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# CARBON COUNT: 2018 ASLA ANNUAL MEETING

## Highlights

- 2018 ASLA meeting educational session featured speakers' travel-related CO2 emissions equaled approximately 80 to 118 metric tons.
- About half of 395 featured speakers traveled by air and emitted almost all travel-related CO2 emissions.
- 2018 meeting travel-related emissions may correspond to an Arctic summer sea-ice loss of 240 to 357 square meters (2579 to 3839 square feet, or 0.06 and 0.09 of a square acre).
- Removing 2018 meeting travel-related emissions from the atmosphere would require one year and 3,327 to 4,908 new three-inch caliper sugar maple trees, or their equivalent.
- Recommendations for eliminating or reducing travel-related ASLA meeting emissions are presented.



## Abstract

A special report by the Intergovernmental Panel on Climate Change (IPCC) indicated that reductions in CO2 emissions must equal the removal of CO2 from the atmosphere to prevent social, economic, and ecological consequences associated with global warming in excess of 1.5º C (2.7º F). The American Society of Landscape Architects (ASLA) is "dedicated to the efficient, effective, and prudent use of Society resources for the betterment of landscape architecture and the common good." Yet, four or more ASLA annual meetings that attract practitioners, academicians, and students from across the U.S. and beyond are planned for the future. To estimate the potential addition of CO2 to the atmosphere, this study used two Online carbon calculators to compute the travel-related CO2 emissions of educational session featured speakers at the 2018 ASLA annual meeting in Philadelphia. About half of 395 featured speakers traveled by air and emitted almost all travel-related CO2 emissions. About one-third of speakers traveled by train; the fewest arrived by car. Many speakers were local and may have contributed little to overall CO2 emissions. Approximately $800 to $1200 could offset the travel-related CO2 emissions, but the CO2 would still remain in the atmosphere and contribute to global warming for up to several hundreds of thousands of years. Estimated emissions for the 2018 meeting may correspond to an Arctic summer sea-ice loss of 240 to 357 square meters, and would require at least over 3,300 new 3" caliper sugar maple trees to remove the travel-related CO2 emissions. To meet the IPCC's recommendation, an additional 3,300 to 4,900 sugar maples would be needed to help limit global warming to 1.5° C. This study concludes by considering the potential

implications for future annual meetings and practice, including the elimination of the annual national meeting, reorganization as a triannual or quinquennial meeting, or regional meeting.

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## Introduction

Like many other landscape architecture practitioners, academicians, and students at the 2018 ASLA Annual Meeting in Philadelphia, the interactions with other registrants, awareness of advancements in knowledge, skills, technology, and products that I gained by attending will last. The carbon dioxide that we collectively emitted into the atmosphere by traveling to the Pennsylvania Convention Center will last longer—well beyond our lifetimes.

Without question, the CO2 and other greenhouse gases that we humans have emitted have caused Earth's global mean surface temperature to warm 1º C (1.8º F) above pre-industrial levels (between 1850 and 1900). According to measurements made in October 2018 by the NOAA Earth System Research Laboratory at the Mauna Loa Observatory, the atmosphere contained 406 parts per million (ppm) of CO2. Ice cores from Antarctica indicate that atmospheric CO2 has remained below 300ppm for at least the last 400,000 years. While jarring, we stand to make an even greater impact in the atmosphere and on Earth than we already have.

Just prior to the 2018 ASLA annual meeting, in early October, The Intergovernmental Panel on Climate Change (IPCC) released a special report that examines the anticipated social, economic, and ecological impacts related to a global warming of 1.5º C (2.7º F). The report directly relates to the mission, values, and culture of the ASLA. The "About" page of the Society's web site states that landscape architects "lead the planning, design, and stewardship of healthy, equitable, safe, and resilient environments." The ASLA values commitments "to environmentally and socially conscious principles and practices across all aspects of the profession." The culture of the ASLA is "Dedicated to the efficient, effective, and prudent use of Society resources for the betterment of landscape architecture and the common good." Equity is mentioned specifically three times on the web page. In the 1.5º C special report, the IPCC reiterates three aspects of equity from a previous report that must be considered in future decisions to prevent further warming: fairness between generations of people, states, and individuals. People and states that have benefitted most from greenhouse gas emissions are most responsible for global warming, and will be less impacted, have more representation in efforts to solve the problem, and will benefit most from progress toward a low-carbon economy.

