



2016 Top Markets Report **Building Products and Sustainable Construction**

Overview and Key Findings

Introduction

The trend toward “greener,” more sustainable construction has taken hold in construction markets globally. Governments, private enterprise and consumers around the world increasingly recognize the role buildings play in energy, water, materials and other resource usage; greenhouse gas (GHG) emissions; the safety, health, and productivity of citizens; and the sustainability and resilience of a nation’s built environment. As building-related technologies advance and awareness of their potential benefits grows, many nations now look beyond “greener” buildings. This vision seeks buildings that offer healthier environments, “smart” buildings where efficiencies are maximized through information collection and system-to-system communication, and buildings that provide resilience in the face of natural and man-made risks. Increasing global urbanization is a steady driver fueling these trends. U.S. building products are competitive in construction markets worldwide and in both highly developed and developing economies. U.S. manufacturers have much to offer global markets that recognize how increasing building performance can contribute to public and private sector goals and priorities.

The Building Products Sector

This study ranks 75 international markets in terms of export potential for seven categories of U.S. building products. U.S. products in these categories compete well in global construction markets and have strong potentials to deliver on the goals of increasingly sustainable construction.

This sector includes:

- heating, ventilation, air conditioning and refrigeration (HVACR) equipment;
- lighting;
- plumbing products;
- wood products;
- insulation;
- windows and doors; and
- glass.

U.S. manufacturers across industries contribute to the sustainability, health and resilience of the built environment, and ITA is not defining these seven product categories as green or preferred. Nor is ITA attempting to identify only export market opportunities associated with sustainable construction. The purpose of this study is to identify international markets with the greatest overall opportunity for U.S. building product exports, in which green building and other trends may create additional opportunity for U.S. exporters.

\$39 Billion Export Portfolio (2018)

This sector comprised a U.S. export portfolio worth \$35.2 billion in 2015. It is projected to grow to \$39.4 billion in 2018. U.S. export growth is projected in six of the seven subsectors considered. In the plumbing products sector alone, a slight decline in exports is projected for 2018 compared with 2015 levels. This may reflect the trend in plumbing products manufacturing to address international market opportunities via more proximate or lower cost manufacturing in addition to exporting from the United States.

Figure 1: U.S. Exports (in USD Billions)

	2015	2018 - Projected
HVACR	\$19.30	\$21.50
Lighting	\$3.30	\$3.70
Plumbing Products	\$1.38	\$1.32
Wood Products	\$8.30	\$9.70
Insulation	\$1.05	\$1.20
Doors, Windows	\$0.82	\$0.86
Glass	\$1.05	\$1.07
Total Sector	\$35.20	\$39.40

Global Construction Market Growth

Over the coming decade and beyond, construction is expected to be one of the more dynamic sectors of the world economy. Construction output across the globe is expected to grow 85 percent by 2030, creating a \$15.5 trillion market by that date.ⁱ As developed economies recover from economic downturns and developing economies advance in their industrialization, the rate of worldwide construction growth, projected at 3.9 percent per year to 2030, outstrips that of projected global GDP growth by more than 1 percent.

The Urbanization Megatrend

More than half of the world's population today lives in urban areas, and nearly all countries across the globe are experiencing increasing urbanization.ⁱⁱ This global urbanization megatrend drives demand for both new buildings and reconstruction and retrofit of existing building stock, as cities work to create environments in which increasingly dense populations can thrive. It also drives an imperative to build "greener," more sustainable buildings that conserve energy, water and other resources while supporting occupant safety, health and productivity and adding to the resilience of the built environment.

The trend of increasing sustainable construction across global markets is propelled by government policies, consumer preferences and market forces. This growth trend spans both

developed and developing markets and is not limited to any specific regions of the world. It creates strong opportunities for U.S. suppliers of HVACR, lighting, plumbing products, wood products, insulation, windows and doors and glass. U.S. manufacturers of all these product categories enjoy excellent reputations for product diversity, quantity, quality and reliability.

Global Trends Driving Sustainable Construction

Governments and the private sector often pursue more sustainable construction under goals or programmatic themes. Policies and market developments associated with the following objectives and thematic initiatives are intensifying globally, creating opportunities for U.S. building product exporters.

Energy efficiency (ongoing push for increased gains): Fully one-third of the world's energy use is estimated to take place inside buildings,ⁱⁱⁱ meaning that increasing building energy efficiency can have enormous impacts on energy demand and greenhouse gas (GHG) emissions. Products from all seven subsectors of this group have the ability to make strong contributions to increasingly energy efficient building performance.

Water efficiency (and its nexus with energy efficiency): Water shortages and drought conditions experienced around the globe underscore the importance of buildings in creating more sustainable environments. Estimated to account for some 20 percent of total water use, buildings have enormous potential to achieve gains. Increasingly, markets demand buildings with water conservation and management strategies, from use of water-efficient fixtures and appliances to separation of uncontaminated graywater for re-use, to rainwater harvesting and storm water management. Increasing water efficiency also can provide concurrent energy efficiency gains.

Resilience: Resilience is a concept receiving considerable attention from governments, banks and investors, international development organizations and private sector construction stakeholders. In the face of natural and man-made risks, the ability to circumvent, withstand, survive and recover from impacts is essential to economic and social vitality. Buildings have a clear role to play in this sphere, creating opportunities for building product exporters. Energy efficient buildings are able

to operate longer without external power sources and require less power at full operational levels. Buildings with high quality envelopes (windows and doors, glass, insulation, wood products) and ventilation systems (HVACR) create safer, more comfortable environments in the case of an impact, prolonging consistency of operations. Water conservation and management (plumbing products) likewise create less demand on external systems and extend a building's operational life in the event of an impact.

