World Green Building Trends 2018 SmartMarket Report

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Carrier, its parent company, United Technologies Corporation, and Dodge Data & Analytics (then known as McGraw Hill Construction) first began collaborating on this research program in 2008 because both companies believed green building was poised to transform construction on a global scale. This 2018 edition of the research demonstrates that their vision has been fulfilled, more than either could have imagined.

This report compares data from the latest study (2018) to previous ones in the series (2012 and 2015), analyzing the level of green activity, the benefits of building green, the triggers most likely to spur further green market growth and the challenges that may impede it.

One of the most encouraging trends is the increasing percentage of respondents who expect to do the majority of their projects (more than 60%) green in most of the 20 countries/regions included in this study. The global average for this group is expected to increase from 27% to 47% between 2018 and 2021, and in about half of the locations, the percentage who expect they will be doing the majority of their projects green by 2021 is expected to double. This trend analysis clearly demonstrates increasing global commitments to building green.

This year’s study also features a deep look into the importance of healthier buildings as an element of green building. Findings validate its importance globally, with particular strength in diverse markets like China, Colombia, India, Ireland and South Africa, as well as the US. This is an emerging priority that can be expected to gain increasing traction in future studies.

Consistent with previous studies, the top challenges and triggers vary strongly by market, and thus, each market is analyzed in regional/country sections. Some of these sections compare the 2018 responses to those from 2015, providing a unique vantage point into the priorities and drivers in some of the top green markets in the world.

Among the most compelling elements of the data are the strong business benefits reported for both new green buildings and green renovations/retrofits of existing buildings. The findings since 2012 have clearly demonstrated the value of investing in green. For example, there has been a steady growth since 2012 in the number of owners who see a 10% or greater increase in asset value for new green buildings compared with traditional ones.

We would like to thank Carrier for their partnership on this research since 2008. We also thank the other organizations whose support made this SmartMarket Report possible, including the American Institute of Architects, Autodesk and the US Green Building Council, as well as the efforts of the World Green Building Council in advising on the study and promoting participation among its members.
Executive Summary

Green building activity continues to grow across the globe, with dramatic increases expected in 20 countries across five continents between now and 2021. The latest in a series of studies, the findings show great consistency in the benefits derived from green with previous studies in 2012 and 2015, but they also demonstrate the increasing influence of social factors like creating a sense of community, encouraging sustainable business practices and especially improving occupant health and well-being.

Green Building Activity Is Increasing, But Is Not Always Certified
For the first time, global respondents were asked two questions about their level of green activity: the percentage of their projects considered green using a definition provided in the survey, and the percentage of their projects that are or will be certified under a recognized green building system. (See the Methodology on page 75 for the definition provided for green building.)

The chart at right reveals the total share of green projects reported by all global participants in the study currently, and the expected share in three years. It demonstrates that green building activity will increase, and, even more important, it shows that most of the increase comes from a large percentage of respondents (47%) who believe that they will build the majority of their projects (more than 60%) green by 2021.

The findings also reveal that some respondents who do the majority of their projects green are not certifying all of those projects. More important, the gap among those doing the majority of their projects green and those who are actually seeking green certification on the majority of their projects is expected to grow between 2018 and 2021. This indicates that green activity is expected to exceed certification activity and may suggest that those experienced with green are using certification more strategically.

Growth in Green Driven by Ongoing Strong Business Benefits
The table at right shows the significant operating cost savings, short payback periods and asset value increases achieved from investments in new green buildings and green retrofit projects reported by respondents in the current study and the two previous ones in 2012 and 2015. The savings achieved, the payback periods and the increased asset values are strikingly consistent, despite changes in the number of respondents, in geographies and in global economic conditions over those years. These business benefits form the foundation that helps promote the growth of further green building activity.
Client Demands and Environmental Regulations Remain the Top Triggers for Building Green

The current findings, represented in the chart at right, closely echo those of the previous 2015 study. The top triggers demonstrate that the market is pulled by client demand and pushed by environmental regulations globally. However, the importance of these and other triggers vary significantly by country.

Creating Healthier Buildings Is a Priority for Green Building

Creating healthier buildings is also an important trigger for green building globally, especially in Brazil, China, India, South Africa and the US. In addition, improving occupant health ranks first among the social reasons for building green, and the percentage selecting it has jumped 5 points from the 2012 study.

