USGS
science for a changing world

2018 Minerals Yearbook

GYPSUM [ADVANCE RELEASE]

U.S. Department of the Interior
U.S. Geological Survey

November 2021

Gypsum

By Robert D. Crangle, Jr.

Survey data and tables were prepared by Susan M. Weaver, statistical assistant.

In 2018, the U.S. production of crude mined gypsum was 21.1 million metric tons (Mt) with an estimated value of $174 million (tables 1, 7). Those amounts represented a slight increase in tonnage and a 13% increase in value from the 2017 production of 20.7 Mt valued at $155 million. The United States was the world's leading producer and consumer of mined crude gypsum, followed by Iran (16 Mt, estimated) and China (15.5 Mt, estimated) (table 7). The apparent consumption of gypsum in the United States decreased by 7% to 43.2 Mt in 2018 from 46.6 Mt in 2017. Calcined gypsum production decreased by 5% to 16.9 Mt in 2018 compared with 17.8 Mt produced in 2017.

The sales of synthetic gypsum decreased by 19% to 17.0 Mt in 2018. Coal-burning powerplants in the United States are required to operate sulfur dioxide scrubbing systems, which results in the precipitation of large quantities of byproduct gypsum. Because byproduct gypsum was available, often at a substantially lower cost than its mined counterpart, a number of wallboard production facilities have been constructed adjacent to coal-fired electric powerplants. In 2018, approximately 44% of the synthetic gypsum produced in the United States was neither sold nor used and in most cases was discarded (American Coal Ash Association, 2019).

Legislation and Government Programs

Several million tons of gypsum waste are generated every year during building demolition, wallboard installation, and wallboard manufacturing. Construction costs are lower when full pieces of uncut wallboard are used rather than multiple, smaller remnants. As a result, between 10% and 12% of the wallboard used in new construction and renovation is discarded as scrap. Only a small part of that waste has been recycled. The most recent legislative action concerning the disposal of gypsum was in 2010 when the Massachusetts Department of Energy and Environmental Affairs banned the disposal of clean wallboard from State waste disposal facilities (Massachusetts Department of Energy and Environmental Affairs, 2011). To date, no other State has instituted a similar regulation that addresses the disposal of wallboard. As landfill space becomes scarcer, recycling is expected to increase. In addition to recycling scrap in wallboard plants, wallboard scrap may also be ground and used as a soil conditioner.

Wallboard manufacturers and the construction industry have been exploring ways to return scrap and waste wallboard to plants for recycling. Other potential markets for recycled gypsum include cement production, stucco additive, sludge drying, water treatment, grease absorption, and athletic-field marking. Until costs decline and (or) legislation associated with the disposal of scrap gypsum in landfills becomes more restrictive, recycling likely will continue to remain a low priority within the industry.

Imports of corrosive wallboard from China into the United States remained an issue, although new complaint reports have ceased. By yearend 2018, the U.S. Consumer Product Safety Commission had received 4,051 reports of possible corrosive wallboard from residents in 44 States, the District of Columbia, American Samoa, and Puerto Rico. Most complaints were filed for homes constructed during 2006 and 2007 (U.S. Consumer Product Safety Commission, 2019). Sulfide gases emitted from the problematic drywall were suspected of damaging copper wiring and plumbing and posed concerns for human health (Global Gypsum Magazine, 2010a). Following several years of complaints regarding corrosive wallboard imported from China, a class-action settlement among owners of approximately 20,000 affected single-family homes, most of which were located in Gulf Coast States and the southern United States, and Chinese wallboard manufacturer, Knauf Plasterboard Tianjin Co. Ltd., was settled on July 9, 2013, with claims accepted through October 25, 2013 (U.S. District Court, 2013). By March 2016, a total of 24,312 claims had been reviewed with disbursed payments of $82,565,727 under the Chinese Drywall Settlement Program (U.S. District Court, 2016). A separate lawsuit by Porter-Blaine Corp. and subsidiary Venture Supply Inc, filed against Beijing New Building Materials, Knauf Gips, Liberty Mutual Insurance, and Taishan Gypsum Co. continued to be litigated through 2018 (U.S. District Court, 2018).

Production

Industry data for gypsum were collected by the U.S. Geological Survey (USGS) from semiannual and annual surveys of gypsum operations and from quarterly data provided by the Gypsum Association. In 2018, the USGS annual survey canvassed 60 gypsum operations that accounted for all known domestic output of crude and byproduct gypsum. Data were available for all operations through this survey, the Gypsum Association, the American Coal Ash Association, State agencies, and Federal agencies. Of the 60 operations, 5 did not respond to the survey, and their respective production levels were estimated based on prior reported production levels in conjunction with employment records published by the Mine Safety and Health Administration.

The United States was the world's leading producer of crude gypsum in 2018, with 21.1 Mt accounting for an estimated 15% of global output (table 7). The United States was also the leading producer of crude gypsum in 2017, accounting for an estimated 15% of global output during that year. For 2018, crude gypsum in the United States was produced at 52 mines in 16 States (table 2). Because reporting is nationally aggregated by several large gypsum producers with locations in multiple States, the order of production by State is not known.

The U.S. gypsum industry primarily consisted of a few large, vertically integrated companies that mined gypsum and manufactured wallboard, plaster, and other gypsum products. Companies with the highest production levels of crude gypsum were USG Corp. with nine mines, National Gypsum Co. with six mines, CertainTeed Corp. with four mines, American Gypsum Co. LLC with three mines, Georgia-Pacific LLC with three mines, and PABCO Gypsum with one mine. In 2018, these six companies produced an estimated 42% of U.S. crude gypsum.

Knauf Group, a privately owned German construction company founded in 1932, agreed to purchase the USG, headquartered in Chicago, IL, for $7 billion. The merger of the two companies would create one of the largest wallboard manufacturing companies in the world. At the time of the June 2018 agreement, Knauf employed approximately 27,000 people and had revenue of more than $8 billion. USG, founded in 1902, had 6,800 employees and annual sales of $3.2 billion in 2017, the most recent year for which data were available (Channick, 2018).

In 2018, domestic output of calcined gypsum decreased by 5% compared with that of the previous year to 16.9 Mt valued at $540 million (table 1). The process of calcining gypsum involves heat, which removes a portion of the molecular water found within crude gypsum ($CaSO_4 \cdot 2H_2O$). Calcined gypsum, or hemihydrate ($CaSO_4 \cdot 0.5H_2O$), can then be rehydrated to form a variety of plaster-based products, including wallboard.