Net-Zero Energy Buildings (NZEB): The NZEB concept has captured considerable attention globally. Government policies and private initiatives can be seen being geared to designing, building and operating structures in which the total amount of energy used by the building on an annual basis is roughly equal to the amount of renewable energy generated on site. Achieving high energy and water efficiency within the building is needed to minimize demand for energy, which is important to the concept. This creates opportunities for all building product manufacturers.

Intelligent or "smart" buildings: A smart building is generally understood as one reflecting a holistic approach to a building's design, construction and operation to maximize efficiencies, occupant comfort and other functional priorities. The building is a system of systems that communicate within the building and externally to optimize performance. Smart buildings create immediate opportunity for design services and information and communication technologies. They also create demand for high-quality building products with inherent efficiency and interoperable functionality compatible with smart building design.

Street lighting and smart cities: Smart buildings are recognized key elements of smart cities. Certain subsector building product categories are also often highlighted as essential to smart city performance. One such example is smart LED street and infrastructure lighting. Smart exterior lighting is lauded globally for its contributions to energy efficiency, reduced maintenance requirements, public safety and overall usability of the built environment.

Healthy buildings: Across many building categories, notably among institutional and commercial buildings, there is a focus on increasing building value through a healthy building approach. This

places an emphasis on indoor air quality, use of low-toxicity materials, occupant thermal comfort, access to natural light, safe and efficient water use, and materials and system resistance to contamination. All product categories across sector have roles to play in the construction and operation of healthy buildings.

Specific ways in which these themes manifest in key U.S. export markets are explored in the Case Studies section of this report.

Key Findings: Top Markets and Methodology

The building product sector as a combined whole has a high density of export destinations. Fully, 72 percent of building products exports went to the top 10 markets in 2015. A high density of export destinations also characterizes each of the seven subsectors within this group.

For the combined sector, the most recent trade data show over 60 percent of U.S. exports going to four markets: Canada, Mexico, China and Japan. The prominence of these four countries underscores that U.S. exporters across the sector compete well in:

- markets that are proximate as well as more distant markets, where transport and materials handling costs are a factor;
- markets that are both highly developed and developing; and
- markets in which U.S. free trade agreements enable preferred market access or duty-free import of U.S. products as well as in those where tariff barriers persist.

A complete ranking of projected 2018 export potential for 75 international markets is included in Appendix 2. These building product market rankings provide a broad sense of international markets with the greatest promise across the seven subsectors.

International trade conditions shared across all seven subsectors include:

- a high density of export destination, with the majority of subsector exports destined for the top five markets;
- a U.S. exporter base comprised of a small number of large companies and a broad base of small and medium-sized companies;

- products in which global competition is fierce and sales margins typically are small, meaning that tariffs can have a major impact;
- standards and conformity assessment requirements as the most significant reported non-tariff barriers to trade;
- increased opportunity as green retrofit and new green construction take larger shares of the construction environment; and
- subsectors in which USG trade policy, trade promotion, trade facilitation, export market development and trade remedy tools all are relevant.

Moving beyond these commonalities, review of leading export markets on a combined sector alone is insufficient. A subsector-specific review of top export market rankings is also informative.

Methodology

The 2016 *Top Markets Building Products and Sustainable Construction Report* utilizes an analytic approach consistent with the 2015 Top Markets report (“TMR15”). Following its publication, ITA evaluated the effectiveness of the TMR15 projections against reported annual trade data for 2015. This is an imperfect evaluation because 2015 trade data was compared with TMR15 projections, which looked two years ahead of that timeframe, but it represents one method of review. Because a

significant percentage of U.S. exports is concentrated in a small number of markets for the building product sector, our evaluation considered the number of TMR15 projected top 10 export markets that were confirmed to be Top 10 markets in 2015 based on actual reported trade data.

The results showed that for the combined sector taken as a whole, nine out of the top 10 markets projected were confirmed to be top 10 markets in the 2015 data. For the individual subsectors, the accuracy of results was as follows: HVACR, nine out of top 10; lighting, eight out of top 10; plumbing, seven out of top 10; wood products, nine out of top 10; insurance, eight out of top 10; windows and doors, seven out of top 10; and glass, six out of top 10.

The 75 markets chosen to be included in the 2016 Top Markets rankings reflect the leading 75 export markets in terms of 2015 value of exports for all subsectors combined together as a sector, based on U.S. dollar volumes of U.S. total exports^{iv}. Together, these 75 markets accounted for more than 98 percent of building products exports in 2015. A list of the markets is found in Appendix 1.

