

# A European Future Without Russian Natural Gas?

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## Abstract

This report summarizes results from a set of scenarios regarding the future of Russian pipeline gas supplies into Europe which were presented at the 2022 USAEE Conference in Houston.

## Overview

In the fall of 2021 Russia began mobilizing more than 100,000 troops to the Ukrainian border for "exercises" with Belarus. Gas traders in Europe and elsewhere began to get nervous due to low gas storage volumes after a hard European winter. Combined with the presence of the Russian troops near Ukraine, this nervousness began to drive gas prices at the TTF trading point in Northwest Europe higher and higher. Russia decided not to provide additional gas to quell this nervousness, choosing instead to send only the minimum volume required by its various contracts with European buyers and transit partners. Some believe this strategy was aimed at getting quick approval and startup of the newly completed Nord Stream 2 pipeline, but this did not happen.

On February 28, 2022, Russia invaded Ukraine. What some thought might be a quick victory has since turned into a quagmire. It has also turned most of Europe to adopt punitive economic sanctions against Russia including plans and actions to wean themselves off of Russian energy supplies, including natural gas, for good.

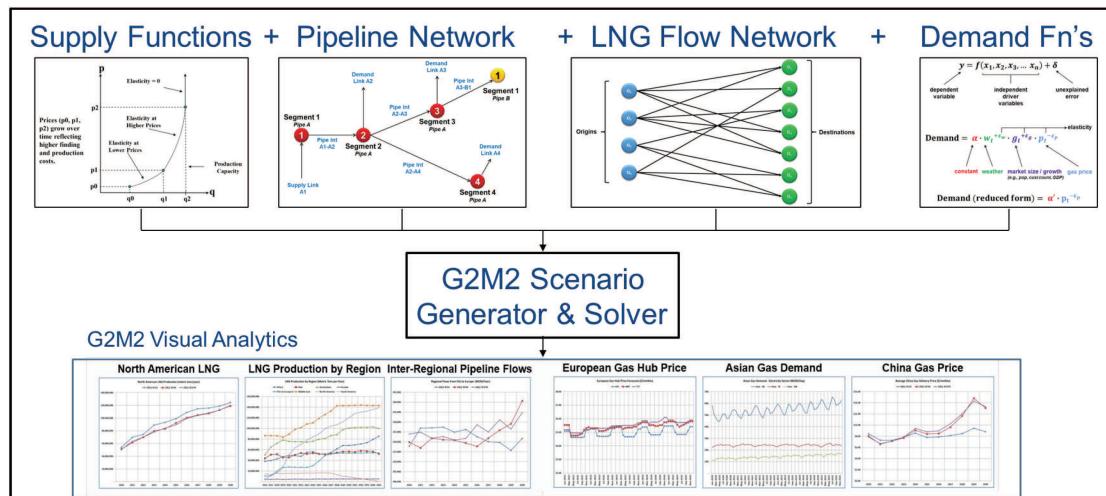
But is this possible? Russia was supplying about 40% of the gas that Europeans have been consuming over the past several years. Where could it get the gas it needs to make up for the loss of this supply source?

It is time to update RBAC's 2016 presentation at the IAEE Conference in Baku to 2022 realities. At that time, one of us (Brooks), presented results from a study which examined alternative remedies Europe might adopt were Russia and Ukraine not able to reach a new deal when the Ukraine gas transit agreement expired at the end of 2019. This update is what we presented

to the USAEE Houston Conference this October 2022.

## Methods

RBAC used its G2M2 Market Simulator for Global Gas and LNG to develop scenarios and compute results addressing these questions. It consists of modules for supply, infrastructure, pipelines, and LNG flow.



G2M2 permits users to run a wide variety of scenarios under assumptions of their own choosing. G2M2 uses the AMPL language to express non-linear math programming models in mathematical form and then Gurobi to solve those models. G2M2 includes a detailed representation of natural gas supply, demand, pipelines, storage, and LNG exports, imports, and shipments for the entire world.