Everyone, including us landscape architects, must act immediately. If warming continues at the current rate of 0.215º C per decade, Earth will have warmed 1.5º C by 2040. For every year that actions to reduce greenhouse gas emissions are delayed, two years are needed to decrease emissions to zero and keep the global mean surface temperature at or below 1.5º C. If warming is not arrested immediately, and the global mean surface temperature rises to 2º C (3.6º F), current states and individuals, and future generations who have gained little, if anything, from greenhouse gas emissions and lack representation will be impacted severely, and in some cases, gravely.

One educational session at the 2018 ASLA Annual Meeting explored what landscape architects are doing to address climatic change. An Online article in The DIRT ("Landscape Architects: Now is the Time for Climate Action," October 25, 2018) summarized intentions and actions by the ASLA, International Federation of Landscape Architects, and the Landscape Architecture Foundation (LAF). Representatives from each organization noted that landscape architects' skills and knowledge present unique opportunities to lead climate action. The LAF climate action plan tells landscape architects to "go for it" and aim for zero carbon; "walk the talk," "lead by example" and reduce our ecological footprint at home and the office.

As an effort to act on these points, and "use my voice," in what follows, I estimate a portion of the CO2 emissions that may have resulted from travel to the 2018 ASLA annual meeting. I conclude by discussing the ramifications of the CO2 emissions, consider the effectiveness of carbon offsets, and potential implications for future annual meetings, and practice.



## Counting Method

To estimate the quantity of carbon dioxide emitted into the atmosphere caused by traveling to Philadelphia to attend the 2018 ASLA Annual Meeting and EXPO, I focused on all featured educational session speakers from the meeting program provided to all meeting attendees. A spreadsheet I created in Microsoft Excel contained each featured educational session speaker's name and organization (i.e., company, university, municipality), which I entered into an Internet search engine to identify speakers' likely point of origin. In many cases, the contact page on organization web sites presented a city or town location, which I documented as the point of origin. When web sites offered only an email address, or multiple office locations, I documented the location on featured speakers' LinkedIn pages, or from a telephone area code associated with the speaker. Next, I determined the likely mode of travel from the speakers' point of origin to Philadelphia. In many cases, the distance between the point of origin and Philadelphia dictated an obvious travel mode. Speakers that originated within the Northeastern Corridor could have traveled by air, train, or car. In these cases, I considered the mode of travel that emitted the least amount of carbon.

I used two free Online carbon footprint calculators—carbonfootprint.com and carbonfund.org—for individuals to compute carbon emissions in metric tons. I opted not to use the Online carbon calculator available from the International Civil Aviation Organization (ICAO), a United Nations specialized agency, because their database contains fewer U.S. airport locations in comparison to carbonfootprint and carbonfund calculators. However, I observed that the results from the ICAO calculator for air travel emissions equal those of the carbonfootprint calculator. When using the carbonfootprint calculator, I specified "return trip" and "economy class" for flights, and "long distance train" travel. Edmunds.com reported that the Toyota Camry and Honda Accord, which emit equal amounts of CO2, were the second and third most popular cars, respectively, in 2013, the latest year of car offered in the carbonfootprint calculator. Therefore, I used emission values associated with a 2013 Toyota Camry for all likely car travel. I derived all mileage from featured speakers' point of origins to Philadelphia for car and train travel from an Online search engine mapping application. The carbonfootprint calculator does not specify one-way or return trips for car and train travel, so I doubled the calculated figures for these modes of travel. The carbonfund calculator does not offer a calculator for car travel, so I only used the figures from the carbonfootprint calculator for car travel. Additionally, I did not opt to account for radiative forcing when using the carbonfund calculator, which would have further increased CO2 emission estimations.