In addition to calcined and crude gypsum production, synthetic gypsum was generated as a byproduct of various industrial processes. The primary source of synthetic gypsum was flue gas desulfurization (FGD) systems at coal-fired electric powerplants. Smaller quantities of synthetic gypsum were derived as byproducts of chemical processes such as acid neutralization, citric acid production, sugar production from sugar beets, and titanium dioxide production. Synthetic gypsum was used as a substitute for crude gypsum, principally for wallboard manufacturing, cement production, and agricultural purposes, in descending order of tonnage.

Approximately 400 synthetic gypsum producers synthesized an estimated 30 Mt of FGD gypsum in 2018 (American Coal Ash Association, 2019). Of the total synthetic gypsum produced, 17 Mt was sold or used in 2018, with a total estimated value of $85 million. Based on recent utilization rates, an estimated 44% of synthetic gypsum produced was neither sold nor used and in most cases was discarded (American Coal Ash Association, 2019).

In 2018, gypsum-derived products, including agricultural products, cement, plasters, and wallboard, totaled 43.3 Mt with a value of $5.09 billion. This represented a slight increase in tonnage and a 4% increase in value compared with the 42.6 Mt produced in 2017 valued at $4.91 billion (table 3).

During 2018, seven companies manufactured gypsum wallboard products in the United States. Approximately 2.20 billion square meters (23.7 billion square feet) of wallboard products with a value of $3.27 billion were shipped, which represented a 5% decrease compared with that in 2017 (table 4).

Consumption

In 2018, U.S. apparent consumption of gypsum was 43.2 Mt, 7% less than that in 2017. Domestic sources (mined crude plus an estimated 17 Mt of synthetic gypsum sales) met approximately 88% of domestic consumption requirements; imports, totaling 5.19 Mt, satisfied the remaining need. Sales of synthetic gypsum were estimated to be 19% less than those in 2017. Although the consumption of synthetic gypsum was down significantly in 2018, it continued to be used in large quantities at many wallboard plants throughout the United States. This widespread use of synthetic gypsum was based upon its ready availability in many parts of the country, coupled with its lower cost compared with mined crude gypsum. Though decreases in synthetic gypsum production have taken place, and may continue to take place, the use of synthetic gypsum by the wallboard industry will likely continue.

Gypsum products were categorized as either calcined or uncalcined (table 3). Calcined gypsum is produced by heating powdered natural or synthetic gypsum to approximately 350 degrees Fahrenheit, which partially dehydrates the gypsum to form a hemihydrate base needed to manufacture a variety of gypsum products, including plaster and wallboard. Calcined gypsum was produced domestically from mined crude and synthetic gypsum to manufacture wallboard and plaster products. Uncalcined gypsum was used to produce portland cement and in agriculture. Miscellaneous uses, such as athletic field markings, accounted for less than 1% of consumption.

In 2018, more than 99% of calcined gypsum was estimated to have been used in the production of plaster and prefabricated products, much of which consisted of wallboard (table 3). Owing to an estimated underreporting in specific end-use calcined gypsum products, the following percentages were based on reported calcined-gypsum wallboard products. Type X gypsum board, so named because of extra fire retardation qualities, consumed 45%, by weight, of calcined gypsum. Half-inch wallboard accounted for 38% of calcined gypsum consumption. Water- and moisture-resistant board, typically used in bathroom and kitchen walls, accounted for 11% of calcined gypsum. Other wallboard, including mobile-home board, predecorated wallboard, sheathing, and veneer base constituted most of the balance (table 4).

Uncalcined gypsum consumption in the United States increased by 3% to an estimated 25.6 Mt in 2018 from 24.8 Mt in 2017. About 4.80 Mt, or 19%, was consumed in portland and masonry cement production (table 3). Gypsum was added to cement to retard its setting time and accounts for 3% to 7%, by weight, of cement output (van Oss, 2005, p. 8; Roskill Information Services Ltd., 2009, p. 320). Most of the remainder of the uncalcined gypsum consumed, about 20.8 Mt, was used for agricultural purposes, a slight increase from that in 2017. Finely ground gypsum rock was used in agriculture and other industries to neutralize acidic soils, improve soil permeability, add nutrients, stabilize slopes, and provide catalytic support for maximum fertilizer benefits. Large quantities of uncalcined

gypsum were also used by the oil and gas industry as a road base as well as ground cover for rig platforms (Layden, 2014). Small quantities of high-purity gypsum also were used in a wide range of industrial applications, including the production of food, glass, paper, and pharmaceuticals.

Prices

In 2018, the average U.S. unit values (free on board, mine or plant) were estimated to be $8.25 per metric ton for crude gypsum, a 10% increase from that in 2017, and $32 per metric ton for calcined gypsum, a 7% increase from that in 2017 (table 1). The average unit value for prefabricated products, which includes wallboard, reported by domestic producers during the year was $236 per metric ton, a 3% increase from that in 2017 (table 3). The average unit value of uncalcined gypsum used primarily for agricultural purposes was estimated to be $40 per metric ton, a 14% increase from that in 2017, and that used in cement production was about $18 per metric ton, unchanged from 2017 (table 3).

During 2018, the average combined unit value of prefabricated gypsum products, which includes wallboard, increased by 3% from that in 2017 (table 4).

Foreign Trade

The United States imported crude gypsum from 17 countries and exported it to 71 countries and territories; 54% of total exports went to Canada. Imports of crude gypsum in 2018 increased by 8% from those in 2017 and accounted for 12% of apparent consumption. Canada, Mexico, and Spain accounted for more than 98% of imported gypsum. The majority of imports from Canada went to east coast plants, and sources in Mexico chiefly served the west coast. Most of the crude gypsum imported by the United States from Mexico was produced by Compañía Minera Caopas, S.A. de C.V. and Compañía Occidental Mexicana, S.A. de C.V., in Baja California Sur, both of which operate mines on the Baja California Peninsula (Compañía Occidental Mexicana, S.A. de C.V., 2019; Secretaría de Economía, 2019). Almost all gypsum imported from Canada came from Nova Scotia.