Social Reasons for Building Green Gain in Importance Over Time

Consistent with the 2012 and 2015 studies, respondents in 2018 were asked to rank several social reasons for building green on a one to five scale, from not important to very important. The chart at right shows the percentage who consider several of the reasons provided to be important/very important.

In addition to demonstrating the importance of healthier buildings, the chart shows a general trend of ascribing increased importance to the social reasons for building green over time, especially increasing worker productivity, creating a sense of community and supporting the domestic economy.

Obstacles to Building Green

Respondents citing higher first costs as a top obstacle has dropped from 76% in 2012 to only 49% in 2018. However, despite the drop, it still remains the top barrier in 2018.

Three additional barriers are selected by roughly one third of the respondents: lack of political support or incentives, affordability (green is for high-end projects only) and lack of public awareness. The degree to which each of these barriers is influential varies a great deal by country, suggesting different strategies are needed to promote green globally.
Green Building Activity and Trends in North America

North America is comprised of three active green markets, although the Canada and US market is more mature than that of Mexico. Costs are a particular concern for this region, although Canada and Mexico both report strong business benefits from their green building projects.

When comparing the findings of Canada, Mexico and the US, it is important to consider the percentage of participants in the survey who are members of green building councils (GBCs). Canada has the second highest percentage in the study as a whole, at 63%, the US is slightly above average at 53%, and Mexico is well below average at 20%. These percentages may influence the relative levels of activity reported in these markets.

Green Building Market Activity

All of the three major markets in North America—Canada, Mexico and the US—currently have relatively high levels of green building activity. Over 85% of respondents from all three countries do at least some green building, and for over two thirds, green projects account for more than 15% of their work. However, there are also some notable differences in the level of green activity by country.

- **Canada** has the highest percentage (35%) of those doing the majority (over 60%) of their projects green, and the US is close behind at 32%.
- **While Mexico lags in terms of those doing a majority of green projects, a higher percentage of those respondents currently report a moderate (31% to 60% green projects) and low (15% to 30%) level of green activity than in the US and Canada.**
- **Mexican respondents are very enthusiastic about the percentage of green projects they will be doing by 2021,** with those expecting to do a majority of green projects doubling from 27% in 2019 to 54% by 2021.

By 2021, a higher percentage of respondents from all three countries expect to see their levels of green building activity increase.

- **Canada and the US report the same 13 percentage point uptick in those expecting to do the majority of their projects green.** This level of growth reveals highly active, growing markets in both countries.

SECTORS WITH EXPECTED GROWTH

The top sectors for green projects in Canada, Mexico and the US vary. The analysis includes comparisons to the 2015 study for the US and Mexico,
but not for Canada, since Canada did not have a sufficiently large level of participation in the previous study.

- The top sector for green building in Canada is new institutional construction, selected by 60%.
- 45% also anticipate doing green institutional construction in the US, a figure substantially above the percentage in Mexico (32%) and the global average (37%). This percentage is also consistent with the findings from the 2015 study for US engagement in green institutional construction.
- The top sector for green building in the US is green existing buildings/retrofits, selected by 50%. This is higher than the percentage (43%) who reported that they expected to do work in this sector in 2015.
- Green existing buildings/retrofits is also an active sector in the Canadian green building market, with 52% expecting to be engaged in these projects.
- Mexico at 32% lags considerably behind the US and Canada in expectations for green existing buildings/retrofits, but Mexico is also more in line with the global average (37%), which the US and Canada far exceed. However, this is a drop from the findings in 2015, when nearly half (48%) of respondents from Mexico expected to do green retrofit projects.
- The top sector for green building in Mexico is new commercial construction, selected by 52%. However, it is notable that this is a drop from the 65% who expected to do new green commercial construction in 2015.
- A relatively high percentage in Canada (44%) and the US (45%) also expect to do these projects, but both are below the global average of 51%. In the US, this is also on par with the findings from the 2015 study.
- Low-rise residential construction is also selected by a high percentage of Mexican respondents (43%). The percentage anticipating doing this work in Canada (37%) is also above the global average of 30%, but the US (25%) is notably below that average for this sector. This was not one of the top three sectors in Mexico in 2015, though, which suggests that it has gained in importance in this market.

### Influence Factors for Future Green Building Activity

#### TRIGGERS

While there are some overlaps, there are also some significant differences in the percentages who identify their top triggers for new green building activity in Canada, Mexico, and the US.

