

# “Baby, It’s Cold Outside” (and Inside). Natural Gas to Heat Homes. What’s to Come this Winter...

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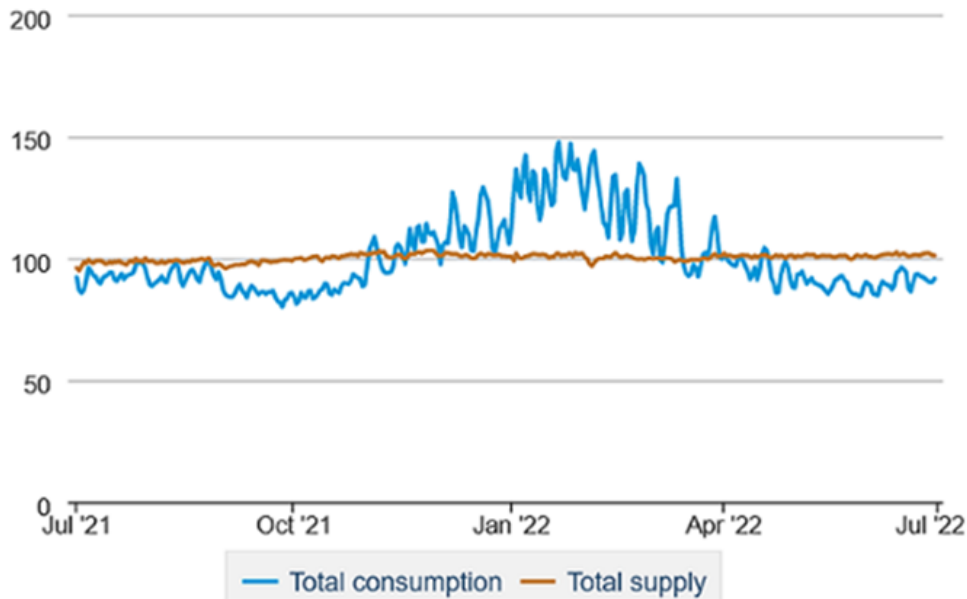
*“Baby, it’s Cold Outside” is a song from the 1950s where, in contrapuntal [verses](#), a woman explains why she must leave (“I really can’t stay”) and a man counters with a reason she should stay (“But, baby, it’s cold outside”). In light of the disruption in the global trade in oil and natural gas ensuing from the conflict in Ukraine, the last line of the song (“At least there will be plenty implied / If you got pneumonia and died”) might be a premonition of what’s to come this winter. What would be implied today is that some country or group of countries should be held accountable, should millions in Western Europe or the United States or both freeze to death this winter for lack of ability to heat their homes.*

Such a dire situation is widely [predicted](#) as Russia has been reducing the amount of natural gas supplied to many NATO member countries. Because natural gas is the primary fuel used to heat homes (either directly or through gas-fired electric power plants), we don’t have to wait till winter to gauge how likely the prediction is to come true. This precognition is made possible because of the way natural gas is produced, stored, traded, and consumed.

The demand for natural gas varies greatly over the course of a year, with peak demand coming in the colder months. For instance, in the United States consumption of natural gas in the winter is around 150 bcf (billion cubic feet) per day but less than 100 bcf per day in summer. For technical reasons, the supply of natural gas is more or less constant throughout the year, currently about 100 bcf per day in the US.

## Total supply/demand balance (last 365 days)

billion cubic feet per day



Source: US Energy Information Administration

To handle the seasonal variation in the demand for natural gas, the industry stores excess gas in the warmer months, then taps the stored gas to meet the greater demand in winter. Natural gas cannot be stored in tanks like oil because of its diffuse, i.e., gaseous, nature (the tanks would need to be a degree of magnitude larger than those used to store oil). So, what the industry does is inject some of the gas they just extracted back underground during summer (using depleted fields as storage tanks) and taps the reserved gas as needed in winter.