Wallboard exports increased by 12% in 2018, totaling 573,000 metric tons (t) valued at $101 million, of which more than 90% went to Canada. Wallboard imports, almost all of which originated from Canada and Mexico, increased by 3% in 2018 to 458,000 t valued at $119 million (table 6).

World Review

Global crude gypsum production in 2018 was estimated to be 143 Mt, a slight increase from that in 2017 (table 1). In 2018, 78 countries produced gypsum, with the 10 leading producers accounting for 70% of total world production (table 7). The United States was the leading producer of crude gypsum in 2018 with 21.1 Mt, followed by, in decreasing order of estimated tonnage, Iran with 16.0 Mt, China with 15.5 Mt, Turkey with 10.0 Mt, Thailand with 9.3 Mt, Oman and Spain, each with 7.0 Mt, Mexico with 5.4 Mt, Japan with 4.7 Mt, and Russia with 3.8 Mt. Gypsum production in Iran of 16.0 Mt in 2018 was based on dated historical production information that may not fully account for more than 20 years of double-digit inflation, unemployment as high as 10%, or the increased cost of land and housing in urban areas, all of which may have limited the actual production of gypsum (Esmaeili, 2008; Khajehpour, 2013). Despite those circumstances, the Iranian economy also expanded between 2016 and 2018 at approximately 10%, likely boosting the domestic housing sector and leading to a corresponding increase in gypsum production (Salehi-Isfahani, 2018; World Bank Group, The, 2018). Determining an accurate gypsum production level in Iran remains problematic.

Previous versions of this chapter included published gypsum production quantities for China that totaled up to 130 Mt. Additional information regarding the gypsum marketplace in China revealed that the vast majority of that amount was likely synthetic gypsum, which was not intended to be included in table 7. Hence, the large decrease in reported gypsum production in China reflects a recategorization of gypsum material and does not indicate a large decrease in the production of gypsum in China.

Production in North America accounted for an estimated 21% of total crude gypsum production. Although the use of gypsum wallboard increased worldwide, only industrialized nations used gypsum primarily for wallboard products. In developing countries, especially in Asia and the Middle East, most gypsum was used in the production of cement or plaster products. World production may have been underestimated because output by some foreign gypsum producers was used to manufacture products onsite, which may not have been reported. Additionally, production from small deposits in developing nations was intermittent and, in many cases, unreported.

Worldwide, the leading use of gypsum was in the manufacture of cement and concrete. Cement manufacture accounted for approximately 50% of worldwide gypsum consumption, and plaster products, including wallboard, accounted for approximately 30% of all consumption.

As a low-value, high-bulk mineral commodity mined from deposits widely distributed throughout the world, gypsum tended to be used within the many countries where it was produced. Less than 20% of the world's crude gypsum production was estimated to enter international trade. Only a few countries, such as Canada, Mexico, Spain, and Thailand, were major crude gypsum exporters; of these, Canada and Mexico were significant exporters because their large deposits were near wallboard markets in the United States.

Estimated world production capacity for gypsum wallboard in 2017 exceeded about 17 billion square meters per year (183 billion square feet per year) at more than 250 plants worldwide.

Australia.—Boral Ltd., Australia's leading building and construction materials producer and parent company of USG Boral, contributed $63.1 million of equity accounted income. That was a 9% decrease from fiscal year (FY) 2017. The decline was attributed to a reported $11 million in one-time costs associated with gypsum supply issues in Australia owing to an unanticipated, temporary port closure coupled with an unfavorable reserve adjustment in India (Boral Ltd., 2019, p. 9). The future of a joint venture owned equally by Boral and USG, named Boral Gypsum, which began in March 2014, was

under review following Knauf's proposed purchase of USG in 2018 (Boral Ltd., 2019, p. 6). The sale closed on April 24, 2019 (Bloomberg LP, 2019).

Canada.—Canada produced an estimated 3.0 Mt of crude gypsum in 2018. About 1.37 Mt, or 46% of production, was exported to the United States. In 2018, WSB Titan, the leading distributor of wallboard in Canada with 23 locations in six Provinces, was purchased by Gypsum Management and Supply, Inc., headquartered in Tucker, Georgia (Global Gypsum, 2018a). Red Moon Resources Inc., an industrial minerals company, initiated mining at the Ace gypsum mine in western Newfoundland in 2018. The Ace Mine has an estimated annual mining production of 318,000 metric tons per year for approximately 10 years (Global Gypsum Magazine, 2018b).

China.—In 2018, Beijing New Building Materials PLC (BNBM) and Taishan Gypsum, both owned by the China National Building Material Company Ltd., reported total annual gypsum board manufacturing capacity of 2.47 billion square meters (25.6 billion square feet). From 2005 to 2018, BNBM's operating income rose from 6.2 billion yuan to 22.6 billion yuan and its profit rose from 69 billion yuan to 233.2 billion yuan. Those income and profit increases equated to an average annual compound growth rate of 10% and 10%, respectively (China National Building Material Company Ltd., undated). From 2006 through 2013, China's wallboard production increased at an annual rate of 20.9%, with 2.7 billion square meters of wallboard manufactured in 2013 (Tiwari, 2014). Wallboard has become a standard building material in commercial construction for non-load-bearing walls and ceilings in China, with an estimated 80% of all domestically consumed wallboard used in commercial construction (Global Gypsum Magazine, 2011).

Japan.—Yoshino Gypsum Co., Ltd., which opened Japan's first wallboard factory in 1921, was the leading wallboard producer with 14 wallboard and 5 plaster plants located throughout Japan. The company's combined capacity of 350 million square meters per year of its Tiger Board product accounted for approximately 70% of Japan's total wallboard output (Global Gypsum Magazine, 2012; Yoshino Gypsum Co., Ltd., 2019). With few crude gypsum mining resources, Japan stopped mining gypsum in 1976 and has relied on synthetic, recycled, and imported gypsum since then to meet much of its domestic demand (Pressler, 1984; Global Gypsum Magazine, 2010b).

Mexico.—In 2018, gypsum production in Mexico was estimated to be 5.40 Mt, unchanged from that in 2017. About 2.10 Mt, an estimated 39% of Mexico's 2018 crude gypsum production, was exported to the United States. In 2018, USG Mexico, S.A. de C.V., the leading manufacturer of wallboard in Mexico, operated five mining and manufacturing facilities (USG Corp., 2019). The largest known gypsum (selenite) crystals in the world, up to 12 meters (39 feet) in length, were discovered at the Naica Mine in Chihuahua (Bressan, 2018).

