

What causes an energy crisis?

Some case studies

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Energy crises – an anatomy

- ❖ Britain's winter energy crisis (electricity, coal and gas) in Q1 1947
- ❖ U.S. oil shock in 1973/74
- ❖ Britain's energy crunch in 2021

(1) Pre-crisis erosion of spare production capacity and/or inventories

- ❖ Tightening U.K. coal supplies from 1943 onwards and ultra-low stocks by winter 1946
- ❖ Erosion of spare oil production capacity in United States from late 1960s/early 1970s
- ❖ Tightening global gas market and increasing reliance on wind/gas generation in 2021

(2) Failure to appreciate increasing risk and take timely preventive action

- ❖ United Kingdom fortunate to get through winter 1946, stagnating coal production
- ❖ United States becomes increasingly reliant on imports from early 1970s, heating oil then gasoline shortages earlier in 1973
- ❖ Asia LNG prices spike in Q1 2021 and European gas inventories fall to unusually low levels in Q2 2021

(3) Short-term trigger that turns potential shortage into actual shortage

- ❖ United Kingdom experiences unusually prolonged cold weather in Jan-Feb 1947
- ❖ Arab oil embargo declared in October 1973
- ❖ U.K. wind farm output dwindles during still weather in Aug-Sep 2021

(4) Panicked reaction

What caused Britain's midwinter energy crisis in 1947?

Contributing causes

- Structural problems with Britain's coal industry since 1920s
- Coal industry nationalization, ownership issues, under-investment and labour relations problems
- Failure to increase coal output during the war and afterwards
- Rapid growth in electricity consumption after the war ended (electricity as “modern” energy)
- Failure to rebuild depleted coal stocks over summer of 1946 after near shortages in winter of 1945/46
- Failure to plan and prepare for increasing risk of a coal and electricity crisis
- Disagreements between government ministers and officials
- Over-optimism by minister of fuel and power Emanuel Shinwell
- Unusually low and prolonged temperatures in Jan and Feb 1947
- Blizzards hit rail and road transportation preventing fuel resupply

