

Calculating Hotel Industry Impact:

The Case of Hilton Lightstay

by Daniella Foster, Eric Ricaurte, and Lindy Farrar

EXECUTIVE SUMMARY

With the development of such initiatives as the Paris Agreement and UN Sustainable Development Goals (SDGs), many of the world's nations are pledging action to address concerns regarding carbon production and energy use. Likewise, a substantial number of hotel companies are participating in carbon-reduction efforts, even as the lodging and travel industry continues its rapid growth. The ability to measure the industry's environmental performance is an essential first step toward addressing the industry's conservation efforts. Building on the data collected for the Cornell Hotel Sustainability Benchmarking (CHSB) Index, this study is the first to lay the groundwork for measuring the industry's collective impact by combining several data sets to estimate the total supply, energy usage, water usage, and carbon emissions of the hotel industry worldwide—based on room count. Taking the next step, the study uses results of Hilton's LightStay program—a value-chain approach to improving environmental performance that engages franchisees and centers on management—as an example of its analytical methodology. Applying this sustainability management platform, the analysis finds that Hilton reduced its portfolio-wide energy usage intensity by 22 percent, water usage intensity by 22 percent, and carbon emissions intensity by 34 percent from 2008 through 2018. Through this example, the study demonstrates methods to evaluate the industry's overall ability to improve performance and collaboration. Most critically, the analysis demonstrates a method that can be applied by any hotel or firm, regardless of size, including franchisees and independent properties.

ABOUT THE AUTHORS



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The global lodging industry has long been focused on making efforts to reduce its use of resources. However, only recently have industry participants joined together to measure their overall resource use and chart the reduction of such use. Thus, the story of sustainable development is now being told through metrics and goals. The first chapter of what we now call sustainability focused the industry's efforts over a half century on identifying common issues, building awareness, and figuring out how to calculate conservation performance. With the ability and willingness to measure usage, the year 2015 marked a new chapter, in which the industry has moved toward common objectives for collective impact.

Beyond the industry itself, global agreements now exist on the collective performance needed to mitigate climate change, notably with the Paris Agreement. This agreement is the first-ever universal, legally binding global climate deal that aims to mitigate climate change and adapt to its effects. Governments adopting the deal agree to a long-term goal of keeping global temperature rise to a level that is well below 2°C above pre-industrial levels. To limit the adverse effects of climate change and reduce risks, signatories must pursue efforts to further limit the current temperature increase to 1.5°C, and to achieve net zero emissions in the second half of this century. As part of the agreement, ratifying parties also agree to set additional targets every five years, publicly report on their progress, and track their progress through a transparency and accountability system. As of September 2019, 185 parties have ratified the agreement.¹

Commitments are not only stemming from the public sector, but also the private sector, as companies seek to reduce their carbon footprint and resource-use intensity. Businesses have engaged in such initiatives as the Renewable Energy Buyers Alliance, rallying businesses toward larger buyer demand to make renewable power more feasible.² More broadly, the UN Sustainable Development Goals (SDGs) consist of a set of 17 goals and 169 targets, which include objectives to end poverty, protect the planet, and ensure prosperity for all. Each goal comprises a set of targets intended to be achieved by 2030.³ Sustainable tourism is specifically mentioned in several SDG targets, including the promotion of sustainable tourism to contribute to the local economy (SDG 8—*decent work and economic growth*), monitoring of sustainable tourism to create jobs and promote local culture and products (SDG 12—*responsible production and consumption*), and the increase in economic benefits from the sustainable use of marine resources, including those relating to tourism (SDG 14—*life below water*).

Given that the travel and tourism industry generates 10.4 percent of all global economic activity,⁴ the industry represents a critical segment for achieving

sustainable development goals. In that regard, 2017 was named the International Year of Sustainable Tourism for Development. Designated by the United Nations 70th General Assembly, the International Year sought to support a change in policies, business practices, and consumer behavior toward a more sustainable tourism sector that also contributes to the UN Sustainable Development Goals. The International Year promoted tourism's role in the following key areas: (1) inclusive and sustainable economic growth; (2) social inclusiveness, employment, and poverty reduction; (3) resource efficiency, environmental protection, and climate change; (4) cultural values' diversity and heritage; and (5) mutual understanding, peace, and security.⁵

Industry goals. In response to the Paris Agreement, SDGs, and the International Year of Tourism for Sustainable Development, the International Tourism Partnership (ITP) launched the following set of 2030 goals specific for the hotel industry:

- **Carbon**—embrace the ambition of science-based targets and encourage the wider industry to join its collaboration to develop carbon reductions at scale;
- **Water**—support increased water-use efficiency, sustainable withdrawals, and supply of freshwater to address water scarcity and reduce the number of people affected by water scarcity by embedding water stewardship programs across hotel portfolios;
- **Youth employment**—collectively assist one million young people under 25 through employability programs led by hotels by 2030; and
- **Human rights**—drive positive change on respect for human rights and fostering safe and inclusive working environments.⁶

These industry goals, adopted by ITP's members (constituting over a dozen global hotel companies), are a seminal part of the discussion for hotel collective impact. These goals translate the issues of the Paris Agreement and SDGs, and focus them on four key areas relevant specifically to, for, and by the hotel industry. This enables each member, and ultimately individual properties to align and contribute to the industry's potential for collective impact.

These initiatives come at a time when tourism is growing at a rapid pace and faces an emerging

¹ United Nations Climate Change. (2019) Paris Agreement – Status of Ratification. <https://unfccc.int/process/the-paris-agreement/status-of-ratification>.

² rebuyers.org.

³ United Nations. (2019) Sustainable Development Goals. <https://sustainabledevelopment.un.org/?menu=1300>.

⁴ World Travel and Tourism Council. (2019) "Travel & Tourism continues strong growth above global GDP." <https://www.wttc.org/about/media-centre/press-releases/press-releases/2019/travel-tourism-continues-strong-growth-above-global-gdp/>.

⁵ Prokosch, Peter. (2019) "2017: International Year for Sustainable Tourism for Development," Linking Tourism and Conservation. www.ltandc.org/2017-international-year-for-sustainable-tourism-for-development/.