Outlook

The average sales price for residential new homes was essentially unchanged nationwide in 2018 from that in 2017 (U.S. Census Bureau, 2019a). Flattened sales prices, coupled with historically low mortgage interest rates, likely contributed to increased sales activities within the housing sector in 2018, and by extension, the wallboard market (Federal Home Loan Mortgage Corp., 2019). Because the residential housing market is responsible for approximately 60% of the consumption of gypsum products, a key economic indicator used by the gypsum and wallboard industries is the number of new housing starts, as measured by the issuance of new building permits. Since 1959, an increase in housing starts has been closely paired with an increase in gypsum consumption. Likewise, during periods of economic recession when housing starts often precipitously declined, gypsum consumption also decreased (fig. 1).

The average number of housing starts from 1959 through 2018, including multidwelling units, was 1.4 million per year. Housing starts averaged about 1.8 million per year during the 5 years preceding the recessionary years that began in December 2007. Housing starts in 2017 and 2018 were 1.203 million and 1.249 million, respectively (U.S. Census Bureau, 2019b). As the surplus of residential real estate constructed before 2009 was drawn down, the Nation's annual population growth of more than 3,000,000 may necessitate an increase in residential construction in the near future (Bachman, 2015; Reyes, 2015; Passy, 2019; U.S. Census Bureau, 2019c).

Future growth rates of synthetic gypsum, following more than 20 years of large annual growth rates, may begin to slow as significant supplies of comparatively less expensive and cleaner burning natural gas compete with coal in the generation of electric power. The increased production and consumption of domestic shale gas could lead to a corresponding decrease in coal consumption and, with it, a decrease in the production of synthetic gypsum. Shale-gas production in 2018 was 526 million cubic meters (18.6 billion cubic feet), which was 9% more than that in 2017 and nearly four times the 151 million cubic meters (5.34 billion cubic feet) produced in 2010 (U.S. Energy Information Administration, 2018).

In the long term, as disposal areas for excess synthetic gypsum reach capacity and the opening of new disposal sites becomes increasingly difficult, power companies may continue the trend of converting electric generation plants to operate on natural gas, especially if shale-gas supplies continue to offer an economically attractive alternative to coal. Because the retrofitting of coal-fired electric powerplants with desulfurization systems has been accomplished for most plants and less expensive natural gas is available for electrical generation, FGD gypsum production may stabilize. The changeover from using crude gypsum for wallboard production to FGD gypsum likely will be limited to FGD plants within close proximity to wallboard production facilities or to new wallboard plants that would be constructed adjacent to existing FGD facilities.

The U.S. gypsum industry has been moving toward the use of large-capacity wallboard plants supplied from multiple sources, including synthetic gypsum from coal-fired electric powerplants. These larger wallboard plants have been built in regions of high population and new construction growth, which are the areas of highest consumption. Older and less efficient crude-gypsum-fed plants could become less competitive but could see a revival owing to the possibility of lesser quantities of FGD gypsum produced. In response to increased public awareness,

the gypsum industry may boost the recycling of scrap gypsum in its raw materials streams. The industry may also increase the use of labels, such as the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) program, which certifies varying levels of ecologically conscious building practices (U.S. Green Building Council, undated).

Industry trends indicate significant developments abroad in the coming decade. The pace and magnitude of wallboard plant construction in Asia, particularly in China, India, and Thailand, indicate that the continent, with billions of potential consumers, will likely become one of the world's leading gypsum wallboard markets. Should the economic conditions in the United States more favorably affect the United States housing sector, and in turn domestic consumption for gypsum, Canada's gypsum production could increase. Elsewhere, wallboard production capacity growth and the recognition of the convenience and economy of wallboard as a building material in Central America, Europe, and South America means that wallboard manufacturing may require increased gypsum production in the future. A decline in national and global economic conditions, however, could hamper such growth.

References Cited

American Coal Ash Association, 2019, 2018 coal combustion product (CCP) production & use survey report: Farmington Hills, MI, American Coal Ash Association, 1 p. (Accessed July 29, 2019, at https://www.acaa-usa.org/Portals/9/Files/PDFs/2018-Survey-Results.pdf.)

Bachman, Daniel, 2015, Housing construction—What happens when the kids finally leave?: Westlake, TX, Deloitte University Press, March 12. (Accessed April 17, 2020, at https://www2.deloitte.com/uk/en/insights/economy/behind-the-numbers/future-of-us-housing-market.html.)

Bloomberg LP, 2019, Knauf completes acquisition of USG Corporation: New York, NY, Bloomberg LP, 1 p. (Accessed April 17, 2020, at https://www.bloomberg.com/press-releases/2019-04-24/knauf-completes-acquisition-of-usg-corporation.)

Boral Ltd., 2019, Boral annual report 2018: North Sydney, New South Wales, Australia, Boral Ltd., 156 p. (Accessed September 11, 2019, at https://www.boral.com/sites/corporate/files/media/field_document/Boral-Annual-Report-2018.pdf.)

Bressan, Daniel, 2018, The largest crystals ever discovered are at risk of decay: Jersey City, NJ, Forbes, July 5. (Accessed April 18, 2020, at https://www.forbes.com/sites/davidbressan/2018/07/05/the-largest-crystals-ever-discovered-are-at-risk-of-decay/#6ec93e0273af.)

Channick, Robert, 2018, Chicago-based USG to be acquired by Knauf in $7 billion deal: Chicago [IL] Tribune, June 11. (Accessed August 6, 2019, at https://www.chicagotribune.com/business/ct-biz-knauf-usg-merger-20180611-story.html.)

China National Building Material Company Ltd., [undated], Company introduction: Beijing, China, China National Building Material Company Ltd. (Accessed September 6, 2019, at http://www.cnbmltd.com/col/col901/index.html.)

Compañía Occidental Mexicana, S.A. de C.V., 2019, ¿Qué hacemos? [What do we do?]: Isla San Marcos, Mexico, Compañía Occidental Mexicana, S.A. de C.V. (Accessed August 29, 2019, at http://www.comsamexico.com.mx/#QueHacemos.)

Esmaeili, Abdoulkarim, 2008, Economics of gypsum production in Iran: Journal of Applied Sciences, v. 8, no. 4, p. 711–714.