Time horizon

Long term



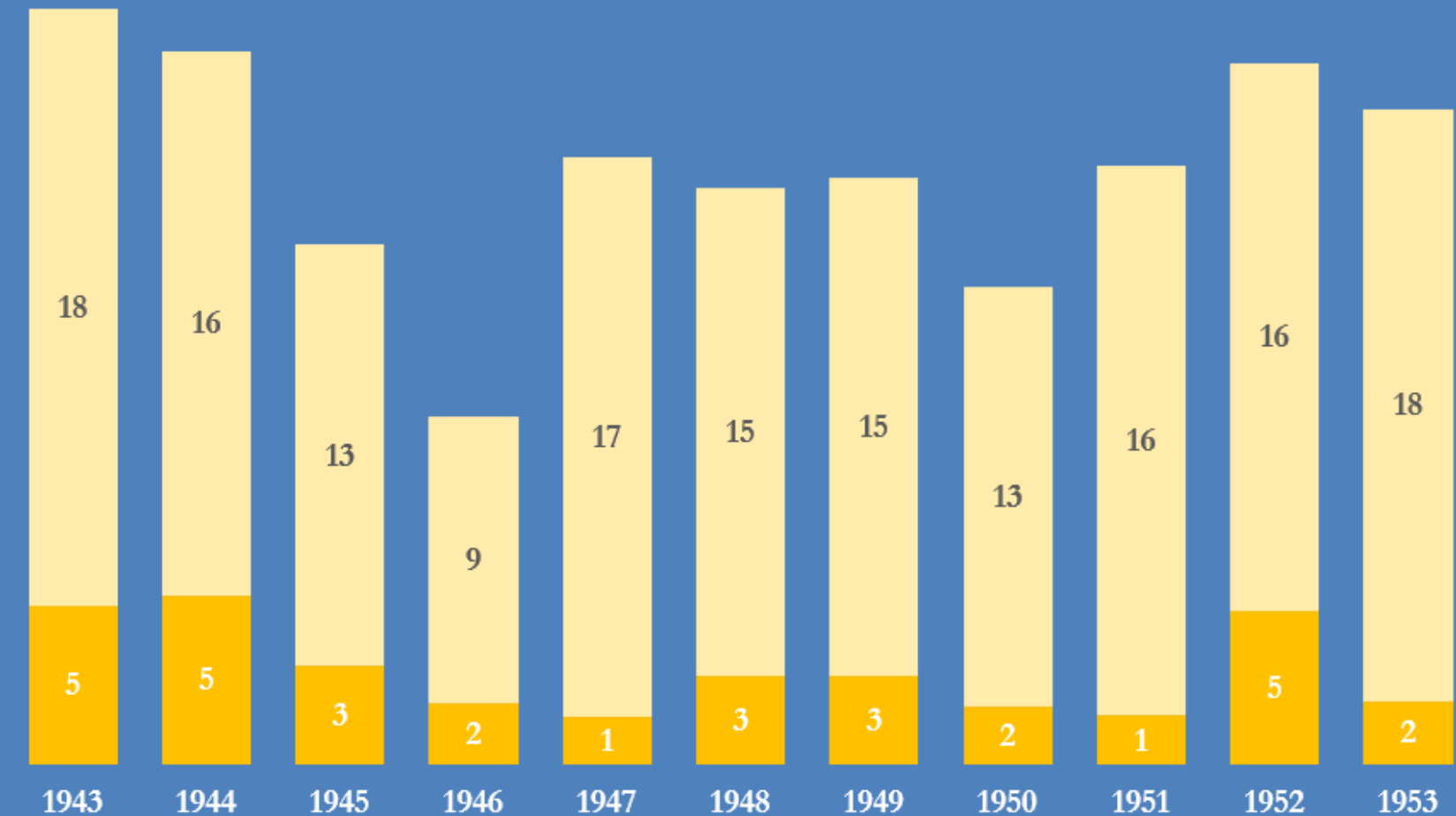
Medium term



Short term

United Kingdom coal stocks 1943-1953

million metric tonnes, year-end

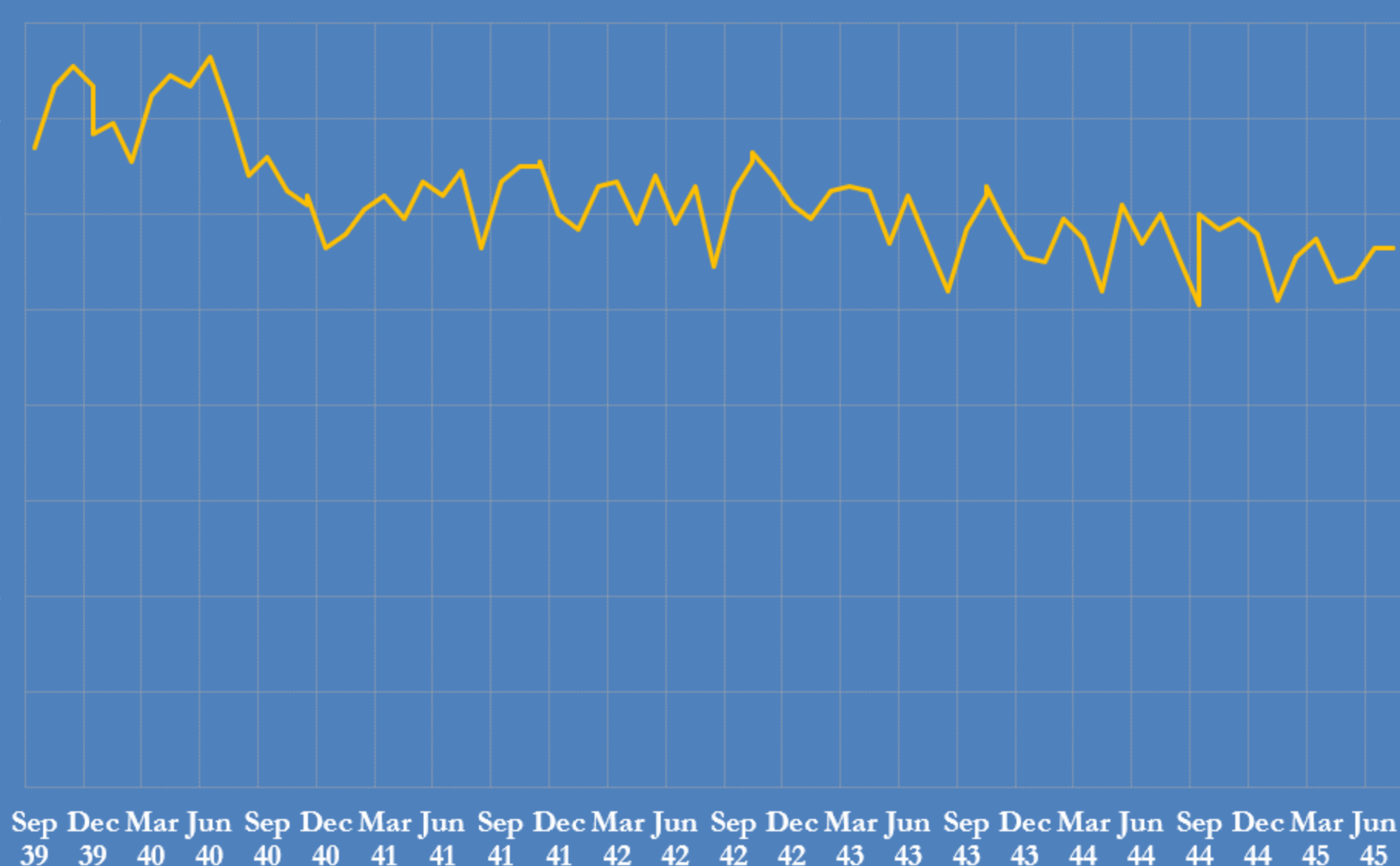


■ Distributed stocks
■ Colliery stocks

Source: Historical Coal Data: Coal Availability and Consumption, 1853-2019
UK Department for Business, Energy, Industry and Skills
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U.K. railways, coal loaded, 1939-1945

