ADVANCING AMERICA'S

Healthcare

The Value of Natural Gas to the U.S. Healthcare Sector

December 2023

AGA
American Gas Association

Table of Contents

Disclaimer

This report was prepared for the American Gas Association, with the assistance of its contractors, to be a source of independent analysis. Neither the American Gas Association, its contractors, nor any person acting on their behalf:

- Makes any warranty or representation, express or implied, with respect to the accuracy, completeness, or usefulness of the information contained in this report, or that the use of any information, apparatus, method, or process disclosed in this report may not infringe privately owned rights,
- Assumes any liability, with respect to the use of, damages resulting from the use of, any information, method, or process disclosed in this report,
- Recommends or endorses any of the conclusions, methods or processes analyzed herein.

References to work practices, products or vendors do not imply an opinion or endorsement of the American Gas Association or its contractors. Use of this publication is voluntary and should be taken after an independent review of the applicable facts and circumstances.

This nonpartisan study is based on independent analysis and research and is not intended to advocate a particular view on any specific legislation or encourage readers to act with respect to specific legislation. Conclusions reached in this report are the product of objective research and do not necessarily represent the opinions of FTI Consulting.

Letter from the President & CEO: The Essential Role of Natural Gas in the Healthcare Industry

When we think of essential industries, our nation's healthcare sector typically ranks at the top. America's doctors, nurses, hospital staff, care providers, and countless others are an integral part of our everyday lives. But we rarely think about all the things that are critical to a functioning healthcare sector. Affordable and reliable energy is in that category.

Our third analysis in the *Advancing America* series focuses on the role that natural gas plays in the healthcare sector – including hospitals, labs, nursing facilities, physicians' offices, and a variety of other care centers. Beyond the essential services that take place in these facilities across the country, the healthcare sector is a major part of the U.S. economy. According to this analysis, the healthcare sector supports nearly 37 million jobs and contributes $3.4 trillion to GDP. The sector also accounts for $880 billion in tax revenue at the federal, state, and local levels.

This analysis finds that the U.S. healthcare sector consumes more than 271 billion cubic feet of natural gas each year, which is more than the annual natural gas consumption of 14 individual states.[1] While total natural gas consumption by this sector may seem small – especially compared to others, such as agriculture (which was the subject of the first *Advancing America* analysis[2]) – the natural gas consumed by the healthcare sector is irreplaceable.

Survey data from the U.S. Energy Information Administration (EIA) show that 74% of hospitals use natural gas for space heating, and 80% of hospitals use natural gas for water heating.[3] They also tend to consume more energy per square foot than any other commercial building type.[4] And unlike other commercial buildings, hospitals remain open 24/7. Everything from ventilators to the lights during surgery requires a steady and reliable stream of energy. Hospitals keep backup generators on site to ensure any power outage doesn't affect the life-saving work that occurs every hour of every day. Natural gas provides necessary resilience, especially during natural disasters when electrical outages are common and emergency care can be most in demand.

DID YOU KNOW?

74% of U.S. hospitals use natural gas for space heating and water heating.

[1] https://www.eia.gov/naturalgas/annual/pdf/table_002.pdf
[2] The *Advancing America* series of analyses and reports can be found at https://www.aga.org/research-policy/natural-gas-advancing-america/
[3] FTI Consulting analysis of 2018 CBECS microdata for inpatient health care principal building activity
[4] 2018 CBECS Table C12

In fact, EIA's survey data[5] show zero all-electric inpatient health care facilities in the United States, underscoring the challenge of transitioning this critical sector to 100% electric.[6]

Despite these facts, there are still individuals and policymakers who advocate bans or restrictions on natural gas access, preferring to "electrify everything." Notably, the healthcare sector has raised concerns about whether hospitals could even comply with an all-electric mandate. Last year, the Washington State Hospital Association noted that fossil fuel generators are the "only available technology to meet the high-power demands within hospital facilities since battery technology is not feasible on the scale needed to power a hospital for at least 96 hours," which is required for accreditation from the Centers for Medicare and Medicaid Services.[7]

In addition to the functional problems, we must also consider the costs. According to this analysis, the cost of mandated electrification for the healthcare sector would total $16.3 billion through 2050. It would also put at risk tens of thousands of jobs throughout the sector.

These job losses would disproportionately harm women and people of color. In the healthcare sector, women account for more than 75% of the workforce, compared to a national rate of 46.8%. Workers of Asian or African American backgrounds are also represented at a higher rate in healthcare than the national average.

People from all over the world seek treatment in the United States because they are in search of the best care possible. Our doctors and medical professionals are world renowned. We should work every day to maintain American leadership in this essential industry, and as this analysis shows, providing access to affordable and reliable energy like natural gas is a critical part of doing so.

Karen Harbert

President and CEO, American Gas Association

[5] 2018 CBECS

[6] FTI Consulting analysis of 2018 CBECS microdata for inpatient health care principal building activity

[7] https://sbcc.wa.gov/sites/default/files/2022-03/WSHA%20Comment_030822.pdf

Executive Summary

The American Gas Association engaged FTI Consulting, Inc. ("FTI") to describe the economic value natural gas provides to the U.S. healthcare sector, which is defined to include hospitals, healthcare offices, outpatient care centers, laboratories, home health care services, and residential care facilities.[8] The findings in this analysis are based on data from the U.S. Energy Information Administration, the Annual Energy Outlook, the U.S. State Energy Data System and the IMPLAN model, a widely used economic impact modeling tool.

The healthcare sector uses a considerable amount of energy, but unlike other consumers, energy demand from healthcare is around-the-clock. Hospitals engage in many energy-intensive activities such as laundry, medical and lab equipment use, sterilization, computer and server use, food service, and refrigeration – all of which require a steady and reliable source of power 24 hours a day. Data from the U.S. Department of Energy show natural gas is approximately one-third the unit price of electricity,[9] which means natural gas keeps energy affordable for healthcare facilities across the country.

The healthcare sector's share of commercial and industrial consumption is highest in the Northeast and Mid-Atlantic regions of the United States. Renewable energy options like solar and wind are limited in these regions due to the natural terrain and geography. These regions are also typically colder and rely more heavily on natural gas for space and water heating.

This study finds that:

The healthcare sector accounts for **23.3% percent all U.S. jobs, $3.4 trillion in GDP, and $274 billion in state and local taxes**.[10]	Businesses within the healthcare sector directly consumed approximately 271.6 billion cubic feet (bcf) of natural gas in 2022,[11] **roughly equivalent to the total natural gas consumption of Utah.**[12]

- The U.S. healthcare sector supports **17.5 million direct jobs, 7 million indirect jobs, and 12.4 million induced jobs**. Women and individuals of Asian or African American backgrounds are represented at a higher rate in healthcare jobs than the national average, with **women accounting for more than 75% of the healthcare workforce**.

---

[8] Healthcare offices include offices of physicians, dentists, and other health practitioners, and residential care facilities include nursing, community care, mental health, and substance abuse centers.
[9] https://www.govinfo.gov/content/pkg/FR-2023-08-28/pdf/2023-18532.pdf
[10] Using 2022 employment level of 158,297,000. Source: https://fred.stlouisfed.org/series/CE16OV
[11] The EIA Commercial Buildings Energy Consumption Survey shows total 2018 gas consumption of 272.0 Bcf across health care, nursing home or assisted living, and medical (non-diagnostic) principal building activities. This was adjusted to 271.6 Bcf for 2022 based on total commercial demand in 2022 falling 0.1% from 2018 levels.
[12] Utah consumed 274.0 Bcf of natural gas in 2022, according to the EIA

- Mandated electrification of the U.S. healthcare sector would **cost the U.S. economy $16.3 billion through 2050**.
    - New York, New Jersey, and Massachusetts would bear the highest costs of electrification, with 2050 annual energy expenditures increasing by $350 million, $94 million, and $90 million respectively.
- A recent survey published by the U.S. Energy Information Administration[13] showed **zero all-electric inpatient health care facilities** in the United States.[14]
- According to a survey of commercial buildings published by the U.S. Energy Information Administration, **74% of hospitals use natural gas for space heating and 80% of hospitals use natural gas for water heating.**[15] The survey results also indicate hospitals tend to consume more energy per square foot than many other commercial building types.[16]
- Electrifying a hospital can be **extremely complicated and costly**. Hospitals have more sophisticated wiring and piping than other commercial facilities and are far more complex than houses or apartment buildings. They also must comply with more regulations and safety requirements.
    - **Hospitals have less ability to reduce energy usage through demand response or other curtailments.** For example, whereas homes and some businesses may be able to adjust thermostats or change when they use large appliances in response to high demand events, hospitals have no such flexibility. Ventilators, refrigerators that contain medicine, surgical equipment, and other medical devices must be available on demand.
- The higher electric demand resulting from restricting natural gas in hospitals would also likely require expensive and complex updates to the power grid. In fact, based on the EIA's most recent Commercial Buildings Energy Consumption Survey ("CBECS"), U.S. health care facilities would experience a **more than 61.4% annual increase in total electricity usage** if required to use electricity exclusively for their energy needs.[17]
- According to the U.S. Environmental Protection Agency, **more than 200 hospitals across 30 states use Combined Heat and Power ("CHP") systems** fueled by natural gas, which provide both electricity and thermal energy for heating and cooling.[18] According to the U.S. Department of Energy, nearly 100% of these hospitals are designated critical infrastructure facilities, noting that

[13] 2018 CBECS
[14] FTI Consulting analysis of 2018 CBECS microdata for inpatient health care principal building activity
[15] ibid.
[16] 2018 CBECS , Table C12
[17] The calculated value equals the "Sum of major fuels" divided by the primary electricity usage. Sourced from: 2018 CBECS, Table C1
[18] https://www.epa.gov/chp/chp-hospitals-superior-energy-superior-patient-care

CHP systems "allow the facilities to provide reliable electric and thermal energy to maintain [the] nation's security, public health and safety, and support sectors."[19]

The U.S. healthcare sector directly consumes nearly

272 billion cubic feet

of natural gas each year, roughly the same as Utah's annual natural gas consumption, with a population of 3.3 million

Introduction and Context

The U.S. healthcare sector relies on natural gas for space heating, water heating, laundry, and cooking needs. Natural gas is also used as an energy source for medical equipment such as sterilizers and laboratory instruments. Natural gas is generally the lowest-cost option for space and water heating for the various commercial structures in the U.S. healthcare sector, including hospitals and nursing and residential care facilities.

Replacing natural gas with more expensive alternatives could raise healthcare costs. In 2022, annual healthcare spending in the U.S. was projected at 17.4% of total GDP, or a staggering $13,413 per capita.[20] Approximately 8% of the average household's 2022 expenditures in the U.S. were attributable to healthcare services, higher than the amount spent on many other essentials including both the energy needed to heat and cool homes and the food to keep families fed.[21,22] Increased costs for healthcare providers associated with electrification of end uses currently fueled by natural gas are likely to pass to consumers in the form of higher prices.