The issue of volume does not arise with gas transported by pipeline, as the gas is pumped in its diffuse state, but it does in the case of gas transported by ship. So, for maritime transport, natural gas is converted to a liquid by lowering its temperature to  $-260^{\circ}$  Fahrenheit (The volume of natural gas in its liquid state is about 600 times smaller than its volume in its gaseous state). The liquified natural gas (LNG) is converted back into a gas in regasification terminals at the tankers' destinations.

Transport by ship is much more expensive than transport by pipeline. Hence, gas from Russia is sent to Germany through the infamous Nord Stream pipelines, not shipped across the Baltic Sea. If Europeans have to depend on LNG shipped from the United States or the Middle East this winter, it will cost them a lot more to heat their homes (Prior to the hostilities in Ukraine, Russian gas delivered by pipeline was about 40% cheaper for Europeans than LNG shipped from the United States).

More fundamental than price as to whether we or the Europeans will be freezing this winter is supply. Russia has [curtailed](#) deliveries of natural gas to several European countries and more curtailments are likely to follow if hostilities continue. The United States' NATO allies are depending on the US to make up for any shortfalls, but is that possible? Only if the US increases production or cuts domestic consumption (so as to have more gas available for export). As to increasing production, the price natural gas is traded at on the global market

has risen from around \$4 last year to over \$8 today. This should motivate our drillers to bring marginally profitable fields into production, though it's unlikely that can be done in time to ameliorate any shortage this winter (Even if we had more LNG to send to Europe, the amount we could provide is constrained by a [lack](#) of enough regasification terminals there). Reducing domestic consumption is fraught with the danger of sociopolitical turmoil (look at the chaos resulting from airlines reducing their flight schedules, which may have more to do with an unstated goal of reducing domestic consumption of jet fuel than a lack of pilots).

The interplay amongst the various factors which determine the provisioning of natural gas to consumers is too complex to go into here (even if I understood it!), but I do believe there is a simple, indicative metric which lies at the nexus of all these factors. This metric is the rate at which underground storage of natural gas is being replenished during the low demand season. Here's a chart showing the amount of natural gas (in bcf) in underground storage in the United States over the last 3 1/2 years:

