Sustainability At Massport

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Introduction

Overview of Massport

The Massachusetts Port Authority (Massport) is an independent public authority that develops, promotes, and manages airports, seaports, and transportation infrastructure in the state of Massachusetts. Massport operates Boston Logan International Airport, Hanscom Field, and Worcester Regional Airport. Massport also operates shipping terminals in Boston, as well as the Tobin Bridge.

Massport is run by a seven-member board appointed by the governor, and is self-supported, receiving no state tax funding. Though created by the state legislature, its operating structure is similar to a private corporation, with a board and CEO. Massport's structure is organized by business area (e.g. airport, seaport) and function (e.g. finance, legal, environment and safety).

Massport's mission is as follows:

Massport owns and operates an integrated world-class transportation network that promotes economic growth and opportunity, enhances the quality of life of New England residents and protects the freedom to travel safely, securely, efficiently and cost-effectively. In meeting our responsibility to connect New England with the world, Massport strives to always be a good steward by treating colleagues and customers with respect, embracing diversity and minimizing the impact of transportation services on our neighbors and the environment.

Problem Statement

Massport's largest asset is the Boston Logan International Airport. Over the last decade, it has spent over $4 billion in modernizing and upgrading its facilities, most visibly the complete renovation of Terminals A and E, with Terminal A becoming the world's first air terminal to be LEED certified, in 2006. Notable environmental considerations include roofing membrane and paving designed to reflect heat, storm water filtration devices to remove pollutants, water-efficient plumbing, extensive use of daylight, and construction waste recycling. Special measures were taken to minimize the use of volatile organic compounds.

Despite its efforts to build and operate sustainably, Massport directly controls only a small percentage of operations at the airport. Most of the space is leased out to airlines and concessionaires. Lease agreements spell out the details of how the facilities are used and operated. In the area of concessionaires, Massport contracts with two concessions operators, BAA and Westfield. These in turn sublease space out to concessionaires such as Dunkin' Donuts, Au Bon Pain, and newsstands. In the area of terminals and gates, lease agreements vary by airlines and by terminals. For example, Terminal A is operated by Delta while Terminal E is shared among different airlines.

In light of these operating arrangements, this study attempts to address the following three questions:

1. How can Massport collaborate with its tenants more effectively on sustainability?
2. How can Massport reduce its ecological footprint on activities it controls directly?

3. How can Massport strive toward sustainability while operating under regulatory constraints?

**Unique Challenges**

As mentioned before, Massport needs creative ways to collaborate with its tenants to maximize sustainability at its facilities. The lease agreements provide Massport leverage over airport-wide initiatives, but best results are achieved through collaboration, not coercion.

There are other differences unique to Massport from other owner-tenant relationships such as office buildings and shopping malls. Massport operates on an almost continuous basis, with flights landing well into the night and taking off early in the morning. Massport also needs to be mindful of its primary mission, to move passengers through the airport in comfort and safety. Sustainability efforts that negatively impact this mission are not acceptable.

Furthermore, many airlines have operating procedures that must be consistent at all airports and it would be either impractical or impossible to operate differently only at Logan. Finally, Massport is affected by FAA, TSA, EPA, and other regulatory agencies that impose specific restrictions on the disposal of waste, the transportation of material, etc.

Fortunately, despite these challenges, there are still many ways of moving toward a more sustainable airport, as this study will show.
Description of Methodology

Scoping
The scope of this project is limited to Logan Airport, as it has the greatest public visibility, and is the most accessible from Cambridge. Within Logan Airport, the project focuses on the relationship between Massport, the tenants (airlines, concessionaires), and the sub-tenants (individual restaurants, newsstands, and retailers). This project is not limited to any specific terminal at the airport, since any recommendations to change the owner-tenant relationship can likely be applied to all terminals.

Interviews
Interviews were conducted with a number of internal and external sources to gain an understanding of the current status of sustainability efforts and to research efforts going on at other airports in the US. The first interviews were conducted with Massport management to gain an understanding of the overall picture and the goals that Massport is trying to achieve. Specifically we spoke to Catherine Wetherell, our project sponsor, Jack Hemphill, Logan’s Business General Manager, and Sal Amico, the Manager of Airport Concessions. The next round focused on the individual stakeholders at Massport, which includes the concessionaires and retail operators, specifically Debbie Russell, the BAA-Logan Concession Manager. Finally, interviews were conducted with leaders at other airports that have strong sustainability programs, including Denver International, and Oakland International. These interviews not only provided a basis for comparison but also helped collect best practices from around the country.

Secondary research
The challenges of an owner-tenant relationship and sustainability are not unique to MassPort. Other airports, the US Air Force, and shopping malls all have similarities with MassPort, either relating to aviation, the owner-tenant relationship, sustainability, or any combination of the three. In addition to studying MassPort’s situation, this project aims to look at the state of the industry and discover successful strategies that have been used in similar situations and can be applied at MassPort.