Data sets created in support of the National Export Initiative (NEI) Building Products Sector Strategy form the analytical basis of this study. Under the NEI, ITA established a data concordance of Harmonized Tariff System (HTS) product categories at the 6-digit HTS level. For the seven building product subsectors

Figure 2: Projected Top 10 Markets by Subsector (2018)

	HVACR	Lighting	Plumbing Products	Wood Products	Insulation	Doors & Windows	Glass
1	Canada	Canada	Mexico	China	Mexico	Canada	Hong Kong
2	Mexico	Mexico	Canada	Canada	Canada	Mexico	Canada
3	China	China	Saudi Arabia	Mexico	China	Bahamas	Mexico
4	Saudi Arabia	Korea	UAE	Japan	UK	Australia	Colombia
5	Germany	Saudi Arabia	Taiwan	Vietnam	Korea	Saudi Arabia	UAE
6	UK	Germany	UK	UK	Australia	Russia	South Africa
7	Brazil	Japan	Venezuela	Italy	Brazil	UK	Turkey
8	Australia	UK	Korea	Turkey	Japan	Japan	Australia
9	Japan	Taiwan	Australia	Australia	France	Venezuela	Venezuela
10	France	Netherlands	South Africa	Spain	Germany	Netherlands	Kuwait

considered in this study, a total of 194 product categories within the HTS tariff line schedule were utilized. It is ITA's assessment that these trade data groupings reflect a reasonable approach to valuing U.S. exports in the seven subsectors. A complete listing of HTS product categories considered for each of the seven subsectors is found in Appendix 4.

Trade data utilizing the HTS do not distinguish end-use or product performance characteristics within a product category (such as whether a product is "green"). For this reason, U.S. Census Bureau data for all products within each subsector were utilized to rank export markets for the subsector as a whole and for all seven subsectors together.

Utilizing five years of U.S. Merchandise Trade total exports data from 2011 to 2015 for all of the 194 HTS product categories, ITA utilized a linear projection to smooth annual growth fluctuations, arriving at a projected 2018 export total for each of the 75 export markets. This was done for each of the seven subsectors, individually, as well as for the sector as a combined whole. The full rankings for the 75 markets on a sector and a subsector-specific basis are found in Appendix 2 and Appendix 3, respectively.

Industry Overview and Competitiveness

This report addresses seven subsectors of building products manufacturing: HVACR equipment, lighting, plumbing products, wood products, insulation, windows and doors, and glass for use in buildings. Across all seven sectors, U.S. manufacturers are recognized worldwide for high quality products reflecting state-of-the-art manufacturing techniques. The U.S. industry in each subsector features a small number of large, diversified corporations with global footprints along with a large number of small and medium-sized enterprises manufacturing a narrower range of products. U.S. products across the seven categories enjoy strong global brand recognition and compete well in both developed and developing markets.

U.S. products in each of sector categories are well positioned to capitalize on growth opportunities and respond to the following trends that have emerged across key global markets.

HVACR Market Trends

The global HVACR equipment industry is projected to grow at a compound annual growth rate of 5.35 percent between 2015 and 2022. This would result in a HVAC market valued at \$151 billion by the end of that period.^v Growth drivers include the following:

- *Government regulations* across the world are aimed at requiring more *energy efficient and environmentally friendly products*. For HVACR, such regulations include approaches such as Minimum Energy Performance (MEP) standards, product labelling requirements and others. Beyond energy efficiency, policymakers seeking to mitigate climate change have focused on the role of refrigerants, assessing ozone depleting potential (ODP), global warming potential (GWP) and/or life cycle climate performance (LCCP) in their approach to regulation.
- *Global demand for new construction and for energy efficient buildings* is amid world population growth and increasing urbanization. HVACR is recognized as a significant contributor to a building's energy requirements and is a natural focal area for achieving reductions.
- *An increased focus on indoor air quality* is a component of building performance. HVACR systems play a well understood role in providing thermal comfort as well as sufficient ventilation and humidity control to occupants with an increased awareness of health aspects in a building.
- *Increased interest in smart cities* recognizes the ability of HVACR systems to communicate with sensors and other building systems to optimize operational efficiency and occupant comfort.
- *Strong consumer interest in smart technologies and user-friendly controls* is also creating demand for new HVACR products. Innovations, such as smart thermostats and easy-to-use interfaces that offer remote access, are stimulating interest in products featuring these capabilities.

Lighting Market Trends

Industry estimates project a \$122 billion global lighting market by 2025,^{vi} reflecting anticipated ongoing strong growth. Lighting is well recognized as an area in which building energy performance may be increased quickly, in both new construction and retrofit projects. Awareness that potential lighting systems can offer value beyond energy efficiency is shaping potential market opportunities for U.S. exporters.

- *Smart, connected, controllable lighting:* Sensors and lighting level adjusters are becoming more advanced and connectable, allowing lighting system components to communicate within the lighting system and also with other devices. Adding smart features to lighting also may create new opportunities in retrofit markets that have already seen strong LED uptake and may be open to further retrofit only when provided new offerings.
- *Lighting systems as data networks:* Increasing interest in the Internet of Things, in part, means that lighting systems are increasingly being seen as potential data transmission networks.
- *Smart LED street lighting as a core element of smart cities:* The movement seeking smart city infrastructure creates a global opportunity for manufacturers of smart exterior lighting, which is increasingly seen as a key component of smart city infrastructure. Such lighting offers not only energy efficiency benefits but also offers increases in public safety and public space usability.
- *Focus on quality, especially LED:* Highly energy efficient LED lighting is well established in the global marketplace, and adopters are beginning to signal awareness of quality and performance differences among LED products.
- *Bio-dynamic aspects of lighting:* Lighting can play a key role when occupants' sense of wellbeing, comfort, productivity and ability to learn are under consideration. This is increasingly a factor in schools, hospitals, government buildings and workplaces, among other building segments.