The healthcare sector has spoken out about how restrictions on energy choices could impact operations. For example, in response to a proposed building code change that would prohibit new buildings from using natural gas or other fossil fuels for heating, the Washington State Hospital Association expressed significant concerns:

[19] https://doe.icfwebservices.com/downloads/chpDataset
[20] https://www.healthaffairs.org/doi/10.1377/hlthaff.2023.00403
[21] https://www.bls.gov/news.release/cesan.nr0.htm
[22] https://www.eia.gov/consumption/residential/data/2020/c&e/pdf/ce1.1.pdf

> *WSHA is very concerned about the proposal to eliminate fossil fuel combustion for space heating due to hospitals' unique backup power requirements. Hospitals' top priority is to keep patients safe under all circumstances 24/7 and 365 days a year. Because of this, the Centers for Medicare and Medicaid Services (CMS) require hospitals to have at least 96 hours of backup power available in the event of a power outage. This is a mandatory condition for CMS accreditation that ensures hospitals are ready to serve patients if their power supply is disrupted. Hospitals' backup power is currently provided by onsite fossil fuel generators, which is the only available technology to meet the high-power demands within hospital facilities since battery technology is not feasible on the scale needed to power a hospital for at least 96 hours. Every hospital hopes to use its' generators infrequently, but recent cases of extreme weather, power outages, wildfires, and flooding have caused hospitals throughout the state to use their backup power systems to maintain operations.*[23]

Across the United States, there are more than 6,100 hospitals[24] and 30,600 assisted and residential care facilities,[25] according to data from the U.S. Bureau of Labor Statistics. And that's only a portion of the total healthcare sector, which also includes hundreds of thousands of doctor's offices, laboratories, and other facilities.[26] This is a large sector of the economy that also has intense energy demand, using more energy per square foot than any other commercial building type.

When considering the role of natural gas in the healthcare sector, resilience is a major part of the story. When natural disasters strike, functioning hospitals are even more critical than usual, and for many hospitals across the country, natural gas provides the resilience necessary for these facilities to remain open even when local power grids fail.

For example, during the devastation of Hurricane Sandy in 2012, the Montefiore Medical Center in New York was able to operate without interruption and continue to provide medical care.[27] Its Combined Heat and Power (CHP) system, which is fueled by natural gas, provides a concurrent generation of electricity and thermal energy for heating and cooling, as well as steam for sterilization. The CHP system not only kept Montefiore operating; it allowed the facility to accommodate patients from other hospitals that suffered from power outages. Unsurprisingly, the hospital says its CHP system "allows us

[23] https://sbcc.wa.gov/sites/default/files/2022-03/WSHA%20Comment_030822.pdf
[24] https://www.aha.org/statistics/fast-facts-us-hospitals
[25] https://www.ahcancal.org/Assisted-Living/Facts-and-Figures/Pages/default.aspx#:~:text=%E2%80%8BT%E2%80%8Bhere%20are,community%20is%2039%20licensed%20beds.
[26] https://www.bls.gov/iag/tgs/iag621.htm
[27] https://www.epa.gov/chp/chp-hospitals-superior-energy-superior-patient-care

to provide to Montefiore patients, employees, and members of the communities we serve a safe, reliable, resilient, and environmentally friendly source of power."[28]

According to the U.S. Environmental Protection Agency, CHP systems are installed in more than 200 hospitals across 30 states,[30] and the agency provides additional case studies for natural gas-fueled systems in Maryland[31] and Maine.[32]

Natural gas powered microgrids can also provide a reliable source of electricity and space heating during severe weather events. In 2021, millions of homes and businesses in Texas lost power during Winter Storm Uri. But microgrids supplied by Enchanted Rock were able to supply continuous power to more than 140 customer sites, including healthcare and senior citizen facilities. In a release, Enchanted Rock noted that the company "fuels all of its microgrids with natural gas supplied from the underground gas infrastructure, which helps ensure its microgrids can provide continuous electrical resiliency. The company recently announced all of its customers have the option to use Renewable Natural Gas for their resiliency service, which results in zero or negative carbon equivalent emissions."[33]

DID YOU KNOW?

Baltimore Washington Medical Center's cogeneration plant is reducing greenhouse gas emissions and was estimated to save the hospital about **$750,000 in annual energy cost**s. Using natural gas instead of diesel will r**educe BWMC's emissions by 10,000 tons of CO2 per year** without threatening the reliability requirements of the hospital.[32]

This report examines the full scope and scale of the U.S. healthcare sector, including the sector's direct and indirect use of natural gas, the cost of replacing natural gas with all-electric, and how natural gas is used in healthcare. It begins by describing natural gas demand from the sector, as implied by federal economic and energy data.

[28] https://www.montefiore.org/energy-efficiency
[29] https://www.capitalgazette.com/environment/ph-ac-cn-bwmc-earth-day-0422-20170421-story.html
[30] https://www.epa.gov/chp/chp-hospitals-superior-energy-superior-patient-care
[31] https://www.epa.gov/sites/default/files/2019-03/chp_casestudy5.png
[32] https://www.epa.gov/sites/default/files/2019-03/chp_casestudy1.png
[33] https://www.prnewswire.com/news-releases/enchanted-rock-to-supply-dual-purpose-microgrids-to-three-retirement-center-management-facilities-in-the-houston-area-301463233.html

Natural Gas Consumption and the U.S. Healthcare Sector

Natural Gas Consumption[34]

The consumption of natural gas associated with the U.S. healthcare sector was estimated using IMPLAN data[35] and data covering gas consumption from the EIA.[36] IMPLAN is an "input-output" (or "IO") model of national and regional economies that shows the contributions of an economic sector, specific enterprise, or policy to the economy. FTI used IMPLAN to estimate the full impact of the U.S. healthcare sector ("direct") by accounting for its supply chain ("indirect") and its direct and indirect employee spending ("induced"). Appendix A describes the methodology and approach used to estimate natural gas consumption by the healthcare sector.

When including the direct use of natural gas by the U.S. healthcare sector and the indirect use in its industrial supply chain, the U.S. healthcare sector consumes roughly 493.3 Bcf, shown in Table 1. This is slightly lower than Colorado's total natural gas consumption (in all sectors) each year.[37] Such a level of natural gas consumption is also equivalent to almost 4.1 percent of all commercial and industrial gas consumption across the U.S. economy in 2022, based on EIA data on consumption by sector.

Table 1 – U.S. natural gas consumption supported by the healthcare sector

Economic Sector	Units	Direct Demand[38]	Indirect Demand[39]	Direct & Indirect
Commercial	Bcf	271.6	61.4	333.0
Industrial	Bcf	0.0	160.3	160.3
C + I[40]	Bcf	271.6	221.8	493.3

SOURCE: IMPLAN Model, EIA Natural Gas Consumption Data, FTI Calculations

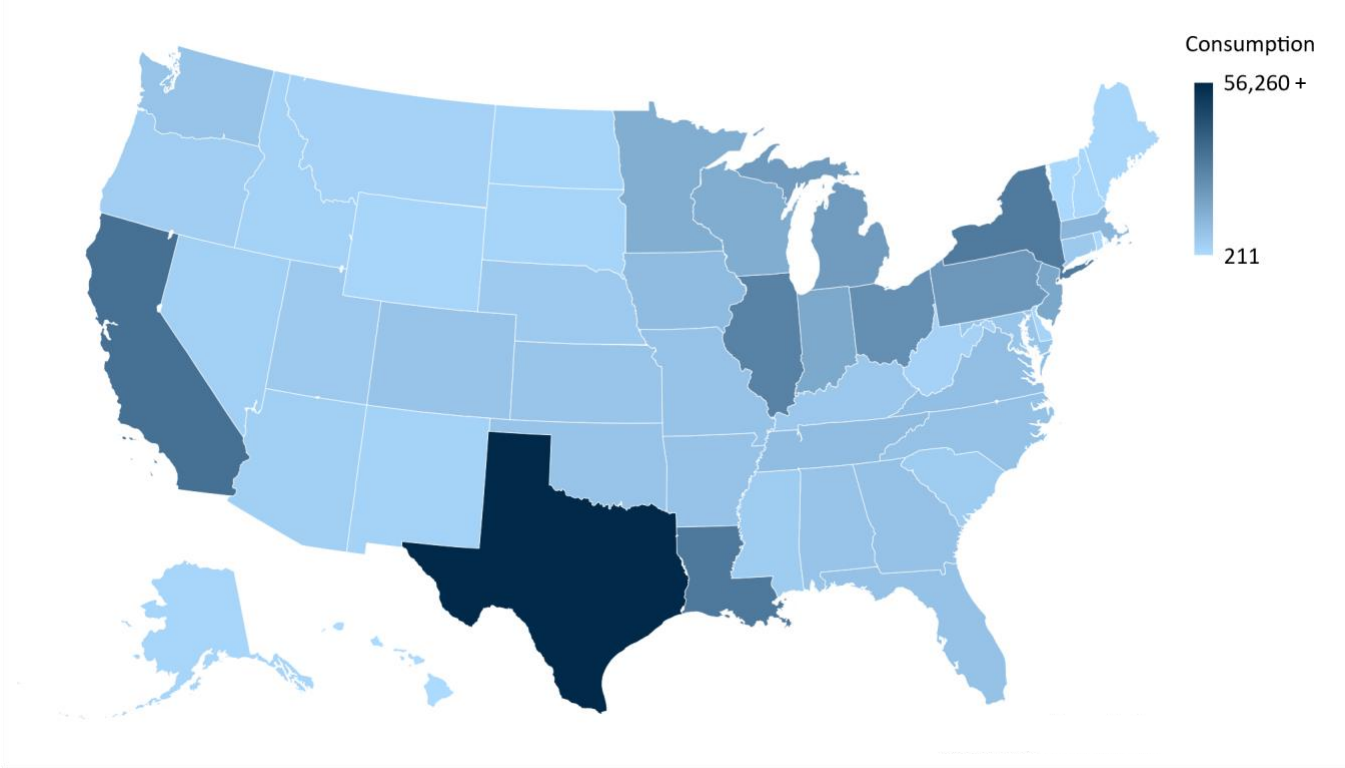
The healthcare industry's share of commercial and industrial consumption is highest in the Northeast and Mid-Atlantic regions of the United States. These regions are typically colder and rely more heavily

[34] All figures and tables related to natural gas demand use full-year 2022 data as their underlying source
[35] https://implan.com
[36] https://www.eia.gov/
[37] 503.5 Bcf in 2022 according to EIA https://www.eia.gov/dnav/ng/ng_cons_sum_dcu_SUT_a.htm
[38] The EIA Commercial Buildings Energy Consumption Survey shows total 2018 gas consumption of 272.0 Bcf across health care, nursing home or assisted living, and medical (non-diagnostic) principal building activities. This was adjusted to 271.6 Bcf for 2022 based on total commercial demand in 2022 falling 0.1% from 2018 levels.
[39] Indirect gas demand, or the demand from industries in the healthcare supply chain, was determined using an input-output table that specified the share of each industry's output derived from natural gas purchases.
[40] Commercial sector plus industrial sector

on natural gas for space and water heating. Additionally, renewable energy options like solar or wind are limited due to the natural terrain and geography.

Figure 1 displays the total natural gas consumption of the healthcare sector at the state level, while **Figure 2** shows the percentage of state-level natural gas consumption that is attributable to healthcare. An important factor that drives differences between states is the size of the state, where larger state economies (e.g., Texas or California in **Figure 1**) have larger absolute results for natural gas demand. Another important factor is state specific industry mixtures (e.g., Ohio in **Figure 2**, where a large portion of gas consumption is attributable to the chemical manufacturing sector).