Ranking process
For an organization as large as Logan Airport, there are a multitude of ways to reduce its environmental impact. However, part of the goal of this project is to identify the most promising initiatives and justify which ones can produce the most impact with the fewest hurdles. This project used the metrics listed below to sort and rank recommendations for sustainability.

Regulation barriers
Like all airports, Logan Airport must operate within the regulations of the FAA, DHS (TSA), Department of State (Border Patrol and Immigration), and local ordinances. Oftentimes, this prevents MassPort from undertaking sustainability efforts that are typical of other transportation hubs. Bomb-proof trashcans, the requirement to incinerate trash from border patrol quarantining, and the strict rules regarding airplane taxiing on the ground are just a few examples. This project aims to deliver recommendations that can be...
implemented within the regulatory barriers, but also consider what changes would be effective if the regulations were absent. Therefore, the first criterion for recommendations is whether or not it falls within the present regulatory framework for a US airport.

**Impact**

The second criterion this project will consider is impact. Impact can be measured in quantitative units, from tons of CO2 saved, to tons of solid waste diverted, to kilowatt-hour reductions. There can also be qualitative impacts, from customer satisfaction, community relationships, and public perception. Since we do not have sufficient data for Logan Airport, we will attempt to compare the various recommendations on a scale from 1 to 5, (with 5 being the greatest impact).

**Feasibility**

The feasibility criterion encompasses ease of execution and cost. For example, converting ground equipment from diesel to electric or installing solar panels would be relatively infeasible, while adding recycling bins and circulating monthly sustainability bulletins would be highly feasible. Each recommendation is assigned a value from 1 to 5, with 5 being the most "feasible" recommendation.

**Control**

An addition metric utilized in this ranking process is control, or Massport’s ability to maintain compliance. Although a recommendation may be highly feasible in terms of operational execution, it may also be completely unenforceable or outside of Massport’s realm of influence. Examples of this include consolidation of hotel shuttles and the use of green cleaning products by food vendors. Each recommendation is assigned a value from 1 to 4, with 4 being the most enforceable recommendation.

**Time horizon**

The final metric is the time required to implement the change. Recommendations that can be implemented quickly are much more desirable, considering the frequent turnover of restaurants and retailers at the airport. Also, the sooner tangible results are achieved, the easier it will be to raise support for future sustainability initiatives.
Research & Interview Findings

Best practices from SEA-TAC

Logan can gain significant knowledge by looking at sustainably progressive airports in the US with similar throughput and tenant structures. An excellent example is the Seattle-Tacoma International Airport, or SEA-TAC, which serves 31 million passengers annually, and is the 15th busiest airport in the US. As in the case with MassPort, the Port of Seattle is the owner, builder, operator, maintainer, and lessor for many areas of the SEA-TAC airport and has dealt with many of the unique challenges that Logan airport faces. In addition, SEA-TAC is looking for ways to operate more sustainability within its current capital assets, rather than simply rebuild or make significant retrofits. The following information was found in a SEA-TAC report from the FAA Northwest Mountain Region Conference in April 2008. We were unable to get in touch with a representative from SEA-TAC; however we recommend Massport continue its current relationship of sharing best practices with the northwest airport.

Goals and Scope

One of the main learnings from SEA-TAC’s program is the upfront agreement and communication of the airport’s overall sustainability goals, known as its “Goals of Sustainable Airport Management.” An explicit statement of goals for both internal and external communication is an essential step in rallying widespread support, generating buy-in and accountability, and inspiring intrinsic motivation. For SEA-TAC these goals are four-fold:

1. To make decisions fully informed on total cost of ownership implications
2. To better manage long term capital and operating costs
3. To promote environmentally sustainable development
4. To conserve resources

In addition, SEA-TAC is pragmatic in their sustainability program outlook and understands that environmental sustainability is often aligned with financial sustainability. They look at sustainability as not just an environmental initiative, but as a broader continuous improvement opportunity in the way SEA-TAC operates, maintains its assets, makes decisions, and mitigates risks. Finally, at interim stages of the sustainability strategy rollout, the airport has taken an “achievement/opportunity” approach, very much in alignment with the mentality of continuous improvement. In other words, as changes are made and success achieved, additional and new opportunities are identified and added to the scope.

Partnerships

Another notable strategic choice made by SEA-TAC was engaging the Clean Airport Partnership (CAP), an independent body exclusively dedicated to working with airports on achieving improved environmental “quality and efficiency.” Through its association with SEA-TAC, CAP has assessed and validated Seattle’s
prior achievements, identified new opportunities, and helped create a user-friendly and easy-to-read sustainability report for effective internal and external communication.