million tons, 4-week periods ending on dates shown

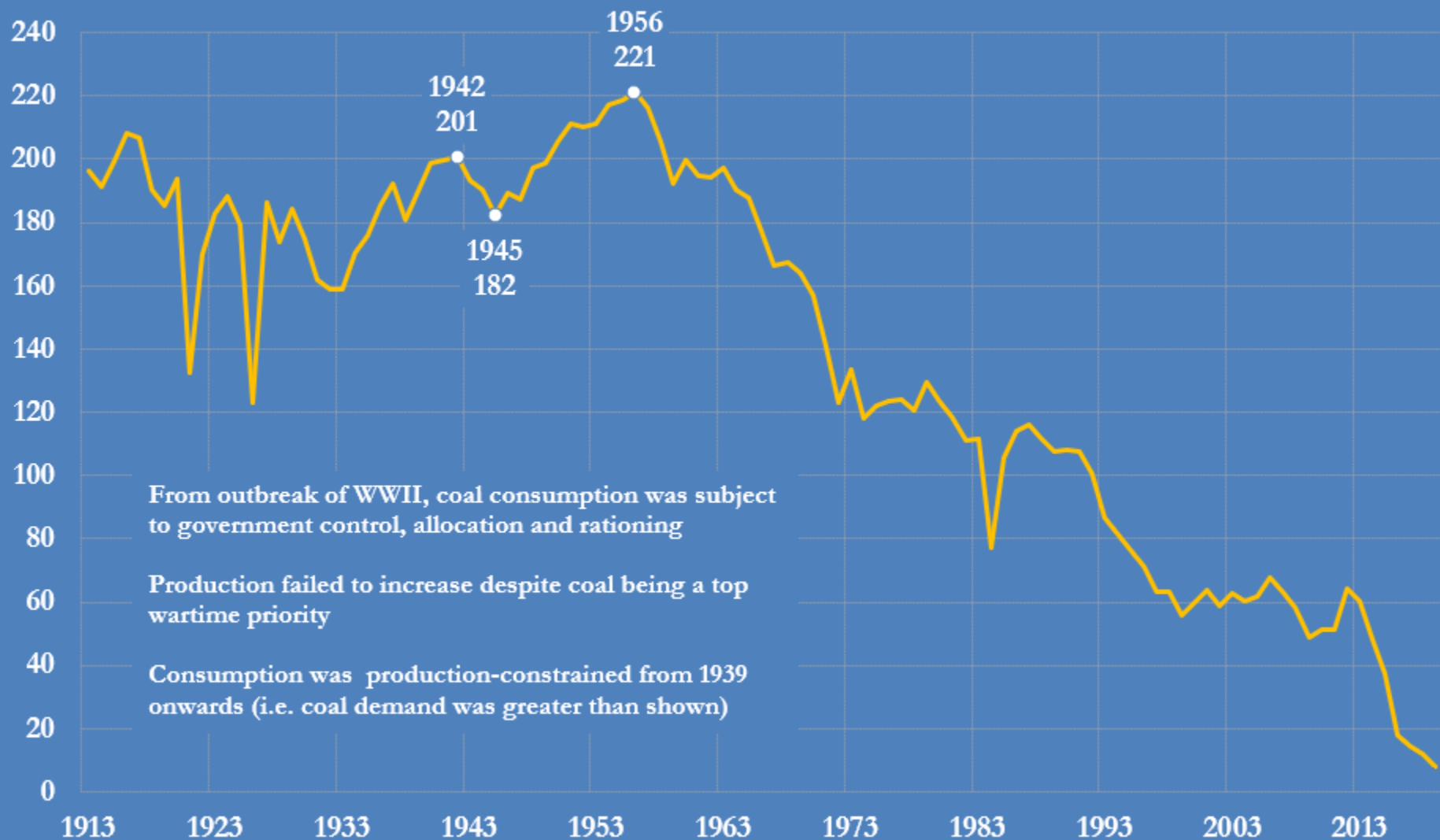


Source: History of the Second World War - Inland Transport, Table 1

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United Kingdom domestic coal consumption, 1913-2013

annual, millions of metric tonnes



Source: Digest of U.K. Energy Statistics

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“Everybody knows there is going to a serious crisis in the coal industry except the Minister of Fuel and Power. I want to tell you there is not going to be a crisis in the coal industry, if by crisis you mean that industrial organisation is going to be seriously dislocated and that hundreds of factories are going to be closed down”

Emanuel Shinwell, Minister of Fuel and Power, October 24, 1946

Britain's cabinet met on Jan 7, 1947, to agree an emergency reduction of 50% in coal supplies to industry

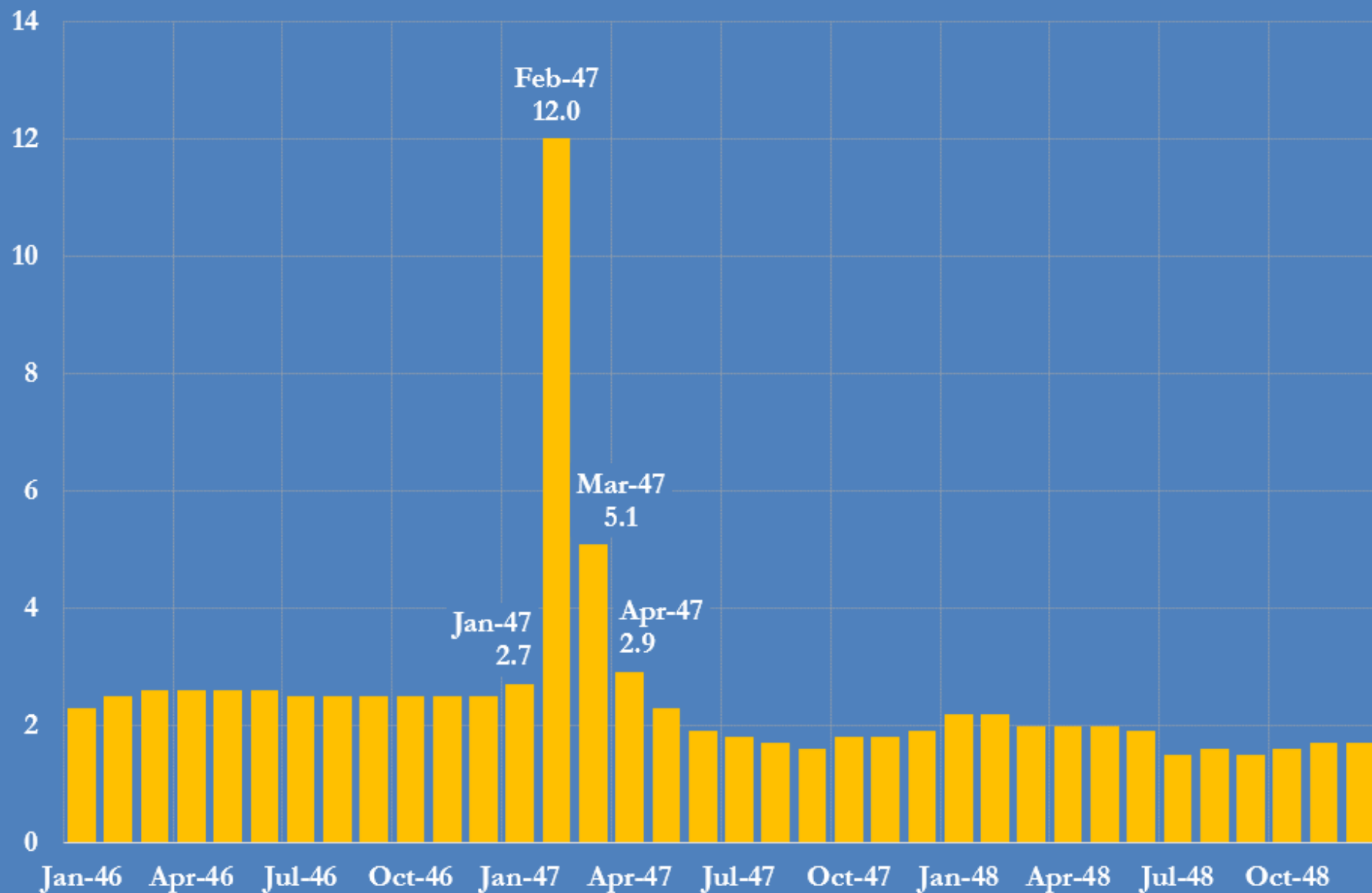
Electricity generators started to run out of coal later in Jan and Feb 1947