Figure 1 – State natural gas consumption supported by the healthcare sector (MMcf)



SOURCE: IMPLAN Model, EIA Natural Gas Consumption Data, FTI Calculations

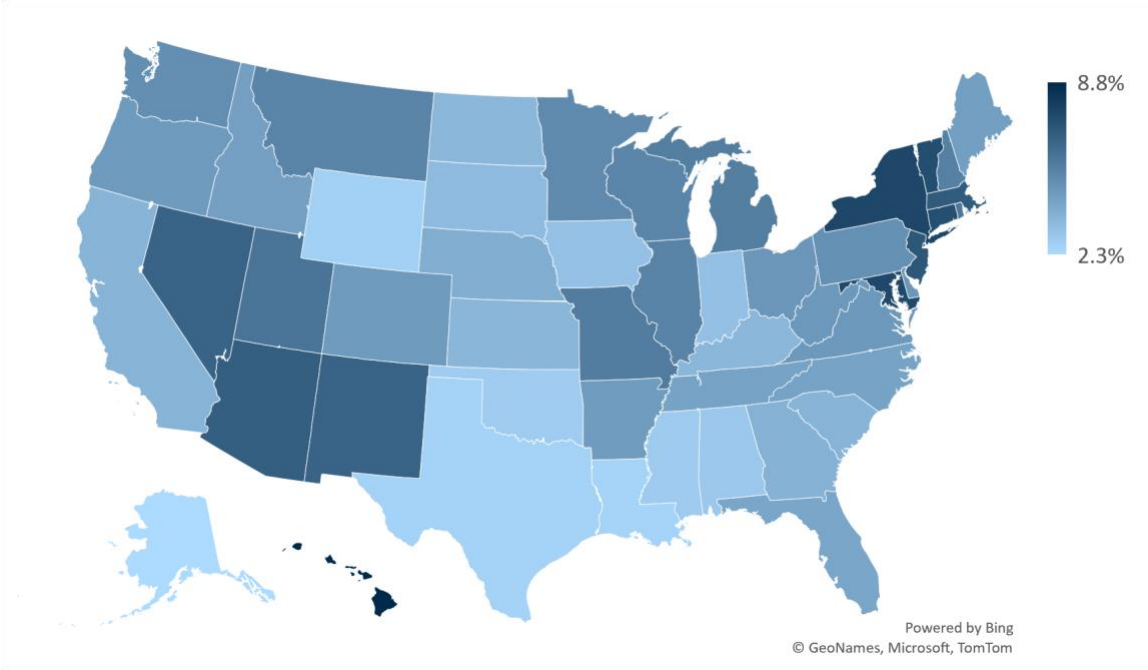
Figure 2 shows the "intensity" of gas consumption supported by the U.S. healthcare sector for each state energy sector and economy relative to all commercial and industrial gas consumption. Some of the major highlights and takeaways from Figure 2 include:

- The states with relatively large healthcare sectors, such as states in the Northeast, have the highest share of their commercial and industrial natural gas consumption supported by the U.S. healthcare sector. While the U.S. healthcare sector is distributed nationally, it is over-indexed within states with healthcare hubs that treat patients from out of the region.
- The share of commercial and industrial demand supported by the U.S. healthcare sector tends to be higher in the Northeast and the Midwest's East North Central region, which is the northern

portion of the region and generally the coldest. The share of state natural gas consumption is relatively small in North Dakota and Wyoming, which are exceptions due to their large energy sectors and high gross natural gas consumption.

- At least 2.3 percent of the natural gas delivered to commercial and industrial customers is used by the U.S. Healthcare sector in each state. Alaska, Louisiana, and Texas have the smallest share, however Texas and Louisiana have large absolute gas consumption supported by the U.S. healthcare sector.
- On a per capita basis, Hawaii, Florida, and Arizona have the lowest natural gas consumption from the healthcare sector.

Figure 2 – Share of state commercial and industrial natural gas consumption supported by the healthcare sector (%)



SOURCE: IMPLAN Model, EIA Natural Gas Consumption Data, FTI Calculations

Table 2 shows the economic sectors with the highest level of gas consumption either directly or indirectly related to the U.S. healthcare sector. The most prominent sectors in Table 2 include:

- The economic sector with the highest level of consumption is the U.S. healthcare sector's hospital component. This is sensible because hospitals are the largest of the subcomponents of the U.S. healthcare sector and have the most diverse needs for natural gas such as heating, sterilizing, and temperature control, as well as backup generation.
- The petrochemical sector is the largest supply-chain sector from Table 2. Petrochemicals are a component of the supply chain for many materials and industries, including “plastics, fertilizers,

packaging, clothing, digital devices, medical equipment, detergents, tires, and many others."[41] Applications for the U.S. healthcare sector from this list include plastics and packaging for the medicines and pharmaceuticals, textiles and detergents for hospital linens, and various types of medical equipment.

- Other supporting sectors include industrial gas manufacturing, chemicals, construction (maintenance and repair of nonresidential structures), and transportation.

Table 2 – Largest consumers of natural gas by the U.S. healthcare sector and its supply chain (MMcf)

Rank	Economic Sector	Direct	Indirect
-	Health Care	198,724	-
-	Nursing home or assisted living	65,908	-
-	Medical (non-diagnostic)	6,990	-
1	Petrochemical manufacturing	-	30,323
2	Industrial gas manufacturing	-	19,084
3	Other basic organic chemical manufacturing	-	15,011
4	Maintenance and repair construction of nonresidential structures	-	12,427
5	Couriers and messengers	-	8,755
6	Iron and steel mills and ferroalloy manufacturing	-	7,650
7	Other local government enterprises	-	6,882
8	Other basic inorganic chemical manufacturing	-	6,586
9	Truck transportation	-	5,347
10	Paper mills	-	5,167
11	Glass product manufacturing made of purchased glass	-	4,269
12	Printing	-	3,983
	ALL OTHERS >>	-	96,308
	TOTAL >>	271,622	221,793

SOURCE: IMPLAN Model, EIA Natural Gas Consumption Data, FTI Calculations

[41] https://www.iea.org/reports/the-future-of-petrochemicals

Cost Impact of Replacing Gas in the U.S. Healthcare Sector

FTI constructed an illustrative and representative scenario using federal energy data and information from the IMPLAN model to analyze the cost impact of replacing natural gas with electricity in the U.S. healthcare sector. This scenario is not the only possible future for the U.S. energy sector but presents a plausible pathway with straightforward assumptions. The scenario relies upon the EIA's 2023 Annual Energy Outlook's Reference Case. Appendix A further describes the approach and methodology used to estimate cost impacts of replacing natural gas with electricity in the healthcare sector.

Cost Impacts

The cost impacts of the scenario modeled by IMPLAN in this report includes the following highlights:

- Between 2026 and 2050, the cumulative increase in net operational costs for the healthcare sector would be $16.3 billion.
- Higher healthcare costs would results in less disposable income for households and reduced overall spending. This would translate to $32.2 billion in reduced GDP across the country from 2026 through 2050.
- The reduced economic activity would lead to a loss of approximately 276 thousand job-years for U.S. workers from 2026 through 2050.
- New York alone would accumulate approximately 35 percent of the net $16.3 billion in total U.S. costs. New York has a large economy and population, an extensive healthcare sector with a significant number of major hospitals centered around New York City, and is comparatively cold, collectively making the impact on the Empire State the largest nationally.

Table 3 shows the states with the largest cost impacts.

Table 3 – States with the highest net fuel costs from replacing gas with electricity (2023 $ millions)

Rank	State	Net Costs (2026-2050)
1	New York	$5,687
2	New Jersey	$1,543
3	Massachusetts	$1,540
4	Michigan	$1,500
5	Minnesota	$1,148
6	Ohio	$1,032
7	Wisconsin	$935

8	Pennsylvania	$821
9	Connecticut	$797
10	Illinois	$746
	ALL OTHERS >>	$517
	TOTAL >>	$16,267

SOURCE: SEDS Energy Demand, AEO Reference Case, American Gas Association[42], FTI Calculations

U.S. hospitals are facing rising costs due to labor shortages exacerbated by the COVID-19 pandemic. Staffing shortages and the use of expensive contract labor drove wages up 11% in 2022 and 7% in Q1 2023.[43] This, in part, has led to a dramatic decrease in hospital margins. Moody's Investor Service noted that margins are below 3% for a third of the company's rated hospitals. Prior to the pandemic, only about 6% of hospitals had margins in that range.[44]

The most likely outcome of a cost increase for U.S. healthcare sector is higher prices for patients and downward pressure on wages for workers. Both effects reduce U.S. household income – either reducing workers' nominal wages on one side or reducing consumers' real income through higher prices. Wage and staffing impacts threaten to exacerbate the U.S. healthcare sector's already high turnover rate. According to a recent report, the hospital turnover rate stands at 22.7%.[45] Turnover itself can have a significant impact on diminishing hospital margins. The same report notes that the average cost of turnover for a bedside registered nurse is more than $52,000, resulting in the average hospital losing between $6.6 and $10.5 million in 2022. Increased hospital costs due to the electrification of end uses currently powered by natural gas threaten to put downward pressure on wages, leading to increased turnover, which itself will drive increased hospital costs, resulting in a feedback loop.

[42] https://naturalalliesforcleanenergy.org/wp-content/uploads/2021/08/AGA_Study_On_Residential_Electrification_Jul2018.pdf
[43] https://www.beckershospitalreview.com/finance/hospital-salary-wage-growth-slowed-to-7-in-q1
[44] https://www.hfma.org/finance-and-business-strategy/healthcare-business-trends/the-latest-on-hospital-finances-signs-of-improvement-but-margins-remain-tight/
[45] https://www.nsinursingsolutions.com/Documents/Library/NSI_National_Health_Care_Retention_Report.pdf

How Natural Gas is Used in the U.S. Healthcare Sector

Natural gas has several important use cases throughout the U.S. economy where alternative energy sources, such as electricity, would not provide the same level of service nor allow for similar products. Large hospitals, for example, tend to be energy-intensive buildings. Based on the data from past Commercial Buildings Energy Consumption Surveys ("CBECS") produced by EIA, hospitals tend to consume more energy per square foot than other buildings in the commercial sector.[46] Unlike other commercial buildings, hospitals are open 24 hours a day, are occupied by thousands of employees, patients, and visitors and often rely on sophisticated heating, ventilation, and air conditioning ("HVAC") systems to control temperature and air flow. Hospitals are also home to many energy-intensive activities such as laundry, medical and lab equipment use, sterilization, computer and server use, food service, and refrigeration. Other important examples include:

Energy Services

Combined heat and power ("CHP") often powered by natural gas, is the concurrent generation of electricity and thermal energy for heating, cooling, hot water, and steam for sterilization. CHP is a valuable energy resource for hospitals because it can provide all a hospital's energy services efficiently and especially during grid outages. In a hospital setting, lives may be at risk when the power goes out. As grid outages from weather-related events and other causes become more common, the need for resilient energy sources becomes more apparent.