## Estimations of CO2 Emissions

I commanded Excel to compute the sum of all carbon emissions for all 395 featured speakers in each of 118 educational sessions across four meeting days. Thirty-three featured speakers presented more than once; of these, four spoke in three sessions. I counted each featured speakers' CO2 emissions only once, regardless of the number of presentations in which he or she participated. Of all featured speakers, about half traveled by air and emitted almost all of the CO2 that may be related to their presence at the conference, which results in an average of 0.40 metric ton (mt) or 0.57 mt of CO2 per person (Table 1). Most featured speakers traveled from California, particularly Los Angeles and San Francisco (Tables 2 and 3). Speakers that probably flew from Seattle, San Diego, Chicago, Denver, and Detroit also contributed noticeably to CO2 emissions (Table 3). The eleven speakers who may have flown internationally, from Africa, Canada, China, Europe, South America, and Iceland, may have emitted between 13.06 and 18.38 mt of CO2, which is more than the 17 speakers that travelled from Washington state combined (Table 2).

Just over one-third of speakers probably travelled by train and emitted a small fraction of meeting-related CO2, with an average, per person, of 0.01 to 0.05 mt (Table 1). Not surprisingly, a great many speakers represented Pennsylvania, New York, and Massachusetts (Table 2), in particular Philadelphia, New York City, Boston, and Washington DC (Table 3). Just over ten percent of speakers lived locally. By my estimation, the fewest number of speakers traveled by car, though they may have emitted almost as much CO2 as the 140 speakers that likely travelled by train (Table 1)! One person spoke via telecommunications software (i.e., Skype) and emitted little to no CO2 to participate in an educational session.

At meetings' end, the featured speakers may have been responsible for emitting between 80 and 118 mt (176,369 to 260,145 lbs) of CO2 into the atmosphere due to the distance and mode of travel to and from the 2018 ASLA Annual Meeting in Philadelphia (Table 4).

## Consequences and Potential Actions

To understand the possible effects on Earth, one can relate the quantity of CO2 emitted from 2018 featured speakers' travel to Artic sea-ice loss. Notz and Stroeve (2016) note in *Science* that changes in Arctic sea ice may correspond to changes in mid-latitude weather patterns, habitat, and human activities in northern latitudes. Observations made between 1953 and 2015 showed that a loss of about 3 square meters of September Arctic sea ice corresponded to one mt (2204.62 pounds) of human-induced CO2 emissions. Thus, CO2 emissions caused by 2018 annual meeting featured speakers' travel may correspond to the loss of 240 to 357 square meters (2579 to 3839 square feet, or 0.06 and 0.09 of a square acre) of Arctic summer sea ice.

***Should we purchase carbon offsets?*** At present, Delta and jetBlue airlines purchase carbon offsets. Delta estimated that it purchased 30,000 and 15,000 carbon offsets in April 2018 for patrons and employees, respectively (https://news.delta.com/delta-offsets-carbon-emissions-170000-customers-thursday. Accessed 21 November 2018). Since 2012, Delta has purchased more than 8 million offsets. If we assume that each offset is equal to one pound, Delta may have purchased offsets equal to 3,628 mt of CO2, which relates to about 10,884 square meters of Arctic sea-ice loss, or 2.69 square acres, since 2012. jetBlue states on their website that they have purchased carbon offsets that amount to 2 billion pounds of CO2 to date, which is equivalent to about 907,184 metric tons and corresponds to an Arctic sea-ice loss of over 2.7 million square meters, or 672 square acres. Clearly, jetBlue is doing more to offset the air travel emissions.

United Airlines and Amtrak allow passengers to calculate travel-related CO2 emissions themselves. United provides an Online calculator through their website that is about equal to the carbonfund calculator. For instance, a round trip from Los Angeles to Philadelphia is estimated to result in 0.81 mt of CO2 using the carbonfund calculator, but 0.86 mt on United's website (carbonfootprint estimates 0.57 mt of CO2). The carbonfund calculator is embedded into the Amtrak website. In both cases, the carbon offset is equal to ten times the CO2 emitted. So, the 1,200 to 1,700 pounds of CO2 that went into the atmosphere from LAX to Philly can be offset for between $6 and $8. And $800 to $1,200 would cover the carbon offset costs of the 2018 ASLA annual meeting featured speakers' travel.