Power cuts led to widespread factory closures with millions thrown temporarily out of work

U.K. official unemployment rate, 1946-1948

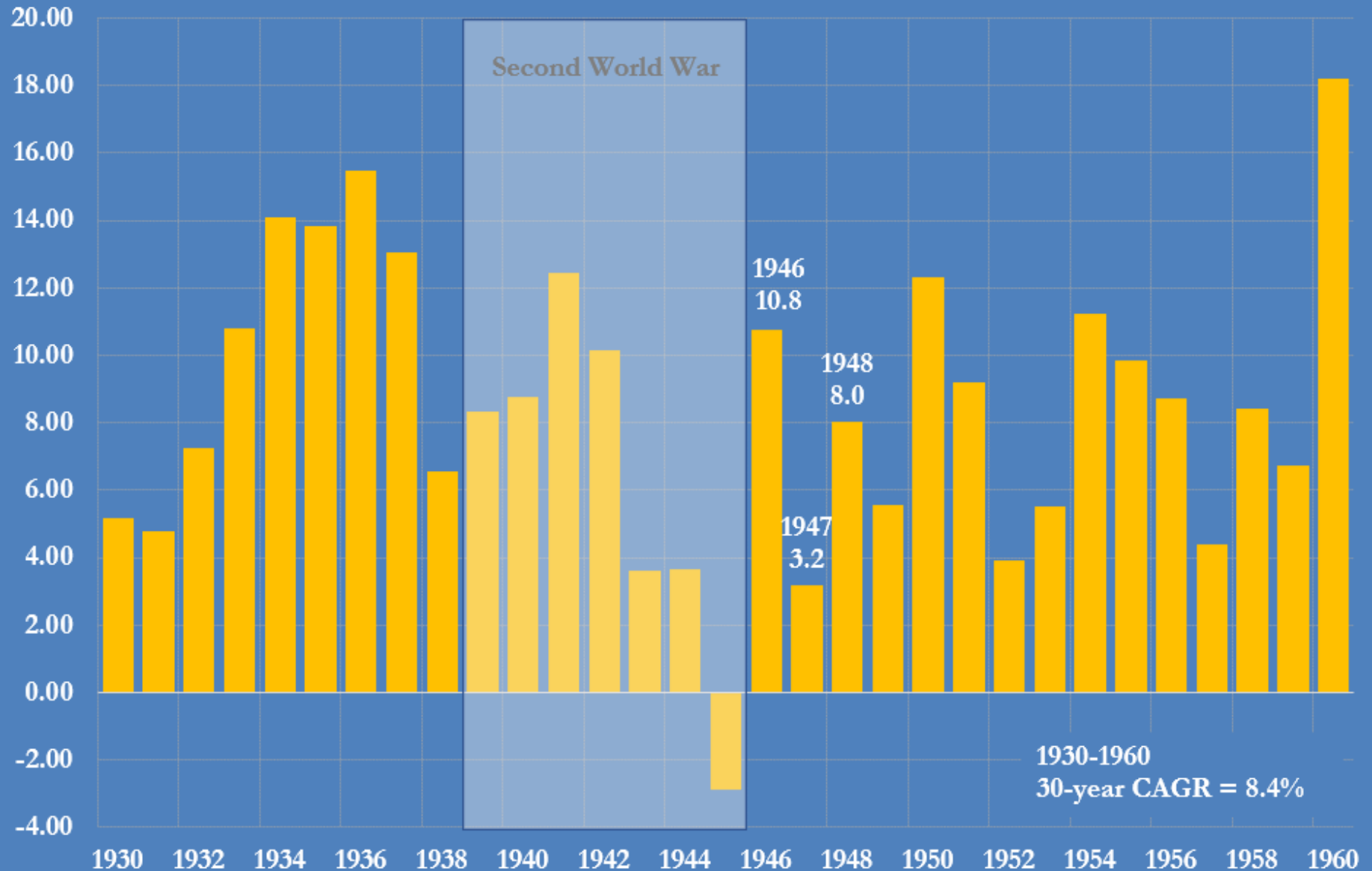
monthly, percent

showing impact of factory closures and layoffs during fuel crisis in Jan-Mar 1947