According to the EPA, the Montefiore Medical Center, which in 1993 became the first hospital in New York City to install a CHP system, remained operational during two of the United States' most catastrophic grid outages – the Northeast Blackout of 2003 and Hurricane Sandy in 2012.[47] When 50 million people and critical systems across the Northeast lost electricity in 2003, Montefiore Medical Center was the only hospital to operate with full electricity service in New York City. Additionally, the CHP system, powered by natural gas, also continued to provide the hospital with cooling during the concurrent heat wave. Similarly, Hurricane Sandy, which cut electricity to more than 7.5 million people, had no effect on Montefiore Medical Center's ability to provide medical care thanks to its natural gas powered CHP system. In fact, it was able to accommodate patients from other hospitals. The hospital noted that its investment in CHP "allows us to provide to Montefiore patients, employees, and members of the communities we serve a safe, reliable, resilient, and environmentally-friendly source of power."

[46] 2018 CBECS Table C12

[47] https://www.epa.gov/chp/chp-hospitals-superior-energy-superior-patient-care

Emergency Backup Generation

Adopted in all 50 states, the National Fire Protection Association's NFPA 70 National Electric Code ("NEC") requires every hospital to have two independent power sources that provide a minimum level of reliability.[48] These are typically a normal source such as a utility and an alternate source, most often a fuel oil-powered on-site generator. While natural gas is sometimes used, hospitals often opt to install diesel generators because they are required to have 96 hours of fuel stored on-site and it is difficult to store that much natural gas. These diesel generators are heavy emitters of carbon dioxide and other pollutants.

The number of hospitals using natural gas for space heating was 74% and for water heating was 80%.[49] Cooking was reported in 96% of hospital buildings, with natural gas as the most common fuel.[50] During an electricity outage, these end uses can continue functioning normally using natural gas. In a scenario where all end uses were electrified, backup electricity generation systems would need to be significantly larger to handle the increased loads. Aside from increasing costs to hospitals, which would be required to add additional or larger backup generators, this would drive the use of more diesel fuel and emit more pollutants into the atmosphere.

Space Heating

The healthcare sector occupies 77,000 structures that use natural gas, including 7,000 inpatient and 70,000 outpatient facilities.[51] Inpatient facilities take up 2.3 billion square feet while outpatient facilities total nearly 1.8 billion square feet.[52] The two categories together are 4.2 percent of all commercial floorspace throughout the economy and 5.0 percent of all commercial square footage that uses natural gas.

Economic Contributions of the U.S. Healthcare Sector

The U.S. healthcare sector represents a significant part of the U.S. economy as measured by jobs, output, labor income, and gross domestic product ("GDP"). Additionally, this economic activity contributes to federal, state, and local tax revenues.

FTI used IMPLAN to estimate the full impact of the U.S. healthcare sector ("direct") by accounting for its supply chain ("indirect") and its direct and indirect employee spending ("induced") as defined further below:

- **Indirect** – The effect of the direct impact on suppliers, such as medical equipment or pharmaceutical manufacturers.

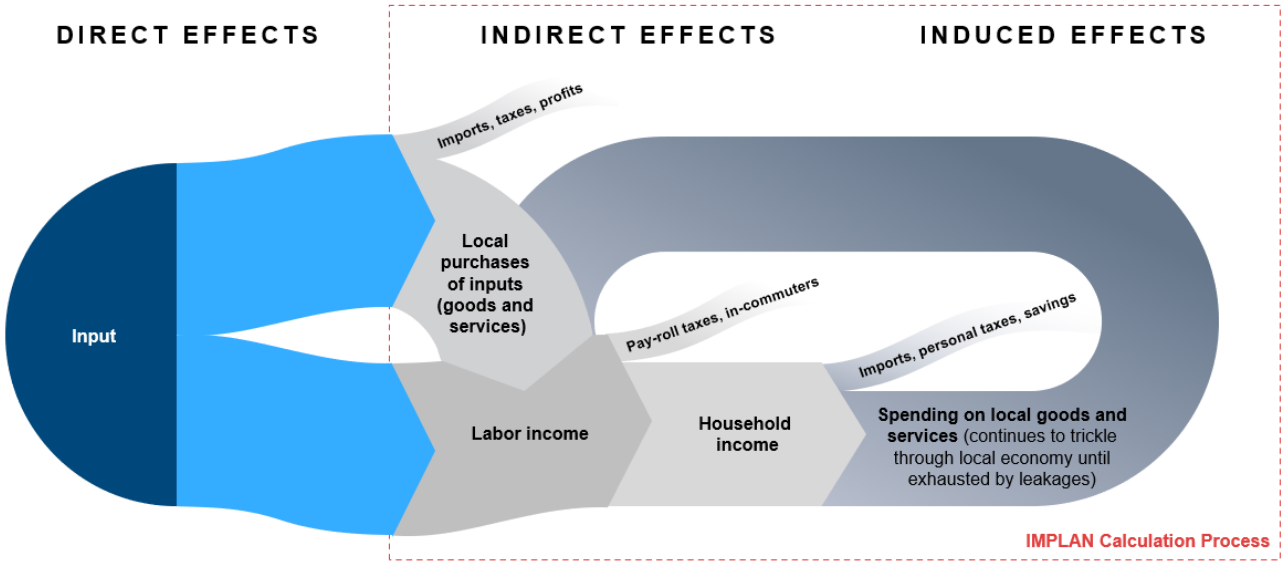
---

[48] https://www.csemag.com/articles/hospital-emergency-power-supply-systems/
[49] FTI Consulting analysis of 2018 CBECS microdata for inpatient health care principal building activity
[50] FTI Consulting analysis of 2018 CBECS microdata for inpatient health care principal building activity
[51] 2018 CBECS
[52] 2018 CBECS

- **Induced** – The direct economic sector and its suppliers compensate employees for their labor and proprietors and creditors (such as a bank) for their ownership, which in turn stimulates consumer spending when households take this income and spend it.

Figure 3 shows the calculation process for IMPLAN, including the indirect and induced effects:

Figure 3 – IMPLAN calculation process



For an example of direct, indirect, and induced working together, consider a hospital in a small town. Many members of the local economy would work at the hospital or have jobs dependent on its activities such as transportation. Visitors from outside the town would visit the hospital and spend money both at the hospital, and in surrounding businesses such as restaurants or gas stations.

Activities directly supported by the hospital would constitute the "direct" impact in IMPLAN. Supporting and supplier sectors, such as construction services to build and maintain the hospital or supporting facilities, would be part of the "indirect" impact in IMPLAN. These sectors would provide most of the jobs in the region and therefore most of the income, which supports consumer expenditures in the region by residents (e.g., hospitals and schools).

Based on the IMPLAN modeling undertaken for Table 4, the U.S. healthcare sector supports 17.5 million direct jobs, 7.0 million indirect jobs, and 12.4 million induced jobs. These employment results would be commensurate with the macroeconomic impacts, including $2.3 trillion in sales output, $1.4 trillion in U.S. GDP, and $1.3 trillion in household labor income. As shown below, the U.S. healthcare sector supports $606 billion in federal tax revenues, mostly through federal income and payroll taxes, and $274 billion in state and local revenues.

Table 4 – Economic impact of the U.S. healthcare sector

Impact	Units	Direct	Indirect	Induced	Total
Employment	Jobs (millions)	17.5	7.0	12.4	**36.9**
Sales Output	2023 $ billions	$2,302	$1,264	$2,270	**$5,836**
GDP	2023 $ billions	$1,430	$694	$1,280	**$3,404**
Labor Income	2023 $ billions	$1,332	$459	$707	**$2,498**
Federal Taxes	2023 $ billions	$290	$107	$209	**$606**
S&L[53] Taxes	2023 $ billions	$81	$48	$145	**$274**

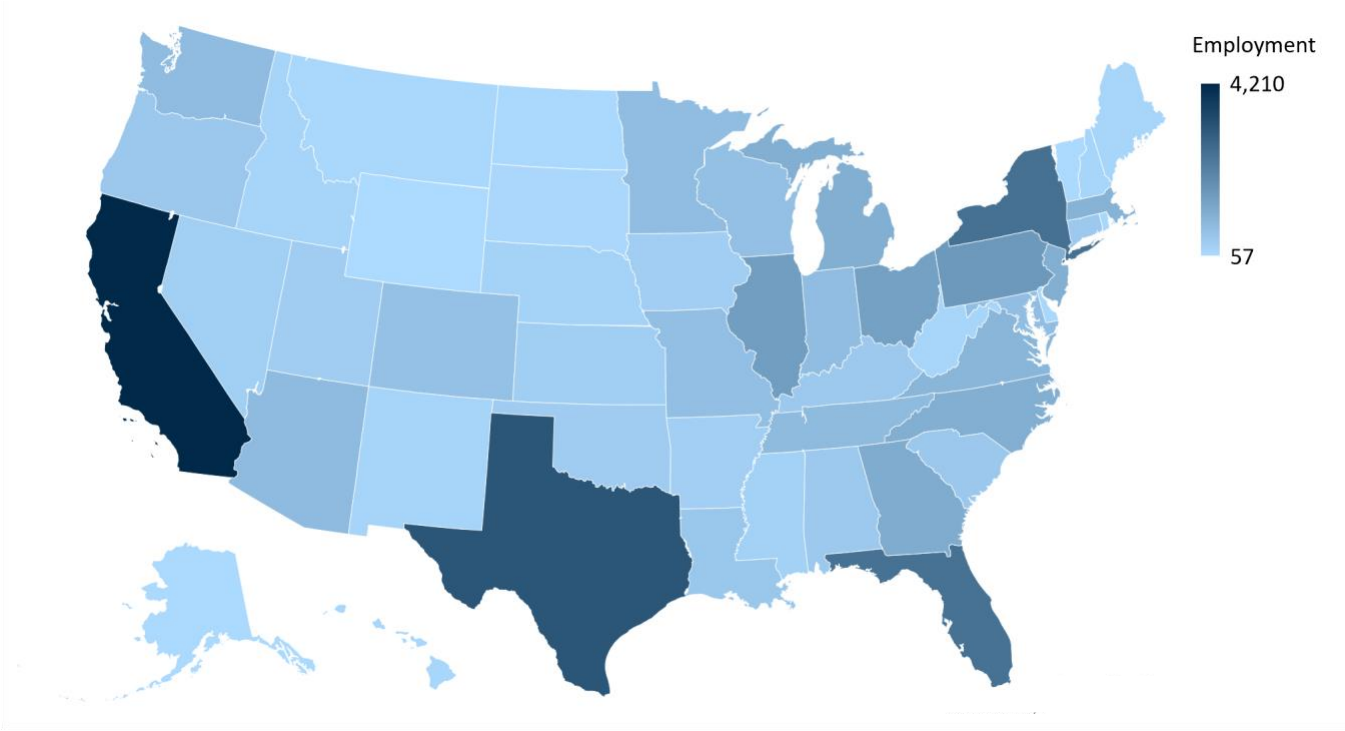
SOURCE: IMPLAN Model, FTI Calculations

Figure 4 through Figure 7 show the results for total employment and GDP from the table above for 50 states and the District of Columbia. Major highlights include:

- Total employment as summarized in Figure 4 is concentrated in larger economies and states in the Northeast, particularly the Mid-Atlantic region, such as New York, Pennsylvania, and New Jersey. Generally, the U.S. healthcare sector closely correlates with GDP by state or state population. Therefore, larger states tend to have more employees working in the healthcare sector.
- While some states have proportionally higher impacts in Figure 5 and Figure 7 because of interstate and international medical care, states with larger economies and populations generally have a larger healthcare sector due to their market sizes.
- Figure 6 shows the total GDP impact by state, which are highest in states with larger economies such as California, Texas, and New York.