2019			2020			2021			2022				5 Yr. Avg. Withdrawal or Build	5 Yr. Avg. Storage
Week End	Wdwt / Bld	BCF	Week End	Wdwt / Bld	BCF	Week End	Wdwt / Bld	BCF	Wdwt / Bld	BCF	Week Ending	Data Released		
12-28	-20	2705												
1-4	-91	2614	1-3	-44	3148	1-1	-130	3330	-31	3195	31-Dec-21	06-Jan-22	-104	3106
1/11	-81	2533	1/10	-109	3039	1-8	-134	3196	-179	3016	07-Jan-22	13-Jan-22	-167	2939
1-18	-163	2370	1-17	-92	2947	1-15	-187	3009	-206	2810	14-Jan-22	20-Jan-22	-174	2765
1-25	-173	2197	1-24	-201	2746	1-22	-128	2881	-219	2591	21-Jan-22	27-Jan-22	-182	2584
2-1	-237	1960	1-31	-137	2609	1-22	-192	2689	-268	2323	28-Jan-22	03-Feb-22	-150	2433
2-8	-78	1882	2-7	-115	2494	2-5	-171	2518	-222	2101	04-Feb-22	10-Feb-22	-127	2306
2-15	-177	1705	2-14	-151	2343	2-12	-237	2281	-190	1911	11-Feb-22	17-Feb-22	-175	2132
2-22	-166	1539	2-21	-143	2200	2-19	-338	1943	-129	1782	18-Feb-22	24-Feb-22	-172	1960
3-1	-149	1390	2-28	-109	2091	2-26	-98	1845	-139	1643	25-Feb-22	03-Mar-22	-85	1874
3-8	-200	1190	3-6	-48	2043	3-5	-52	1793	-124	1519	04-Mar-22	10-Mar-22	-85	1789
3-15	-47	1143	3-13	-9	2034	3-12	-11	1782	-79	1440	11-Mar-22	17-Mar-22	-43	1747
3-22	-36	1107	3-20	-29	2005	3-19	-32	1750	-51	1389	18-Mar-22	24-Mar-22	-67	1680
3-29	23	1130	3-27	-19	1986	3-26	14	1764	26	1415	25-Mar-22	31-Mar-22	-18	1662
4-5	25	1155	4-3	38	2024	4-2	20	1784	-33	1382	01-Apr-22	07-Apr-22	11	1674
4-12	92	1247	4-10	73	2097	4-9	61	1845	15	1397	08-Apr-22	14-Apr-22	43	1717
4-19	92	1339	4-17	43	2140	4-16	38	1883	53	1450	15-Apr-22	21-Apr-22	38	1755
4-26	123	1462	4-24	70	2210	4-23	15	1898	40	1490	22-Apr-22	28-Apr-22	53	1808
5-3	85	1547	5-1	109	2319	4-30	60	1958	77	1567	29-Apr-22	05-May-22	77	1885
5-10	106	1653	5-8	103	2422	5-7	71	2029	76	1643	06-May-22	12-May-22	83	1967
5-17	100	1753	5-15	81	2503	5-14	71	2100	89	1732	13-May-22	19-May-22	85	2053
5-24	114	1867	5-22	109	2612	5-21	115	2215	80	1812	20-May-22	26-May-22	101	2153
5-31	119	1986	5-29	102	2714	5-28	98	2313	90	1902	27-May-22	02-Jun-22	99	2253
6-7	102	2088	6-5	93	2807	6-4	98	2411	101	2003	03-Jun-22	09-Jun-22	98	2351
6-14	115	2203	6-12	85	2892	6-11	16	2427	92	2095	10-Jun-22	16-Jun-22	78	2429
6-21	98	2301	6-19	120	3012	6-18	55	2482			17-Jun-22	23-Jun-22	86	2515
6-28	89	2390	6-26	65	3077	6-25	76	2558			24-Jun-22	30-Jun-22	68	2583
7-5	81	2471	7-3	56	3133	7-2	16	2574			01-Jul-22	07-Jul-22	61	2644
7-12	62	2533	7-10	45	3178	7-9	55	2629			08-Jul-22	14-Jul-22	54	2698
7-19	36	2569	7-17	37	3215	7-16	49	2678			15-Jul-22	21-Jul-22	39	2737