⁶ International Tourism Partnership. (2019) ITP Goals. www.tourismpartnership.org/itp-goals/.

backlash due to the global trend of efforts to prevent “overtourism.”⁷ The concern stems from amazing jumps in some countries’ international tourism arrivals—an upsurge fueled by multiple factors. One of these is rapid economic growth that has created an affluent middle class with a disposable income available for leisure travel, particularly in the Asia-Pacific region. The Chinese emerging economy, for example, has shattered all forecasts to become a travel market force. Additionally, increased interest in travel among emerging markets due to their rising income and prosperity has led to further tourism growth. The influence of social media and desire to use travel as a form of self-expression among this group has significantly promoted tourism growth and created unprecedented expansion in the region.⁸ Asian countries, particularly Japan, Korea, Vietnam, and Thailand, have experienced significant arrival growth. Korea experienced a 15-percent growth in the arrival of visitors between 2017 and 2018, for instance.⁹ Likewise, international arrivals in Thailand reached a new record in 2018, exceeding 38 million, a 7.5-percent increase over the previous year, and that figure is expected to reach over 41 million in 2019.¹⁰ Europe is also part of this growth trend. In 2017, European Union international tourist arrivals reached half a billion, accounting for 40 percent of the world’s total arrivals.¹¹ One of the outcomes of this growth has been an increased awareness of the relationship of tourism to its potential impacts, both positive and negative. Sustainable tourism is a longstanding concept that has come into the global spotlight, not for the need to grow ecotourism options, but to manage tourism’s growth sustainably. This encompasses making optimal use of resources while maintaining ecological processes and conserving natural habitats and biodiversity; respecting the host communities and their heritage; and ensuring long-term

economic operation, while providing socio-economic benefits to all stakeholders.¹²

Beyond its global benefits, promoting sustainable tourism is a logical strategy for destination managers. Given the fact that a destination’s attractiveness is based on its unique natural and cultural heritage, it only makes sense that the destination’s resources and attractions should be protected and valued.¹³ The challenge of sustainable tourism arises when a destination with a vast value chain must balance economic growth with the preservation of resources. The community must determine the optimum path of managing the influx of tourists, as the volume of arrivals affects a destination’s people, environment, and economy. Hotels must be part of any efforts toward sustainable tourism.

With the Cornell Hotel Sustainability Benchmarking study, now in its sixth year, many industry operators are participating in the type of research that is needed to explore how the industry’s collective impact can be aggregated and then related to a particular hotel firm or an individual hotel. In this study, we present the case of Hilton Worldwide’s environmental performance within the context of this trend. We focus on Hilton in part because it now has a data record extending over ten years for many of its properties.

In 2008, Hilton rolled out LightStay, a sustainability management platform which enabled tracking and monitoring performance in aggregate across all Hilton-branded hotels. This allowed hotels within the portfolio—including owned, managed, leased, and franchised properties—to manage and increase efficiency in a consistent platform. This is an important step forward, given the diversity of management and ownership within any company’s portfolio. To begin with, however, the aggregate results were not tangibly related to the impact their performance had on such matters as climate change, water availability, or community. Consequently, the research presented here seeks to add to the body of literature first by quantifying the global supply of the hotel industry for energy, water, and carbon emissions and then comparing those figures with Hilton’s data set to explore the potential for collective impact.

⁷ Shevachman, Andrew. (2017) “It’s summer and everyone is writing about overtourism,” Skift. <https://skift.com/2019/06/19/its-summer-and-everyone-is-writing-about-overtourism/>

⁸ UNWTO/GTERC. (2018) Asia Tourism Trends: 2018 Edition. <https://www.e-unwto.org/doi/book/10.18111/9789284420056>.

⁹ Korea Tourism Organization. (2019) Korea, Monthly Statistics of Tourism. https://kto.visitkorea.or.kr/eng/tourismStatics/key-Facts/KoreaMonthlyStatistics/eng/inout/inout.kto?func_name=3.

¹⁰ Royal Thai Embassy. (2018) Thailand Tourism: Thailand sets new tourism record with over 38 million arrivals. <https://thaiembdc.org/2019/02/04/thailand-sets-new-tourism-record-with-over-38-million-arrivals/>.

¹¹ World Tourism Organization UNWTO. (2019) European Union Tourism Trends. <https://www.e-unwto.org/doi/pdf/10.18111/9789284419470>.

¹² World Tourism Organization UNWTO. (2019) Sustainable Development of Tourism Definition. www.sdt.unwto.org/content/about-us-5.

¹³ World Tourism Organization UNWTO. (2017) Sustainable Cruise Tourism Development Strategies: Tackling the Challenges in Itinerary Design in South-East Asia. www.e-unwto.org/doi/pdf/10.18111/9789284417292.

Recognizing the Hotel Company's Footprint

The impacts of a hotel go far beyond its doors to the entire value chain, including the local community members who are employed at the property and the hotel guests' travel footprint, as well as products those travelers buy and the experiences they seek. The Global Sustainable Tourism Council (GSTC) has standardized common criteria and accredited various certification programs, which encompass issues beyond operations extending into a hotel's value chain.¹⁴ The overarching theme is to maximize benefits to local communities and the environment, while minimizing negative impacts. This includes ensuring that the development of a hotel property does not cause adverse natural impacts or generate unethical practices toward local inhabitants, using appropriate and sustainable practices and materials, such as local employment and purchasing, applying appropriate marketing aspects, and helping guests be responsible tourists while visiting the destination.

Hotels can choose to incorporate sustainability throughout their entire value chain, including procuring local products and ensuring that centrally purchased goods are ethically procured in terms of social responsibility and sustainability. Thus, for instance, a hotel's procurement department can stimulate inclusive growth for local businesses and communities. Sustainable tourism also implies management of resources across this value chain. Water is a particular concern, as water stress and scarcity become bigger issues. As one example of the choices facing hotel operators, on the one hand, a hotel's effluent could pollute the natural resources tourists are going to visit, or, on the other hand, the hotel can support a sustainable model and prevent degradation.