**Specific Initiatives/Achievements**

SEA-TAC has divided their sustainability initiatives into five main subsections: solid waste, air, building efficiency, water, and noise. This section will outline some of the more successful programs in each of these areas that could be applicable to Logan airport as well.

- **Solid waste:** Thus far SEA-TAC has implemented coffee grounds composting, “pay as you throw” tenant incentives, waste segregation and centralized collect, and waste-to-cement technology. Additional opportunities include waste auditing, recycled content procurement, green cleaning products, promotion of biodegradable food and beverage containers, and food composting.

- **Air/Landside:** SEA-TAC has successfully implemented multiple programs that reduce a customer’s footprint when gaining access to the airport, many of which Logan has already done. Novel ideals include a clean taxi program, the creation of an on-site “Clean Vehicle Fleet,” promoting employee ride-sharing, and a reduction of vehicle idling. In addition, SEA-TAC has converted its ground support equipment from diesel to electric power. Other notable opportunities that they have identified are the encouragement of clean rental cars, the consolidation of hotel shuttles, and the expansion of many of the current green programs.

- **Air/Aircraft:** SEA-TAC has begun using a fuel hydrant system that reduces the distance traveled and time utilized by fuel trucks. In addition, aircraft powerback has been prohibited, requiring the use of a “tow truck” for reverse taxiing. Finally, a full greenhouse gas inventory has been completed. Additional opportunities include gate power and the use of pre-conditioned air, which would eliminate the need to run the engines or APU at the gate, as well as carrier education in sustainability.

- **Building Efficiency:** While many of these programs have already been implemented at Logan, such as lighting upgrades, HVAC improvements, and the potential use of photovoltaics, additional opportunities include heat recovery methods and “full cost” based utility rates.

- **Water:** An often overlooked resource, water should be considered in a sustainability strategy as much as energy or any other resource. SEA-TAC has thus far conducted on and off-side wetlands mitigation, implemented stormwater management techniques to avoid flooding, sedimentation, and contamination, contained and processed de-icing effluent, and utilized an organic filter for metals removed during composting. Additional opportunities include the expansion of public access to wetland mitigation sites, waterless urinals, and the ability to isolate water system valves.

- **Noise:** Lastly, SEA-TAC has made advances in the reduction of noise through the purchase of residential properties in high noise areas of the runway and insulating homes and schools with noise canceling materials. Other opportunities include the ground power and pre-conditioned air mentioned in the “Air” section, increasing funding additional R&D in this area, and finally
advocating for “continuous descent” approach procedures, which allow a constant angle of descent from cruising altitude to final approach, reducing both fuel consumption and noise.

**Energy Analysis at SEA-TAC**

As a benchmarking exercise to be discussed in the recommendation section, it is very useful for an airport to identify and understand where its energy is derived. SEA-TAC once again provides an excellent example. Taking an overview of the energy inflows to an airport, 98% of the total energy arrives as Jet A jet fuel. Granted, 99% of that fuel is burned by the airplane while traveling, but it puts the energy use of the airport in perspective with the greater global environmental effects. Although energy savings at the airport are important, efforts to reduce the fuel consumption of airplanes could potentially have greater impact on a global level than similar efforts at the airport.

Looking specifically at energy use at the airport, British Airways estimates that 1% of aircraft fuel is used on the ground to support the APU. With this assumption, Jet A fuel still comprises 24% of the total energy consumption, and electric energy is the primary form consumed at SEA-TAC.

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**United States Air Force: Managing for Operational Sustainability**

In 2007, the US Air Force released their inaugural "Managing for Operational Sustainability" report outlining the present environmental impact of the USAF's operations, and their goals for the next five years. With a budget of $129B and 333,000 employees (in 2007) the Air Force has a significant environmental footprint, and significant potential to reduce their environmental effects. The Air Force is a good model to compare with MassPort, as they face similar challenges in operating and supporting thousands of aircraft and personnel.
One of the first steps that the USAF is taking to reduce their environmental impact is to determine their baseline usage. They use the Global Reporting Initiative framework for determining their total emissions of greenhouse gases (GHGs), in terms of carbon dioxide equivalents (CO2e). With a baseline to start from and a consistent measurement methodology, they can then set targets for future years, and accurately monitor their improvement.

Going forward, the USAF has specific reduction goals for Facilities, Vehicle Operations, and Aviation. Specifically, they are looking to improve the efficiency of their buildings, increase their use of alternative energy vehicles, and move towards synthetic fuel blends for aircraft.