Plumbing Products Market Trends

Global demand for plumbing fixtures and fittings is expected to grow at a rate of 5.3 percent annually through 2018, creating a \$70 billion market worldwide. The Asia-Pacific region is expected to account for the largest share of growth globally while the residential sector is expected to outpace non-residential applications.^{vii} The following trends are among the key drivers of market demand:

- *Increased focus on water conservation and efficiency:* The challenge of water shortage is being experienced worldwide in developed and developing countries alike.
- *Water efficiency and energy efficiency link:* Awareness has increased around the world of the connections between water and energy efficiency, adding resonance to calls to conserve and manage water efficiently.
- *Increased focus on public health aspects of water management:* As populations grow and urbanization increases, so too does pressure on insufficient water systems in terms of water supply and water safety. This is particularly a factor in developing markets, with respect to entire systems. In advanced markets, sanitation and hygiene are increasingly important factors, leading to demand for products designed for self-cleaning or more efficient and effective cleaning and reduced human contact (touchless or tap-on/tap-off).
- *Aging populations and accessibility:* Increases in life expectancies around the world signal enduring elderly populations with accessibility preferences and requirements in their homes. Such requirements are also naturally seen in institutional construction segments.
- *Control technology:* As with many other building product areas, demand is high for integrated plumbing product control technologies. There is also a desire for control technologies that will coordinate plumbing products and other systems, such as lighting, in an integrated interface.

Plumbing products fall into two main categories: finish materials, which come into contact with people (sinks, faucets, toilets, bathtubs,

showerheads, etc.) and rough materials, which are used in walls, floors and other piping-related applications. In terms of finish materials, U.S. water conservation standards might not be as stringent as some in the more water-scarce countries. U.S. exporters must closely examine such factors to determine product competitiveness. With respect to rough materials, the United States is one of just three countries using the imperial system of measurement, along with Burma and Liberia. Any U.S. manufacturer of rough materials for plumbing that is seeking to export products must be aware of this factor. For countries using the metric system, it is unrealistic to envision selling rough materials based on the imperial system of measurement for use in projects designed to metric sizes.

While more advanced countries have established plumbing infrastructure and present near-term opportunities, the lower level of plumbing infrastructure in less developed countries presents an opportunity for the U.S. in the longer-term. Collaboration between U.S.-based plumbing code and standard developers and relevant authorities in developing countries creates opportunities for information and resource sharing. Ultimately, this can lead to local solutions being developed based on international best practices and standards. This approach may lead to greater long-term certainty about market potential and market access requirements, benefitting U.S. plumbing product exporters.

Within the sector, the plumbing subsector is notable for how some leading U.S. companies have addressed international market opportunities by establishing manufacturing facilities overseas in proximate or lower-cost markets.

Wood Products Market Trends

International trade in wood products grew at nearly a 9 percent compound annual growth rate from 2009 to 2014, with world import demand reaching \$111 billion in 2014.^{viii} U.S. wood products exporters are well positioned to capitalize on two key trends in the global marketplace:

- *Legality requirements:* U.S. timber has been assessed as having an extremely low risk of having been harvested illegally. This may be a strong selling point in the context of globally heightened awareness of the negative impacts of illegal logging, both ecologically and economically. Numerous countries are now engaged in collaborative efforts to combat illegal logging and associated trade. The European Union, Australia and the U.S. have implemented regulatory requirements aimed at halting trade in timber and wood products harvested illegally according to laws in the country of harvest. The EU Timber Regulation and Australia's Illegal Logging Prohibition Act place the burden on their importers to conduct risk assessment of supplies.
- *Green characteristics:* Wood also has a number of environmental and performance benefits that relate to sustainable construction. Wood is well recognized as a renewable resource and a storage medium for carbon dioxide. Wood products lend themselves to reuse, and a building comprised of wood elements is more easily deconstructed. Life cycle assessment (LCA) methods applied to wood showcase applicable performance strengths, including energy efficiency in application.

Insulation Market Trends

The worldwide insulation market is projected to grow at a compound annual growth rate of 8.5 percent through 2020, reaching a global market size of \$67 billion.^{ix} Growth expectations are driven in part by the following factors:

- *Broad awareness of insulation's contribution to energy efficiency benefits:* Properly insulating a building is recognized as a foundational, cost-effective approach to improving a building's energy performance.
- *Regulatory requirements* around the world increasingly make insulation levels mandatory across building segments.
- *Growth of new construction in developing markets and increases in new construction and re-insulation activity in retrofit projects in developed markets:* With construction

entering a new period of dynamism post-recession, new construction is occurring in an environment of heightened awareness of how much insulation offers in potential energy efficiency gains. Owners of existing buildings can conduct cost-benefit assessments, often leading to re-insulation decisions.

Windows and Doors Market Trends

The global window and door industry is forecast to reach \$171 billion by 2018,^x reflecting a rebound in growth. U.S. manufacturers of windows and doors are well-positioned to capitalize on the key trends affecting markets worldwide.

- *Technological advances are creating dynamism in the subsector.* These include advances related to energy efficiency and strength that can lead to new competitive advantages.
- *New construction and replacement and repair activity is expected to be robust.*
- *Energy efficiency is the key driver.* Strong global interest in increased energy efficiency means high quality products will have the most to offer new build and retrofit projects.
- *Increased interest in passive houses:* Homeowners have shown an increased interest in building practices that include requirements designed to keep indoor temperatures stable with minimal heating and cooling systems. Highly energy efficient windows, in particular, play a key role in this design approach.
- *Daylighting and connection to the outdoors:* The twin objectives of assuring occupants access to natural light and creating a sense of seamless transition between indoor and outdoor environments has led to preference for larger windows and doors with clean sight lines. Daylighting is an important element of indoor environmental quality and is of considerable interest in schools, healthcare settings and workplaces.
- *Smart windows:* There is increasing interest in windows that change the amount of solar energy (sunlight and heat) transferred based on electronic or environmental controls.