The UN's Sustainable Development Goals and those of the International Tourism Partnership present a solid opportunity for hoteliers to rally around specific performance targets relating to environmental, social, and economic issues, such as poverty reduction, access to education, and gender equity. A challenge arises, however, in translating a company's performance in terms of its quantified contribution to those goals. As a first step, industries pool their efforts to quantify their impacts and footprint at an aggregate level and demonstrate collective impact to global goals. An example of this is the Sectoral Decarbonization Approach (SDA), which outlines the scenarios for

¹⁴ Global Sustainable Tourism Council. (2019) GSTC Destination Criteria. <https://www.gstcouncil.org/gstc-criteria/gstc-destination-criteria/>.

meeting the 2-degree goal. This approach provides guidance for companies to set "science-based targets," including mitigation potential and activity growth relative to economic and population growth.¹⁵ Subsequently, companies can relate their performance to the industry footprint, and in the case of the hotel industry, individual hotels can then see their relationship to the whole. In this vein, the ITP recently released a Hotel Global Decarbonization Report,¹⁶ which builds upon the SDA model for the hotel industry based on its supply, forecasted growth, and decarbonization pathways at high level, in both a contextual call to action and a benchmark for hotels to set science-based targets. Though such accounting is nascent, the ultimate benefit is the ability to recognize that each individual component plays a role in helping to make the industry more sustainable.

The franchising conundrum. For hotel companies, perhaps the largest step toward expanding the recognition of impacts and influence in their value chain is the involvement of franchised properties. As many chains did not have managerial control of these properties and in some cases were not able to obtain data, the companies initially did not include franchises in their reported metrics. In the case of Hilton, once LightStay was rolled out across both managed and franchised properties, the data made it clear that the franchised portfolio represents the bulk of Hilton's environmental footprint. The same is likely true for other global hotel chains with growth strategies focused on franchising. This means that engaging franchisees represents an immense opportunity to reduce impacts and to promote sustainable travel and tourism.

It is no secret that hotel ownership is fragmented globally, with a wide diversity of ownership structures. Thus, a hotel's owner could be a publicly traded real estate investment trust (REIT), large private equity fund, sovereign wealth fund, or state enterprise holding, but the owner also could be a small company or an individual. In the economy segment and in many emerging markets where the largest hotel pipeline now exists, franchisees may not be institutionally capitalized or globally represented. They are often local

¹⁵ Science Based Targets. (2015) The Sectoral Decarbonization Approach (SDA): A method for setting corporate emission reduction targets in line with climate science. <https://sciencebased-targets.org/wp-content/uploads/2015/05/Sectoral-Decarbonization-Approach-Report.pdf>.

¹⁶ International Tourism Partnership. (2017) ITP carbon report provides hotel sector's goal to mitigate climate change. www.tourismpartnership.org/blog/itp-carbon-report-provides-hotel-sectors-goal-mitigate-climate-change/.

small or mid-size enterprises (SMEs) or family investors who are tied to their local economies and have a vested interest in their destination's vitality. While individual hotel chains may have more information and insight regarding the entities that franchise their hotels, research has not been published regarding franchisees in general in terms of the economic value they represent, their types of business profiles, or their motives and views on hotel ownership as an investment choice.

Achieving global sustainability goals implies collective action. For the hotel industry, it's clear that no single entity can achieve a global target, and having a small fraction of managed properties achieve a target is insufficient if the wider supply of franchised and independent hotels miss that target. Likewise, one company's success toward sustainability is not relevant in the long-term if the majority of the industry and the hotel supply do not rally to achieve global goals. With those points in mind, hotel chains have the opportunity to engage owners and franchisees early in the process to help embed sustainability into hotel operations and investment decisions.

Focus on investment choices. In short, decreasing a hotel's environmental footprint requires owners and franchisees to agree on investment areas, including such common areas as boilers, chillers, windows, lighting, furniture, and architectural design. Three major areas that are key in determining a hotel's footprint are heating and air conditioning, hot water, and lighting.¹⁷ Regarding HVAC, for instance, switching to an air-to-water heat pump from a conventional heating system can save up to 50 percent on energy consumption and reduce a property's carbon footprint by 12,000 kg.¹⁸ To further decrease a hotel's footprint, the discussion surrounding investments is evolving to include investing and procuring renewable energy. All of these are good practices with proven returns, but if their value is not demonstrated to franchisees and supported from the beginning stages, they may be lost opportunities to increase the economic value afforded to local owners and economies. Not only do the decisions involve tactical specifications of a property's

¹⁷ Idaho Power. (2019) Additional Business Resources. https://docs.idahopower.com/pdfs/energyefficiency/businessstips/Commercial_Tip_Sheets_Hotels.pdf.

¹⁸ Bruns-Smith, A., Choy, V., Chong, H., and Verma, R. (2015). "Environmental Sustainability in the Hospitality Industry." Cornell Hospitality Report. Cornell University, School of Hotel Administration. Industry: Best Practices, Guest Participation, and Customer Satisfaction," Cornell Hospitality Report. Cornell University, School of Hotel Administration. www.scholarship.sha.cornell.edu/cgi/viewcontent.cgi?article=1199&context=chrpubs.

building envelope, capital equipment, and FF&E, but hotel companies and franchisees must discuss matters relating to brand environmental and social consciousness, as well as determine the individual investor's commitment to sustainability. By proactively engaging franchisees, hotel chains can address their impacts and help stimulate a wider change in the industry through a network effect of local hotel franchisees and owners at each destination.