To be effective, carbon offsets must be achievable, additional to carbon reductions that may happen anyway, and assure you that action is occurring. Each is difficult to guarantee. Nonetheless, whether you, the airline, or rail service purchase a carbon offset, the CO2 still enters and stays in the atmosphere. As the IPCC 1.5º C special report states, each greenhouse gas persists in the atmosphere for different durations. Methane ($CH_4$) may be the most potent greenhouse gas, but only lasts about a decade aloft. CO2 lasts for hundreds of thousands of years. So, purchasing carbon offsets for travel are available and inexpensive, but the CO2 emissions may persist and contribute to global warming long after you travel.

***Airplanes fly, and emit CO2, with or without you, so does opting not to fly really make a difference?*** Frontier Airlines boasts that lightweight seats made of recycled leather save 214 gallons of jet fuel per seat per year, which may reduce the release of 1.90 mt (4190 lbs) of carbon into the atmosphere (https://www.flyfrontier.com/about-us/why-fly-frontier. Accessed 29 November 2018). A vacant seat is lighter than a seat occupied by a person, who may also have luggage. Thus, by opting out of air travel, one reduces fuel use by decreasing the weight of an airplane, and reduces the demand for air travel, albeit slightly. If demand decreases enough, supply, and CO2 emissions may decrease too.

***How effectively do trees sequester carbon?*** Using trees to remove CO2 from the atmosphere is part of or better than purchasing offsets, one may think. Reforestation, afforestation, and ecosystem restoration are possible and effective, as the IPCC 1.5º C special report makes clear. However, massive scale deployment of these methods may not be feasible due to the time it takes a tree to remove CO2, the number of trees needed to remove large quantities of CO2, and the area of land on which the trees need to grow. Additionally, to restrict global warming to 1.5º C, the quantity of CO2 that plants remove from the atmosphere must *equal or exceed* reductions in greenhouse gas emissions. In other words, if we reduce CO2 emissions by 100 gigatons, we *also* need to remove at least 100 gigatons of CO2 from the atmosphere.

Experimenting with the Online Tree Benefit Calculator (www.treebenefits.com) is informative. A 3-inch caliper sugar maple is capable of removing 53 pounds of CO2 from the atmosphere in one year. *One* year! So, it would take 3,327 to 4,908 *new* three-inch caliper trees one year to remove the 80 to 118 metric tons (176,370 to 260,145 pounds) of CO2 from the atmosphere that 395 featured speakers' travel may have caused for the four-day 2018 annual meeting. American beech and white oak trees, which may remove about 40 pounds of CO2 per year, would require more exemplars; sweetgums, at 22 pounds per year, would require even more. Don't bother with evergreens like the eastern red cedar and southern magnolia, which remove about 16 pounds of $CO_2$ per year. The preceding figures might be high. According to the Center for Urban Forest Research (CUFR) Tree Carbon Calculator, after accounting for a number of environmental factors, a three-inch caliper sugar maple may only sequester about 36 pounds of $CO_2$ per year. At any rate, to remove the $CO_2$ that resulted from featured speakers' travel, and the equivalent quantity to limit global warming to 1.5º C, we'd need to plant at least 6,000 to 9,800 trees and let them breathe for one full year.

Beware that tree production also results in $CO_2$ emissions. A life cycle assessment of a field-grown 5 cm (2-inch) 'October Glory' red maple by Ingram (2012) showed that about 18 pounds more $CO_2$ was emitted during five years of production than was sequestered due to energy, machinery, chemicals, and other inputs.

In sum, widespread tree installation is an unrealistic solution to removing $CO_2$ from the atmosphere. The best solution is, among other actions, to stop flying.