<table>
<thead>
<tr>
<th>Focus Area</th>
<th>Requirement</th>
<th>Goals</th>
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<tbody>
<tr>
<td><strong>Facility Energy</strong></td>
<td>Reduce Energy Consumption (EO 13423)</td>
<td>Starting in FY 07, reduce energy intensity (million BTU/square foot) by 3% per year (against FY03 baseline)</td>
</tr>
<tr>
<td></td>
<td>Meter Facilities to track energy consumption (EPAct05)</td>
<td>Meter all facilities where cost effective by 2012</td>
</tr>
<tr>
<td></td>
<td>Construct Energy Efficient Facilities (EPAct05)</td>
<td>Construct 30% more energy efficient facilities than ASHRAE 90.1 when cost effective</td>
</tr>
<tr>
<td></td>
<td>Increase Use of Renewable Power (EPAct05, EO 13423, 10 USC 2911)</td>
<td>3% by FY07, 5% by FY10, 7.5% by FY13, 25% by FY25 of total electric use</td>
</tr>
<tr>
<td></td>
<td>Air Force Internal Requirement</td>
<td>Beginning in FY09, pursue LEED Silver for Air Force military construction projects</td>
</tr>
<tr>
<td><strong>Vehicle Operations</strong></td>
<td>Percent of Light Duty Vehicles that are Alternative Fueled Vehicles (AFVs) (EPAct 1992/2005)</td>
<td>75% of vehicles purchased each year</td>
</tr>
<tr>
<td></td>
<td>Reduce Covered Fossil Fuel Consumption using FY05 as the baseline (EO 13423)</td>
<td>2% beginning in FY06 and continuing through FY15</td>
</tr>
<tr>
<td></td>
<td>Increase Alternative Fuel Consumption Using FY05 as baseline (EO 13423)</td>
<td>Increase 10% per year beginning in FY06 and continuing through FY15</td>
</tr>
<tr>
<td></td>
<td>Replace Light Duty Conventional Vehicle Authorizations with Low Speed Vehicles (LSV) (AFI 23-302)</td>
<td>30% by FY12</td>
</tr>
<tr>
<td><strong>Aviation</strong></td>
<td>Air Force Internal Requirement</td>
<td>Certify the entire inventory of aircraft for operations with a 50/50 synthetic fuel blend by 2011</td>
</tr>
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<td></td>
<td></td>
<td>By 2016, be prepared to cost competitively acquire 50% of the Air Force’s domestic United States aviation fuel requirement via an alternative fuel blend in which the alternative component is derived from domestic sources produced in a manner that is greener than fuels produced from conventional petroleum</td>
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Figure 3-2. Key Air Force Energy Goals

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With these kinds of targets in place, they are better positioned to decide what kind of measures will be necessary to achieve these goals.

**Clinton Climate Initiative (CCI) and Building Owners and Managers Association (BOMA)**

In 2008, the Clinton Climate Initiative (CCI) worked on a project with the Building Owners and Managers Association (BOMA) to develop some best practices to help improve the efficiency of buildings around the world. Their findings are applicable to many types of owner/tenant relationships and can be applied to commercial and government properties. MassPort falls well within those bounds and would be able to apply many of their recommendations.

BOMA recognizes the challenges involved with investing in energy efficiency. The "Holding Period Bias" biases building owners to reduce investment in energy efficiency, since they cannot be sure that they will occupy the building long enough to recoup the energy savings from their investments. This explains why many of the efficiency investments to date have been in government owned buildings. BOMA also recognizes that the split incentive between owners and tenants prevents either one from investing in energy savings. The owner has no incentive to help the tenant save on energy bills, and the tenant does not expect to occupy the space long enough to gain a reasonable return on their investment. Finally, many projects require a capital investment, and that capital is often appropriated to areas other than energy conservation. In today's economy, it is even more unlikely for firms to have available capital.

To address these problems, BOMA recommends the use of Energy Service Companies (ESCOs), who look for opportunities for energy savings, invest their own capital in the upgrades, and then share the savings with their clients. Thus, neither the owner nor the tenant of the property has to provide any capital, and neither has to worry about the long-term effects of the investment. If the property changes hands, the ESCO can continue to share the savings with the new owner. Although the property owner and tenant do not realize the full monetary value of their savings, they are able to eliminate the risks of investment, take advantage of the ESCO's expertise, and avoid many of the barriers facing energy efficiency projects.

In their literature, BOMA addresses some of the typical challenges and shares best practices associated with hiring an ESCO to achieve sustainability goals:

- Before choosing an ESCO, the customer must define their goals, which could be: LEED certification, Energy Star certification, percent reduction in energy use, or a dollar value in cost savings.

- The ESCO market is competitive, and customers should compare quotes and energy saving estimates from each one before entering into a contract.

- The customer and ESCO need to evaluate sites and choose the ones with the greatest potential for improvement. (typically older, inefficient buildings)

- Before making any changes, it is critical to benchmark the current energy and utilities usage.
Finally, the customer needs to continuously monitor the performance of ESCO to ensure that energy savings targets are being met.