That said, most of the world's hotel supply is not affiliated with any global chain, although hotel owners and operators are usually a part of associations or informal networks locally that can spread best practices if mobilized. As the industry continues to grow across the Asia Pacific regions, for instance, these regions prove less energy efficient than the United States and European markets, as they use sources to generate electricity which are more carbon intensive (such as coal). As just one example, the median carbon footprint of an overnight stay at a full-service hotel in the United States is 31.4 kg, which is less than half that of China (75.8 kg) and less than a third compared to Japan (94.6 kg).¹⁹

By calculating impact and bringing franchisee data into the fold, the hotel industry can help increase the boundary of data when working toward goals, and measure its performance based on a more representative boundary of its impact. Toward this idea, Hilton set out to examine the data from LightStay to assess its footprint of both managed and franchised properties in relation to the industry as a whole. The brand also measured how the gains in lowering its footprint through the LightStay program can translate to the industry's footprint. In the following section, the assumptions, calculations, and overall methodology are presented as a demonstration for an owner or operator of a portfolio of hotels, as well as a destination seeking to relate its hotel supply to the whole.

Estimating Hilton's Footprint in Relation to the Global Supply

To understand the contribution of Hilton's portfolio to the industry's carbon footprint, its metrics need to be compared according to the size and segmentation of its portfolio as they relate to that of the global hotel supply. Though global figures have been calculated

¹⁹ Ricaurte, E., and R. Jagarajan (2019) "Hotel Sustainability Benchmarking Index 2019: Energy, Water, and Carbon," *Cornell Hospitality Report* 19(4). Cornell University, School of Hotel Administration Center for Hospitality Research (chr.cornell.edu). Using measure 1, Hotel Rooms Footprint per the Hotel Carbon Measurement Initiative, methodology.

or quantified for travel and tourism as a whole,²⁰ as well as quantified in a high-level baseline scenario for decarbonization,²¹ a tally of the global supply of hotels and hotel rooms is not readily available. For that matter, the definition of what is a hotel is not always straightforward. Thus, our first step is to estimate the footprint by room count for full-service and limited-service hotels.

As a starting point, the 2018 statistics of hotel accommodations by country from the UNWTO tally a total of 712,299 hotels and 25,796,920 hotel rooms globally.²² Although this count seems precise, it is clearly overstated in some countries and understated in others, as several countries are either missing data partially or entirely, or they show unexplained variances from year to year. For example, the United Arab Emirates does not submit data to the UNWTO, and the United Kingdom's supply data are missing in some years. Additionally, in a comparison of 2018 data from India and Korea, Expedia lists over nine times as many hotels in India and four times as many in Korea as are reported through the UNWTO.²³ One reason for this discrepancy might be that the definition of a hotel is not uniform. Moreover, although the UNWTO ratio of hotel rooms in a country to its number of hotels is approximately 40 rooms per hotel, the ratio varies widely from country to country. Argentina's reported UNWTO data put that nation's average room count per hotel at approximately 16, for instance, while the ratio for neighboring Brazil is 32 and for Uruguay, 26. By comparison, in Macau, China, the ratio is at its highest with 326. Given that Hilton's 2018 global average in its data boundary was 160 rooms per hotel, it's clear that the global counts are influenced by the presence of many small hotels that offer just a few rooms.

Expedia's database also demonstrates the diversity of hotel sizes, as an analysis done in September 2018 demonstrated that over 44 percent of listed hotels have fewer than 20 rooms. At the same time, listed

²⁰ See: Gossling, S., Hall, M.C., Scott, D. (2015). *Tourism and Water*; also see: World Tourism Organization UNWTO. (2019) *Yearbook of Tourism Statistics*. *loc. cit.*

²¹ ITP Global Hotel Decarbonisation Report (2017) See: www.tourismpartnership.org/blog/itp-carbon-report-provides-hotel-sectors-goal-mitigate-climate-change/.

²² World Tourism Organization UNWTO. (2019) *Yearbook of Tourism Statistics*. *loc. cit.*

²³ Data compiled from listings of hotels and their room counts on expedia.com in September 2018.

hotels with over 20 rooms accounted for 93 percent of the total room count.

To estimate the global supply in 2018 and reduce the variance, the following steps were taken:

- (1) The UNWTO hotel and room count by country was adjusted (generally reduced) according to ratio of Expedia count to UNWTO count, using a boundary of hotels with more than 20 rooms.
- (2) When the UNWTO 2017 hotel count or room count was unavailable, a recent prior year from the UNWTO was used or else estimated based on the ratio of rooms per hotel for either that country in a prior year, or for the global average of approximately 40 rooms per hotel, then adjusted according to the previous step.
- (3) When UNWTO data were missing entirely or seemingly inaccurate, the country's Expedia inventory of hotels over 20 rooms was used, expanded by the overall ratio of hotel and room count found in UNWTO compared to Expedia globally.
- (4) When no data were available from either source, a global ratio of international tourism arrivals to hotel rooms was used, then extrapolated based on the UNWTO's statistics of 2017 international arrivals to the country.
- (5) For China, data were supplemented by figures obtained from www.ctrip.com.
- (6) Afghanistan, North Korea, Nauru, Somalia, South Sudan, and Syria were excluded, as no data were available for hotel supply or tourism arrivals.
- (7) A high-level estimate of 4 percent of hotels over 20 rooms being in the full-service category was used to segment the supply.

Estimated global supply. The resulting estimated global hotel supply in 2018 was 447,449 hotels, for a total of 27,646,937 rooms, or approximately 62 rooms per hotel. Of these hotels, 17,898 were full-service properties and 429,551 offered limited service. Though a relatively small fraction of the hotels in the world are full service, their room count is substantial, given their size. For example, the average full-service Hilton hotel in 2018 was 289 rooms, compared to 112 for a limited-service property. Given that branded hotels are likely to have much higher room counts than independent limited-service hotels, the average room count for limited-service hotels globally was estimated at 52. This translates to an estimated 5.2 million full-service

EXHIBIT 1

2018 estimated global hotel supply



| | All | Full Service | Limited Service |
|-------------------------------------|------------|--------------|-----------------|
| Hotel Count | 447,449 | 17,898 | 429,551 |
| Room Count | 27,646,937 | 5,167,525 | 22,479,412 |
| Average Room Count per Hotel | 62 | 289 | 52 |

Note: Includes only properties with 20 or more rooms.

rooms and 22.3 million limited-service rooms, as shown in the table and graphs in Exhibit 1.