***Future annual meetings.*** The ASLA intends to organize annual meetings in the future. In a questionnaire distributed to 2018 annual meeting attendees, the ASLA stated that the locations of the next four ASLA Conferences on Landscape Architecture (formerly the annual meeting and EXPO) have been selected, and "contracted to take place" in San Diego (2019), Miami (2020), Nashville (2021), Seattle (2022). The questionnaire prompts participants to rate the attractiveness of each of 12 cities that span the U.S. This questionnaire statement, and my study results, imply that the ASLA is at least unaware of the carbon emissions that result from annual meetings; are contractually obligated to hold four future conferences that may result in the emission of at least 320 to 472 metric tons of $CO_2$ (80 to 118 mt per conference), an Artic summer sea-ice loss of at least 960 to 1,416 square meters; and the need for about 13,310 to

19,633 *new* three-inch caliper sugar maple trees, or their equivalent, to remove the emissions of conference-related carbon from the atmosphere. (Double those numbers of trees to limit global warming to 1.5ºC.) Additionally, the ASLA intends to consider organizing annual conferences beyond 2022 that will encourage additional carbon emissions due to attendee travel.

To prevent the emission of all conference-related carbon due to attendee travel, the ASLA must cancel the contracts for the planned conferences in San Diego, Miami, Nashville, and Seattle, and eliminate plans for all foreseeable future conferences. Obviously, there will be consequences. The ASLA will forfeit funds derived from conference registrants that go toward professional advocacy. The ASLA may be required to pay a monetary penalty to break contractual bonds. ASLA members will have to find other ways of acquiring professional development credits. Learning from gardens, plazas, parks, and other landscape architecture projects will need to occur locally, and more through print and digital media. Planned or chance in-person meetings with former classmates, colleagues, and students who live and practice throughout the country will not happen. Opportunities to speak with product representatives, "network," or brush elbows with "starchitects" will become rarer. On the other hand, consider that the cancellation of these conferences will be an effort to protect the health, safety, and well-being of the individuals, states, and future generations who are under- or not represented in actions to arrest global warming, and who will benefit little, if at all, from future carbon emissions. The ASLA (i.e., members and staff) will practice what it espouses; we'll "walk the talk." You or your company will save money on airfare, hotel accommodations, food, and time away from home and the office, though that may be welcome for some.

If the ASLA is unable or unwilling to eliminate the planned conferences between 2019 and 2022, perhaps each can be an opportunity to explore the organization of annual *regional* conferences instead of national. Regional boundaries may be dictated by the mode of travel (i.e., train, in particular) and relatively comfortable distance of travel, such as six hours—the train time from Boston to Philadelphia. Regional conferences may be broader in scope and replace annual ASLA chapter conferences, if the regional conference occurs nearby. Carbon emissions will still occur as a result of train, or car, travel, but will likely be less in comparison to annual national meetings that require or encourage air travel.

Advancements in telecommunications offer yet another alternative to national conferences. ASLA members could congregate in local convention centers to attend remote presentations by featured speakers. At least one featured speaker at the 2018 ASLA meeting presented via Skype. Attendees will still have the opportunity to ask questions and receive answers from speakers, but the chance to talk one-on-one and in-person with speakers following presentations cannot occur, unless the speaker is physically present.

There are at least two alternatives that the ASLA could consider if only minimizing conference-related carbon emissions is of interest. First, annual conferences could occur every two to five years, or more. The decreased frequency may encourage more members to attend and take advantage of advancements in knowledge and skills that evolve and prove reliable over spans of time greater than one year. The greater the duration between conferences, the more likely that conference-related carbon emissions will be lower in comparison to emissions for annual conferences. Second, the ASLA conference could occur in conjunction with another annual conference in an allied professional organization, including the AIA, CSI, APA, and NRPA. Attendees traveling to one location may attend more than one conference, thus dividing the conference-related emissions among several conferences. While the wider availability of educational and field session options may be appealing, the duration, registration fees, and schedule of sessions associated with each conference requires careful thought and planning. Carbon emissions might be cut in half, professional development credits may double, but so, too, may the time and cost to attend two conferences.