Federal Home Loan Mortgage Corp., 2019, 30-year fixed-rate mortgages since 1971: McLean, VA, Federal Home Loan Mortgage Corp. (Accessed August 6, 2019, at http://www.freddiemac.com/pmms/pmms30.html.)

Global Gypsum Magazine, 2010a, Corporation focus—China National Building Material Group Corporation: Global Gypsum Magazine, September/October, p. 28.

Global Gypsum Magazine, 2010b, Japanese gypsum board market profile: Global Gypsum Magazine, November 1. (Accessed August 18, 2019, at http://www.globalgypsum.com/magazine/articles/326-japanese-gypsum-board-market-profile.)

Global Gypsum Magazine, 2011, The status and development trends of the wallboard industry in China: Global Gypsum Magazine, March 3. (Accessed July 2, 2019, at http://www.globalgypsum.com/magazine/articles/322-the-status-and-development-trends-of-the-wallboard-industry-in-china.)

Global Gypsum Magazine, 2012, Yoshino Gypsum: Global Gypsum Magazine, March, p. 16.

Global Gypsum Magazine, 2018a, GMS benefits from Titan acquisition and rising prices: Global Gypsum Magazine, December 5, p. 1. (Accessed September 10, 2019, via https://www.globalgypsum.com/news/item/1486-gms-benefit-from-titan-acquisition-and-rising-prices.)

Global Gypsum Magazine, 2018b, Red Moon loads first shipment of gypsum from Ace Mine: Global Gypsum Magazine, September 13, p. 1. (Accessed September 9, 2019, via https://www.globalgypsum.com/news/item/1468-red-moon-loads-first-shipment-of-gypsum-from-ace-mine.)

Khajehpour, Bijan, 2013, Iran's housing crisis: Al-Monitor [Washington, DC], June 17. (Accessed August 23, 2019, at http://www.al-monitor.com/pulse/originals/2013/06/iran-housing-sector.html.)

Layden, Logan, 2014, Three reasons to care that Oklahoma is no. 1 in gypsum—Twinkies, beer, roads: StateImpact Oklahoma, October 13. (Accessed August 12, 2019, at https://stateimpact.npr.org/oklahoma/2014/10/13/three-reasons-to-care-that-oklahoma-is-no-1-in-gypsum-twinkies-beer-roads/.)

Massachusetts Department of Energy and Environmental Affairs, 2011, Summary of waste ban regulations: Boston, MA, Massachusetts Department of Energy and Environmental Affairs, March, 2 p. (Accessed August 6, 2019, via http://www.dighton-ma.gov/document_center/health%20dept/additional%20link/MADEP%20Waste%20Ban%20Regulation%20&%20Materials%20Listing.pdf.)

Passy, Jacob, 2019, Home building in the U.S. still hasn't recovered from the last recession: Barron's Financial and Investment News, September 12. (Accessed September 12, 2019, at https://www.barrons.com/articles/home-building-in-the-u-s-still-hasnt-recovered-from-the-last-recession-heres-why-51568282700.)

Pressler, Jean, 1984, Byproduct gypsum, *in* Kuntze, R.A., ed., The chemistry and technology of gypsum: American Society for Testing and Materials Special Technical Publication 861, p. 105–115.

Reyes, C.B., 2015, Population growth exceeds new housing—By a lot: First Tuesday Journal [Riverside, CA], April 3. (Accessed September 11, 2019, at http://journal.firsttuesday.us/population-growth-exceeds-new-housing-by-a-lot/42627/.)

Roskill Information Services Ltd., 2009, Gypsum and anhydrite—Global industry markets and outlook (10th ed.): London, United Kingdom, Roskill Information Services Ltd., 367 p.

Salehi-Isfahani, Djavad, 2018, Yes, Iran's economy is suffering—But it's not all about the U.S.: Foreign Affairs, September 25. (Accessed August 23, 2019, at https://www.foreignaffairs.com/articles/iran/2018-09-25/yes-irans-economy-suffering-its-not-all-about-us.)

Secretaría de Economía, 2019, Directorio del sector minero [Mining sector directory]: Mexico City, Mexico, Secretaría de Economía. (Accessed August 28, 2019, at http://www.desi.economia.gob.mx/empresas/empresas3.asp?Clave=99.)

Tiwari, Ritesh, 2014, Global and China gypsum board industry report 2014–2016: PRWeb, September 9. (Accessed September 5, 2019, at http://www.prweb.com/releases/gypsum-board-industry/report-2014-2016/prweb12155688.htm.)

U.S. Census Bureau, 2019a, Median and average sales prices of new homes sold in United States: U.S. Census Bureau, 11 p. (Accessed August 9, 2019, via https://www.census.gov/construction/nrs/historical_data/index.html.)

U.S. Census Bureau, 2019b, New residential construction: U.S. Census Bureau. (Accessed August 6, 2019, via https://www.census.gov/construction/nrc/historical_data/index.html.)

U.S. Census Bureau, 2019c, 2014 national population projections tables—Summary tables: U.S. Census Bureau. (Accessed September 12, 2019, via https://www.census.gov/data/tables/2014/demo/popproj/2014-summary-tables.html.)

U.S. Consumer Product Safety Commission, 2019, Drywall information center: U.S. Consumer Product Safety Commission. (Accessed August 14, 2019, at http://www.cpsc.gov/en/Safety-Education/Safety-Education-Centers/Drywall-Information-Center/.)

U.S. District Court, 2013, MDL–2047 Chinese-manufactured drywall products liability litigation: New Orleans, LA, U.S. District Court, February 7. (Accessed August 21, 2019, via http://www.laed.uscourts.gov/case-information/mdl-mass-class-action/drywall.)