Glass Market Trends

Steadily progressive innovations in glass technology relevant to buildings have transformed the role of glass in the built environment, creating a broader set of functions and applications well suited to green building. These newer glass applications centered on thermal insulation performance and sunlight modulation technologies supplement historically recognized benefits of glass, including aesthetics, durability, safety and sound insulation. The following trends are among the demand growth drivers for glass in construction markets worldwide.

- *Energy performance:* There is worldwide understanding of how glass can contribute to the increased energy performance of buildings. Innovations, such as double-glazed or triple-glazed units with inert gas filling and low-emissivity coatings, have dramatically increased the insulating properties of glass facades and windows. In the face of increased regulatory requirements globally associated with building energy performance, this means more demand for glass solutions. Applications within buildings also are including larger sizes of glass.
- *Applicability to new construction and retrofit:* The energy efficiency improvements glass offers means that building owners can achieve significant gains via retrofit. This increases global opportunity.
- *Dynamic glass:* Dynamically tinted glass for windows, skylights and curtainwalls enables control of the amount of solar energy (sunlight and heat) entering a building at any time. In addition to dramatically lowering building cooling requirements during the hottest times of the day, dynamic glass enables optimization of daylighting and a sense of connection between indoor and outdoor environments. It can reduce costs associated with alternate solar energy controls (shades or blinds, for example) and can reduce costs associated with replacing sun-damaged interior fittings, such as carpets and upholstery.
- *Smart glass:* Electronically tinted glass can be adjusted manually or automatically via a building automation system. This type of

glass is a “smart” application and can be integrated with other building systems, such as HVAC, lighting and security systems.

- *Benefits beyond energy efficiency:* As noted above regarding windows, allowing natural light into buildings and creating a connection are increasingly important elements of green buildings focused on occupant wellbeing and productivity. Glass also is recyclable.
- *Renewable energy potential:* Recent innovations in glass technology have placed the material at the center of renewable energy generation, including solar-thermal and photovoltaic applications.
- *Versatility across climates:* Given the wide array of glazing solutions, glass can be a fit for all climates in which green building is a priority.
- *Security aspects:* Increased focus on safety and security of buildings worldwide creates opportunities for glass with relevant performance characteristics.

Some U.S. manufacturers of glass products for construction use have opted to address international market opportunities via more proximate or lower cost manufacture.

Global Industry Landscape

U.S. building product exporters faced an international market opportunity of \$377 billion in 2015, the total of all non-U.S. import demand for buildings products.^{xi} Global trade in all seven subsectors on a combined basis reached \$433 billion in world import demand in 2014. This reflects a five year compound annual growth rate of 7.8 percent from its 2009 level. The United States is the largest world importer of building products. With the United States’ share of world imports removed, the non-U.S. world import demand for building products stood at \$372 billion in 2014.

A review of globally reported import data shows major import markets together with their respective import market growth rates over the same five year period.

Figure 3: Largest Importers of Building Products

	Importing Country	Imports from World (2014)	Import Market Growth (5-Year CAGR)
1	U.S.	\$60 billion	10.7%
2	China	\$43 billion	14.8%
3	Germany	\$30 billion	7.7%
4	Japan	\$22 billion	7.1%
5	France	\$18 billion	2.1%
6	UK	\$18 billion	8.4%
7	Canada	\$14 billion	7.1%
8	Italy	\$12 billion	1.6%
9	Mexico	\$12 billion	11.3%
10	Korea	\$10 billion	6.0%

To gain the most detailed understanding of global demand for specific product categories, it is valuable to review the data on a subsector-specific basis. The following section examines import demand trends for each of the seven segments of this sector.

HVACR Product International Trade

- U.S. exports are projected to reach \$21.5 billion in 2018, up from \$19.3 billion in 2015
- Global opportunity: world import demand for HVACR (excluding U.S.) reached \$160 billion in 2014
- This reflects a 6.8 percent compound annual growth rate (2009 to 2014)

Figure 4: Largest HVACR Import Markets

	Importing Country	Imports from World (2014)	Import Market Growth (5-Year CAGR)
1	U.S.	\$27 billion	11.5%
2	Germany	\$14 billion	7.2%
3	China	\$14 billion	5.9%
4	Japan	\$8 billion	8.9%
5	Mexico	\$7 billion	13.1%
6	France	\$7 billion	3.2%
7	UK	\$7 billion	6.7%
8	Canada	\$6 billion	7.4%
9	Russia	\$5 billion	15.0%
10	Italy	\$5 billion	1.8%

Lighting Product International Trade

- U.S. exports are projected to reach \$3.7 billion in 2018, up from \$3.3 billion in 2015
- Global opportunity: world import demand (excluding U.S.) for lighting reached \$46 billion in 2014
- This reflects a 7 percent compound annual growth rate (2009 to 2014)

Figure 5: Largest Lighting Import Markets

	Importing Country	Imports from World (2014)	Import Market Growth Rate (5-Year CAGR)
1	U.S.	\$10.8 billion	12.2%
2	Germany	\$5 billion	9.2%
3	France	\$3 billion	2.1%
4	UK	\$2 billion	8.9%
5	China	\$2 billion	-3.1%
6	Canada	\$2 billion	7.7%
7	Mexico	\$1.6 billion	10.5%

