an alternative for Russia's oil and infrastructure.
Kirkuk-Ceyhan (Operating since 1976)	1.6	600	Kiruk (Northern Iraq)	Türkiye to Ceyhan oil port ^a	A diplomatic dispute between Türkiye and Iraq relating to Kurdish use of the

					pipeline have temporarily halted flows in 2023. 51
Iraqi Section of Kirkuk-Ceyhan	1.5	220	Kirkuk	Fishkhabur (Iraq- Türkiye border)	Iraq's portion of the pipeline was the target of militant attacks and stopped operating in 2014. The pipeline's effective capacity was significantly lower than its nameplate capacity prior to its closure.
Turkish Section of Kirkuk- Ceyhan	1.5	400	Fishkhabur (Iraq-Türkiye border)	Türkiye Ceyhan oil port ^a	
Kurdish Regional Government (KRG) Pipeline (Operating since 2014)	0.7	250	Northern Iraq	Ceyhan oil port ^a via connection to the Kirkuk-Ceyhan pipeline at Fishkhabur	A plan to expand the pipeline was canceled in 2021. In early 2023, exports were halted. ⁵²
Samsun-Ceyhan (Canceled in 2013)	Up to 1.5	340	Russia and Central Asia	Türkiye to Ceyhan oil port	It would have allowed oil to bypass the congested Turkish Straits, but the project was canceled in 2013 because it was deemed uneconomical.

Data source: U.S. Energy Information Administration, Country Analysis Turkey, 2017

Note: b/d=barrels per day

^a Flows were disrupted to the Ceyhan port in 2023 due to earthquake damage and weather disruptions.

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