U.S. District Court, 2016, MDL–2047 Chinese Drywall Settlement Program: New Orleans, LA, U.S. District Court, March 22, 8 p. (Accessed August 21, 2019, at http://www.laed.uscourts.gov/sites/default/files/Drywall/BG%20Status%20Report%203.22.16%20pdf.pdf.)
U.S. District Court, 2018, MDL–2047 Chinese Drywall Settlement Program: New Orleans, LA, U.S. District Court, November 9, 32 p. (Accessed April 15, 2020, at http://www.laed.uscourts.gov/sites/default/files/drywall/Allen%20-%20Notice%20of%20Proposed%20Settlement_0.pdf.)
U.S. Energy Information Administration, 2018, Natural gas: U.S. Energy Information Administration, November 28. (Accessed August 14, 2019, at http://www.eia.gov/dnav/ng/ng_prod_shalegas_s1_a.htm.)
U.S. Green Building Council, [undated], Overview: Washington, DC, U.S. Green Building Council. (Accessed September 3, 2019, at http://www.usgbc.org/leed.)
USG Corp., 2019, Descripción general de la empresa [Company overview]: Chicago, IL, USG Corp. (Accessed September 9, 2019, at https://www.usg.com/content/usgcom/spanish/about-usg/company-overview.html.)
van Oss, H.G., 2005, Background facts and issues concerning cement and cement data: U.S. Geological Survey Open-File Report 2005–1152, 80 p. (Accessed August 12, 2019, at http://pubs.usgs.gov/of/2005/1152/2005-1152.pdf.)
World Bank Group, The, 2018, Islamic Republic of Iran—Overview: Washington, DC, The World Bank Group. (Accessed August 23, 2019, at http://www.worldbank.org/en/country/iran/overview.)
Yoshino Gypsum Co., Ltd., 2019, Company profile: Tokyo, Japan, Yoshino Gypsum Co., Ltd. (Accessed August 25, 2019, at http://yoshino-gypsum.com/en/company/seisan.html.)

GENERAL SOURCES OF INFORMATION

U.S. Geological Survey Publications

Coal Combustion Products. Ch. in Minerals Yearbook, annual (1994–2000).
Gypsum. Ch. in Mineral Commodity Summaries, annual.
Gypsum. Ch. in United States Mineral Resources, Professional Paper 820, 1973.
Gypsum. Mineral Industry Surveys, monthly.
Gypsum Deposits of the United States. Bulletin 697, 1920.
Historical Statistics for Mineral and Material Commodities in the United States. Data Series 140.

Other

Gypsum. Ch. in Mineral Facts and Problems, U.S. Bureau of Mines Bulletin 675, 1985.
Gypsum Association.

TABLE 1
SALIENT GYPSUM STATISTICS[1]

(Thousand metric tons and thousand dollars)

	2014	2015	2016	2017	2018
United States:					
Crude:					
Production:					
Quantity	16,200 r	16,600 r	17,000 r	20,700	21,100
Value	129,000 r	129,000 r	136,000 r	155,000	174,000
Imports for consumption	3,720	4,030	4,340	4,800 r	5,190
Synthetic gypsum sales[2]	15,200	15,500	16,700	21,000 r	17,000
Calcined:					
Production:					
Quantity	16,100	16,500	17,900	17,800	16,900
Value	435,000	462,000	537,000	534,000	540,000
Products sold, value[3]	3,070,000	3,190,000	3,270,000	3,340,000	3,270,000
Exports, value	45,800 r	41,700	36,800	39,700	42,200
Imports for consumption, value	7,620	7,210	15,300	7,790	8,410
World, production	150,000 r	138,000 r	139,000 r	142,000 r	143,000

rRevised.
[1]Table includes data available through May 7, 2020. Data are rounded to no more than three significant digits.
[2]Source: The majority of these data originate from the American Coal Ash Association.
[3]Prefabricated gypsum products.

TABLE 2
CRUDE GYPSUM MINED IN THE UNITED STATES, BY STATE[1]

State	2017 Active mines	2017 Quantity (thousand metric tons)	2017 Value[e] (thousands)	2018 Active mines	2018 Quantity (thousand metric tons)	2018 Value[e] (thousands)
Arizona, Colorado, New Mexico	5	2,010	$17,000	6	2,320	$23,900
Nevada and Utah	9	4,580	43,600	9	4,410	44,100
Arkansas and Louisiana	2	W	W	2	W	W
California	5	858	11,900	5	1,020	10,100
Iowa and Indiana	4	1,630	13,500	5	1,680	16,700
Michigan	2	W	W	2	W	W
South Dakota and Wyoming	3	W	W	3	W	W
Kansas, Oklahoma, Texas	20	8,660	64,900 [r]	20	8,530	70,400
Total	50	20,700	155,000	52	21,100	174,000

[e]Estimated. [r]Revised. W Withheld to avoid disclosing company proprietary data; included in "Total."
[1]Table includes data available through May 7, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3
GYPSUM PRODUCTS (MADE FROM DOMESTIC, IMPORTED, AND SYNTHETIC GYPSUM) SOLD OR USED IN THE UNITED STATES, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	2017 Quantity	2017 Value	2018 Quantity	2018 Value
Uncalcined:				
Portland and masonry cement	4,430	79,700	4,800 [e]	86,400
Agriculture and other[2]	20,400	712,000	20,800 [e]	832,000
Total	24,800	792,000	25,600 [e]	918,000
Calcined:				
Plaster	82	27,100	80	26,400
Prefabricated gypsum products[3]	14,500	3,340,000	13,800	3,270,000
Other[4]	3,220	745,000	3,790	876,000
Total	17,800	4,110,000	17,700	4,170,000
Grand total	42,600	4,910,000	43,300	5,090,000

[e]Estimated.
[1]Table includes data available through May 7, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes gypsum used for infrastructure purposes, unspecified uses, and estimated underreported amount.
[3]Includes weight of paper, metal, or other materials.
[4]Estimated underreported amount.

TABLE 4
PREFABRICATED GYPSUM PRODUCTS SOLD OR USED IN THE UNITED STATES[1]

Product	2017 Quantity (thousand square feet)	2017 Quantity[2] (thousand metric tons)	2017 Value (thousands)	2018 Quantity (thousand square feet)	2018 Quantity[2] (thousand metric tons)	2018 Value (thousands)
Veneer base	292,000	212	$53,000 r	278,000	202	$50,500
Sheathing	525,000	381	171,000 r	517,000	376	173,000
Regular gypsum board:						
3/8-inch	392,000	124	24,800 r	580,000	184	36,800
1/2-inch	12,600,000	5,730	1,150,000 r	11,600,000	5,270	1,110,000
5/8-inch	180,000	106	25,400 r	3,040	2	440
Total	13,200,000	5,960	1,200,000 r	12,200,000	5,460	1,140,000
Type X gypsum board	8,770,000	6,360	1,430,000 r	8,580,000	6,230	1,400,000
Water- and moisture-resistant board	2,170,000	1,580	489,000 r	2,150,000	1,560	500,000
Grand total	25,000,000	14,500	3,340,000	23,700,000	13,800	3,270,000

rRevised.
[1]Table includes data available through May 7, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes weight of paper, metal, or other materials.