Interview Takeaways

Massport Logan Employees

Through our interview with Logan employees, we learned some key facts about tenant-employee culture, as well as airline operations. Although the airport consists of thousands of employees all with very different relationships to Massport, i.e. Westfield, BAA employees, vendor employees, airlines employees, Massport employees, we learned that all of these groups consider themselves “Logan employees.” As a result, there is a distinct culture of camaraderie and cohesiveness. This learning was initially surprising, and should be tapped into by Massport as much as possible in order to gain momentum with green initiatives.

In addition, Massport employees are typically quite willing to participate in Logan-driven initiatives, as long as it does not require activities that detract from their operations. These programs are Logan-based and would most likely not be specified in the tenant leases. Finally, even though Logan has four terminals with individual managers, rules, and regulations at each, Logan employees do not respond well to terminal-specific programs. Because of cross-terminal communication and the fact that many of the concessions have storefronts in multiple terminals, programs run more smoothly when they are introduced across the board. Temporary pilot programs have worked quite well at Logan in the past, but only when done airport-wide.

Additional insights from these interviews were centered around the airlines. It is generally believed that most airlines, with their focus on operational efficiency, have already taken advantage of much of the low hanging fruit green initiatives, leaving only high up-front cost, “worse before better” options left. This fact makes finding opportunities for airline incentivized behavioral change difficult for Massport.

Finally we also learned that airlines like consistency in their operational procedures from airport to airport. Although they will comply with certain one-off Logan initiatives, it is usually not without extreme pushback. This tendency for resistance should be taken note of by Massport when trying to roll-out programs that affect the airlines.

BAA Interview

As one of the two primary tenants at Logan Airport, BAA handles many of the sub-leases with the actual concessionaires in the terminals. Neither BAA nor Massport have any overarching sustainability guidelines, but there are definitely isolated projects that have a positive effect on the environment. BAA provides frying oil recycling for all of their tenants, and Massport requires all tenants to recycle their cardboard. In addition, certain concessionaires (Au Bon Pain was cited specifically) have their own programs for recycling and waste reduction, independent of BAA or Massport.

BAA is definitely excited to hear new suggestions for sustainability, but has not had many directives from Massport to make any changes. BAA runs other air malls, but does not have extensive sustainability experience from other sites that could be applied to Logan.
Port of Oakland Interview

Oakland International Airport focuses on the “triple bottom line” when considering their sustainability efforts. Their goal is to be economically, environmentally, and socially sustainable, and their results prove that they have been active in all three areas.

Social Sustainability

On the social front, they try to involve their community as much as possible, and live by the motto, "your dollars go to your local community." One strategy Oakland uses is to try to use local contractors as much as possible. To reach this goal, they give local contractors a 10% benefit when comparing price bids for a project. (However, they cannot use this policy with contracts that are federally funded.) Oakland also establishes project labor agreements to ensure that contractors compensate workers with wages and benefits on-par with workers in a union and promote apprenticeship programs to help develop skilled labor. Last, but not least, Oakland is a strong supporter of employee volunteer efforts, including annual giving campaigns and employee-run efforts to fund scholarships at local high schools.

Environmental & Economic Sustainability

On the environmental side, Oakland effectively recycles waste and conserves electricity, but also steps back to take a “big picture” view of the overall footprint of the airport. Oakland measures each project by its “Lifecycle Cost” rather than breaking out economic effects and environmental effects. Lifecycle Cost includes the total cost of the project over its usable lifetime, which can include anticipation of future environmental regulations, reduction of fuel use, and immediate capital costs. But, Oakland has found that projects that have the lowest Lifecycle Cost also tend to be environmentally friendly.

Some of Oakland’s recent achievements include designing the airport gates to be “multi-use” so that they can be used by personnel from any airline. Thus, instead of building a new terminal to house new airlines, Oakland can have airlines share gates and get greater utilization out of the facilities they already have. The result has been that Oakland airport was top rated in metrics involving passenger traffic per gate and turns per gate. In addition, when renovating one terminal, they found that recycling the construction materials from the site was not only environmentally preferable (less trucking to and from the landfill and less virgin material), but was also lower cost. These kind of “big picture” efforts really show the significant results that Oakland has achieved.

Oakland knew that its sustainability programs would not be effective without buy-in from everyone at the airport, so the first step in the process was to spread the word with a series of town hall meetings. They involved fun and games, but focused on providing information, and getting ideas back from the people on the ground. Oakland also suggests that initiatives be organization-wide, so that everyone is held to the same standard. Finally, Oakland seems to really get the most out of the facilities that they already have, which is arguably the most effective form of sustainability.