8	Netherlands	\$1.6 billion	7.9%
9	Japan	\$1.5 billion	9.1%
10	Italy	\$1.4 billion	5.2%

Plumbing Products International Trade

- U.S. exports are projected to decline slightly to \$1.32 billion in 2018, from \$1.38 billion in 2015
- Global opportunity: world import demand (excluding U.S.) for plumbing products reached \$24 billion in 2014
- This reflects a 5.7 percent compound annual growth rate (2009 to 2014)

Figure 6: Largest Plumbing Product Import Markets

	Importing Country	Imports from World (2014)	Import Market Growth Rate (5-Year CAGR)
1	U.S.	\$3.6 billion	7.1%
2	Germany	\$2.2 billion	8.1%
3	France	\$1.6 billion	3.4%
4	UK	\$1.4 billion	4.7%
5	Italy	\$897 million	1.8%
6	China	\$855 million	1.8%
7	Canada	\$819 million	5.2%
8	Mexico	\$805 million	4.6%
9	Russia	\$779 million	9.2%
10	Japan	\$776 million	12.8%

Wood Products International Trade

- U.S. exports are projected to reach \$9.7 billion in 2018, up from \$8.3 billion in 2015
- Global opportunity: world import demand (excluding U.S.) for wood products reached \$111 billion in 2014
- This reflects a 8.9 percent compound annual growth rate (2009 to 2014)

Figure 7: Largest Wood Product Import Markets

	Importing Country	Imports from World (2014)	Import Market Growth Rate (5-Year CAGR)
1	China	\$22 billion	26.9%
2	U.S.	\$16 billion	10.6%
3	Japan	\$11 billion	6.0%
4	Germany	\$7 billion	7.9%
5	UK	\$5 billion	14.0%
6	France	\$4 billion	0.5%
7	Italy	\$4 billion	0.2%
8	Canada	\$4 billion	6.7%
9	Netherlands	\$3 billion	3.9%
10	Korea	\$3 billion	8.3%

Insulation Products International Trade

- U.S. exports are projected to reach \$1.2 billion in 2018, up from \$1.05 billion in 2015
- Global opportunity: world import demand (excluding U.S.) for insulation reached \$7.3 billion in 2014
- This reflects a 6.4 percent compound annual growth rate (2009 to 2014)

Figure 8: Largest Insulation Import Markets

	Importing Country	Imports from World (2014)	Import Market Growth Rate (5-Year CAGR)
1	U.S.	\$766 million	11.4%
2	Germany	\$618 million	6.5%
3	China	\$571 million	13.5%
4	France	\$488 million	1.7%
5	Canada	\$367 million	9.5%
6	Mexico	\$346 million	16.7%
7	UK	\$286 million	6.5%

8	Italy	\$252 million	1.9%
9	Belgium	\$209 million	1.0%
10	Russia	\$205 million	16.4%
11	Korea	\$196 million	18.3%

Doors and Windows International Trade

- U.S. exports are projected to reach \$857 million in 2018, up from \$817 million in 2015
- Global opportunity: world import demand (excluding U.S.) for doors and windows reached \$12.1 billion in 2014
- This reflects a 4.9 percent compound annual growth rate (2009 to 2014)

Figure 9: Largest Door and Window Import Markets

	Importing Country	Imports from World (2014)	Import Market Growth Rate (5-Year CAGR)
1	U.S.	\$2.1 billion	3.9%
2	Germany	\$1.1 billion	11.0%
3	UK	\$926 million	4.1%
4	France	\$874 million	1.1%
5	Japan	\$795 million	3.5%
6	Switzerland	\$735 million	9.0%
7	Canada	\$587 million	6.1%
8	Austria	\$437 million	5.7%
9	Russia	\$428 million	7.0%
10	Denmark	\$415 million	1.5%

Glass for Construction International Trade

- U.S. exports are projected to increase to \$1.07 billion in 2018, up from \$1.05 billion in 2015
- Global opportunity: world import demand (excluding U.S.) for glass related to construction reached \$12 billion in 2014
- This reflects a 7.9 percent compound annual growth rate (2009 to 2014)

Figure 10: Largest Glass Import Markets

	Importing Country	Imports from World (2014)	Import Market Growth (5-Year CAGR)
1	China	\$2.7 billion	51%
2	Hong Kong	\$1.2 billion	59%
3	Korea	\$878 million	-7.50%
4	U.S.	\$621 million	8.30%
5	Canada	\$465 million	7.10%
6	Germany	\$425 million	-2.90%
7	France	\$386 million	-0.70%
8	Malaysia	\$274 million	8.70%
9	Poland	\$270 million	1.60%
10	Belgium	\$269 million	3.30%

Challenges, Barriers, and Opportunities

ITA is well positioned to assist U.S. companies via the trade promotion, trade policy, trade promotion, trade facilitation and overall market expansion approaches described below.

Challenge: Actionable Intelligence on In-country Sales Channels, Buyers and Influencers

Building products exporters face a global competitive environment, including sophisticated world-leading foreign manufacturers at the higher-end together with lower cost, lower quality producers seeking to claim market share. In this environment, U.S. exporters need both market-level context information as well as subsector-specific intelligence on sales channels, buyers and potential sales influencers.

Sales channels and buyers

In each international market and in each of the seven subsectors, different sales channels and buyer types are of primary and secondary importance to U.S. exporters. For building products, information on which of the following channels hold the greatest promise for achieving sales enables a company to streamline its market development approach.