- **Client demands** is the top trigger in Canada and the US, particularly in Canada, where it is selected by 50%. Client demands was also the top trigger in the US in the 2015 study, selected by an even higher percentage (52%) than in the current study.
- **Environmental regulations** are an important trigger for green building in Canada and Mexico. In Mexico, this is a big change from 2015, when environmental regulations were not even included among the top five triggers.
- **Market transformation** is also selected by a high percentage of Mexican respondents (43%). The percentage anticipating doing this work in Canada (37%) is also above the global average of 30%, but the US (25%) is notably below that average for this sector. This was not one of the top three sectors in Mexico in 2015, though, which suggests that it has gained in importance in this market.
- **Healthier buildings** is also an active sector in the Mexican green building market, with 52% expecting to be engaged in these projects.
- **Lower operating costs** is also selected by a high percentage of Mexican respondents (43%). The percentage anticipating doing this work in Canada (37%) is also above the global average of 30%, but the US (25%) is notably below that average for this sector. This was not one of the top three sectors in Mexico in 2015, though, which suggests that it has gained in importance in this market.

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**Top Triggers Driving Future Green Building Activity in North America**

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<table>
<thead>
<tr>
<th>Trigger</th>
<th>Canada</th>
<th>US</th>
<th>Mexico</th>
<th>Global Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Client Demands</td>
<td>50%</td>
<td>44%</td>
<td>19%</td>
<td></td>
</tr>
<tr>
<td>Environmental Regulations</td>
<td></td>
<td>39%</td>
<td>28%</td>
<td>32%</td>
</tr>
<tr>
<td>Right Thing to Do</td>
<td>31%</td>
<td>28%</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>Healthier Buildings</td>
<td>29%</td>
<td></td>
<td>25%</td>
<td>27%</td>
</tr>
<tr>
<td>Market Transformation</td>
<td></td>
<td>23%</td>
<td>12%</td>
<td></td>
</tr>
<tr>
<td>Lower Operating Costs</td>
<td>19%</td>
<td>15%</td>
<td>28%</td>
<td></td>
</tr>
</tbody>
</table>

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Dodge Data & Analytics, 2018

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has also increased in importance since the 2015 study, when 25% of Mexican respondents considered it a top trigger.

- Healthier buildings is an important trigger in the US and a moderately important one in Canada, but few in Mexico consider it an important trigger for building green. Since it was not included in the 2015 study, no comparison is possible for the US or Mexico.
- Doing the right thing also continues to be an important trigger for green building in Canada, and a moderately important one in the US.

**CHALLENGES**

The top challenge to increased green building reported in Canada, Mexico and the US is higher first costs (perceived or actual). 73% of US respondents in the current study select this as a top challenge, far more than the 53% in Canada, and the 41% in Mexico or the 49% global average for this factor. In the US, the finding is consistent with the 2015 study, in which 70% regarded higher costs as a top challenge. However, in Mexico, the percentage has reduced considerably since 2015, down 13 points from 54%.

In the US and Canada, affordability (the perception that green is for high-end projects only) is the second biggest obstacle, selected by 37% in the US and 36% in Canada. It is notable that the third most commonly noted obstacle in the US (30%) and the fourth in Canada (31%) is the challenge in making the business case due to the split between operational and capital costs. The combined importance of all these obstacles suggests that costs in general are the major obstacle to building green.

In Mexico, the lack of political support or incentives for green is considered a top obstacle by 39%, the second highest for this country and consistent with the findings from 2015. It is the third highest obstacle in Canada at 32%, but only 26% in the US select it.

It is also notable that 30% select high levels of corruption in the industry/government in Mexico, three times the global average for that factor.

**Social and Environmental Reasons for Building Green**

**SOCIAL REASONS**

Respondents were first asked to rate the importance of six social reasons for building green, including creating a sense of community, improved worker productivity, improved aesthetics, supporting the domestic economy, encouraging sustainable business practices and improving occupant health and well-being. Then those who rated each as important were asked to select their top two social reasons for building green.

For Canadian, Mexican and US respondents alike, two factors emerged as the top two: improving occupant health and well-being, and encouraging sustainable business practices.