U.K. net electricity supplied, 1930-1960

annual, percent change from prior year



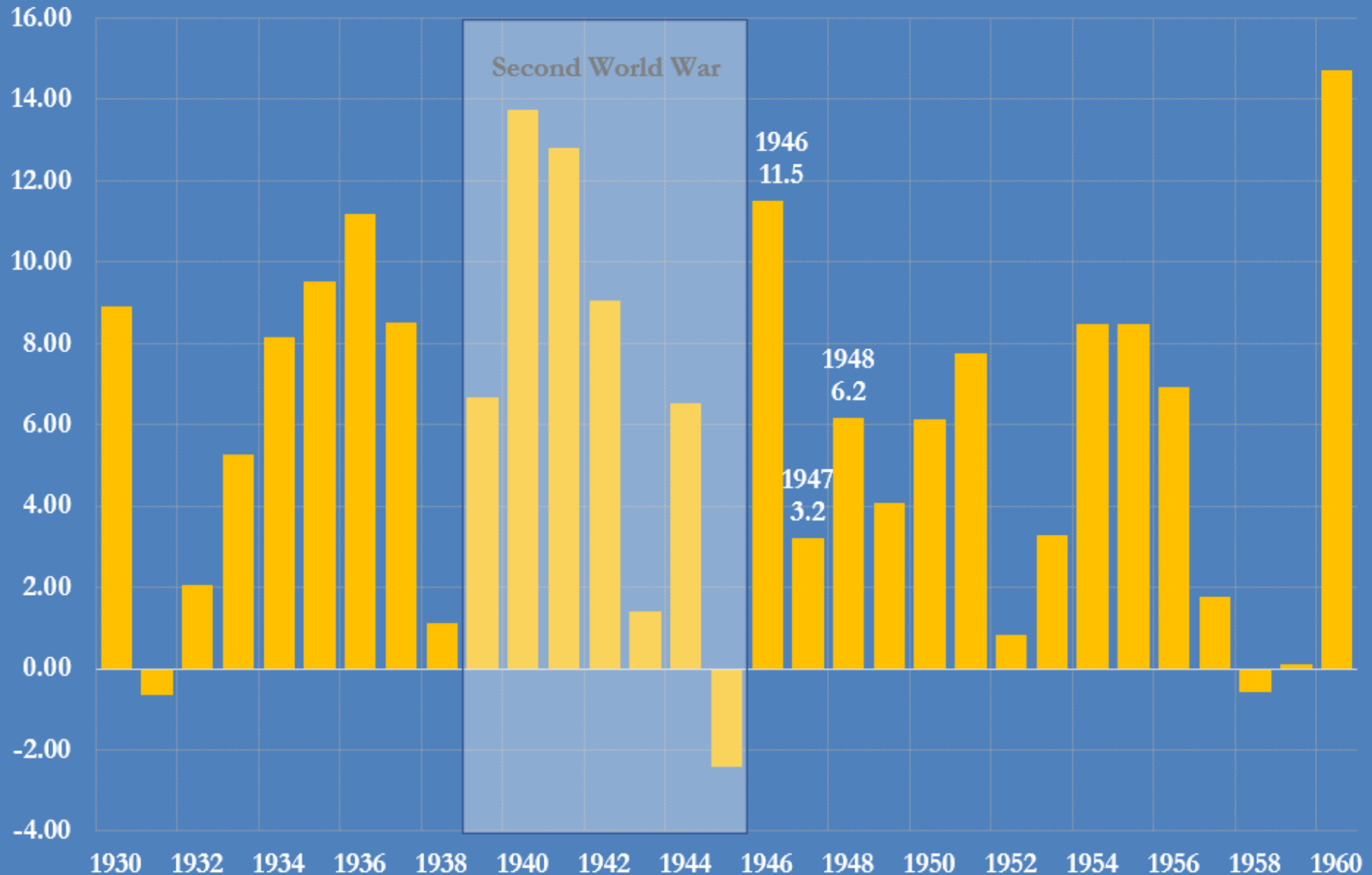
Source: UK Historical Electricity Statistics

UK Department for Business, Energy and Industrial Strategy (formerly Ministry of Fuel and Power)

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U.K. coal consumption for electricity generation, 1930-1960

annual, percent change from prior year



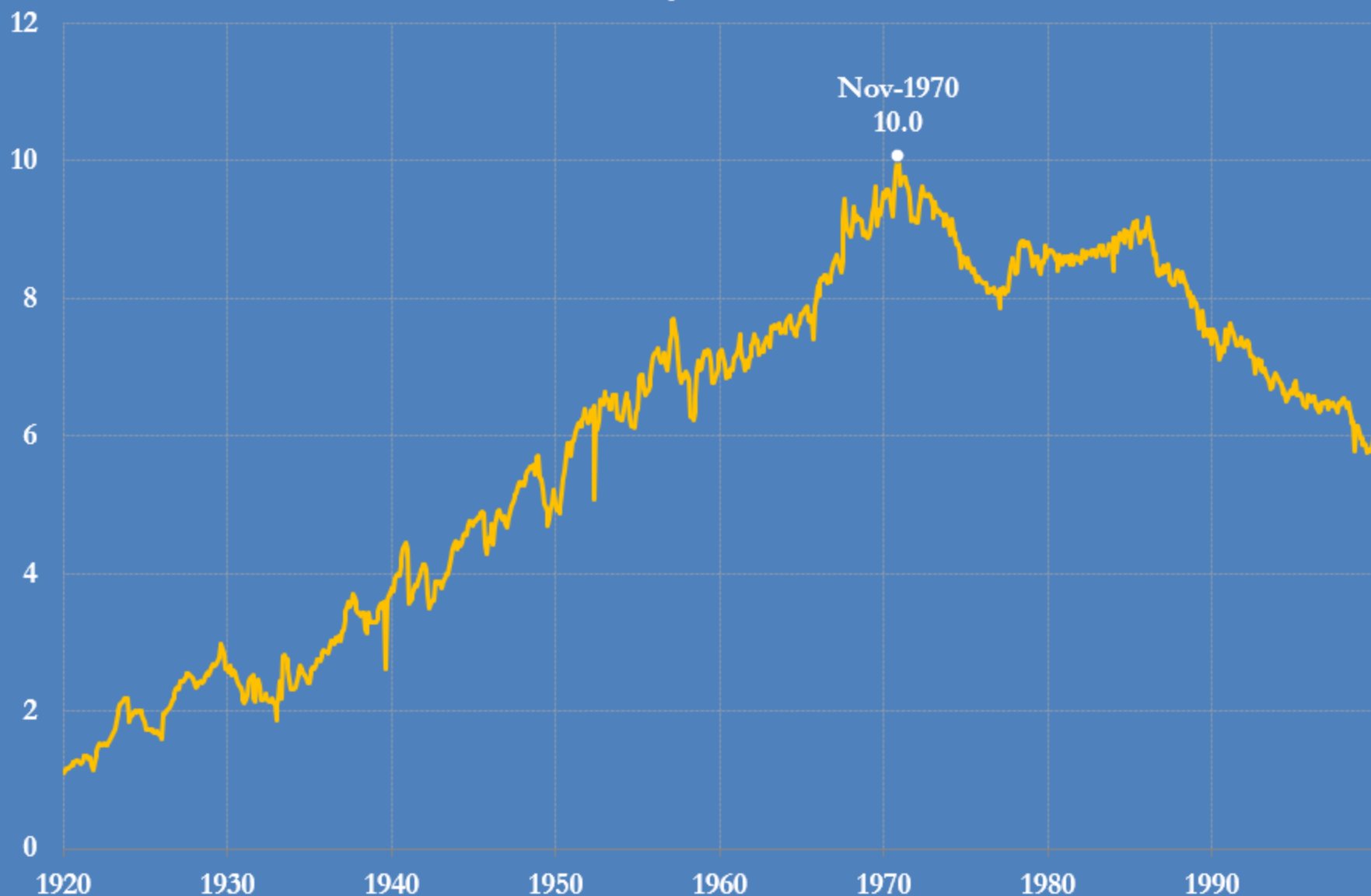
Source: UK Historical Electricity Statistics