- Government entities
- Architects
- Design & build companies
- Trade contractors
- Building facility managers
- Distributors
- Showroom dealers
- Retailers
- Other

Influencers

In addition, in some international markets, there are one or more entities – government or private sector – that can heavily impact the success of a market strategy for U.S. building products exporters. Gaining information about these types of entities will help the exporter set priorities for in-country outreach and relationship development.

U.S. Government Resources

- As a component of trade promotion activities, on a market-specific and subsector-specific basis, ITA staff in a target market may be able to support U.S. exporters with information on key sales channels and influencers in that market.

Challenge: Actionable Intelligence on Sales Opportunities

U.S. exporters consistently have expressed a desire for concrete information about specific sales prospects in a market as early as possible.

U.S. Government Resources

- For information on ITA Global Design and Construction Team resources, please refer to the Resources for U.S. Exporters addendum to this report.
- ITA staff members in foreign markets conduct in-country outreach to subsector-specific sales channels and influencers to develop intelligence on potential sales opportunities. U.S. exporters may register to receive trade leads at: https://www.linkedin.com/groups?home=&gid=4979345&trk=anet_ug_hm&goback=%2Egna_4979345

Challenge: Trade Promotion in Highly Competitive Global Markets

U.S. building product exporters compete with world-leading companies and low-cost producers in every international market. Traditional trade promotion approaches can be employed successfully in the sector's leading markets to put U.S. exporters and their products in direct contact with potential buyers. These approaches include domestic and international trade shows, overseas trade missions and reverse trade missions bringing international buyers to the United States, and direct matchmaking programs that feature tailored market research and buyer introductions, among other services.

U.S. Government Resources

- *Sub-sector specific or green theme events:* Trade promotion activities are most useful when conducted on a subsector-specific basis to enable U.S. suppliers to engage more knowledgeable would-be buyers in discussion of product performance characteristics and technical requirements. Trade events organized around specific themes, such as green building, smart cities or resilient communities, for example, may also provide opportunity to promote a range of building product categories in context of their performance contributions.
- *Public-private partnership models:* For building product exporters, ITA has found the public-private partnership model to be highly successful in developing export markets and closing sales. Under this approach, participating U.S. exporters engage in product promotion in target markets while, as needed, U.S. government agencies bolster this promotion work via tailored government-to-government dialogs. Such public-private partnership models consistently have delivered high returns on investment when considering the value of reported U.S. exports generated to the level of federal investment.

Snapshot: Market Development Cooperator Program

Public-private partnerships under ITA's MDCP program support U.S. building product exporters.

- U.S.-China Build program with Evergreen Building Products Association
- Standards and Codes for Sustainable Construction (Gulf Region) with ASTM International
- Water for Indonesia Now (WIN) program with International Association of Plumbing and Mechanical Officials (IAPMO)
- Japan Market Access Program with Evergreen Building Products Association

Challenge: Tariffs

Leading 2018 export markets for the building products sector include a number of countries with which the U.S. has free trade agreements (FTA). In non-FTA markets, tariffs remain a consistent barrier for all seven subsectors. Escalating tariffs, meaning the tariff rates that increase with the technical sophistication of the product, or the level of processing inherent in the product, are a characteristic of many markets in the sector export landscape.

U.S. Government Resources

- ITA is available to help U.S. companies understand the tariffs their products will be subject to in international markets.
- The U.S. government pursues maximum and shortest phase-in tariff reductions, ideally leading to zero tariffs, for building products in bilateral and multilateral trade agreements. Significant tariff reductions will be achieved when the Trans-Pacific Partnership (TPP) Agreement enters into force. Additional opportunities are being pursued in the Trans-Atlantic Trade and Investment Partnership (TTIP) Agreement and the World Trade Organization (WTO) Environmental Goods Agreement (EGA), now under negotiation.
- The U.S. government monitors and enforces implementation of its existing free trade agreements.

- The [FTA Tariff Tool](#) is a public resource available to assist U.S. exporters in understanding the tariff benefits of free trade agreements.

Challenge: Standards and Conformity Assessment (Non-tariff Market Access) Requirements

U.S. industry reports standards and conformity assessment issues (certification, inspection, sampling, testing and accreditation) as the most significant non-tariff barriers to trade for the building products sector. These types of barriers are burdensome for all exporters, and their inherent cost impacts may create a disproportionate burden for SMEs.

1) *Guidance for U.S. Exporters*

- *Market Intelligence:* As a key component of export market intelligence reports, ITA can provide U.S. exporters with access to subsector-specific information on standards (mandatory and voluntary) and conformity assessment requirements, so companies can best determine paths to compliance and reflect compliance in product marketing.
- *Standards Attachés at U.S. embassies:* ITA has standards attachés posted to U.S. embassies in Beijing, Brussels, Mexico City and Sao Paulo that can assist exporters with standards market access issues and provide early notice of construction and public works activities relevant to the building sector.

2) *U.S. Private Sector Notification of and Engagement in Standards Development Work*

- *U.S. firms are encouraged to engage in international standardization activities.* Participants actively engaged in the standards development process have the greatest impact on a standard, and many developing countries with limited resources rely on international standards rather than creating their own.
- There is significant work under way on sustainability and life cycle issues in standardization organizations, such as the International Organization for Standardization (ISO).
- ITA works with the American National Standards Institute to provide early warning about emerging standards issues and to encourage companies to become involved as a way to preempt possible market access issues.

- U.S. entities can sign up for notifications from National Institute of Standards and Technology (NIST) on standards development in target markets.