The scenarios generated are delineated below:

- 22Q3 USAEE 1
  - Assumes Russia-Ukraine peace achieved by Mar-Apr 2023
  - All Russian pipelines resume to normal operation
- 22Q3 USAEE 2
  - Return to normalcy Nov-2024 (winter 2024-2025)
- 22Q3 USAEE 3
  - Return to normalcy Nov-2029 (winter 2029-2030)
- 22Q3 USAEE 4
  - Never return to normalcy

## Results

In the next few years, it will be very difficult for Europe to totally make up for the loss of Russian gas if the Ukraine and Poland transit links are completely severed and the Nord Stream and Nord Stream 2 pipelines are not repaired and brought back into ser-

## Dr. Robert Brooks

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vice. Somewhat surprisingly, however, if a peaceful resolution is not obtained within the next several years, decreasing gas demand in Europe might make the point moot. We created several scenarios with widely different restrictions on Russian gas to Europe. Both European market prices, as represented by the Dutch TTF price, and gas deliveries to consumers tend toward convergence by 2030 and for the remainder of the forecast horizon (to 2050).

## Conclusions

- In the near term (2022-2025) European prices (TTF) are highly dependent on the extent and duration of the reduction of Russian gas supplies
- As shown in Figure 1 above, in the medium to long term (2030-2050), the price spread between the scenarios narrows to about \$1.40 (15%)
- The only long-term difference is due to the fate of the Nord Stream pipelines
  - Scenarios 1, 2, and 3 are identical beginning Nov-2029
  - Scenario 4 is identical to 3 except it totally excludes the Nord Stream pipelines
- European gas production maintains current levels until 2031 when it begins a terminal decline in all scenarios
- LNG import growth makes up for nearly all lost pipeline gas after 2029
- LNG imports decrease in the long term due to lower European gas demand
- Pipeline imports increase when Russian imports resume until 2041 when they also begin a decline due to lower European gas demand

## Implications for the Future in Europe

The results of these scenarios indicate that, in the long run, declining European demand for gas means that