***Limitations.*** This study is not perfect. I acknowledge at least five limitations. First, my estimations of carbon emissions are only based upon the educational session featured speakers listed in the 2018 ASLA annual meeting program. I did not estimate the carbon emissions related to those people leading 16 field sessions, two general sessions, six workshops, and ASLA staff involved in running the conference. More importantly, **I did not estimate the carbon emissions related to all meeting attendees that were not featured speakers**! Consequently, my results, and the implications, are likely low and possibly considerably lower than the actual travel-related emissions. Second, I did not estimate the carbon emissions due to travel by product representatives to and from the EXPO, and for transport of EXPO products and materials to and from the Pennsylvania Convention Center. Again, conference-related emissions (and corresponding Arctic sea-ice loss, monetary offset costs, and new trees needed to sequester CO2) that I present are *almost certainly lower* than the figures would be if I were to estimate and incorporate these additional values. Third, some featured speakers may not have presented, may have been replaced by someone whose travel resulted in more or less carbon emissions, or may have presented remotely by way of telecommunications software. Thus, a replication of this study may result in estimations of carbon emissions that differ from those I present. Fourth, I estimated the travel-related carbon emissions of educational session featured speakers for *only one meeting*. Estimating the travel-related carbon emissions of featured speakers at past ASLA annual meetings is possible and may help ASLA members and staff understand whether travel-related carbon emissions for conferences located on the West Coast, Deep South, or Midwest are different than the 2018 annual meeting in Philadelphia. However, regardless of the findings following such studies, carbon emissions must cease, and reducing our professional carbon footprint is well within reach, if we'd just stay on the ground, and probably on rails. Finally, this study was not reviewed by at least two anonymous peers. Thus, the reliability and validity of the methodology that I present, as well as the objectivity of the implications stemming from the data, has not been evaluated by anyone other than myself. There may be flaws. Please, point them out. Please, replicate the study.

***Future travel and practice.*** More difficult will be reducing travel-related carbon emissions in practice. Landscape architects need and want work, and will go where the work is, whether down the road or across the Atlantic. Regional, bi-coastal, and international offices may have access to more work, and high quality work, and gain influence, repute, and attention inside and outside the profession of landscape architecture. A project may restore a stream, increase biodiversity, repurpose materials, sequester carbon, and connect children to nature. If these benefits rely upon tons of carbon emissions beyond that embodied in the materials the landscape architects specified, are we really practicing sustainably? Are we protecting the health, safety, and well-being of others? As it is, jet-setting across the country to attend the annual meeting, or for practice, all while proclaiming that we have the knowledge and skills to create sustainable, resilient places seems, to me at least, that we are trying to benefit from progress toward a low-carbon economy. That's not equitable.

Think globally. Think generationally. Act equitably. Practice locally.

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**Table 1. Quantity of Featured Speakers by Travel Mode**

| Travel Mode | # Speakers | % of overall speakers | Carbonfootprint Total mt | Carbonfootprint Mean | % of Carbon Carbonfootprint Total | Carbonfund Total mt | Carbonfund Mean | % of Carbon Carbonfund Total |
|---|---|---|---|---|---|---|---|---|
| Air | 194 | 49.11% | 77.96 | 0.40 | 97.62% | 109.66 | 0.57 | 92.24% |
| Train | 140 | 35.44% | 1.08 | 0.01 | 1.35% | 7.57 | 0.05 | 6.37% |
| Car | 13 | 3.29% | 0.82 | 0.06 | 1.03% | ? | NA | |
| Local | 47 | 11.90% | ? | 0 | NA | ? | NA | |
| Skype | 1 | 0.25% | NA | NA | NA | NA | NA | |
| **Total** | 395 | | | | | | | |