UK Department for Business, Energy and Industrial Strategy (formerly Ministry of Fuel and Power)

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U.S. crude oil production, 1920-1999

monthly, million b/d

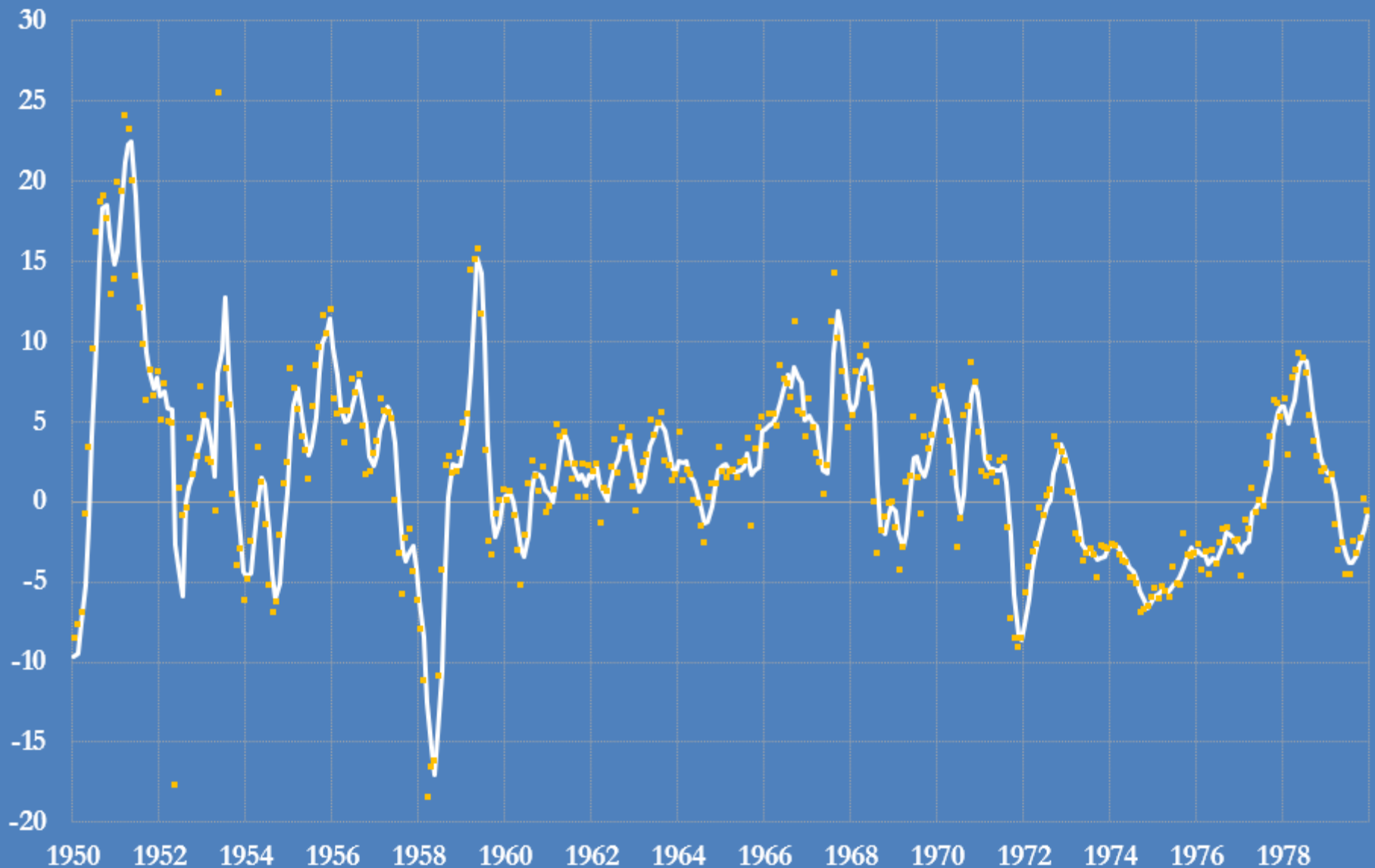


Source: U.S. Energy Information Administration

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U.S. crude oil production, 1950-1979