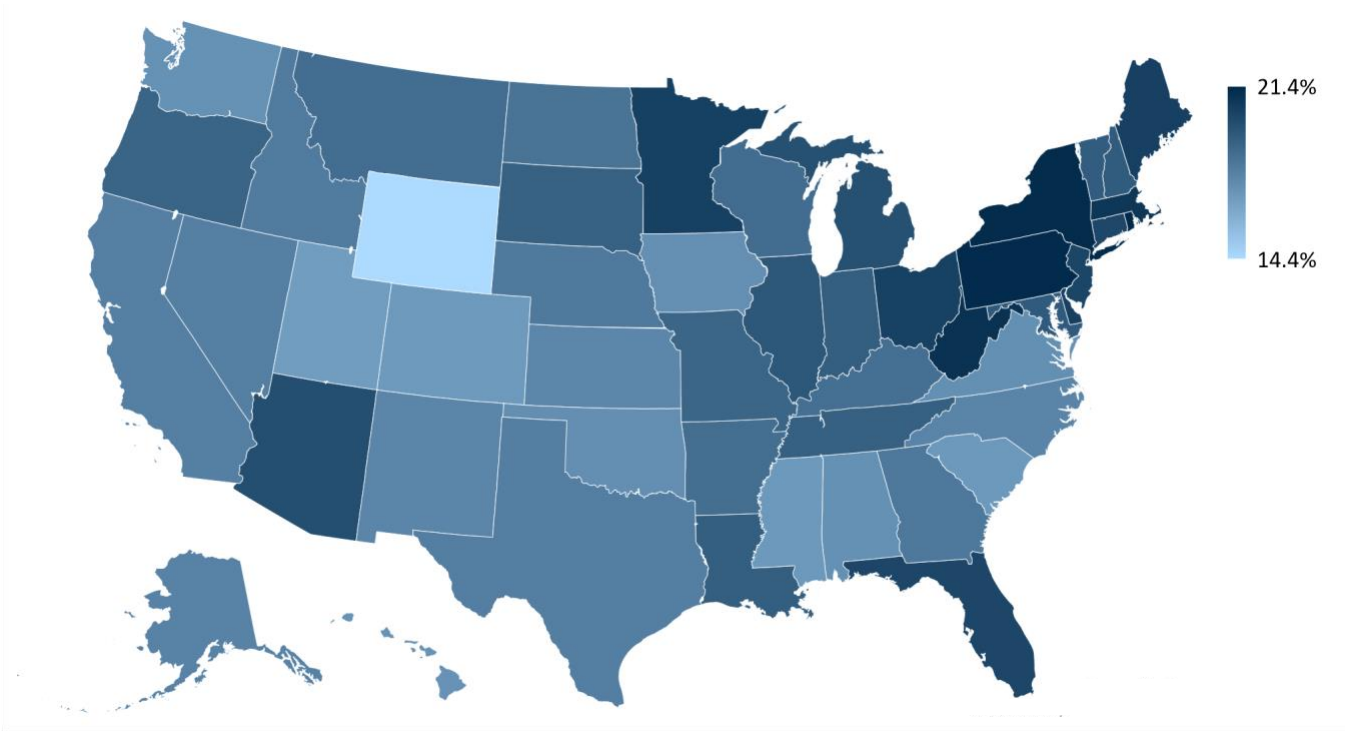
[53] "S&L" = State and local governments

Figure 4 – Total jobs by state supported by the U.S. healthcare sector (thousands)



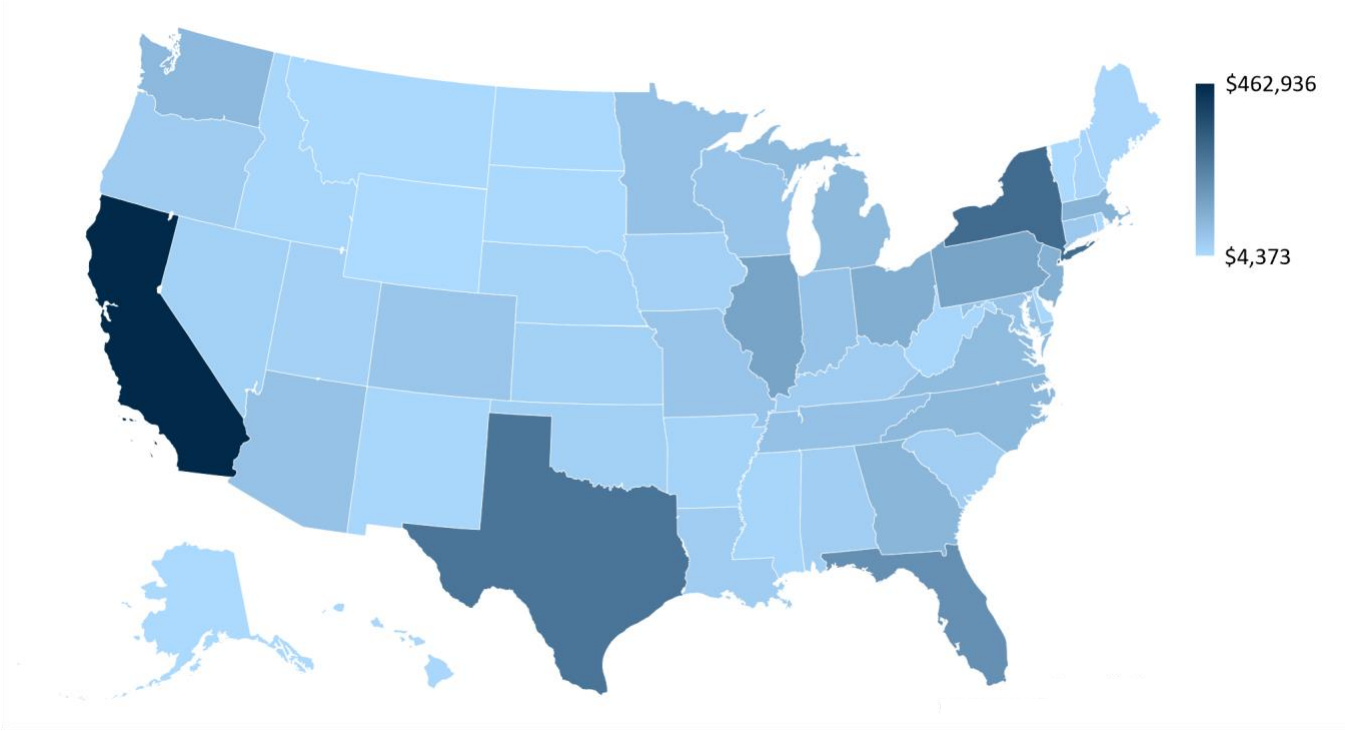
SOURCE: IMPLAN Model, FTI Calculations

Figure 5 – Share of total state jobs supported by the U.S. healthcare sector (%)



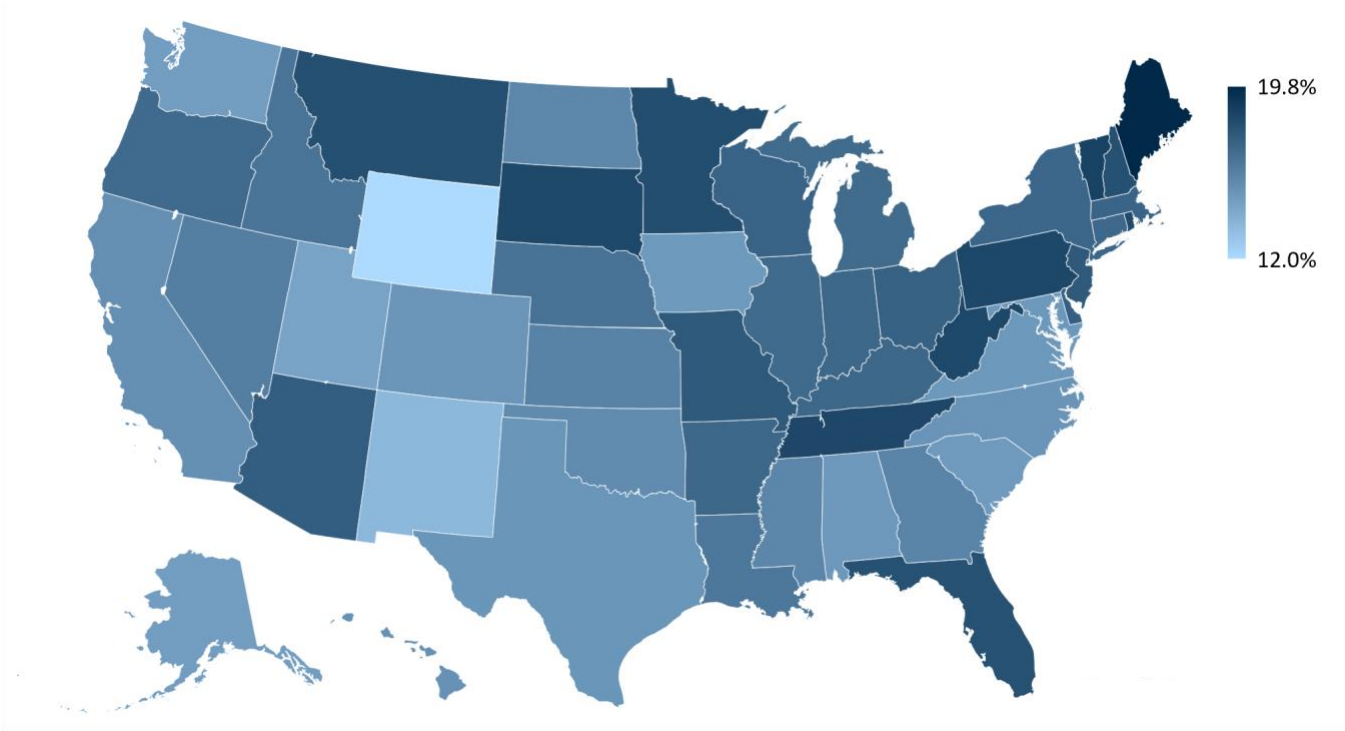
SOURCE: IMPLAN Model, FTI Calculations

Figure 6 – Total GDP by state supported by the U.S. healthcare sector (2023 $ billions)