TABLE 5
IMPORTS FOR CONSUMPTION OF CRUDE GYPSUM, BY COUNTRY OR LOCALITY[1]

(Thousand metric tons and thousand dollars)

Country or locality	2017 Quantity	2017 Value	2018 Quantity	2018 Value
Canada[2]	1,480	16,300	1,370	19,100
Dominican Republic	--	--	8	105
Germany	1	168	(3)	369
Malta	10	330	--	--
Mexico	1,810 r	23,600 r	2,100	24,500
Oman	63	854	--	--
Spain	1,350	24,100	1,620	29,700
Turkey	95	3,460	88	3,480
Other	1	253	1	320
Total	4,800 r	69,100 r	5,190	77,600

rRevised. -- Zero.
[1]Table includes data available through May 7, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes anhydrite.
[3]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 6
U.S. GYPSUM AND GYPSUM PRODUCTS FOREIGN TRADE[1]

(Thousand metric tons and thousand dollars)

Year	Crude[2]		Plasters[3]		Boards[4]		Other, value[5]	Total, value
	Quantity	Value	Quantity	Value	Quantity	Value		
Exports:								
2017	36	16,500	107	39,700	512 r	104,000	80,000 r	241,000 r
2018	36	15,500	118	42,200	573	101,000	85,300	244,000
Imports for consumption:								
2017	4,800 r	69,100 r	23	7,790	443	108,000 r	34,500 r	220,000 r
2018	5,190	77,600	22	8,410	458	119,000	43,400	248,000

rRevised.
[1]Table includes data available through May 7, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Data are for "Gypsum, anhydrite," Harmonized Tariff Schedule of the United States (HTS) code 2520.10.0000.
[3]Data are for "Plasters," HTS code 2520.20.0000.
[4]Data are for "Boards, sheets, panels, tiles, and similar articles, not ornamented—Faced or reinforced with paper or paperboard only," HTS code 6809.11.0000.
[5]Data are for "Boards, sheets, panels, tiles, and similar articles, not ornamented: Other," HTS code 6809.19.0000, and "Other articles," HTS code 6809.90.0000.

Source: U.S. Census Bureau.

TABLE 7
MINED GYPSUM: WORLD PRODUCTION, BY COUNTRY OR LOCALITY[1]

(Thousand metric tons)

Country or locality[2]	2014	2015	2016	2017	2018
Afghanistan[e]	60	40	40	40	42
Albania	106	85	85	104	100 [e]
Algeria	1,360	1,770	2,200 [r]	2,500 [r, e]	2,500 [e]
Angola[e]	190	190	190	190	190
Argentina	1,561	1,315	1,558	1,276 [r]	1,280 [e]
Armenia	22	19	15	14 [r]	14 [e]
Australia	2,573 [r]	2,542	2,889 [r]	1,397 [r]	1,400 [e]
Austria	730	715	674	670 [e]	700 [e]
Azerbaijan	145	130	111	33 [r]	30 [e]
Belarus	64	43	63	68	70 [e]
Bhutan	414	389	318	320 [r, e]	320 [e]
Bolivia[e]	1	1	1	1	1
Bosnia and Herzegovina	68	59	61 [r]	99 [r]	100 [e]
Brazil	3,453 [r]	3,131 [r]	3,200 [r, e]	3,200 [r, e]	3,200 [e]
Bulgaria	88	99	41 [r]	99 [e]	100 [e]
Burma	105	100	338	242	300 [e]
Canada	1,811	1,793	1,679	3,001 [r]	3,000 [e]
Chile, crude	843	860	934	1,157 [r]	1,200 [e]
China, natural[3]	19,970	16,300	15,500 [e]	15,500 [e]	15,500 [e]
Croatia	120	138	170	201 [r]	200 [e]
Cuba	98	91	74	85 [r]	85 [e]
Cyprus, crude	348	472	472	703	700 [e]
Czechia	11	11	10	7 [r]	7 [e]
Dominican Republic	240 [r]	240 [r]	140	110 [r]	110 [e]
Egypt[4]	872	744 [r]	1,000 [r, e]	1,000 [r, e]	1,000 [e]
Eritrea[e]	12	13	13	13	13
Ethiopia	244	290	320	320 [e]	320 [e]
France[4]	3,279	2,027	4,183	3,014 [r]	3,000 [e]
Georgia	24	40	53	53 [e]	50 [e]
Germany[4]	1,802	1,800	3,090	3,238 [r]	3,200 [e]
Greece	664	649	778	880 [e]	880 [e]
Guatemala	82	111	131	130 [e]	130 [e]
India	2,902	2,640 [e]	2,700 [e]	2,700 [e]	2,700 [e]
Iran[5]	19,550	20,000 [r]	16,377	16,000 [e]	16,000 [e]
Iraq[e]	1,200	1,000	1,000	1,000	1,000
Ireland	210	250	250	250	200
Israel	82	159	147	116 [r]	120 [e]
Italy	5,887	572	617	620 [e]	620 [e]
Jamaica	45	43	50	50 [e]	50 [e]
Japan	4,674	4,670	4,670	4,700 [e]	4,700 [e]
Jordan	223 [r]	228 [r]	240 [r]	253 [r]	250
Kazakhstan	113	82	137	133 [r]	130 [e]
Kenya[e]	6	6	6	6	6
Laos	708	990 [r]	469 [r]	500 [r, e]	500 [e]
Libya[e]	150	150	150	200	200
Mauritania	60 [e]	70 [e]	70 [e]	200 [r]	200 [e]
Mexico[4]	5,496	5,457	5,403	5,400 [e]	5,400 [e]
Moldova[e]	125	120	120	120	120
Nicaragua	57	50	42	67 [r]	67 [e]
Nigeria	32	25	32 [r]	40 [r]	40 [e]
Oman	3,387	6,049	5,483	6,876 [r]	7,000 [e]
Pakistan	1,446	1,660	1,998 [r]	2,221 [r]	2,200 [e]
Peru, crude	544	438	438	287	300 [e]
Poland[6]	1,052	1,018	1,035	1,108	1,100 [e]
Portugal	329	310	255	152	150 [e]
Qatar[e]	200	210	210	210	210
Romania	807	840	714 [r]	708 [r]	710 [e]
Russia	4,419	4,223	3,996	3,772 [r]	3,800 [e]

See footnotes at end of table.