- A much higher percentage of respondents from the US (78%) select improved occupant health and well-being as one of the top two social reasons for building green than any of the other reasons, or than respondents from Canada (61%) or Mexico (54%).
- Encouraging sustainable business practices is selected among the top two by the highest percentage in Mexico (61%), and by relatively high percentages in Canada (59%) and the US (59%) as well.
- Aesthetics ranks higher in Canada than in most countries, with 30% of respondents selecting it among their top two social reasons for building green.

### Expected Business Benefits of Green Building in North America

<table>
<thead>
<tr>
<th></th>
<th>New Green Building</th>
<th>Green Retrofits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Canada</td>
<td>Mexico</td>
</tr>
<tr>
<td>Decreased Operating Costs Over One Year</td>
<td>12%</td>
<td>11%</td>
</tr>
<tr>
<td>Decreased Operating Costs Over Five Years</td>
<td>21%</td>
<td>23%</td>
</tr>
<tr>
<td>Payback Time for Green Investments (Years)</td>
<td>8</td>
<td>5</td>
</tr>
</tbody>
</table>
ENVIRONMENTAL REASONS

The respondents had a similar set of questions for their top environmental reasons for building green to those they had for their top social reasons. The following considers the choices of the top two among all the environmental reasons rated as important.

- The most frequently selected environmental reason for building green in the US, Canada and Mexico is to reduce energy consumption. Roughly two thirds of the respondents in each country who considered this important selected it among their top two. This is consistent with other findings in the study and the findings of previous studies for the US and Mexico.

- Protecting natural resources was also selected by a high percentage from each country, including 46% from Mexico, 38% from the US and 37% from Canada.

- Reducing water consumption ranks high for Mexican respondents as well, with 47% selecting it among the top two environmental reasons for building green. That is far more than respondents from the US (28%) or Canada (21%). This factor has increased in importance in Mexico since 2015, when it did not rank among the top three environmental reasons for building green.

- Lowering greenhouse gas emissions is a high priority in Canada, with 48% of respondents selecting it as one of their top two environmental reasons. A moderate percentage in the US (36%) and Mexico (31%) also consider this important.

- Surprisingly, relatively few select improved indoor air quality as an environmental reason for building green, despite the importance of healthier buildings as a social reason. It is possible that most view the environment as an external factor outside of the building, and therefore are less likely to choose indoor conditions as an environmental priority.

GREEN RETROFITS

The US estimates for operating cost savings on green retrofits in a 12-month period more closely align to those from Canada and Mexico, with all reporting a relatively high percentage.

Five-year estimates, though, are far more optimistic in Mexico, with 61% selecting the category of 15% or more.

Payback periods for retrofit projects are one year shorter than those expected for new green projects in Canada and the US, and one year longer than for new green projects in Mexico.

Business Benefits

NEW GREEN BUILDINGS

Respondents from Canada and Mexico are more optimistic about 12-month operating cost savings in their new green buildings than those in the US, and than the global average, with median average savings of 12% and 11%, respectively, compared with the US and global average of 8%.

That pattern continues in their estimation of five-year operating costs savings, with median savings boosted for both Canada and Mexico by the high percentage of those who select the highest category included in the study of 15% savings or more (53% selecting that range in Canada and 55% in Mexico). In contrast, the US expectation of 13% savings is on par with global averages.

Mexico also has a shorter payback period for investment in new green buildings than do Canada or the US, probably due to less expensive labor costs.
Methodology:

World Green Building Trends Research

The World Green Building Trends Study was conducted to achieve the following objectives: 1) identify triggers, obstacles and reasons for adopting green building in the domestic marketplace; 2) measure past, current and future levels of activity in green building; 3) identify important construction sectors for growth in green building; 4) measure the impact of green building practices on business operations; 5) profile the use of green building products and/or methods; and 6) uncover trends in the industry through comparison with relevant findings from the 2012 and 2015 Global Trends in Green Building Studies.

The study was conducted between April and June 2018. It was fielded using panel providers, email blasts and association broadcast to members, or by forwarding the link to other groups as follows: 1) multiple Green Building Councils across the world sent email invitations to their members; 2) several associations (AIA, ACE, CIOB, IMEI and USGBC) sent the survey link to members; and 3) the survey was sent to a Dodge Data & Analytics database of industry professionals.

Study Participants

2,078 architects, engineers, contractors, owners, specialists/consultants and investors responded to the survey. All respondents were required to be employed construction professionals and to have non-building projects account for no more than 50% of their office’s revenue.