**Table 2. Featured Speaker Representation by State or Countı**

| State/Country of Origin | # Speakers | % of overall speakers | Travel Mode | Carbonfootprint Total mt | Carbonfootprint Mean | Carbonfund Total mt | Carbonfund Mean | #ASLA Members in State on 11.13.18 |
|---|---|---|---|---|---|---|---|---|
| California | 61 | 15.44% | Air | 35.51 | 0.58 | 52.50 | 0.85 | 1976 |
| Canada | 5 | 1.27% | Air | 1.03 | 0.21 | 1.23 | 0.25 | |
| China | 1 | 0.25% | Air | 1.64 | 1.64 | 2.33 | 2.33 | |
| Colorado | 6 | 1.52% | Air | 2.22 | 0.37 | 3.18 | 0.53 | 448 |
| Columbia | 1 | 0.25% | Air | 0.58 | 0.58 | 0.83 | 0.83 | |
| Connecticut | 3 | 0.76% | Train | 0.00 | 0.00 | 0.13 | 0.04 | 265 |
| Delaware | 3 | 0.76% | Car | 0.06 | 0.02 | 0.06 | 0.02 | 26 |
| Florida | 6 | 1.52% | Air | 1.37 | 0.23 | 1.65 | 0.28 | 761 |
| Georgia | 4 | 1.01% | Air | 0.64 | 0.16 | 0.76 | 0.19 | 310 |
| Germany | 1 | 0.25% | Air | 0.93 | 0.93 | 1.32 | 1.32 | |
| Iceland | 2 | 0.51% | Air | 1.28 | 0.64 | 1.82 | 0.91 | |
| Illinois | 17 | 4.30% | Air | 2.72 | 0.16 | 3.40 | 0.20 | 454 |
| Indiana | 2 | 0.51% | Air | 0.28 | 0.14 | 0.37 | 0.19 | 236 |
| Kenya | 1 | 0.25% | Air | 1.77 | 1.77 | 2.53 | 2.53 | |
| Louisiana | 1 | 0.25% | Air | 0.26 | 0.26 | 0.32 | 0.32 | 180 |
| Maine | 6 | 1.52% | Air | 0.54 | 0.09 | 0.66 | 0.11 | 44 |
| Maryland | 7 | 1.77% | Train | 0.00 | 0.00 | 0.22 | 0.03 | 440 |
| Massachusetts | 39 | 9.87% | Train | 0.78 | 0.02 | 3.45 | 0.09 | 627 |
| Michigan | 12 | 3.04% | Air | 1.32 | 0.11 | 1.60 | 0.13 | 308 |
| Minnesota | 4 | 1.01% | Air | 0.92 | 0.23 | 1.12 | 0.28 | 265 |
| Mississippi | 1 | 0.25% | Air | 0.24 | 0.24 | 0.24 | 0.24 | 68 |
| Missouri | 2 | 0.51% | Air | 0.50 | 0.25 | 0.60 | 0.30 | 210 |
| New Jersey | 3 | 0.76% | Car/Train | 0.04 | 0.01 | 0.08 | 0.03 | 377 |
| New Mexico | 1 | 0.25% | Air | 0.42 | 0.42 | 0.59 | 0.59 | 112 |
| New York | 54 | 13.67% | Car/Train/Air | 0.40 | 0.01 | 2.14 | 0.04 | 927 |
| North Carolina | 8 | 2.03% | Air | 0.68 | 0.09 | 0.84 | 0.11 | 460 |
| North Dakota | 1 | 0.25% | Air | 0.28 | 0.28 | 0.28 | 0.28 | 23 |
| Ohio | 2 | 0.51% | Air | 0.20 | 0.10 | 0.24 | 0.12 | 319 |
| Oregon | 2 | 0.51% | Air | 1.14 | 0.57 | 1.64 | 0.82 | 300 |
| Pennsylvania | 57 | 14.43% | Car/Train/Air | 0.74 | 0.01 | 0.82 | 0.01 | 679 |
| Rhode Island | 1 | 0.25% | Air | 0.02 | 0.02 | 0.08 | 0.08 | 80 |
| Skype | 1 | 0.25% | Internet | 0.00 | 0.00 | 0.00 | 0.00 | |
| South Africa | 2 | 0.51% | Air | 3.74 | 1.87 | 5.34 | 2.67 | |
| Tennessee | 2 | 0.51% | Air | 0.32 | 0.16 | 0.40 | 0.20 | 195 |
| Texas | 13 | 3.29% | Air | 4.29 | 0.33 | 6.13 | 0.47 | 982 |
| The Netherlands | 3 | 0.76% | Air | 2.67 | 0.89 | 3.81 | 1.27 | |
| Vermont | 2 | 0.51% | Air | 0.16 | 0.08 | 0.18 | 0.09 | 46 |
| Virginia | 17 | 4.30% | Train | 0.31 | 0.02 | 1.11 | 0.06 | 471 |
| Washington | 17 | 4.30% | Air | 9.69 | 0.57 | 13.77 | 0.81 | 471 |
| Washington DC | 23 | 5.82% | Train | 0.00 | 0.00 | 0.92 | 0.04 | |
| Wisconsin | 1 | 0.25% | Air | 0.17 | 0.17 | 0.20 | 0.20 | 227 |
| **Total** | 395 | | | 79.86 | 0.35 | 118.89 | 0.48 | |