Global hotel supply at all levels changes daily, even hourly, with the new hotels being added, renovated, or (occasionally) removed. Likewise, the definition of a hotel is also in flux, considering the expansion of timeshares, serviced apartments, vacation rentals, and exchanges. With those caveats, the overall estimate presented here is a step toward achieving the ultimate goal of quantifying collective impact, not statistical precision of supply.

Using a boundary of managed and franchised hotels that were fully open during by the end of 2018, Hilton’s footprint was 5,320 hotels comprising 852,745 rooms, representing approximately 1.2 percent of the global hotel supply. This calculation of Hilton’s share of the supply of hotels is relatively straightforward. However, its share of the footprint is more nuanced, because Hilton’s room count is higher than that of many other firms, with an average of 112 rooms per hotel, given that Hilton’s full-service properties constitute a relatively large portion of its portfolio. While

EXHIBIT 2

Estimated hotel supply by asset class

| | Estimated Global Supply | Hilton Share |
|-------------------------------|-------------------------|--------------|
| Total Hotels | 447,449 | 1.2% |
| Full-service Hotels | 17,898 | 8.2% |
| Limited-service Hotels | 429,551 | 0.9% |
| Total Rooms | 27,646,937 | 3.1% |
| Full-service Rooms | 5,167,525 | 8.2% |
| Limited-service Rooms | 22,479,412 | 1.9% |

room count and occupancy are often the best supply indicators for metrics of water usage, energy, and carbon emissions, floor area is the best supply indicator. Though the floor area of Hilton’s average hotel and guestroom is larger than that of the global hotel supply, it is even more difficult to estimate globally without sound statistics of the hotel supply. To further estimate that relationship, the difference between full-service and limited-service hotels can be used. Exhibit 2 outlines the difference in the portfolio segmentation and estimated share of the global supply. Thus, although Hilton’s 2018 estimated share was 1.2 percent of the hotel count, its share of room count was nearly 2 percent, and it has slightly over 8 percent of the supply of full-service hotel rooms.

Estimating Hilton’s Impact and the Industry Potential for Collective Impact

With those considerations, we began our calculation of Hilton’s share of energy usage, water usage, and carbon emissions within the global hotel supply by estimating the global supply’s footprint, which was derived from the 2019 Cornell Hotel Sustainability Benchmarking (CHSB) Index. The CHSB data constitute the industry’s largest data set, encompassing over 11,500 hotels and 2.2 million rooms. Nevertheless, that database represents less than 10 percent of the estimated global supply of rooms and is generally limited to branded hotels. The median values for full-service and limited-service hotels in each country were multiplied

EXHIBIT 3

Comparison of median energy and water intensity among full service and limited service hotels

| Geography | Median Energy Intensity (Kilowatt-hour per Square Meter) | | Median Water Intensity (Liter per Occupied Room) | |
|-----------|---|-----------------|---|-----------------|
| | Full Service | Limited Service | Full Service | Limited Service |
| | New York | 387 | 249 | 562 |
| Beijing | 218 | 188 | 1,001 | 522 |
| London | 325 | 212 | 369 | 278 |
| USA | 323 | 222 | 607 | 428 |
| China | 220 | 174 | 1364 | 757 |
| Indonesia | 200 | 182 | 907 | 351 |
| Mexico | 323 | 167 | 1007 | 447 |
| Thailand | 245 | 184 | 1267 | 577 |

by the estimated global hotel supply by country.²⁴ Full-service hotels tend to consume more energy and water than limited-service properties, as shown in the examples in Exhibit 3. Where data were not available for specific countries, the weighted average of metrics across all countries with available benchmarks was used to extrapolate for the remainder based on the estimated hotel supply of each country, using the estimated ratio of full-service to limited-service hotels (as discussed above). Exhibit 4 presents these results for 2017 in both a table and graphs.

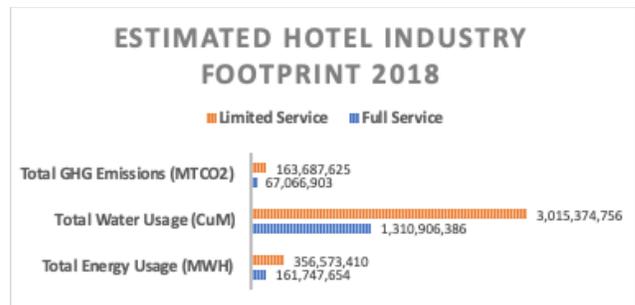
Relatively efficient. Hilton then compared its 2018 performance in proportion to the footprint of the global hotel supply, as shown in Exhibit 5. Interpreting those results, Hilton’s portfolio generally performs more efficiently in energy and carbon emissions than the global data set. While its full-service water intensity is better performing against the global data set, its limited-service water intensity is higher. Intensity figures are difficult to interpret globally, though, because

²⁴ Ricaurte and Jagarajan, *op cit.*

EXHIBIT 4

Estimated 2018 global hotel footprint and sustainability performance indicators

| | Global Estimate | | |
|--|-----------------|-----------------|---------------|
| | Full Service | Limited Service | All Hotels |
| Total Energy Usage (MWh) | 161,747,654 | 356,573,410 | 518,321,064 |
| Total Water Usage (CuM) | 1,310,906,386 | 3,015,374,756 | 4,326,281,142 |
| Total GHG Emissions (MTCO ₂) | 67,066,903 | 163,687,625 | 230,754,527 |
| Energy Intensity (kWh/RM) | 31,301 | 15,862 | 18,748 |
| Water Intensity (CuM/RM) | 254 | 134 | 156 |
| GHG Emissions Intensity (kgCO ₂ e/RM) | 12,979 | 7,282 | 8,346 |



Notes to Exhibits 4, 5, and 6

- MWh = megawatt hours
- kWh/RM = Kilowatt hours per room
- CuM/RM = Cubic meters per room
- MTCO₂ = Metric tons of carbon dioxide
- kgCO₂e/RM = kilograms of carbon dioxide equivalent per room
- kgCO₂e/M² = kilograms of carbon dioxide equivalent per square meter
- L/M² = liters per square meter