SOURCE: IMPLAN Model, FTI Calculations

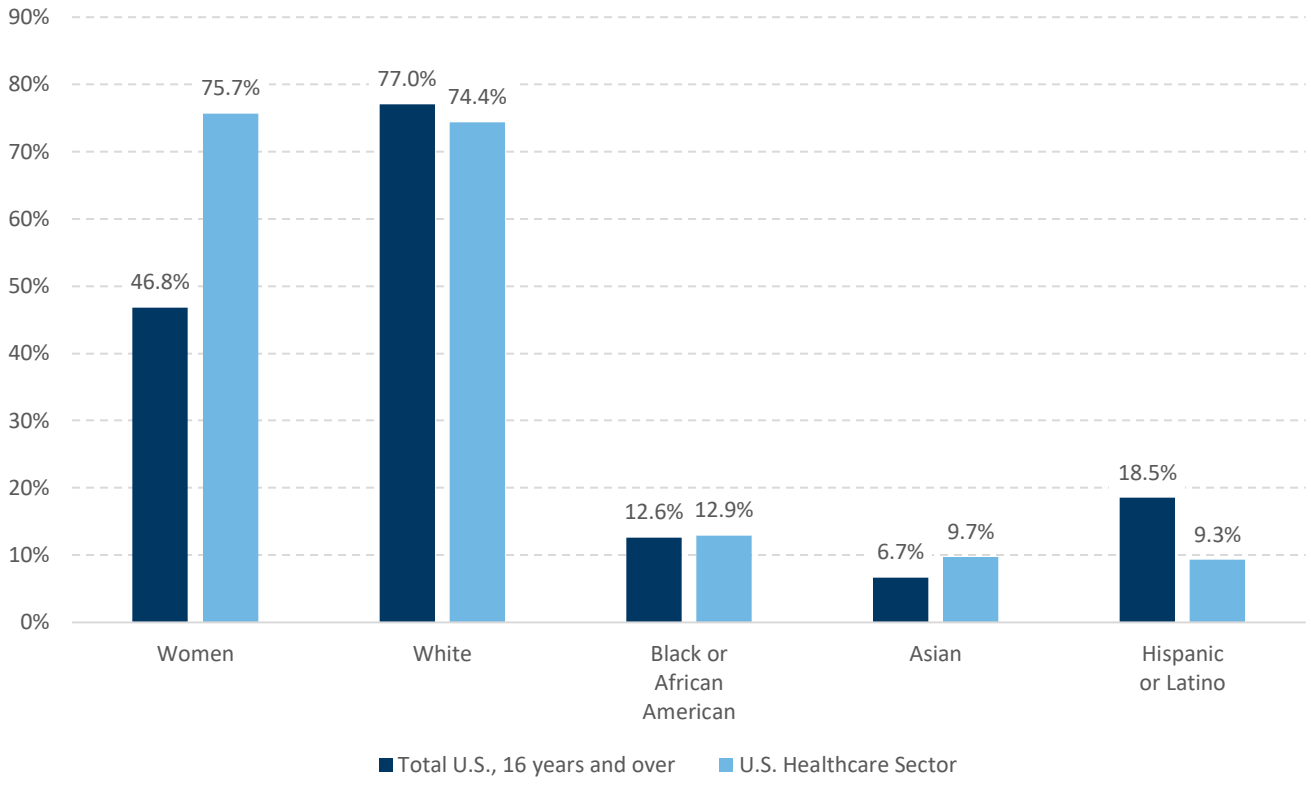
Figure 7 – Share of total state GDP supported by the U.S. healthcare sector (%)



SOURCE: IMPLAN Model, FTI Calculations

Additionally, women make up a disproportionate share of the direct jobs in the U.S. healthcare sector. Figure 8 illustrates the distribution of the workforce across demographic groups, comparing the U.S. economy as a whole with the specific representation in the healthcare sector.

Figure 8 – Demographics of the U.S. healthcare sector's workforce compared to all sectors (2022)[54]



SOURCE: U.S. Bureau of Labor Statistics

[54] https://www.bls.gov/cps/cpsaat11.htm

Appendix A

Approach and Methodology for Estimating Natural Gas Consumption

The following steps were taken to estimate natural gas consumption for the healthcare sector using EIA and IMPLAN data:

- IMPLAN provided the following datapoints:
  - Output by economic sector (all 546 in the IMPLAN database) and by state (the 50 states and including the District of Columbia, a de facto state economy).
  - Share of output dedicated to natural gas consumption from the IO table.
- Output by sector and state was multiplied by the IO coefficient for natural gas demand to estimate the dollars expended by sector and state on natural gas inputs.
- Commercial (wholesale, retail, and all services) and industrial sectors (natural resources, utilities, construction, and manufacturers) were grouped together.
- Using this data, FTI determined each IMPLAN sector's share of commercial OR industrial expenditures on natural gas made in each of the 51 regions.
- FTI compiled historical gas consumption by month by residential, commercial, industrial, and transportation customers based on EIA data.[55]
- FTI allocated the commercial and industrial consumption between IMPLAN sectors based on the estimated share of expenditures using the output and IO data.
- FTI compared this result to the output by sector and region to generate an effective rate of gas consumption (in MMcf) associated with a dollar of direct sales output.
- FTI ran IMPLAN to determine the economic impact of the U.S. healthcare and used the effective rates to estimate the impact on gas demand.

[55] https://www.eia.gov/dnav/ng/ng_cons_sum_dcu_nus_a.htm

Approach and Methodology for Assessing Cost Impacts

The following steps were taken to estimate the cost impacts to the healthcare sector:

- The cost impact scenario assumes that electrification of direct gas use is feasible. This is a simplifying and conservative assumption for the scenario's purposes, but this is unlikely to be desirable in some cases and unrealistic in others.
- Only fuel costs – either in the form of direct natural gas use or direct electricity use – are considered. Any differences in equipment costs are not considered.
- Gas demand for the U.S. healthcare sector and its suppliers would be converted to electricity between 2026 and 2045 at the rate of 5 percent (or 1/20th) per year. In 2045 and the years after, there would be no further conversions because everything is electrified. This trend would represent a gradual conversion to electricity as existing natural gas-fired heating equipment depreciates, buildings are replaced, and new buildings are brought online.
- According to an American Gas Association study on electrification, the thermal efficiency of air-source heat pumps depends on ambient air temperature.[56]
- Ambient temperature depends on the temperature in the hours when heating demand occurs. FTI used NOAA data[57] to construct an 8,760-hour temperature shape by state. FTI then used the shape to determine each hour's share of annual demand and the efficiency of the conversion for each hour. FTI used these two data points to create a weighted average of the conversion efficiency for each state. Conversion efficiencies tend to be highest in the warmest states (e.g., in the Southeast) and the lowest in colder states (e.g., the Midwest).
- FTI compiled energy demand and energy price data from the EIA[58], its 2023 Annual Energy Outlook ("AEO"),[59] and specifically its Reference Case.[60] EIA projects its energy demand and energy price data only at the regional level.[61] To make these series into state-level data, FTI allocated demand between states based on the historical share of demand within regions and the historical ratio of regional prices to state prices from SEDS.[62]
- FTI multiplied the resulting series by the state-level data underlying Table 1 and shown with Figure 2, to determine what share of total state demand for the commercial sector and for the industrial sector was ultimately supported by the U.S. healthcare sector.

---

[56] https://www.aga.org/wp-content/uploads/2018/07/aga_study_on_residential_electrification.pdf
[57] https://www.ncdc.noaa.gov/cdo-web/search
[58] https://www.eia.gov/
[59] https://www.eia.gov/outlooks/aeo/
[60] https://www.eia.gov/outlooks/aeo/tables_ref.php, Table 2 and Table 3
[61] https://www.tampaairport.com/sites/default/master/files/landing-pages/images/census-regions-graphic.png
[62] https://www.eia.gov/state/seds/

- The projected demand and change in demand for gas and power was multiplied by EIA price forecasts for retail energy service to determine the change in net costs.
- The last point assumes electricity prices are not responsive to load increases resulting from the electrification of commercial buildings and industrial facilities. This assumption is conservative and biases the results in the direction of lowering projected net costs of the electrification for the U.S. healthcare sector and its suppliers. In other words, the costs of electrification for the U.S. healthcare sector will almost assuredly be higher than what is estimated in this analysis.
- A higher load could mean higher electricity prices for electric consumers. The increased load might mean higher hourly dispatch prices on wholesale markets and a need for new power plants or transmission upgrades, all of which can cost billions of dollars and will eventually have to fall on utility customers.

Appendix B

Table 5 - Output supported by the Healthcare Industry (2023 $ millions)

State	Direct	Indirect	Induced	Total
AL	$25,683.6	$13,459.4	$26,552.5	$65,695.4
AK	$6,156.0	$2,220.6	$4,392.4	$12,769.0
AZ	$48,422.1	$24,204.5	$41,531.6	$114,158.2
AR	$17,887.3	$8,922.5	$17,267.4	$44,077.3
CA	$254,869.4	$174,605.8	$310,790.4	$740,265.6
CO	$34,238.1	$23,291.6	$41,654.5	$99,184.2
CT	$31,707.3	$15,658.2	$28,538.1	$75,903.6
DE	$8,644.1	$4,496.3	$7,923.7	$21,064.1
DC	$9,366.7	$7,192.8	$10,806.5	$27,366.0
FL	$145,500.6	$74,648.0	$127,054.8	$347,203.4
GA	$62,877.1	$39,710.7	$69,040.7	$171,628.5
HI	$9,177.1	$4,231.8	$8,612.0	$22,021.0
ID	$10,701.6	$5,248.5	$10,856.1	$26,806.2
IL	$92,378.2	$57,376.8	$97,803.0	$247,558.0
IN	$49,517.8	$24,401.0	$45,199.9	$119,118.6
IA	$18,884.7	$11,777.1	$24,942.1	$55,603.8
KS	$20,304.0	$11,423.0	$21,521.8	$53,248.8
KY	$29,726.3	$13,367.9	$26,460.2	$69,554.4
LA	$30,799.2	$15,507.5	$28,380.0	$74,686.7
ME	$12,167.7	$4,222.7	$7,695.1	$24,085.6
MD	$47,264.7	$21,657.1	$37,327.4	$106,249.3
MA	$75,278.8	$33,090.1	$56,538.4	$164,907.3
MI	$71,548.9	$31,120.4	$57,649.5	$160,318.7
MN	$52,347.4	$24,235.3	$42,102.1	$118,684.8
MS	$13,888.6	$7,165.4	$15,116.4	$36,170.5
MO	$45,943.8	$20,881.2	$39,529.4	$106,354.4
MT	$8,559.3	$3,075.2	$6,285.7	$17,920.2
NE	$14,858.5	$9,131.5	$16,835.1	$40,825.1
NV	$16,442.2	$9,940.5	$18,993.8	$45,376.5
NH	$12,225.1	$5,194.4	$9,204.1	$26,623.6
NJ	$72,215.2	$40,885.2	$66,620.0	$179,720.4
NM	$11,122.2	$5,051.9	$10,131.9	$26,306.0
NY	$172,253.2	$95,959.0	$174,504.7	$442,717.0
NC	$58,019.6	$36,078.3	$65,002.7	$159,100.5
ND	$7,640.0	$2,789.1	$5,994.5	$16,423.7
OH	$93,835.2	$42,464.5	$76,591.4	$212,891.0
OK	$22,271.1	$11,535.9	$22,622.7	$56,429.8
OR	$30,182.0	$14,477.4	$26,393.8	$71,053.3

