



## China Natural Gas Domestic Production and Imports Reached Record-High in 2021 but Declined in 2022

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From left to right: Governor Li of Guangdong; Faouzi Aloulou of the U.S. DOE's EIA; President Daren of Sun Yat-Sen University (SYSU); and Professor Guo, SYSU Director of the Center for LNG Education, Training and Research, Guangzhou City, Guangdong, China, November 27, 2005, after the release of the Mandarin version of the EIA's *International Energy Outlook 2005*.

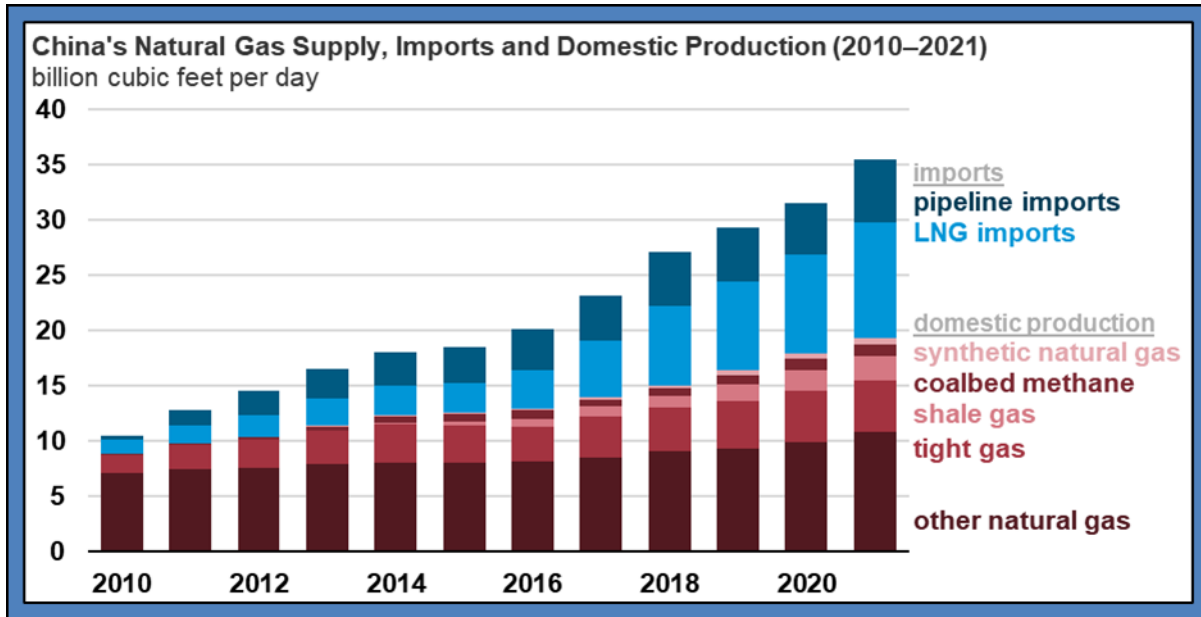
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## China Increased Both Natural Gas Imports and Domestic Production in 2021

In 2021, an average 35.5 billion cubic feet per day (Bcf/d) of natural gas was consumed in China, more natural gas than in any previous year. More than half of the natural gas consumed in China in 2021 came from domestic production, but China also imported record amounts of natural gas by pipeline and as liquefied natural gas (LNG), based on data from Global Trade Tracker and China's General Administration of Customs.



Figure 1



Source: Graph by the U.S. Energy Information Administration, based on China’s National Bureau of Statistics, China’s General Administration of Customs, Global Trade Tracker, and IHS Markit.