TABLE 7—Continued
MINED GYPSUM: WORLD PRODUCTION, BY COUNTRY OR LOCALITY[1]

(Thousand metric tons)

Country or locality[2]	2014	2015	2016	2017	2018
Saudi Arabia	1,780	2,780	3,000	3,150	3,307
Slovakia	65	65	53	60	60 e
South Africa	376	232	262 r	321 r	300 e
Spain[e, 5]	7,000	7,000	7,000	7,000	7,000
Sudan	111	180	355	338	340 e
Switzerland	340	320	340	320	320 e
Syria	181	150 e	150 e	150 e	150 e
Tajikistan	12	9	9	13 e	13 e
Tanzania	200	239	214	124	120 e
Thailand	12,445	11,267	10,407	9,254	9,300 e
Tunisia	850	900	850	850 e	900 e
Turkey	12,600	8,639	10,124 r	10,223 r	10,000 e
Turkmenistan[e]	107	110	110	110	110
Ukraine[4]	1,525	1,255	1,303	1,529 r	1,500 e
United Arab Emirates[e]	700	700	700	700	700
United States[7]	16,200 r	16,600 r	17,000 r	20,700	21,100
Uzbekistan[e]	40	42	35	35	35
Yemen[e]	100	100	100	100	100
Total	150,000 r	138,000 r	139,000 r	142,000 r	143,000 e

[e]Estimated. [r]Revised.

[1]Table includes data available through June 25, 2019. All data are reported unless otherwise noted. Totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

[2]In addition to the countries and (or) localities listed, Colombia, El Salvador, Honduras, Kyrgyzstan, Latvia, Luxembourg, Madagascar, Mongolia, Serbia, and Sri Lanka may have produced gypsum, but available information was inadequate to make reliable estimates of output.

[3]Does not include synthetic gypsum.

[4]Includes anhydrite.

[5]Production is based on fiscal year, with a starting date of March 21 of the year shown.

[6]Includes reported anhydrite and "rock" gypsum.

[7]Does not include byproduct gypsum.

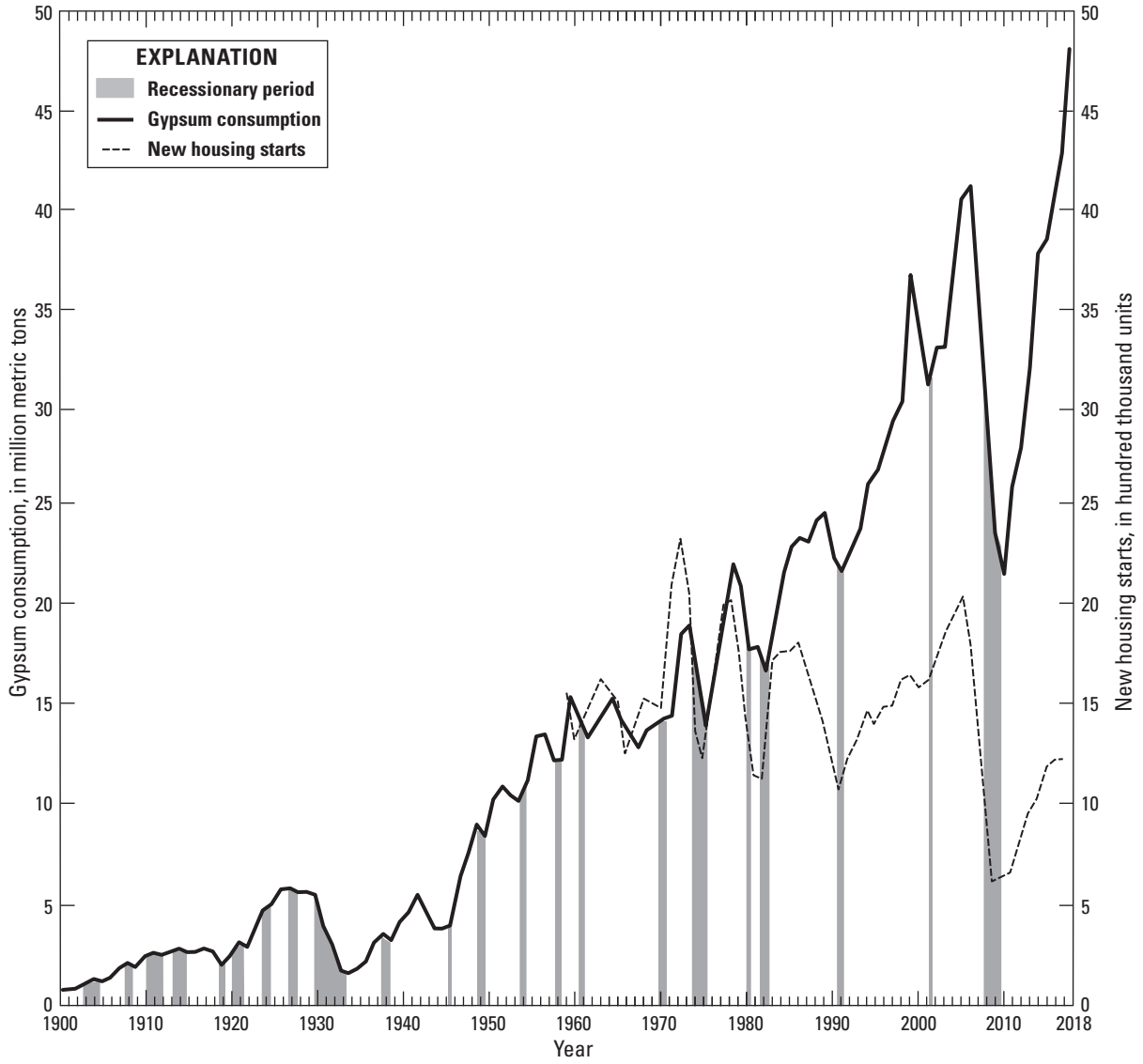

Figure 1. U.S. gypsum consumption and economic recessions from 1900 through 2018, and new residential building permits beginning in 1959.