Energy Service Companies

While Energy Service Companies (ESCOs) have been effective at increasing energy efficiency in government in other sectors, Oakland believes that they are not as effective for airports. First, airports already employ
their own staff of mechanical, electrical, and facilities engineers. Second, the cost of capital can be lower for airports than for ESCOs, so it can be more economical for the airports to undergo capital development projects themselves. While ESCOs can be very helpful to schools and other businesses that lack facilities expertise and cheap capital, Oakland has preferred to use their internal resources instead of looking to the private sector. The only exception is in situations such as solar power, where there are substantial tax benefits available from the government, making it more cost effective for a private company to own the solar panels and receive the tax breaks, since airports do not typically pay taxes.

**Denver Airport Interview**

DIA’s sustainability strategy is built around an ISO 14001 certified Environmental Management System. It is the first airport to receive this certification. This international certification ensures that DIA has a systematic approach to identifying, prioritizing, and managing those aspects of business that have potential to impact the environment.

Their EMS is built around air, water, and waste management programs. Their projects are split into two areas of focus: infrastructure and operations projects in areas that DIA directly controls, and incentive programs for areas that DIA does not directly control. The projects are informed by studies – a master energy study to find ways to reduce energy consumption and a waste composition study to find areas to improve recycling efforts.

Being one of the newest airports in the country, DIA has the advantages of building in environmentally infrastructure from the outset, such as recycling of deicing fluid and providing power plugs at every gate to prevent the need for planes to idle and consume fuel. However, having an EMS ensures that there are continual process improvements.

Organizationally, DIA has a FocalPoint Program, where each department has a representative who monitors and reports on their sustainability initiatives and goals. This program is effective in ensuring that sustainable thinking is infused deep into the DIA organization and that DIA is able to get the “big picture” of where they are meeting the overall goals and where improvements are necessary. One example of success is that through the waste composition study, it was determined that a lot of organic waste was generated from the concessions and from employee break rooms. A pilot composting program was publicized, and DIA, to their surprise, received an outpouring of volunteer support from their own employees.

DIA also draws support and innovation from its partnership with the city and county of Denver’s Greenprint program, a sustainable development initiative. By partnering with the city, DIA is able to leverage expertise and partnerships, such as incentives for hybrid taxis.

Finally, DIA is part of the Global Reporting Initiative, which produces the de facto standard in sustainability reporting. By participating in the GRI, DIA ensures that its annual sustainability report effectively measures, tracks, and improves DIA’s sustainability initiatives.
Recommendations

We've divided our recommendations into four major categories: Communication, Analyzes, Incentive Programs, and Capital Projects. This section will outline each recommendation, discussing the motivation behind it and the primary risks associated. Finally, these recommendations were "ranked" as described in the Methodology section, by impact, execution, and control. Based on these rankings, we will discuss proposed timelines and program priorities.

Communication

Logan can make a huge impact on its customers, employees, and community simply by improving its internal and external communication. Throughout our research, we have found the key to a cohesive and well-participated sustainability strategy is clear and direct communication with employees and external stakeholders. The following recommendations are relatively easy to do, high impact, and all within Massport’s direct control.

Branding and Education – Having traveled through Logan recently, it is clear that Massport is working to communicate the airports sustainability efforts to its customers. Through press releases, posters, Earth Day celebrations, and PA announcements, I, as a traveler, was aware of the existence of green programs at Logan. However, Logan needs to devote equal if not more effort to communicating with its employees. It’s vital for all Logan employees to know not only that Logan is working on sustainability, but specifically how. In order to enable wide-spread participation, you need to generate wide-spread awareness. Massport should brand its green program so that it’s easily identifiable and simply communicated. More will be said on this in the following few recommendations.

Explicitly state holistic goals and quantitative targets – As part of the education and branding discussed above, Logan needs to carve out its sustainability scope. What factors does Logan want to focus on? How bold should its goals be? Does Logan want to out-green other airports? Based on the position Logan hopes to take, the airport needs to state its goals, much like SEA-TAC. And more importantly, Logan needs to communicate these goals, internally and externally, much like a mission statement. This will enable employees to try to align their actions with these goals – all their actions, not just those that have been pre-labeled green. These goals will also allowing Logan to measure improvement and celebrate small wins, thus building Logan’s green brand equity and Logan’s brand equity as a whole.

Sustainability Workshops – A great way to both educate employees and build up a green brand is through sustainability workshops. By having interactive sessions with various groups of employees all together, Massport can hope to cultivate a community-driven work environment and motivate participation. By gathering operators at various levels, these workshops can also help create the goals in the previous recommendations, collect and address concerns, educate employees on what Logan has already done, play to employee’s intrinsic motivation to help the environment, and generate buy-in. While we understand it is very difficult to have large-scale meetings at a 24/7-operating airport, we believe these can be done in shifts and still have significant impact.
“Logan is Green!” Newsletter – This is another easy win and can work to highlight progress on current initiatives, recognize certain proactive individuals, introduce new initiatives, and reiterate goals. In addition, such a newsletter would highly contribute to the Logan green brand, and can be used as both an internal and external branding tool.