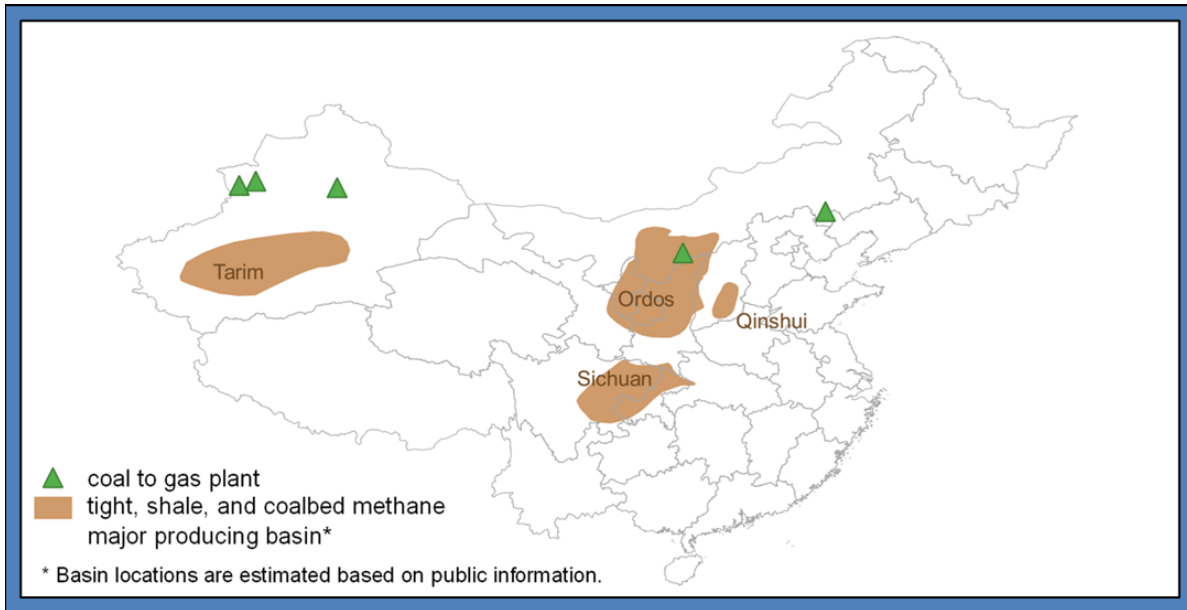
Note: *Other natural gas* refers to natural gas that is produced from discrete gas reservoirs and associated gas from oil production.

Government policies promoting coal-to-natural-gas switching to reduce air pollution and meet emissions targets have been a major factor in the rapid growth of both domestic natural gas production and natural gas imports in China. In March 2022, China’s government released its 14th Five-Year Plan (2021–25), which sets the domestic natural gas production target at 22.3 Bcf/d by 2025, or 3.0 Bcf/d more than domestic production in 2021.

In 2021, 56% of domestic natural gas production in China was natural gas produced from discrete gas reservoirs and associated natural gas from oil production. Production of natural gas from tight gas, shale gas, and coalbed methane collectively accounted for 44% of domestic natural gas production in China during 2021. Various government subsidy programs supported these projects. China’s development of natural gas from sources that use hydraulic fracturing is a key part of the government’s strategy to secure domestic natural gas supply.



**Figure 2**  
**China's Tight Gas, Shale Gas, Coalbed Methane, and Synthetic Gas Producing Areas**



Source: U.S. Energy Information Administration.

Tight gas production in China has grown since 2010, when companies initiated an active drilling program that lowered the drilling cost per vertical well and improved well productivity (Aizhu, 2013). In 2021, China produced 4.6 Bcf/d from tight gas formations, compared with 1.6 Bcf/d of tight gas produced in 2010.

Shale gas development in China has increased steadily in the past few years, growing 21% annually since 2017 (Aloulou, 2015). In 2021, shale gas production totaled 2.2 Bcf/d, which was below the government target of 2.9 Bcf/d by 2020.

Coalbed methane development in China faces significant challenges, including relatively low well productivity and relatively high production costs. Last year, coalbed methane production reached 1.0 Bcf/d, or 5% of China's total natural gas production.