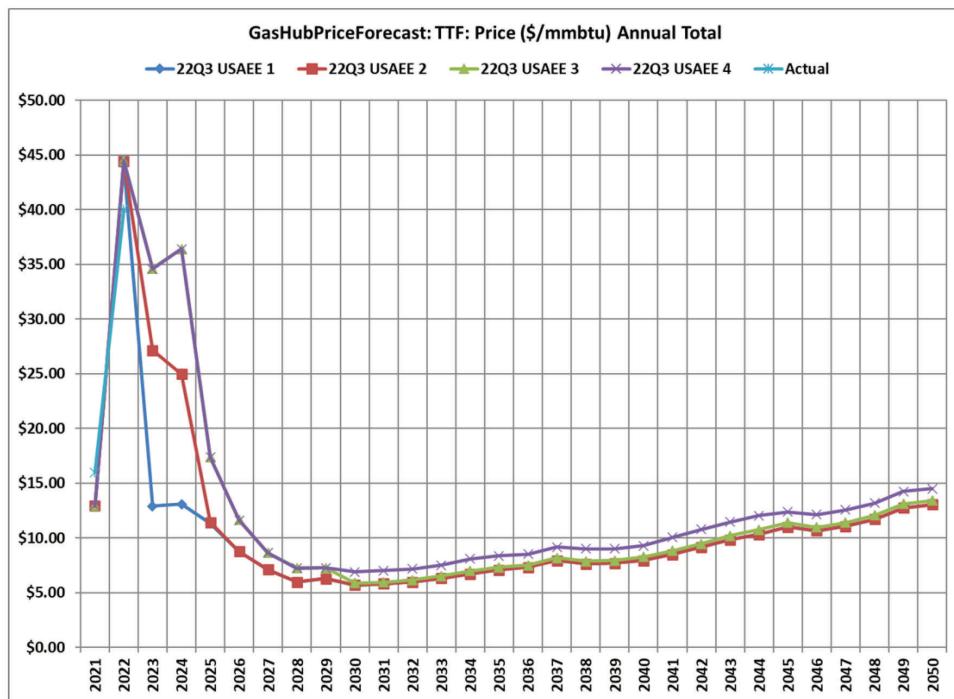


Figure 1: TTF Price Forecast for USAEE Scenarios vs Actual

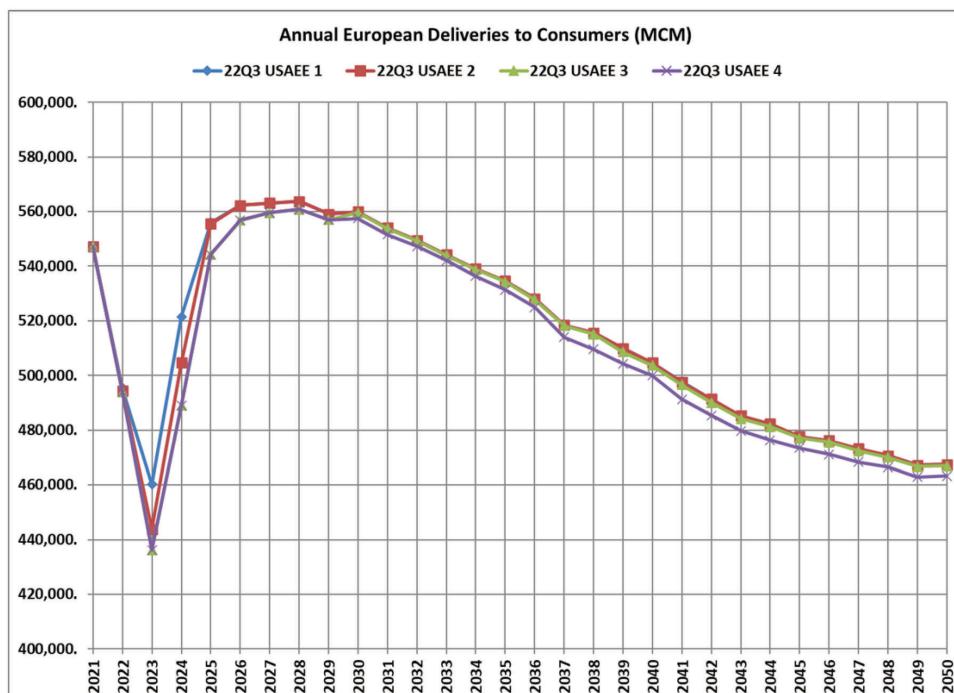


Figure 2: Total Annual Gas Deliveries to European Consumers by USAEE Scenario

- Russia needs to find other markets for its vast gas supplies
  - China is most obvious candidate
- Europe is unlikely to finance big new gas supply projects
  - Trans-Caspian Pipeline
  - East Med Pipeline
  - Trans-Africa Pipeline (Nigeria -> Niger -> Algeria)
  - Middle East to Europe Pipelines (from Iraq or Iran)