As can be seen, underground storage went from being depleted to being replenished around April 1<sup>st</sup> this year, which is normal. However, the rate of replenishment is slower than all other years (e.g., 2095 bcf in the latest week, versus 2203 bcf in 2019). If the growth in stored gas is slower than normal, it means either production is not growing apace with

consumption or domestic supplies are being diverted for export.

In 2014 the amount of gas in storage hit a low of 822 bcf (in March), which caused a number of public utilities to shutter some of their power plants for lack of fuel. One electric company executive warned that we had dodged “not a bullet, but a cannonball” that year. So, keep an eye on how fast underground storage is being refilled in the coming months [here](#). If it’s significantly slower than the 5-year average listed on the right of the chart (2429 bcf for the latest week), then bundle up, baby, because it’s going to be cold outside—and inside, too—come winter.

Below is a chart of US exports of natural gas last year and for the first three months of this year ([Source](#): US Energy Information Administration).

**Table 4.2b Natural Gas Exports by Country**  
(Billion Cubic Feet)

	Brazil <sup>a</sup>	Canada <sup>b</sup>	Chile <sup>a</sup>	China <sup>a</sup>	France <sup>a</sup>	India <sup>a</sup>	Japan <sup>a</sup>	Mexico <sup>b</sup>	South Korea <sup>a</sup>	Spain <sup>a</sup>	Turkey <sup>a</sup>	United Kingdom <sup>a</sup>	Other <sup>a</sup>	Total
<b>2021</b> January .....	21	85	10	39	4	20	64	173	56	7	27	21	36	564
February .....	13	78	7	3	15	14	18	151	18	4	21	34	48	424
March .....	22	91	21	28	34	17	28	183	32	14	4	17	103	595
April .....	12	75	10	47	36	14	29	183	22	23	0	14	101	564
May .....	20	71	18	38	12	28	25	193	46	5	3	11	110	578
June .....	32	70	0	42	4	17	40	198	56	8	0	0	73	539
July .....	40	68	20	42	0	13	25	198	39	9	6	0	106	566
August .....	34	72	16	52	7	21	20	194	50	23	0	0	75	564
September .....	38	72	8	49	7	24	10	179	31	31	24	3	59	536
October .....	41	62	6	42	9	11	38	186	34	36	19	3	58	545
November .....	11	85	3	50	10	15	34	166	31	23	47	31	52	557
December .....	24	109	3	17	34	3	24	167	38	33	38	60	70	621
<b>Total</b> .....	<b>308</b>	<b>937</b>	<b>122</b>	<b>450</b>	<b>171</b>	<b>196</b>	<b>355</b>	<b>2,171</b>	<b>453</b>	<b>215</b>	<b>189</b>	<b>195</b>	<b>891</b>	<b>6,653</b>
<b>2022</b> January .....	17	81	3	0	50	7	22	175	22	49	45	60	78	610
February .....	11	74	0	3	40	7	10	155	27	39	44	25	110	546
March .....	2	104	3	8	64	10	18	169	19	59	17	57	107	638
<b>3-Month Total</b> .....	<b>30</b>	<b>260</b>	<b>6</b>	<b>11</b>	<b>154</b>	<b>25</b>	<b>49</b>	<b>499</b>	<b>69</b>	<b>148</b>	<b>105</b>	<b>142</b>	<b>295</b>	<b>1,793</b>

Some things of note are:

(1) The increase in our exports to NATO allies (France, Spain, Turkey, UK) this year, from less than 800 bcf/yr to 2200 bcf/yr (on a projected annualized basis). Note that the increase in our exports to these countries began *before* hostilities in Ukraine began on Feb. 24th (compare Jan 2021 to Jan 2022: France - 4 bcf vs. 50 bcf, Spain - 7 bcf vs. 49 bcf, etc.).

(2) Exports to Brazil, Chile, India, Japan, and South Korea have dropped over the same time period, from almost 2000 bcf to 800 bcf (on a projected annualized basis). Again, the decrease began before Russia invaded Ukraine (compare Jan 2021 to Jan 2022: especially China - 39 bcf vs. 0 bcf, Japan - 64 bcf vs. 22 bcf, South Korea - 56 bcf vs. 22 bcf). To what country are these countries turning to to make up the shortfall (Russia?).

(3) Total gas exports from the US have increased from 6653 bcf in 2021 to over 7000 bcf this year (projected), while production has remained constant at around 41,000 bcf/yr and withdrawals from underground storage have increased from 1547 bcf in the first three months of 2021 to 1816 bcf in the same period this year (see [this](#)), which hints at increased pressure on our natural gas supply.

An interesting graph from [Bloomberg](#) on the price of natural gas around the world:



Note that price had risen sharply even before Russia invaded Ukraine, raising the question “Which came first?”- the Russian gas cut-offs to Europe or a price rise which led the NATO countries to feel it was time for a showdown with Russia and so they provoked one?

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This article was originally published on [Ken’s Blog](#).

*Ken Meyercord is a retired computer type living in Reston, Virginia, where he fills his ample spare time with taking fitness classes at the Y; hiking, biking, and kayaking the USA; and maintaining a blog ([kiaskblog.wordpress.com](http://kiaskblog.wordpress.com)) for which he has cobbled together enough tall-tales, iconoclastic views, and misinformation to generate over 80 postings. Ken has self-published four books: a treatise on economic theory, “The Ethic of Zero Growth”; a memoir of the Vietnam War years, “Draft-Dodging Odyssey” (under the penname “Ken Kiask”); a eulogy to his starry-eyed, star-crossed son, “At the Forest’s Edge” (under the son’s name: Khaldun Meyercord); and a course teaching a simplified version of English, “Ezenglish” (all available online wherever fine books are sold). In pre-COVID times he haunted think-tank events to ask provocative, iconoclastic questions (see “Adventures in Think Tank Land” on YouTube) and produced a public access TV show, “Civil Discord”, on which discordant views on controversial topics were discussed in a civil manner (episodes of the show can be viewed on YouTube; search for “Civil Discord Show”).*

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