Percent change from prior year, monthly and three-month average

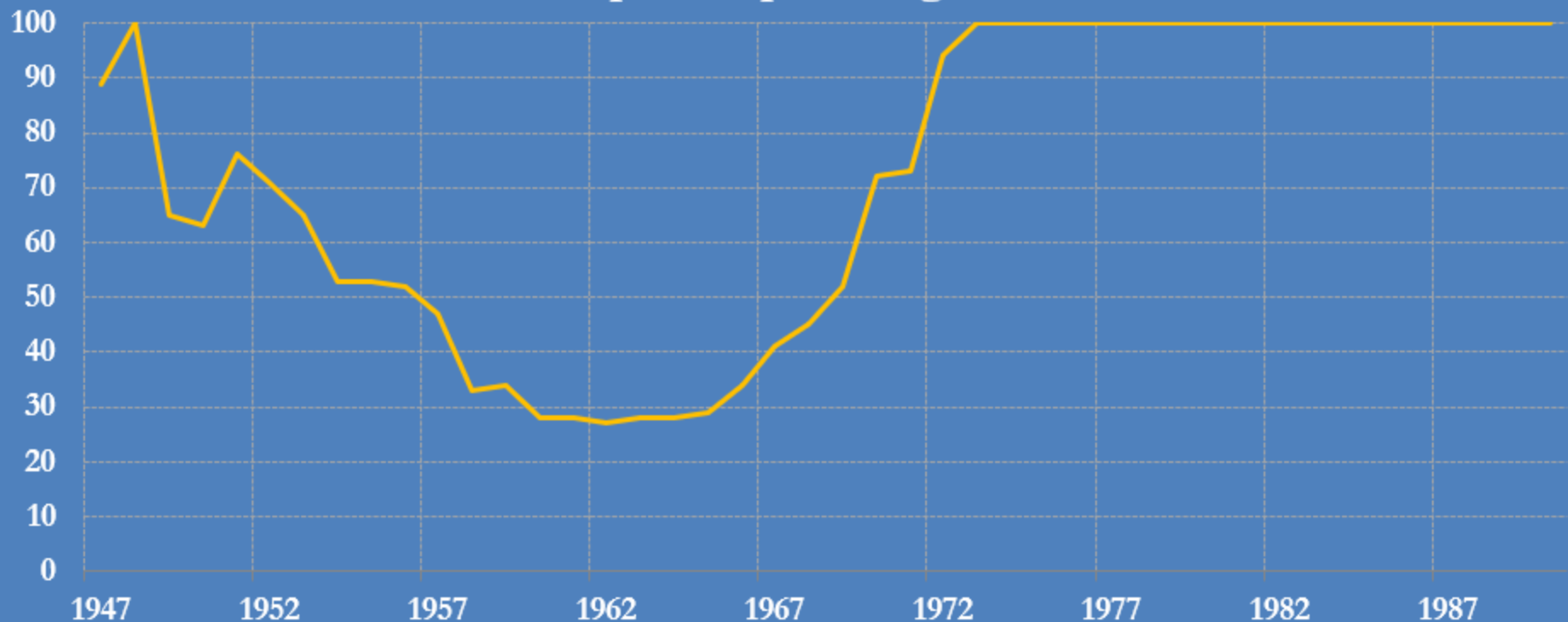


Source: U.S. Energy Information Administration

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Texas as the swing producer in the oil market 1947-1972

Production was controlled through market demand orders which restricted well output to a percentage of the maximum



Source for the data in the chart is [Oil, Gas and Government: the US Experience](#) by Robert Bradley (1996)

Texas Railroad Commission estimated demand for the state's oil and controlled output by telling operators how many days per month they could flow their wells (pre-1963) or what percentage of the maximum efficient flow rate the well could operate at (1963-onwards). On **March 16, 1972**, the Railroad Commission issued a General Market Demand Order which set allowable output to 100% for the first time in almost a quarter of a century -- marking the moment at which the United States ran out of spare production capacity, and pricing power in the oil market passed to OPEC.

On **October 16, 1973** the Arab members of OPEC agreed to cut production by 10% with a further 5% reduction each month in protest at US and European support for Israel. On **October 20, 1973**, Saudi Arabia embargoed oil exports to the United States and was subsequently joined by other Arab states.

The oil shock of 1973/74 is often blamed on OPEC's actions in 1973 but the seeds of the crisis had been sown much earlier with the progressive erosion of US spare capacity from the late 1960s onwards. @JKempEnergy

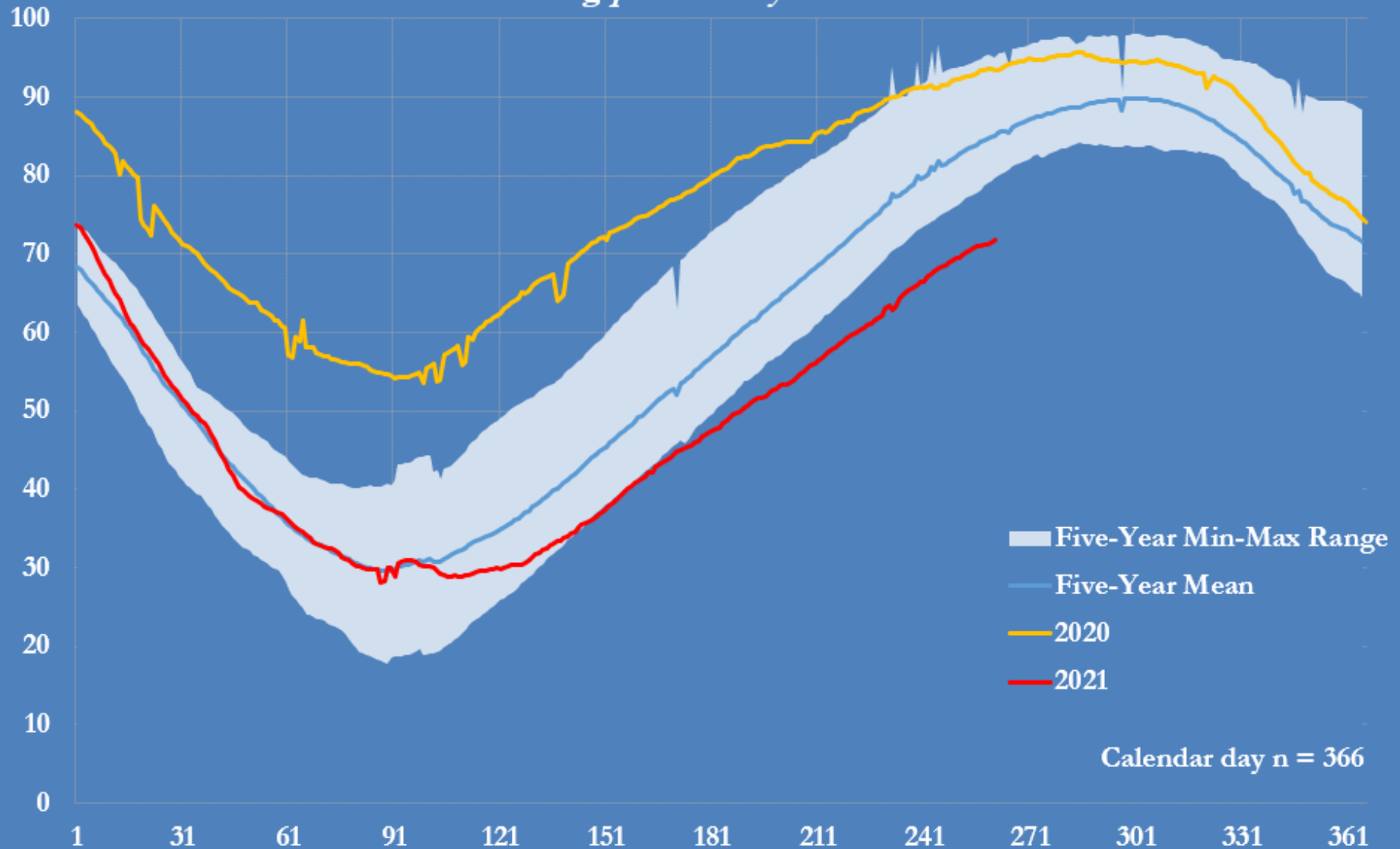
Asia LNG: Japan-Korea Marker, front-month futures contract
U.S.\$ per million British thermal units
daily and exponentially-weighted moving average ($\alpha = 0.15$)