**Analyses**

One of the first places to start when considering a large-scale sustainability strategy is benchmarking. While the act of measuring itself does not have a direct impact, the learnings and awareness of certain hotspots and opportunities is invaluable.

**Greenhouse Gas Analysis** -- A logical place to start is hiring a third party to conduct a full-scale GHG analysis of Logan. The will serve two purposes as Logan moves forward with an integrated sustainability strategy: 1) it will allow for measurable improvement, in particular for internal/external communication purposes, 2) it will identify areas of the airport that, through incentivized behavioral change and capital projects, can have the biggest impact of Logan’s overall footprint. Some risks to consider is the possible determination of an extremely “dirty” part of Logan’s operations and the potential negative publicity that results.

**Localized Tenant Metering** – In order to carry out the “Electricity Pricing” recommendation in the next section, Logan would need to meter each of its tenants’ electricity (and potentially water.) This applies in particular to the concessionaires who, because their utility bill is currently so decoupled from their usage, have foregone certain improvements that would enable them to be more energy efficient.

**Incentive Programs**

Incentive programs are one of the many leverage points that Logan has with their employees, tenants, and sub-tenants. When properly targeted, incentive programs can be a very effective way of starting a wide scale behavior change in a large organization such as Massport.

**Green Certification for Airport Tenants** -- This program would incentivize tenants to meet a pre-determined list of criteria to be able to advertise their establishment as “Logan Green Certified”. Tenants would be able to use the certification in their publications and certified tenants would have a green leaf icon located next to their name on airport directories. Although it has been proven that consumers are not currently willing to pay more for green, consumers will make purchasing decisions based on a company’s commitment to green. A green leaf can influence decision-making and thus increase revenue.

In addition, retailers who achieve this standard would be recognized internally as well. This can be done through financial incentives, but more likely through peer recognition, either on the “board” in Terminal A, through presentation at large-scale meetings, by conducting feature stores in the Logan is Green newsletter, etc.

The first step in developing this program is to gather all of the stakeholders (retailers, food vendors, airlines, and Massport) and determine what a “green” standard should be, and develop some creative solutions for sustainability. Some metrics could include waste production per month, recycling percentage, energy usage per square foot, water usage per square foot, health care benefits for employees, and
consecutive months of green certification. The green standard should also include various levels of compliance (or “shades of green”) so that tenants can take a gradual approach to improvement, and continue to strive to improve.

Use Creative Electricity Pricing to Incentivize Conservation -- Since Logan operates as an electric utility, it has the ability to vary the rate structure to encourage conservation. One incentive to consider is tiered pricing, where as consumption increases, so does the rate for electricity. Another option is to determine a baseline usage for each type of tenant, then charge penalties or give credits based on the variation from the baseline. This way, Logan can remain revenue-neutral, while encouraging conservation through demand management.

Vary Landing Fees Based on Plane Efficiency -- While this proposal may face resistance from the FAA or airlines, Massport could charge different landing fees according to the efficiency rating of the aircraft. These efficiency measurements could be based on the age of the aircraft, the effective miles/gallon/passenger that the aircraft achieved on its journey, or the total fuel use of the aircraft. While the purpose of this program is not to become a revenue source, it would incentivize airlines at Logan to upgrade their fleets to be more fuel-efficient to avoid additional landing fees.

Trash Disposal Fees Based on Volume -- Presently, Logan airport provides trash disposal as a service to its tenants and does not seem to have a pricing structure based on trash volume. Other US airports use a “pay-as-you-throw” approach and charge tenants based on the volume of trash they produce. This gives tenants a real economic incentive to reduce their waste, and the cost to the airport is slightly increased administrative costs to manage the accounts.

Participate In A Footprint Reduction Competition (e.g CarbonRally.com) -- Aside from financial incentive programs, Logan could also harness social incentive programs such as CarbonRally.com where teams sign up online to take carbon reduction challenges, and compete with other teams around the country. The program would be completely voluntary, but these kind of programs increase awareness about sustainability. The more awareness employees have about their own environmental impact, the more they will bring the same attitude with them to the workplace.

Integrate Environmental Criteria Into Terminal Managers’ Performance Metrics -- Terminal Managers should be encouraged to promote sustainability, but also measured and rewarded on sustainability. Typical metrics such as quarterly profit, employee turnover, and cost reduction do not always encourage environmentally friendly behavior. Metrics such as water or energy use per square foot of terminal space, or percentage of vendors meeting the “Logan Green Certification” are measurable metrics that promote sustainability efforts. In addition, incorporating “green champions” into the workforce ensures that there are people at the ground level dedicated to sustainability who are accountable to real results.