State	Direct	Indirect	Induced	Total
PA	$114,086.4	$47,430.2	$84,683.4	$246,200.0
RI	$9,242.0	$3,694.9	$6,503.9	$19,440.9
SC	$23,285.2	$15,556.3	$28,118.9	$66,960.3
SD	$8,938.8	$3,153.3	$6,880.5	$18,972.6
TN	$51,407.1	$24,433.4	$44,975.4	$120,815.9
TX	$166,578.3	$112,611.5	$195,612.2	$474,801.9
UT	$17,020.6	$12,729.3	$23,161.2	$52,911.2
VT	$5,571.8	$1,901.7	$3,957.9	$11,431.4
VA	$51,359.7	$32,445.2	$54,814.2	$138,619.1
WA	$48,557.4	$30,355.6	$62,998.3	$141,911.2
WV	$13,851.9	$4,247.1	$7,969.0	$26,068.0
WI	$44,610.3	$22,248.3	$41,243.5	$108,102.1
WY	$2,401.6	$2,015.5	$4,142.7	$8,559.7

Table 6 - Employment supported by the Healthcare Industry (thousands)

State	Direct	Indirect	Induced	Total
AL	207.2	88.5	162.8	458.5
AK	41.8	11.8	24.1	77.7
AZ	369.9	154.5	250.6	775.0
AR	147.2	53.0	103.2	303.4
CA	1,783.0	891.8	1,534.9	4,209.7
CO	274.0	133.8	238.3	646.1
CT	228.8	77.1	140.3	446.2
DE	61.3	20.3	37.8	119.4
DC	57.5	32.3	50.2	140.0
FL	1,179.8	499.4	825.0	2,504.2
GA	482.5	248.2	404.1	1,134.8
HI	64.8	27.1	52.4	144.3
ID	92.2	34.7	67.2	194.1
IL	676.2	299.8	496.4	1,472.4
IN	371.0	130.7	241.8	743.5
IA	159.8	60.1	128.6	348.5
KS	157.7	61.4	113.7	332.8
KY	222.6	82.5	154.3	459.4
LA	253.0	87.6	160.6	501.2
ME	91.1	26.0	50.2	167.3
MD	364.7	126.7	212.8	704.2
MA	514.8	163.3	291.9	970.0
MI	550.8	187.4	327.8	1,066.0

State	Direct	Indirect	Induced	Total
MN	390.5	124.0	229.5	744.0
MS	118.8	49.4	98.2	266.4
MO	340.3	123.1	236.8	700.2
MT	63.0	21.2	42.8	127.0
NE	112.0	43.4	83.0	238.4
NV	120.9	67.1	123.2	311.2
NH	83.0	30.0	54.4	167.4
NJ	517.8	210.7	341.4	1,069.9
NM	97.1	31.1	63.4	191.6
NY	1,326.9	423.7	781.2	2,531.8
NC	472.0	219.2	378.7	1,069.9
ND	55.6	15.4	32.7	103.7
OH	735.8	237.1	423.9	1,396.8
OK	178.8	75.5	140.7	395.0
OR	226.7	87.3	161.5	475.5
PA	861.8	250.1	477.3	1,589.2
RI	70.1	22.7	39.0	131.8
SC	193.9	103.1	178.3	475.3
SD	60.9	17.1	37.5	115.5
TN	360.1	154.4	269.6	784.1
TX	1,410.0	644.4	1,103.0	3,157.4
UT	145.9	74.8	135.2	355.9
VT	42.0	12.2	25.7	79.9
VA	402.6	188.2	312.5	903.3
WA	344.6	141.6	278.7	764.9
WV	514.8	163.3	291.9	970.0
WI	550.8	187.4	327.8	1,066.0
WY	390.5	124.0	229.5	744.0

Table 7 - Supported by the Healthcare Industry (2023 $ millions)

State	Direct	Indirect	Induced	Total
AL	$15,870.1	$6,209.9	$12,679.3	$34,759.3
AK	$3,936.7	$1,123.1	$2,486.5	$7,546.4
AZ	$30,049.0	$12,531.7	$23,024.2	$65,605.0
AR	$10,385.3	$4,132.2	$8,092.1	$22,609.7
CA	$169,647.1	$103,366.0	$189,923.1	$462,936.3
CO	$21,801.9	$12,413.5	$23,064.5	$57,279.9
CT	$20,588.7	$9,356.3	$17,963.9	$47,908.9
DE	$5,218.4	$2,813.7	$4,926.8	$12,958.9
DC	$5,982.2	$5,142.4	$7,606.1	$18,730.7

State	Direct	Indirect	Induced	Total
FL	$86,941.8	$38,325.0	$70,441.7	$195,708.6
GA	$37,530.6	$21,787.4	$38,666.0	$97,983.9
HI	$6,000.7	$2,270.7	$5,059.3	$13,330.7
ID	$6,352.1	$2,359.4	$5,132.9	$13,844.4
IL	$56,824.6	$33,060.5	$55,588.0	$145,473.2
IN	$30,116.2	$12,416.9	$22,414.0	$64,947.1
IA	$11,373.4	$5,689.0	$11,747.8	$28,810.2
KS	$12,203.9	$5,606.2	$10,296.7	$28,106.8
KY	$17,581.6	$6,493.8	$12,870.4	$36,945.7
LA	$17,804.7	$7,213.9	$13,763.1	$38,781.8
ME	$7,327.0	$2,092.7	$4,224.2	$13,643.9
MD	$28,852.2	$12,388.7	$22,365.0	$63,605.9
MA	$47,502.4	$20,093.6	$35,407.4	$103,003.4
MI	$41,891.7	$15,839.6	$29,841.4	$87,572.6
MN	$32,810.2	$13,060.3	$22,590.8	$68,461.3
MS	$8,162.6	$3,016.1	$6,762.0	$17,940.6
MO	$27,483.4	$10,697.8	$20,406.8	$58,587.9
MT	$5,045.2	$1,341.7	$2,992.2	$9,379.2
NE	$9,067.9	$4,691.0	$8,316.4	$22,075.3
NV	$10,389.9	$5,496.5	$11,215.7	$27,102.0
NH	$7,701.0	$2,957.0	$5,527.4	$16,185.4
NJ	$46,467.1	$23,758.0	$39,888.0	$110,113.1
NM	$6,675.2	$2,381.0	$5,103.3	$14,159.4
NY	$110,913.4	$62,107.8	$116,324.5	$289,345.7
NC	$35,520.4	$18,846.6	$35,109.7	$89,476.7
ND	$4,478.8	$1,309.5	$2,904.6	$8,692.9
OH	$55,386.4	$22,136.8	$40,722.3	$118,245.5
OK	$13,257.3	$5,455.4	$10,899.1	$29,611.8
OR	$19,118.5	$7,739.9	$14,484.9	$41,343.4
PA	$70,090.9	$25,940.8	$47,617.9	$143,649.6
RI	$5,641.3	$2,020.7	$3,787.8	$11,449.8
SC	$14,670.7	$7,478.6	$14,120.5	$36,269.8
SD	$5,391.4	$1,496.8	$3,361.0	$10,249.2
TN	$32,764.0	$12,701.7	$23,418.2	$68,883.9
TX	$103,223.7	$59,263.1	$104,092.1	$266,578.9
UT	$10,045.4	$6,291.0	$12,176.5	$28,512.9
VT	$3,320.1	$924.1	$2,050.0	$6,294.2
VA	$31,881.7	$18,700.4	$31,917.9	$82,500.0
WA	$31,412.5	$17,736.2	$39,934.2	$89,082.9
WV	$7,975.7	$2,035.6	$4,058.8	$14,070.0
WI	$27,343.8	$10,725.5	$20,313.9	$58,383.1
WY	$1,495.2	$895.4	$1,982.8	$4,373.4

Table 8 - Labor Income Supported by the Healthcare Industry (2023 $ millions)

State	Direct	Indirect	Induced	Total
AL	$15,249.1	$4,099.2	$6,918.7	$26,266.9
AK	$3,660.2	$685.6	$1,224.4	$5,570.2
AZ	$27,528.8	$8,422.2	$12,651.3	$48,602.2
AR	$9,578.9	$2,671.1	$4,367.1	$16,617.1
CA	$155,323.8	$68,794.7	$103,881.6	$328,000.1
CO	$20,387.1	$8,665.7	$13,315.2	$42,367.9
CT	$18,837.8	$6,140.3	$10,105.1	$35,083.2
DE	$4,922.2	$1,310.2	$2,206.6	$8,439.1
DC	$5,463.5	$3,999.6	$5,190.2	$14,653.3
FL	$79,589.6	$25,364.9	$38,112.4	$143,066.9
GA	$34,458.9	$14,022.9	$20,668.3	$69,150.1
HI	$5,602.0	$1,450.2	$2,589.5	$9,641.7
ID	$6,116.4	$1,593.1	$2,936.5	$10,645.9
IL	$50,760.0	$21,746.5	$30,787.5	$103,294.0
IN	$28,014.5	$7,599.7	$11,851.3	$47,465.5
IA	$10,767.6	$3,285.8	$6,297.8	$20,351.2
KS	$11,423.0	$3,618.0	$5,757.6	$20,798.6
KY	$16,479.6	$4,246.3	$7,013.9	$27,739.8
LA	$17,035.8	$4,216.6	$6,921.6	$28,173.9
ME	$6,566.1	$1,365.2	$2,249.8	$10,181.0
MD	$26,455.9	$8,493.0	$12,197.8	$47,146.8
MA	$44,128.6	$13,790.3	$21,095.7	$79,014.5
MI	$39,253.1	$10,936.2	$16,720.0	$66,909.4
MN	$30,064.0	$9,089.4	$13,219.0	$52,372.3
MS	$7,728.8	$1,829.5	$3,502.0	$13,060.3
MO	$24,561.0	$7,109.3	$11,386.6	$43,056.9
MT	$4,710.6	$900.6	$1,699.9	$7,311.1
NE	$8,162.2	$2,555.1	$4,244.9	$14,962.2
NV	$9,511.0	$3,394.3	$5,838.0	$18,743.3
NH	$7,075.0	$2,055.2	$3,218.7	$12,348.8
NJ	$43,842.4	$16,887.1	$23,160.9	$83,890.4
NM	$6,121.0	$1,433.8	$2,567.3	$10,122.2
NY	$105,424.4	$38,914.9	$64,053.4	$208,392.7
NC	$32,407.0	$12,312.0	$18,803.6	$63,522.6
ND	$4,134.8	$823.1	$1,575.0	$6,533.0
OH	$50,931.0	$14,036.9	$21,385.4	$86,353.2
OK	$12,321.5	$3,699.4	$6,211.2	$22,232.1
OR	$17,559.9	$5,444.5	$8,435.7	$31,440.1
PA	$66,716.6	$17,848.8	$28,057.9	$112,623.3
RI	$4,955.0	$1,322.9	$2,089.9	$8,367.7
SC	$13,187.1	$4,899.9	$7,733.0	$25,819.9

State	Direct	Indirect	Induced	Total
SD	$5,095.2	$885.2	$1,756.0	$7,736.4
TN	$34,296.4	$8,973.9	$13,876.4	$57,146.7
TX	$100,417.6	$40,518.0	$60,015.9	$200,951.5
UT	$9,193.0	$4,002.6	$6,656.1	$19,851.7
VT	$3,109.9	$625.2	$1,149.9	$4,884.9
VA	$29,174.2	$13,261.5	$16,928.8	$59,364.5
WA	$30,104.4	$10,800.7	$20,152.6	$61,057.6
WV	$7,653.3	$1,264.8	$2,023.0	$10,941.1
WI	$24,676.7	$6,836.2	$11,204.3	$42,717.2
WY	$1,419.1	$555.8	$1,010.0	$2,985.0