Hilton 2018 performance in comparison to the global hotel supply

| | Hilton 2018 Performance | | | Footprint Comparison | |
|---|-------------------------|-----------------|-------------|----------------------|-----------------|
| | Full Service | Limited Service | All | Full Service | Limited Service |
| Total Energy Usage (MWh) | 11,345,729 | 6,466,987 | 17,812,716 | 7.0% | 1.8% |
| Total Water Usage (CuM) | 91,529,354 | 50,943,646 | 142,473,000 | 7.0% | 1.7% |
| Total GHG Emissions (MTCO ₂) | 3,907,161 | 2,157,091 | 6,064,252 | 5.8% | 1.3% |
| Performance Comparison | | | | | |
| Energy Intensity (kWh/M ²) | 310 | 262 | 293 | | |
| Energy Intensity (kWh/RM) | 27,816 | 14,509 | 21,674 | -11% | -9% |
| Water Intensity (CuM/RM) | 225 | 162 | 196 | -11% | 21% |
| GHG Intensity (kgCO ₂ e/M ²) | 105 | 86 | 99 | | |
| GHG Intensity (kgCO ₂ e/RM) | 9,458 | 4,753 | 7,287 | -27% | -35% |

Note: Total figures include prorating of proportion of the 2018 calendar year for hotels added during 2018

of the statistical use of mean and median, and because of the geographical comparisons of performance, where Hilton's portfolio in each country is not equally proportionate to its respective hotel supply. For a truly fair comparison it would be necessary to weigh the performance relative to each country or market, as well as incorporate floor area metrics. However, by relating its corporate footprint to the overall footprint of the industry, Hilton is taking a step closer toward integrating its performance measurement to the global footprint and SDGs. Furthermore, Hilton's 2018 performance when taken into perspective of the improvements since 2008 can be viewed industrywide. As outlined in the next section, Hilton was able to reduce its energy, water, and carbon emissions intensity from a 2008 baseline through 2018. Should the global hotel supply, most of which is unbranded, achieve either similar reductions or similar performance to 2018, the impacts toward global goals would be substantial.

How Hilton Achieved Its Performance Improvements

Hilton's performance improvements are a combination of two primary factors: **(1)** managing performance companywide by implementing the LightStay system to enable hotels to improve performance over time; and **(2)** implementing a global brand standard so that new hotels joining the portfolio are increasingly built for greater efficiency.²⁵

Since 2008, Hilton has been tracking the cumulative savings in energy and water costs as part of the LightStay platform to enable goal setting and tracking for energy, water, and waste efficiency efforts. As a result, the company could monitor its annual and cumulative progress on sustainability across the entire portfolio. Properties tracked within the portfolio from 2008 to 2018 have improved their energy usage intensity by over 20 percent, and a new hotel added to the portfolio in 2016 was on average 26-percent more

²⁵ The geographic distribution, boundary of managed and franchised properties, and floor area per room ratio within the data set all stayed generally constant from 2008 through 2016.

Extrapolation of Hilton's performance improvement for collective impact

| | 2008 Baseline | 2018 Performance Changes | | Equivalent Reduction to Hilton Progress against Baseline | Equivalent Reduction to Hilton's 2018 Performance |
|---|---------------|--------------------------|--|--|---|
| Energy Intensity (kWh/M ²) | 383 | -22% | Total Energy (MWh) | (115,543,249) | (48,427,396) |
| Water Intensity (L/M ²) | 2,381 | -22% | Total Water (CuM) | (947,837,259) | 467,986,916 |
| GHG Emissions Intensity (kgCO ₂ e/M ²) | 157 | -34% | Total GHG Emissions (MTCO ₂) | (77,605,383) | (8,847,143) |

energy efficient per square meter in 2018 than the portfolio's performance in 2008. By 2017, cumulative savings for the company surpassed one billion (US) dollars, in addition to saving enough water to fill over 5,960 Olympic-size pools, eliminate the equivalent of nearly 20,000 households worth of food waste, and save energy that could power over 130,000 households. Exhibit 6 shows an estimated extension of Hilton's efforts as they could apply to the industry as whole.

Long-term effort. Hilton began managing energy use in the early 1970s, starting with the creation of energy management manuals and evolving toward an enterprise-wide strategy. In 2002, when Hilton Hotels Corporation and Hilton International were still separate companies, each company had their own reporting system (EnergyWatch, launched in 2002, and Hilton Environmental Reporting, launched in 2004). When the two companies recombined in 2007, the best of each system was used to create HEAT (Hilton Environmental Analysis and Tracking). HEAT was used to record the energy, water, and waste for all properties while taking the hotel's profile into account. HEAT evolved into LightStay to start tracking 200 sustainability-related metrics, including energy, with consideration of relevant variables (e.g., heating and cooling degree-days, occupancy, and floor area).

In 2008, Hilton formally launched its LightStay performance measurement platform to operationalize sustainability in all Hilton branded hotels. LightStay aimed to deliver value to hotel owners without additional costs, while reducing environmental impacts, improving the guest experience, and driving economic returns. As part of LightStay, Hilton also launched its "meeting impacts calculator" to measure the environ-

mental impact of any meeting or conference held at a Hilton property. The purpose of this tool was to enable meeting planners and corporate travel managers to consider the environmental impact of hotel stays and meetings when making purchase decisions. Additionally, to confirm effective implementation and validity of LightStay, Hilton commissioned a management systems design company to perform a series of third-party audits.

The roll-out took three years, and by 2011 all 3,500 properties within Hilton's global portfolio of brands were using LightStay, without any additional cost to the properties.²⁶ With sustainability as a brand standard across all properties (owned, managed, and franchised), the company became the first major multi-brand company in the hospitality industry to require property-level measurement of sustainability for its managed and franchised portfolio. LightStay, as well as all hotels through Hilton's brand standard approach, were also certified to ISO 14001 (Environmental Management) and (subsequently) ISO 50001 (Energy Management) standards, aligning it with cross-industry best practices in environmental management systems.