Capital Projects

Finally we present an extensive list of potential one-off “capital projects” or activities. We have defined capital projects as being those projects that may involve an initial outlay of capital, and not in the sense of
CapEx vs OpEx. Furthermore, these projects, though requiring upfront capital, almost always have a positive ROI.

**Appoint sustainability champions for each department, could be an already existing employee** – This is the most important recommendation in this section. Following Denver International’s FocalPoint model, a representative from each department within Massport could be assigned the tasks of disseminating sustainability goals for Massport and collecting metrics. We see this as a vital step in penetrating the large and complex Massport organization, and getting information to and from all levels.

**Food scrap composting** – As discovered at DIA and elsewhere, organic waste from concessions and employee break rooms and public areas constitute a large proportion of the waste stream. A composting program could take advantage of unused land while generating income.

**Fuel hydrants** – Installation of fuel hydrants reduce the expense of fuel trucks circulating around terminal gates as well as reduce traffic on taxiways.

**De-icing recycling** – As implemented at Denver International, $1.7 million was saved annually via an onsite aircraft de-icing recycling system. Aircraft needing deicing would drive onto special areas that collect drainage and recycle the de-icing fluid. Environmental damage is also alleviated by reducing the release of glycol.

**Hire an ESCO** – Energy Service Companies put up their own initial capital for energy-saving initiatives, then share in the reward from the cost of energy saved. This is a recommended course of action in a capital-restricted or risk-averse environment.

**Plug in electricity and pre-conditioned air at gate** – Installation of these systems remove the need for planes to idle at the gate, thus reducing pollution and fuel consumption.

**Green cleaning products** – This approach improves air quality inside building and reduces release of undesirable vapors into the atmosphere; however we acknowledge that this is difficult on a variety of levels. With the appearance of certain communicable diseases such as Swine Flu, sanitation and health and safety are of ever-increasing importance. In addition, with the exception of common spaces, the individual tenant hires its own cleaning crew, and Massport would have little leverage to convince them to use new products in only Logan. Especially for chain restaurant that have their own standard operational procedures.

**Conversion of ground equipment from diesel to electric** – This would reduce the fuel emissions that can currently be attributed to the various ground vehicles and machines that run all day.

**Grey water recycling** – Rooftop rainwater can be collected in cisterns and used for cleaning and landscape irrigation. Logan has an enormous physical footprint with a lot of roof space, therefore a significant amount of rainwater can be recovered.

**Consolidate Rental Car Shuttles and hotel shuttles** – An excess of shuttle buses typically exists, each generally operated at very low capacity and causing air pollution and traffic congestion. Consolidated
shuttle services would mitigate this problem. We recognize that Logan is currently working to build a consolidated rental car facility; however it would be beneficial to the environment to incorporate hotel shuttles as well.

**Recommendation Map**

Below is a graph summarizing the different recommendations and illustrating the ranking methodology described in the previous section. To recap, these recommendations were ranked by three dimensions: 1) **ease of execution** which refers to the physical execution of the project, i.e. it is easier to use green cleaning supplies than installing solar-panels; 2) **impact**, in terms of a measurable reduction in GHGs or a noticeable increase in the number of participating vendors; and finally 3) the degree of **control** that Massport has over compliance. For example, Massport would have complete control over whether or not Logan should install fuel hydrants; however it has little to no control over hotels consolidating their shuttles. When determining a time-dependant roll-out plan, Logan should focus its efforts on recommendations in dark vibrant colors in the upper right-hand corner. Massport’s second priority should be the bottom right corner, and finally the bottom left corner. Those recommendations in the upper left are probably not worth the upfront investment.

As Massport considers additional programs and initiatives, we recommend they use a similar mapping technique to determine and present priorities, hurdles, and timelines. This method also requires a critical breakdown of three key factors that will determine success at Massport.
Conclusion

It is our hope that providing actionable recommendations based on our research and interview findings will allow Massport to more effectively roll-out sustainability initiatives, and generate buy-in. Logan already has many cutting-edge programs, from Terminal A to the warm-mix asphalt. However, Logan can hugely benefit from tightening up its program, creating a brand, benchmarking current levels, developing goals, and communicating successes. All of Logan’s current and future programs require employees, many who are not directly employed by Logan, to be motivated to take part. Massport must therefore work with Logan to create a dissemination network for education, awareness, empowerment, and accountability. As a 24/7 operation with an intrinsically large environmental footprint, Logan airport has a unique opportunity to make huge improvements and become a leader in the space of sustainable airports.
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