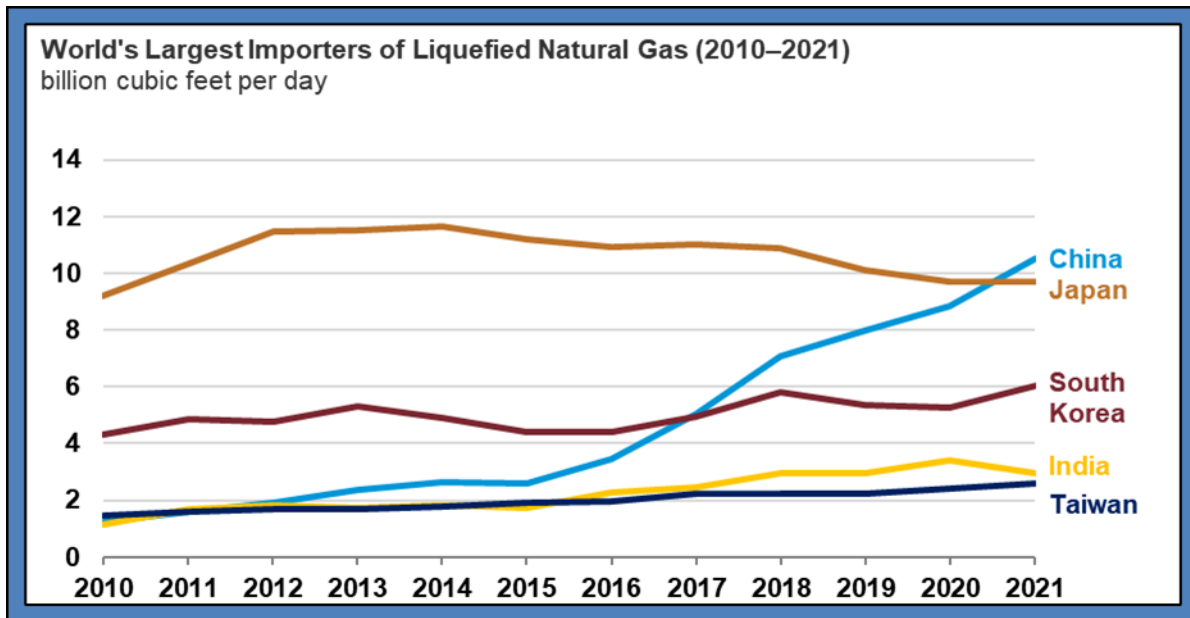
In China, production of synthetic natural gas from coal, which involves gasifying coal into methane at five available plants, totaled 3% of domestic production in 2021.



### As of 2021, China Imports More Liquefied Natural Gas than any Other Country

In 2021, China imported more liquefied natural gas (LNG) than any other country, according to data from Global Trade Tracker and China’s General Administration of Customs. Prior to 2021, Japan had been the world’s largest LNG importer for decades, according to data from Cedigaz.<sup>1</sup>

Figure 3



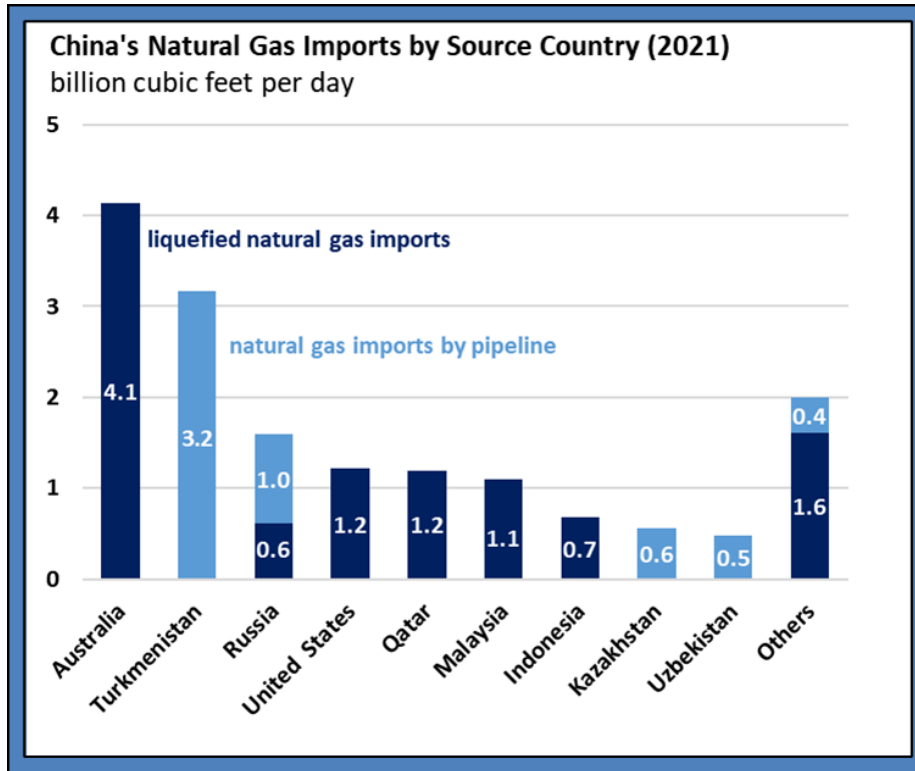
Source: Graph by the U.S. Energy Information Administration, based on data from Japan’s Ministry of Finance, China’s General Administration of Customs, South Korea’s Customs Institute, India’s Directorate General of Commercial Intelligence and Statistics, and Taiwan’s Ministry of Finance via Global Trade Tracker.