3) *Action to Resolve Existing Barriers*

If a U.S. exporter reports a market access barrier specific to standards and conformity assessment requirements, ITA is positioned to take the following actions:

- ITA may determine whether the situation constitutes a violation of the World Trade Organization (WTO) Technical Barriers to Trade (TBT) Agreement or one of our free trade agreements.
- If a potential concern or alleged violation is found, as a first step, ITA may develop an approach to relevant in-country authorities toward resolution, depending on the facts of the situation and working as appropriate with interagency partners. Subsequent steps are determined situationally.
- If no violation is found, ITA encourages the use of a broad range of mechanisms to resolve the issue.

4) *Advocacy Supporting International Standards Use*

- The consistent U.S. government message is that standards for sustainable construction facilitate trade and create certainty in international markets. They ensure that buyers have access to efficient solutions reflecting best consensus expertise and enable product and service providers to offer cutting-edge solutions.

5) *Building Capacity in Target Markets*

- To build capacity in target markets, the U.S. government facilitates *standards-related technical and policymaking information and best practice exchange to encourage business-friendly regulatory environments.* The U.S. government seeks to strengthen good regulatory practices that facilitate trade and investment. Examples include encouraging:
 - transparency about new and revised regulatory requirements;
 - technical dialogues and exchanges to introduce new materials, technologies and non-traditional building systems;

- consultations with the private sector as new regulations are being developed; and
 - clarity about which authorities have leadership responsibility or will implement and enforce regulatory requirements.
- The U.S. government communicates to target market regulators and construction industry players that standards for sustainable construction exist and are available to develop effective solutions to specific local challenges and that they are not only developed by ISO, International Electrotechnical Commission (IEC) and International Telecommunication Union (ITU). The U.S. government creates and leverages opportunities for U.S.-based international standards development organizations and U.S. manufacturers to provide information on their solutions.
 - *Building codes may create opportunities.* In addition to ensuring the safety and health of building occupants, building codes increasingly are being utilized as a regulatory tool to increase building performance.
 - International standards referenced in building codes are important mechanisms for facilitating trade in sustainable construction products and services. The U.S. government seeks to create opportunities for U.S.-based standards and code development organizations to showcase their referenced standards and code approaches.
 - As countries design greener building codes, the U.S. government also seeks to create opportunities to share information on best practices supporting the successful development, implementation, enforcement and evolution of building codes.

6) Utilizing Trade Agreements

- In negotiations of bilateral and multilateral free trade agreements, the U.S. government pursues provisions that reinforce existing commitments under the WTO TBT Agreement and strives for inclusion of next generation commitments above and beyond WTO TBT obligations in areas such

as regulatory cooperation and regulatory coherence.

Challenge: Intellectual Property Rights (IPR) Protection

U.S. exporters have reported instances in some international markets of counterfeit brand labels on building products as well as false performance claims on product labels.

U.S. Government Resources

- Information on U.S. government-created public-access tools and services designed to help SMEs protect and enforce their IPR can be found at the ITA-led website <http://www.STOPfakes.gov>.
- Exporters who need further assistance or who encounter IPR-related problems abroad can contact ITA's Office of Intellectual Property Rights (OIPR) experts for assistance in developing a strategy to address IPR problems. OIPR can also connect exporters to other U.S. government agencies and U.S. embassies around the world to pursue a course of action for resolution of problems.
- Basic information on intellectual property tips for the building products and sustainable construction sector include:
 - U.S. companies in the building products and sustainable construction sector should register their trademarks (brand names, logos, product names) in priority markets, monitor foreign markets for counterfeits and secure their supply chains from counterfeit building materials. Patents, including utility model patents available in some countries, can also be an important tool for maintaining a competitive advantage in innovative building products. Companies should take steps to protect trade secrets through implementing non-disclosure agreements, securing sensitive information and using other means of maintaining confidentiality.

Challenge: Expanding the Green Portion of Construction Markets

For economies in which the U.S. market share is high and where there is a recognized, stable regulatory regime, U.S. government agencies may seek to focus efforts on helping the target market expand the green segment of its built environment in which U.S. products are highly competitive.

U.S. Government Response Tools

- *Share information and best practices.* U.S. government agencies seek to share information and best practices in areas proven to expand green building. A range of areas might include, for example:

- best practices in workforce development related to closing green construction capacity gaps;
- models of innovative public or private financing mechanisms for green building; and
- information on how countries are using cutting-edge tools such as Building Information Modeling (BIM) as part of a policy framework to expand green building. (BIM is a 3D, model-based process for planning, design, construction and operation of buildings.)

ⁱ Global Construction 2030, Oxford Economics and Global Construction Perspective, November 2015.

ⁱⁱ United Nations Environment Program, Department of Economic and Social Affairs, Population Division

ⁱⁱⁱ United Nations Environment Program, Climate Change Mitigation statement

^{iv} U.S. Census Bureau U.S. Merchandise Trade data for 2014 was utilized

^v Global HVAC Equipment Market Analysis – Estimation and Forecast (2015-2022), Research and Markets, February 2016.

^{vi} Lighting the Way, McKinsey & Company

^{vii} World Plumbing – Demand and Sales Forecast, February 2015, Freedonia Group

^{viii} United Nations HS Merchandise Trade Database

^{ix} Grandview Research, November 2015.

^x Global Window and Door Industry 2013-2018: Trends, Profits and Forecast Analysis, Research and Markets, September 2013.

^{xi} UN HS Merchandise Trade Database