Table 9 - Federal taxes Supported by the Healthcare Industry (2023 $ millions)

State	Direct	Indirect	Induced	Total
AL	$3,329.6	$1,215.5	$2,364.3	$6,909.4
AK	$628.1	$231.4	$453.2	$1,312.7
AZ	$5,868.0	$2,147.8	$4,189.4	$12,205.2
AR	$2,163.3	$790.7	$1,539.4	$4,493.4
CA	$35,609.0	$13,189.2	$25,940.3	$74,738.4
CO	$4,999.1	$1,834.3	$3,582.7	$10,416.0
CT	$3,784.7	$1,397.8	$2,743.1	$7,925.5
DE	$964.8	$358.4	$707.2	$2,030.4
DC	$1,390.4	$516.1	$1,014.8	$2,921.3
FL	$18,169.3	$6,627.8	$12,905.7	$37,702.8
GA	$8,497.9	$3,118.8	$6,097.9	$17,714.6
HI	$1,126.6	$413.6	$809.0	$2,349.2
ID	$1,381.6	$503.0	$976.4	$2,861.0
IL	$11,805.5	$4,360.1	$8,555.0	$24,720.6
IN	$5,689.0	$2,092.7	$4,091.0	$11,872.7
IA	$2,563.2	$943.3	$1,844.5	$5,351.0
KS	$2,520.0	$926.5	$1,809.5	$5,256.1
KY	$3,420.0	$1,252.8	$2,441.6	$7,114.3
LA	$3,617.1	$1,324.6	$2,582.2	$7,523.8
ME	$1,248.3	$456.2	$888.8	$2,593.3
MD	$5,500.6	$2,016.6	$3,938.6	$11,455.8
MA	$8,367.6	$3,085.6	$6,043.0	$17,496.1
MI	$8,071.0	$2,954.5	$5,756.1	$16,781.5
MN	$5,954.4	$2,187.6	$4,272.5	$12,414.5
MS	$1,812.5	$659.7	$1,281.2	$3,753.4
MO	$5,259.1	$1,928.3	$3,763.3	$10,950.7
MT	$923.1	$336.4	$653.3	$1,912.8
NE	$1,817.0	$672.5	$1,320.8	$3,810.3
NV	$2,317.5	$849.4	$1,661.3	$4,828.2

State	Direct	Indirect	Induced	Total
NH	$1,371.4	$503.9	$984.8	$2,860.1
NJ	$9,048.8	$3,335.1	$6,529.7	$18,913.7
NM	$1,344.7	$490.3	$954.4	$2,789.4
NY	$22,020.4	$8,150.1	$16,026.2	$46,196.6
NC	$7,914.1	$2,900.9	$5,666.3	$16,481.3
ND	$787.9	$289.4	$564.7	$1,641.9
OH	$10,519.4	$3,858.5	$7,533.8	$21,911.7
OK	$2,847.3	$1,039.3	$2,021.6	$5,908.1
OR	$3,688.3	$1,350.3	$2,633.1	$7,671.8
PA	$12,742.9	$4,671.1	$9,108.3	$26,522.3
RI	$1,004.1	$367.7	$717.9	$2,089.8
SC	$3,378.5	$1,233.9	$2,404.3	$7,016.6
SD	$903.8	$332.6	$649.9	$1,886.3
TN	$6,363.4	$2,328.1	$4,528.5	$13,220.0
TX	$24,068.5	$8,814.9	$17,188.3	$50,071.7
UT	$2,563.0	$939.6	$1,835.2	$5,337.7
VT	$597.0	$217.8	$423.6	$1,238.4
VA	$7,002.2	$2,571.5	$5,030.0	$14,603.7
WA	$6,567.0	$2,442.6	$4,818.8	$13,828.4
WV	$1,337.3	$488.4	$949.9	$2,775.6
WI	$5,138.0	$1,890.1	$3,694.4	$10,722.5
WY	$398.6	$146.3	$285.8	$830.8

Table 10 - State and Local Taxes Supported by the Healthcare Industry (2023 $ millions)

State	Direct	Indirect	Induced	Total
AL	$847.1	$496.1	$1,497.0	$2,840.3
AK	$180.3	$106.0	$321.5	$607.8
AZ	$1,577.0	$925.6	$2,803.5	$5,306.1
AR	$545.6	$321.3	$971.6	$1,838.6
CA	$10,829.6	$6,409.1	$19,545.3	$36,784.0
CO	$1,373.9	$807.1	$2,445.6	$4,626.6
CT	$1,136.2	$668.3	$2,031.6	$3,836.1
DE	$293.5	$176.2	$541.5	$1,011.3
DC	$453.7	$263.8	$798.1	$1,515.6
FL	$4,692.9	$2,759.3	$8,361.8	$15,814.0
GA	$2,308.7	$1,366.9	$4,159.7	$7,835.4
HI	$316.1	$186.2	$566.0	$1,068.3
ID	$340.8	$199.0	$598.9	$1,138.6
IL	$3,420.6	$2,024.9	$6,165.4	$11,610.9
IN	$1,553.4	$915.8	$2,776.1	$5,245.2
IA	$681.9	$404.7	$1,229.4	$2,316.0
KS	$676.9	$398.5	$1,205.7	$2,281.2

State	Direct	Indirect	Induced	Total
KY	$896.3	$525.9	$1,588.4	$3,010.6
LA	$930.1	$548.8	$1,662.2	$3,141.1
ME	$329.4	$193.1	$584.2	$1,106.8
MD	$1,524.8	$894.6	$2,711.8	$5,131.1
MA	$2,491.6	$1,454.2	$4,399.3	$8,345.0
MI	$2,136.7	$1,249.1	$3,768.7	$7,154.6
MN	$1,663.5	$972.0	$2,936.3	$5,571.8
MS	$433.3	$255.4	$772.2	$1,460.9
MO	$1,405.8	$827.3	$2,506.0	$4,739.1
MT	$231.8	$135.0	$406.1	$772.9
NE	$511.7	$305.8	$933.9	$1,751.5
NV	$632.6	$375.3	$1,145.0	$2,152.9
NH	$391.8	$228.8	$692.0	$1,312.7
NJ	$2,659.2	$1,554.1	$4,703.2	$8,916.5
NM	$337.6	$199.4	$604.8	$1,141.7
NY	$6,800.3	$4,009.9	$12,218.3	$23,028.5
NC	$2,116.2	$1,251.7	$3,805.4	$7,173.3
ND	$210.7	$123.7	$373.7	$708.1
OH	$2,828.4	$1,666.0	$5,050.8	$9,545.2
OK	$720.2	$422.3	$1,274.8	$2,417.3
OR	$1,003.4	$586.3	$1,771.9	$3,361.7
PA	$3,527.2	$2,051.1	$6,181.2	$11,759.5
RI	$273.3	$160.7	$487.7	$921.8
SC	$862.2	$509.7	$1,547.3	$2,919.1
SD	$248.4	$145.7	$440.2	$834.3
TN	$1,735.3	$999.6	$2,993.4	$5,728.3
TX	$6,458.2	$3,782.2	$11,432.4	$21,672.8
UT	$670.9	$398.4	$1,212.4	$2,281.7
VT	$154.7	$90.1	$271.5	$516.4
VA	$1,953.7	$1,152.4	$3,503.3	$6,609.4
WA	$2,053.7	$1,222.8	$3,742.2	$7,018.8
WV	$346.4	$201.9	$607.7	$1,155.9
WI	$1,397.7	$824.0	$2,497.2	$4,719.0
WY	$102.4	$61.1	$186.0	$349.5

Table 11 - Gas Consumption Supported by the Healthcare Industry (MMcf)

State	Direct Commercial	Direct Industrial	Indirect Commercial	Indirect Industrial	Total Commercial	Total Industrial	Grand Total
AL	1,995	0	440	4,656	2,435	4,656	7,091
AK	1,242	0	242	230	1,484	230	1,714
AZ	2,758	0	688	319	3,446	319	3,765
AR	4,282	0	1,143	1,954	5,425	1,954	7,379

State	Direct Commercial	Direct Industrial	Indirect Commercial	Indirect Industrial	Total Commercial	Total Industrial	Grand Total
CO	19,090	0	4,416	9,807	23,506	9,807	33,313
CO	4,783	0	1,154	1,177	5,937	1,177	7,114
CT	4,266	0	993	419	5,259	419	5,678
DE	844	0	292	872	1,136	872	2,008
DC	1,199	0	140	0	1,339	0	1,339
FL	4,908	0	1,415	1,609	6,323	1,609	7,932
GA	4,283	0	1,066	2,614	5,349	2,614	7,963
HI	178	0	32	1	210	1	211
ID	1,793	0	402	568	2,195	568	2,763
IL	18,926	0	4,542	4,377	23,468	4,377	27,845
IN	7,417	0	1,671	6,693	9,088	6,693	15,781
IA	4,495	0	815	4,487	5,310	4,487	9,797
KS	3,558	0	768	2,549	4,326	2,549	6,875
KY	2,979	0	831	2,212	3,810	2,212	6,022
LA	2,461	0	601	27,895	3,062	27,895	30,957
ME	723	0	157	469	880	469	1,349
MD	5,722	0	921	230	6,643	230	6,873
MA	9,035	0	1,657	747	10,692	747	11,439
MI	13,877	0	3,004	2,819	16,881	2,819	19,700
MN	9,246	0	1,947	3,001	11,193	3,001	14,194
MS	1,556	0	336	2,782	1,892	2,782	4,674
MO	5,107	0	1,265	1,114	6,372	1,114	7,486
MT	2,095	0	427	343	2,522	343	2,865
NE	2,532	0	600	2,029	3,132	2,029	5,161
NV	2,536	0	637	222	3,173	222	3,395
NH	723	0	161	158	884	158	1,042
NJ	11,907	0	2,957	1,483	14,864	1,483	16,347
NM	2,146	0	364	224	2,510	224	2,734
NY	23,521	0	5,033	1,665	28,554	1,665	30,219
NC	4,555	0	992	2,363	5,547	2,363	7,910
ND	1,325	0	244	474	1,569	474	2,043
OH	14,059	0	3,172	6,342	17,231	6,342	23,573
OK	3,508	0	834	2,929	4,342	2,929	7,271
OR	2,526	0	522	1,073	3,048	1,073	4,121
PA	12,909	0	2,987	5,114	15,896	5,114	21,010
RI	861	0	181	112	1,042	112	1,154
SC	2,011	0	451	2,180	2,462	2,180	4,642
SD	1,019	0	211	956	1,230	956	2,186
TN	4,683	0	1,478	3,086	6,161	3,086	9,247
TX	15,222	0	3,594	37,444	18,816	37,444	56,260
UT	3,685	0	896	592	4,581	592	5,173
VT	569	0	102	36	671	36	707

State	Direct Commercial	Direct Industrial	Indirect Commercial	Indirect Industrial	Total Commercial	Total Industrial	Grand Total
VA	5,758	0	1,281	1,580	7,039	1,580	8,619
WA	4,884	0	1,045	1,329	5,929	1,329	7,258
WV	1,832	0	342	692	2,174	692	2,866
WI	9,029	0	1,782	3,636	10,811	3,636	14,447
WY	1,004	0	217	683	1,221	683	1,904