China’s LNG imports averaged 10.5 billion cubic feet per day (Bcf/d), a 19% increase compared with 2020. LNG imports accounted for more than half of China’s overall natural gas imports and 30% of China’s total natural gas supply in 2021 (Aloulou and Zaretskaya, 2022a).

China began importing LNG in 2006 and, with the exception of 2015 (EIA, 2016), has imported more LNG each year since then. China has rapidly expanded its LNG import capacity, which was estimated at 13.9 Bcf/d in 2021. By the end of 2022, China’s regasification capacity could increase by 2.8 Bcf/d to 16.7 Bcf/d, according to data from S&P Global Platts.<sup>2</sup> In 2021, China imported LNG from 25 countries. The largest six suppliers—Australia, United States, Qatar, Malaysia, Indonesia, and Russia—provided 8.9 Bcf/d, or 85%, of China’s total LNG imports.



Figure 4



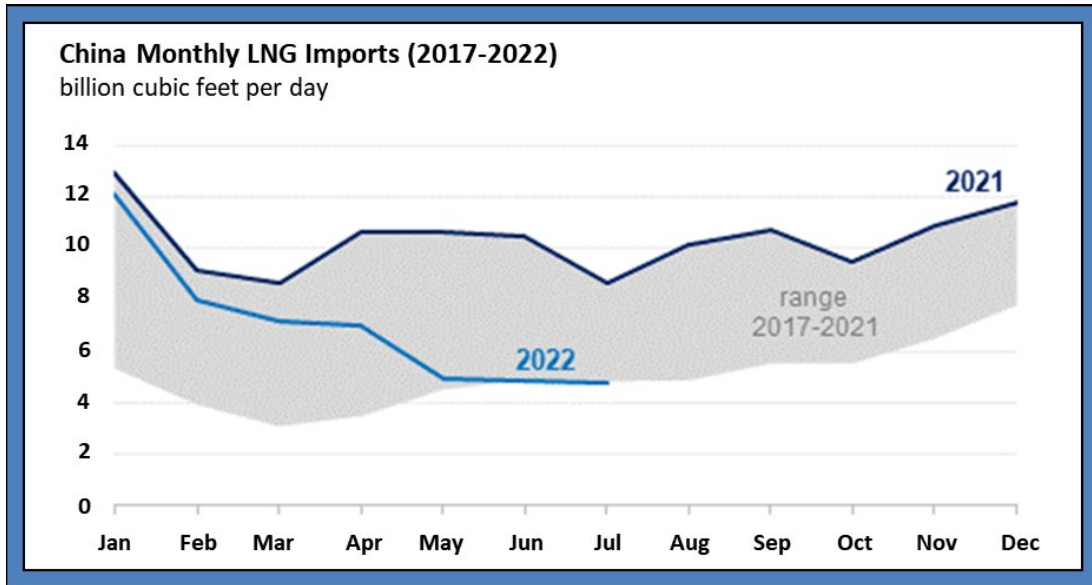
Source: Graph by the U.S. Energy Information Administration, based on data from China's General Administration of Customs and Global Trade Tracker.

Since China lowered tariffs on LNG imports from the United States from 25% to 10% in 2019, U.S. LNG exports to China have increased and in 2021 averaged 1.2 Bcf/d (Jaganathan and Aizhu, 2020). The United States was the largest supplier of spot LNG volumes to China last year.