Expansion and upgrade. In 2015, LightStay was upgraded to cover a wider spectrum of environmental, operational, and social impact reporting. The upgrade included tracking historical energy and weather data, forecasting future energy usage levels, and predicting the impact of performance on cost and annual

²⁶ Hilton. (2010) Hilton Worldwide Unveils "Lightstay" Sustainability Measurement System. <https://newsroom.hilton.com/corporate/news/hilton-worldwide-unveils-lightstay-sustainability-measurement-system>.

consumption, taking into account variables such as occupancy and weather.²⁷ Currently all 5,600+ Hilton hotels are required by brand standard to track their environmental footprint, set annual energy, water, and waste goals, and complete improvement projects in all of those areas to help them achieve those goals. The platform allows hotels to monitor their energy use, water use, and waste, and respond accordingly to reach their goals. When they fall off track from those goals and their performance, the property is notified with opportunities for corrective action available through LightStay, with performance benchmarks to help justify the potential results.

Through data collection, Hilton continues to create tools and training for hotels, provide value for the company and owners, and improve reporting to share best practices and reduce environmental impacts. This resulted in the creation of sustainability goals as a method to empower property teams to evaluate their own sustainability issues and to foster the creation of new environmental practices. Hilton then required hotels to set goals and complete improvement projects based on their local operating context and environment.

As hotel owners and franchisees were able to monitor and interpret their data with more best practice resources, they could make more informed decisions on the efficiency measures to implement in their new hotels. Increased efficiency in building codes and technological improvements have helped new builds. Adding further brand standards helps ensure performance. LightStay also figures into those decisions still up to the owner and franchisee for driving efficiency. In those cases, Hilton's requirement of LightStay as a brand standard and including the system for all franchisees served as a method of building awareness so that the business case could be built among owners themselves. The efforts have not always succeeded, as some hotels added to the portfolio are less efficient than the portfolio average. These issues are then addressed through the LightStay program where the lower-performing properties can be identified and alerted.

Application for Smaller Hotel Chains and Independents

While the case for improving environmental performance resonates with the SDGs and global collective impact discussion, the financial savings associated

with improved performance should be compelling for SMEs and locally owned hotels. While Hilton built and branded its LightStay program for its own portfolio, the general approach can be applied at any hotel regardless of location, size, or chain affiliation. Furthermore, even though most of the world's hotels are independently owned or operated, all have similar opportunities to improve their environmental footprint. Though the technological aspects of LightStay were developed over time to manage data across Hilton's global portfolio, the approach is based on the following actions supporting effective hotel management:

- (1) Track and monitor consumption data and costs for energy, water, and waste monthly;
- (2) Set annual reduction goals each year for energy, water, and waste;
- (3) Model the performance over time, identifying and explaining deviances;
- (4) Undertake and record three improvement projects annually (which can be ongoing or span multiple years), one per each area in energy, water, and waste; and
- (5) Update the property's attributes and other profile data to ensure accurate information.

Measurement is key. Based on Hilton's experience, the first and most important step for a hotel to reduce its environmental impact is to measure and track its environmental performance routinely. Hilton initially offered LightStay to its properties and then required it as a uniform way to take the first step, as it is also the precursor to determining the programs and goals and actions for a specific property, and it builds upon the management practice similar to constantly evaluating performance and service quality in hotels across all other areas of hotel management. Smaller hotel companies and individual hotels can proactively measure their impact, specifically in regard to energy, waste, water, and carbon. This is one of the first steps toward setting environmental goals and targets and toward launching sustainability programs, either on an individual property level, or company-wide level. By measuring consumption and generation data, hotels can better determine best practices based on the location and size of their property.

Additionally, while LightStay provides a checklist and resources for Hilton's properties to evaluate and identify specifications and practices to implement, small hotel chains and independents can collaborate with stakeholders to determine programs and poli-

²⁷ International Tourism Partnership: Green Hotelier (2015) LightStay upgrade helps Hilton cut carbon. www.greenhotelier.org/our-themes/energy/lightstay-upgrade-helps-hilton-cut-carbon/.

cies for their properties. This includes working with employees for education and training not only on measuring environmental impacts, but also mitigating risks. Often, discussions around sustainability in hotels focus on the technical aspects of building equipment, FF&E, and operational procedures. These practices and specifications number in the hundreds, and their viability and return will be based on local aspects of cost, procurement, and operations. Property assessments will help identify which programs are in place, and which are most appropriate to implement over time. Though LightStay streamlines this decision process for a Hilton property, most of the best practices are well known by practitioners in hotel sustainability and can be found in guidelines or cases available online or through local resources. Most important, lessons learned from within the portfolio should be shared across management and development teams or, in the case of independents, among a destination's hotel community.

By monitoring energy, water, and waste together, strategies will cross functional roles and departments, and individual prioritization is enabled and better understood (e.g., water efficiency may be a much better opportunity than HVAC replacement given a particular location and property attributes). Also, performance can be modeled against similar properties, identifying those that underperform and helping inform the prioritization discussions. LightStay models performance within Hilton's portfolio and identifies the range of performance internally, for instance, but other benchmarking initiatives are available to hotels globally and regionally.

Properties can also engage guests by determining what programs resonate most with their clientele. Once programs and policies are determined, hotel chains and independents can begin engaging with organizations, such as Clean the World to launch a soap donation program, or utility companies to purchase renewable energy for their properties as they address the value chain that energy, water, and waste encompass and touch upon.

Engaging staff. Best practices can be found in hotel certifications, guidelines, and case studies widely available in the public domain, and it's up to the hotel team to evaluate and implement those practices. Based on Hilton's experience in the past decade and global view of lessons learned, the most effective approach to improve performance is based on management and staff engagement, as follows:

- (1) Institute a robust approach to track energy consumption and raise alerts when consumption goes

outside of expected boundaries so that corrective action can be taken. This could be managed on a site-by-site basis, but multiple-site organizations would be better off with a central tally.