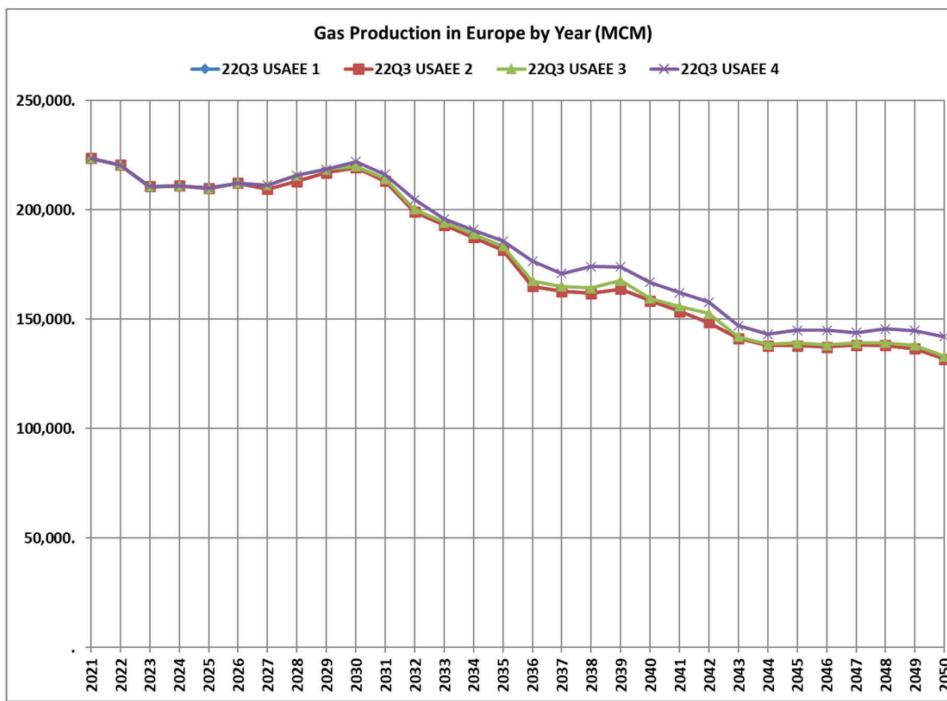


Figure 3: Total European Gas Production by USAEE Scenario

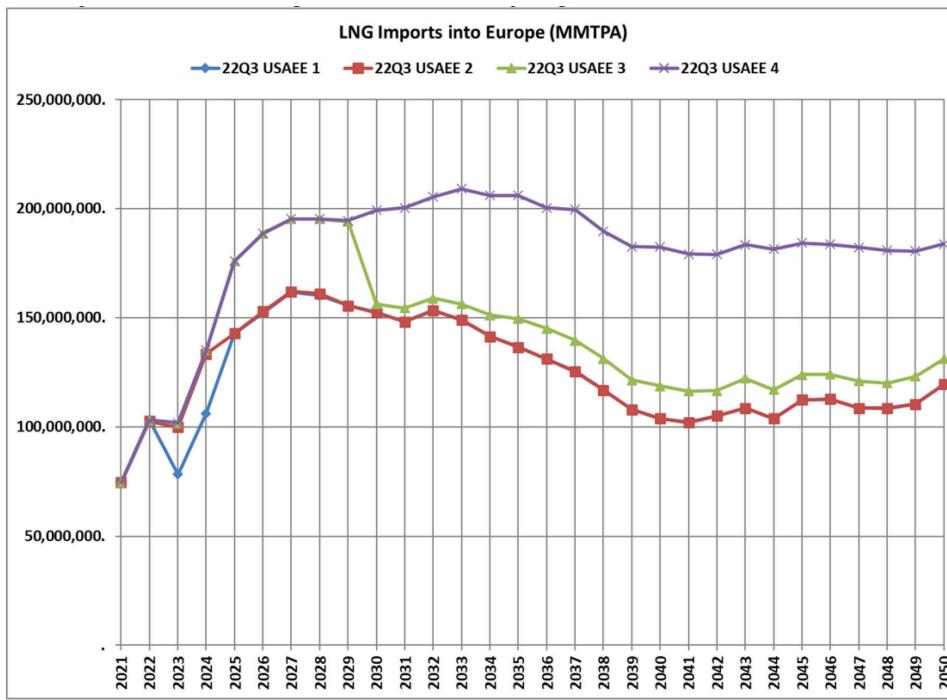


Figure 4: Total LNG Imports into Europe by USAEE Scenario

- LNG imports offers greater flexibility and security of supply
- Floating LNG can be leased for shorter times at lower cost

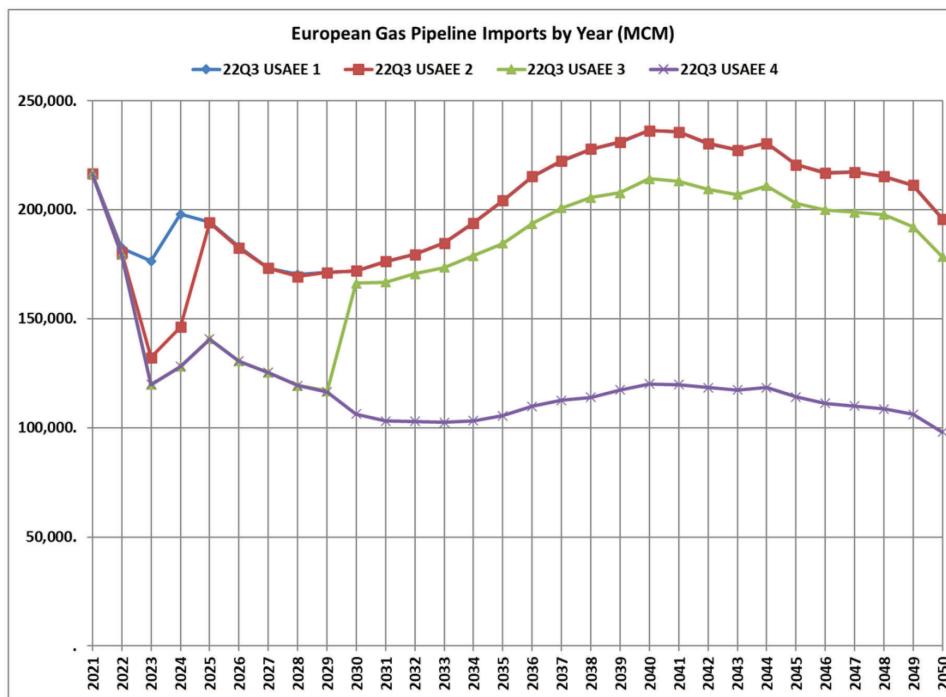


Figure 5: Total Pipeline Imports into Europe by USAEE Scenario