During 2022 and 2023, several new long-term contracts between China and the United States are expected to start from the Sabine Pass and Corpus Christi terminals for a combined estimated volume of up to 0.5 Bcf/d. The new U.S. LNG export terminal at Calcasieu Pass will supply China's two national energy companies—Sinopec with 0.13 Bcf/d (Jaganathan and Aizhu, 2021) and CNOOC with 0.2 Bcf/d (Venture Global LNG, 2021)—starting next year.

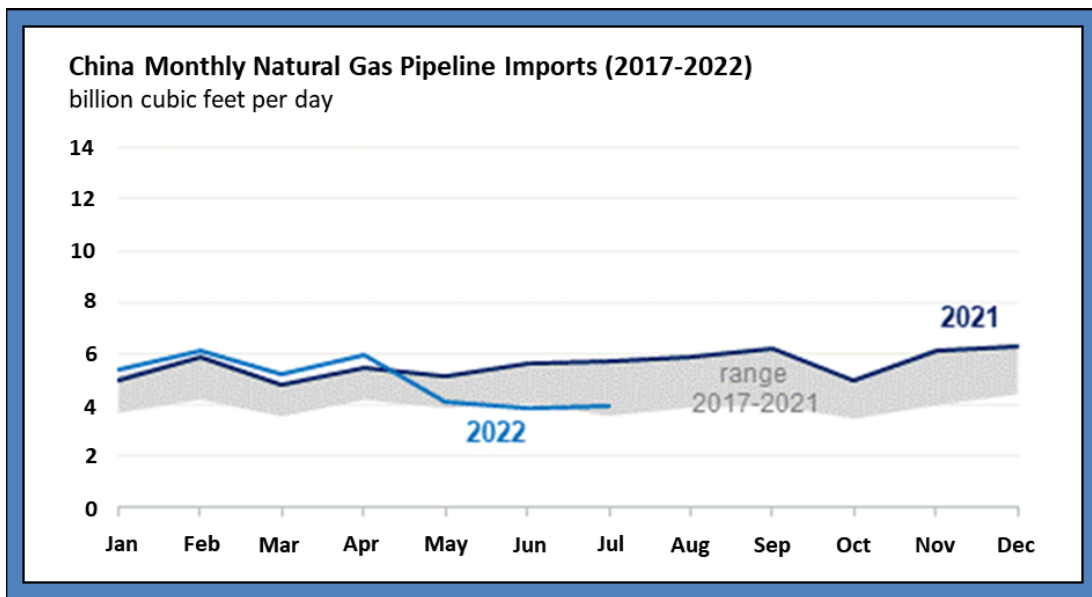


Figure 5



Source: Global Trade Tracker.

Figure 6



Source: Global Trade Tracker.

After becoming the world’s largest LNG importer in 2021, China reduced its LNG imports by approximately one-third in the first seven months of this year. From January through July 2022, China’s LNG imports averaged 7.0 Bcf/d, a 34% decline compared with 10.5 Bcf/d 2021 annual average. LNG imports in China have decreased this year for the first time since 2015. The decline in LNG imports was driven in part by



the slower economic growth, high spot LNG prices, robust growth in hydro and non-hydro renewable power generation that displaced more expensive gas-fired power-generation, as well as government policies, which this year reprioritized supply security and economic stability over emissions targets.

China's natural gas imports by pipeline have also declined in the first seven months of this year (January through July) by 11% compared to 2021 annual average. From January through April 2022, China's pipeline imports averaged 5.7 Bcf/d, and were higher than the 5-year average, but declined from May through July and averaged 4 Bcf/d, trending at the 5-year minimum level.

Overall so far this year (January through July) China has reduced natural gas imports by both pipeline and LNG by about a quarter (26%), with imports averaging 12 Bcf/d over this period, compared with 16 Bcf/d annual average in 2021.

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## Endnotes

This article draws from Aloulou and Zaretskaya (2022a) and Aloulou and Zaretskaya (2022b).