The distribution of respondent is as follows:
- Architect/Design Firm: 25%
- Contractor/Builder: 23%
- Specialist/Consultant: 21%
- Owner/Developer: 18%
- Engineering Firm: 12%
- Investor: 1%

Respondents were located in 86 countries, listed on page 76. Sufficient responses were provided for statistically significant analysis to be conducted for 19 countries, also listed on page 76.

COUNTRIES FEATURED

The percentage of respondents by the countries featured in report are as follows, along with the percentage of respondents from that country who are members of a green building council (GBC):
- Australia: 5% of total; 63% GBC respondents
- Brazil: 2% of total; 12% GBC
- Canada: 3% of total; 68% GBC
- China Mainland: 2% of total; 14% GBC
- China Hong Kong: 2% of total; 46% GBC
- Colombia: 6% of total; 46% GBC
- Germany: 2% of total; 8% GBC
- India: 19% of total; 51% GBC
- Ireland: 1% of total; 61% GBC
- Mexico: 3% of total; 20% GBC
- Norway: 4% of total; 73% GBC
- Poland: 3% of total; 39% GBC
- Saudi Arabia: 2% of total; 8% GBC
- Singapore: 3% to total; 28% GBC
- South Africa: 4% of total; 52% GBC
- Spain: 1% of total; 65% GBC
- UAE: 2% of total; 48% GBC
- UK: 4% of total; 13% GBC
- US: 16% of total; 53% GBC
- Vietnam: 3% of total; 39% GBC

Benchmark of Accuracy

The total sample size of 2,078 benchmarks at a high degree of accuracy: 95% confidence interval with a margin of error of 2%.

Definition of Green Building

Respondents were asked about their company’s level of green activity in two ways: by the share of green certified projects out of their overall work, and by the share of total green projects. For the determination of what qualified as a green building, the following definition was provided:

At a minimum, for a building project to be considered green, it must include the following:
- Efficient use of energy, water and other resources
- Pollution and waste reduction measures, and the enabling of reuse and recycling
- Good indoor environmental air quality
- Consideration of the environment in design, construction and operation

In addition, green building projects include as many of the following as possible:
- Use of renewable energy, such as solar energy
- Use of materials that are non-toxic, ethical and sustainable
- Consideration of the quality of life of occupants in design, construction and operation
- A design that enables adaptation to a changing environment
The results in this report are drawn from survey respondents from the following 86 countries, with statistically significant results on the highlighted 19 countries. See region/country-specific results on pages 46–74.

Afghanistan  Afghanistan  Angola  Argentina  Australia  Austria  The Bahamas  Bahrain  Bangladesh  Belgium  Bermuda  Botswana  Brazil  British Indian Ocean Territory  Brunei  Cambodia  Canada  China (Mainland and Hong Kong)  Colombia  Costa Rica  Czech Republic  Democratic People’s Republic of Korea  Dominican Republic  El Salvador  Finland  France  Germany  Ghana  Gibraltar  Greece  Guatemala  Guyana  Hungary  India  Indonesia  Iran  Ireland  Israel  Italy  Japan  Jordan  Kenya  Kuwait  Latvia  Lebanon  Lesotho  Malaysia  Malta  Mexico  Moldova  Morocco  Namibia  New Zealand  Nicaragua  Nigeria  Norway  Oman  Palestine  Pakistan  Panama  Peru  Philippines  Poland  Portugal  Puerto Rico  Qatar  República de Cuba  Romania  Saudi Arabia  Sierra Leone  Singapore  Slovakia  Slovenia  South Africa  Spain  Sri Lanka  Sweden  Switzerland  Trinidad and Tobago  Turkey  Ukraine  United Arab Emirates  United Kingdom  United States  Uruguay  US Virgin Islands  Vietnam
Resources

Organizations and websites that can help you get smarter about global green building trends.

ACKNOWLEDGEMENTS:

The authors wish to thank Carrier, and its parent company United Technologies Corporation, whose vision and commitment have been essential to this research series since 2008.

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In addition, we thank World GBC for their active role as a research partner in helping the study be a success. We also appreciate the efforts of the GBCs globally who shared the survey with their members.

We also thank our other research partners, ACE, CIOB and IMEI, for their efforts to broaden the reach of our survey and variety of responses.

Finally, we thank all the individuals and organizations who contributed their experiences, data and images for publication in the case studies, along with those who agreed to provide their insights in our feature articles.

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