- (2) Train team members on energy management (beyond the property engineer). This can be basic but should include why it is important (both internally to the organization and also from a global perspective) and tips on how they can have an impact in their day-to-day roles.
- (3) Establish clear communication lines to departments and business units to ensure that all requirements are understood. The general manager plays an important role in ensuring accountability and bringing sustainability performance into routine discussion, to provide the mandate for evaluating and improving that performance.
- (4) Benchmark peers and research best practice examples within the network, when addressing operations, renovations, and even new builds.

Many hotels already have similar programs or components in place, as research has demonstrated.²⁸ Collective impact, however, can be taken much further when rallying all the global hotel supply along a similar approach and reaching the local independent hoteliers and franchisees to move the case studies of individual hotels or hotel companies to quantified industrywide performance.

Outlook: Taking on the Next Set of Goals

As momentum toward sustainable development and tourism continues to build, advancement toward achieving the goals set forth in the UN SDGs and Paris Agreement will continue. These initiatives are time-bound and will have their biggest reach and potential for collective impact within the next ten years. The hotel industry is in a unique position to demonstrate collective impact due to the sector's reach, including its remarkable value chain that extends from large global hotel chains down to small hotel owners and the local supply chain, repeated hundreds of thousands of times in nearly every corner of the globe.

The research presented here seeks to add to the discussion of quantifying overall industry impact and also establishing the relationship that a single hotel

²⁸ For examples, see: Segarra-Oña *et al.* "Environmental Management Certification and Performance in the Hospitality Industry: A Comparative Analysis of ISO14001 Hotels in Spain." scholarship.sha.cornell.edu/chrpubs/119/; and Bruns-Smith *et al.* "Environmental Sustainability in the Hospitality Industry: Best Practices, Guest Participation, and Customer Satisfaction." scholarship.sha.cornell.edu/chrpubs/196/.

can have toward global goals. To further advance the discussion and overcome some of this study's limitations, global data sets need to be improved. In particular, we need improved quality of data on each country's hotel supply to enable more precise analysis. As the UNWTO refreshes its discussion of statistics and metrics to uniformly collect and analyze data among partners in the industry, statistical data should improve over time.²⁹ Likewise, the disclosure and benchmarking of performance in energy, water, carbon, and even waste metrics for hotels will need to increase. As mentioned earlier, although the CHSB data set includes 11,500 hotels, that represents approximately 10 percent of the estimated global supply of hotel rooms and is generally limited to branded hotels. To move forward, we can engage the owners or operators of the vast number of unaffiliated hotels and those held by local or regional companies. By bringing these firms into the global discussion along with hotel owners, we can work toward the goal of having the majority of global hotels take the necessary actions to enable the next generation of sustainable tourism. This would give way to scale solution, bringing down costs, and catalyzing change.

At the local destination level, the "network effect" can be catalyzed. Local trade associations and networks provide excellent platforms for discussions and sharing of best practices, and can be expanded to include more sustainability discussions. In this case, the role of branded properties—which form part of a larger global enterprise with subject-matter experts dedicated to finding the most efficient and sustainable ways to operate and manage growth—will be to help catalyze change to SMEs and local owners for many of the pre-competitive opportunities that sustainability affords.

These discussions will be more important given the trend toward capital-light hotel growth. The brand in a franchise model is incredibly important and requires a consistent commitment to sustainable operations to maintain its brand reputation and promise, but actions will require franchisee engagement. In the case of Hilton, its customers expect the brand to be efficient and responsible in its communities, and that should be carried through to local stakeholders and investors. A value-chain approach has to include building awareness among owners and franchisees in the early stages of hotel development and renovation.

²⁹ World Tourism Organization UNWTO. (2017) 6th International Conference on Tourism Statistics: Measuring Sustainable Tourism. www2.unwto.org/event/6th-international-conference-tourism-statistics-measuring-sustainable-tourism.

The growth conundrum. While Hilton was able to improve its energy, water, and carbon efficiency from 2008 through 2018, its portfolio growth has meant that the company's aggregate footprint has outpaced the intensity reductions achieved. This is a similar scenario for the rest of the hotel industry, which is set to continue growing rapidly in the next two decades as tourism is forecasted to double. In commitment to the ITP goals, Hilton announced a carbon reduction target of 61 percent and for its managed hotels and 52 percent for its franchised portfolio by 2030, from the same 2008 baseline, as approved by the Science-Based Targets initiative (SBTi). The collective impact of other ITP members also setting science-based targets can help pave the way for a low-carbon sector, especially when engaging with owners to achieve the necessary reductions. In addition to reduction targets, the industry will need to evolve its sustainability practices and align with global goals. Hilton's 2030 value-chain targets expand the target-setting approach with more broad commitments to cut its environmental footprint in half while doubling social impact investment, with specific goals covering areas that include energy, water, waste, sourcing, community investment, resiliency, and youth. In this research we examined quantitative efforts for environmental performance, but other areas encompassing the "people" or social SDGs can be similarly approached, and the collective impact of the other two ITP industry goals regarding human rights and youth can be tracked.

We have featured Hilton's Light Stay in this report as an example of a data-driven program for reducing the industry's energy intensity footprint. Hilton is by no means the only firm making such an effort.³⁰ In the wake of constant change and disruption—from natural and man-made disasters to resource scarcity, drought, and unemployment—making up-front investments in sustainability management is smart business. Investments in sustainability have both a long-term financial benefit and help to contribute to more resilient communities that are better prepared to bounce back in times of rapid change and uncertainty. ■

³⁰ In addition to Hilton, the following firms have supported the Cornell Hotel Sustainability Benchmarking Index 2019: Alila Hotels & Resorts; CPG Hospitality; DiamondRock Hospitality Company; Horwath HTL Asia Pacific; Hyatt Hotels Corporation; InterContinental Hotels Group; Mandarin Oriental Hotel Group; Marriott International; MGM Resorts International; Park Hotel Group; Park Hotels & Resorts; Pebblebrook Hotel Trust; Red Planet Hotels; Saunders Hotel Group; Six Senses Hotels Resorts Spas; Sunstone Hotel Investors; The Hongkong and Shanghai Hotels; Xenia Hotels & Resorts, and Wyndham Hotels & Resorts.

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