1 <https://www.cedigaz.org/>

2 <https://www.spglobal.com/commodityinsights/en>

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### Author Biographies

#### FAOUZI ALOULOU

##### Senior Industry Economist, U.S. Energy Information Administration

Faouzi Aloulou is a Senior Industry Economist at the Energy Information Administration (EIA) of the U.S. Department of Energy in Washington, DC since 2001. Currently, Aloulou has been involved in addressing provisions directed at EIA from the Bipartisan Infrastructure Investment and Jobs Act 2021, regarding carbon dioxide emissions data harmonization, and provisions from the Inflation Reduction Act 2022 regarding hydrogen production and its impact on EIA modeling energy consumption in the manufacturing sector. Starting 2010 he has been the Project Manager of EIA's Global Shale Resources and Activities' research effort, for which he regularly authors analytical reports on shale gas and tight oil in the U.S. and the rest of the world. Aloulou initiated the monthly EIA Energy Forecasting Forum in 2002, now called the monthly EIA Energy Data Science Speakers Series, an activity he still is responsible for organizing. Additionally, from 2014 to 2016, he was the Project Manager of EIA's Global Hydrocarbon Supply Model.

Prior to the EIA's re-organization in 2010, Aloulou was the EIA China and Middle East expert, monitoring the two regions' energy resources, supply and consumption patterns, trade, technology use and investment strategies, information provided to the World Energy Projections System (WEPS), the EIA's international energy model. In this capacity, Mr. Aloulou took the initiative to have the EIA's *International Energy Outlook* translated into Chinese and Arabic. In the period, June 2007 to June 2008, Mr. Aloulou was seconded from the U.S. Department of Energy to the Riyadh-based International Energy Forum (IEF) where he developed the early prototypes of country surveys used to extend the Joint Oil Data Initiative (JODI) to natural gas. He also compiled and edited the IEF book, *From Confrontation to Dialogue*, which was released at the Third Summit of OPEC Heads of State on November 13, 2007.

Prior to joining EIA in 2001, he was a Research Associate at Cambridge Energy Research Associates (CERA), Massachusetts, where he worked with the CERA Refined Products team that produced the quarterly *World Refined Products Watch*. While at CERA he authored reports on the taxation of petroleum products, corporate strategies of the national oil companies, and Japan's activities in the Middle East oil and gas sectors. Aloulou interviewed the Prime Minister and the Finance Minister of Malaysia for the 1998 CERA book project co-authored by Daniel Yergin and Joseph Stanislaw: *The Commanding Heights: The Battle between Government and the Marketplace That Is Remaking the Modern World*. Aloulou subsequently served as Energy Advisor at the Prime Minister's Department in Malaysia and reviewed Malaysia's investment programs and energy policies (Vision 2020) as well as working as an independent energy group consultant in Singapore.

Aloulou has a Bachelor of Arts from University of California at Berkeley and a Master's in Public Administration from the Kennedy School of Government at Harvard University. His thesis, "The European Commission Proposal on Carbon/Energy Tax and the OPEC Response," was nominated for the Kennedy School's Don K. Price award. He was granted a fellowship at the Harvard Business School where he continued his research on pricing options and derivatives for tradable permit schemes as an alternative to energy taxation while assisting in teaching courses on negotiation analysis, leadership and authority at Harvard's Kennedy School of Government.

Faouzi Aloulou is an [Editorial Advisory Board](#) member of the *GCARD*, and his previous article for the digest covered "[U.S. Haynesville Shale Gas Production](#)."



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Victoria Zaretskaya is a Lead Industry Economist at the U.S. Energy Information Administration, Office of Energy Analysis. She monitors emerging trends in international natural gas markets and is responsible for analysis and modeling of short- and long-term market fundamentals. Her recent research includes analyzing the global natural gas trade (with a focus on LNG trade), and modeling of global demand-supply balances and prices. She is the author of numerous EIA publications on international natural gas and transportation sectors, including *International Energy Outlook*, *Short-Term Energy Outlook*, *Natural Gas Weekly Update*, and *Today in Energy*. Prior to joining EIA, Zaretskaya was a Principal Fuels Analyst with the Exelon Power Team, where she led fundamental analysis of North American and international natural gas markets to support origination, trading, budgeting, and project evaluation activities. Earlier Zaretskaya worked with consulting firms ICF International, PFC Energy, and Pace Global Energy, where she was responsible for market research and management consulting, contributing to a variety of projects for major oil and gas and power companies, investment banks, and governmental agencies.

Victoria Zaretskaya received an undergraduate degree in Economics (with high distinction) from George Mason University, and a Master's degree in International Public Policy from Johns Hopkins School of Advanced International Studies (SAIS).