## Table 3. Representation by City (5 or More Featured Speakers)

| City of Origin | # Speakers | % of overall speakers | Likely Travel Mode | Per round trip Carbonfootprint | Carbonfootprint Total mt | Per round trip carbonfund | carbonfund Total mt |
|---|---|---|---|---|---|---|---|
| Philadelphia | 47 | 11.90% | Local | 0.00 | 0.00 | 0.00 | 0.00 |
| New York City | 43 | 10.89% | Train | 0.00 | 0.00 | 0.03 | 1.29 |
| Boston | 39 | 9.87% | Train | 0.02 | 0.78 | 0.09 | 3.51 |
| Los Angeles | 27 | 6.84% | Air | 0.57 | 15.39 | 0.81 | 21.87 |
| San Francisco | 25 | 6.33% | Air | 0.60 | 15.00 | 0.86 | 21.50 |
| Washington DC | 23 | 5.82% | Train | 0.00 | 0.00 | 0.04 | 0.92 |
| Chicago | 17 | 4.30% | Air | 0.16 | 2.72 | 0.20 | 3.40 |
| Seattle | 17 | 4.30% | Air | 0.57 | 9.69 | 0.81 | 13.77 |
| Charlottesville, VA | 12 | 3.04% | Train | 0.02 | 0.24 | 0.07 | 0.84 |
| Detroit | 10 | 2.53% | Air | 0.11 | 1.10 | 0.13 | 1.30 |
| Denver | 6 | 1.52% | Air | 0.37 | 2.22 | 0.53 | 3.18 |
| Portland, ME | 6 | 1.52% | Air | 0.09 | 0.54 | 0.11 | 0.66 |
| Raleigh, NC | 6 | 1.52% | Air | 0.08 | 0.48 | 0.10 | 0.60 |
| Austin, TX | 5 | 1.27% | Air | 0.34 | 1.70 | 0.49 | 2.45 |
| Baltimore | 5 | 1.27% | Train | 0.00 | 0.00 | 0.03 | 0.15 |
| San Diego | 5 | 1.27% | Air | 0.56 | 2.80 | 0.80 | 4.00 |

## Table 4. Featured Speakers CO2 Emissions by Timeslot

| Day | Date | Timeslot | mt CO2 Carbonfootprint | mt CO2 Carbonfund |
|---|---|---|---|---|
| Fri | Oct. 19 | 8:30-10:00am | 13.02 | 18.64 |
| Fri | Oct. 19 | 10:30am-12:00pm | 9.07 | 13.32 |
| Fri | Oct. 19 | 1:30-3:00pm | 2.20 | 3.70 |
| Fri | Oct. 19 | 3:30-5:00pm | 4.29 | 6.60 |
| | | **Subtotal** | 28.58 | 42.26 |
| Sat | Oct. 20 | 11:00am-12:30pm | 7.08 | 10.59 |
| Sat | Oct. 20 | 2:30-4:00pm | 5.32 | 8.09 |
| | | **Subtotal** | 12.40 | 18.68 |
| Sun | Oct. 21 | 11:00am-12:30pm | 7.38 | 11.96 |
| Sun | Oct. 21 | 2:30-4:00pm | 6.86 | 10.83 |
| | | **Subtotal** | 14.24 | 22.79 |
| Mon | Oct. 22 | 8:00-9:30am | 5.76 | 8.48 |
| Mon | Oct. 22 | 10:00-11:30am | 4.79 | 6.72 |
| Mon | Oct. 22 | 1:30-3:00pm | 11.31 | 16.03 |
| Mon | Oct. 22 | 3:30-5:00pm | 2.78 | 3.93 |
| | | **Subtotal** | 24.64 | 35.16 |
| | | **TOTAL** | 79.86 | 118.89 |