Source: CME Group

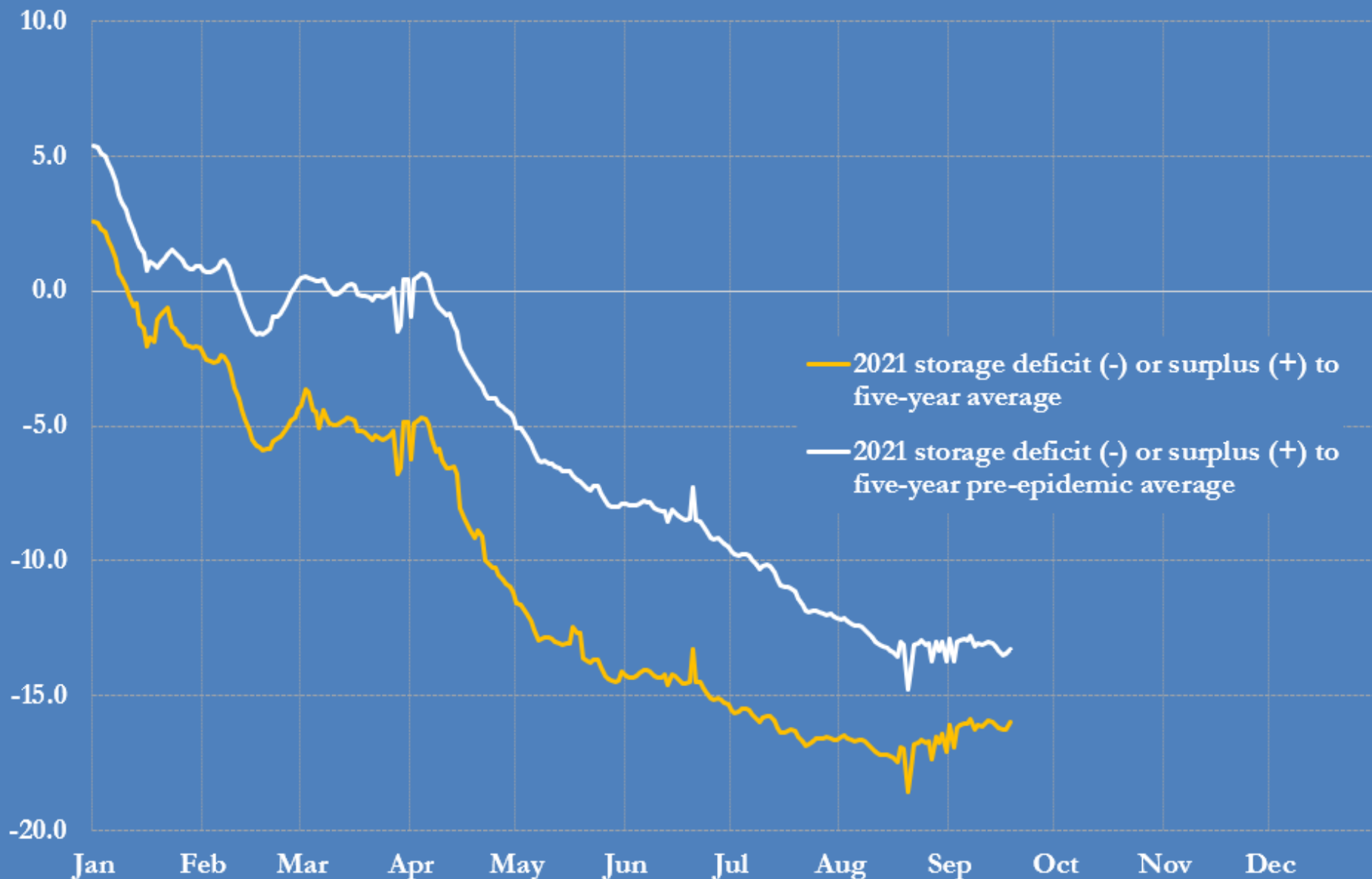
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European natural gas inventories reported stocks as percent of total storage capacity *excluding pandemic year of 2020*



European natural gas storage, 2021

percentage points, surplus (+) or deficit (-) to five-year average



UK spot wholesale gas and electricity prices, 2015-2021

