

A Greenhouse Gas Inventory

*Of the Washington State Attorney General's Office:
An Inventory Case Study*

By

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Author's Note

Since writing this thesis, I have received the Master of Environmental Studies degree from The Evergreen State College and am working as a consultant to organizations interested in measuring and mitigating their own environmental footprints. I am specializing in greenhouse gas inventories and climate action planning.

Please feel free to contact me to set up a consultation with your organization, or with questions regarding this document.

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Abstract

Awareness of climate change is reaching a critical mass to the point where organizations both public and private can no longer afford to remain impassive about the issue. Yet in the professional world, unless something is measured, it is not managed.

A greenhouse gas inventory is one of the first and most important steps toward an organizational awareness and effort to mitigate contributions to this most far reaching of all environmental issues.

In the year 2007, the Attorney General's Office of Washington State emitted 7,126.91 metric tons of carbon dioxide equivalent through its operations. The intent of this thesis is to explain the meaning, origin, data collection methodology, and potential value of this information to organizations of all types. It is written from the standpoint of a case study in hopes that other organizations both public and private will gain insight and understanding into this novel but increasingly commonplace accounting method. In the final section of the paper, I make recommendations in hopes of bettering the reader's understanding of how to frame the case for lowered emissions to their own organization and how such changes can be successfully implemented.

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Table of Acronyms

AAG- Assistant Attorney General

AGO – Attorney General’s Office

CAP- Climate Action Plan

COP- Certificate of Participation

CSR – Corporate Social Responsibility

CTED- Community Trade and Economic Development, a Washington State Agency

ESCO- Energy Service Company

EU ETS- European Union Emissions Trading Scheme

GHG – Greenhouse Gas

LEED- Leadership in Energy and Environmental Design

MTCDE- Metric Tons of Carbon Dioxide Equivalent

PPM- Parts Per Million

RES- Real Estate Services

SCIP- Seattle Climate Partnership

WSDOT- Washington State Department of Transportation

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The Greenhouse Gas Inventory:

Accounting For a Carbon Constrained Economy

Introduction:

Until recently, inaction by the United States, fueled by a previous political regime distrustful of climate science, has stifled international and widespread efforts to seriously address the causes of climate change. However, with a Cap and Trade bill under negotiation in Congress and the anticipation of a U.S. policy colored by the need for immediate action at the upcoming U.N. climate change conference in Copenhagen, one of the least proactive of the industrial nations to this point has essentially initiated a sea change in the way the world views and deals with climate change. The discussion in public and private spheres has now focused on the question of how to mitigate the consequences of such change.

This thesis outlines efforts within the Attorney General's Office (AGO) of Washington State to take a substantial step toward mitigating their climate impacts through the completion of a greenhouse gas (GHG) inventory, and the subsequent formulation of a targeted mitigation plan. This paper should be used as a case study and a roadmap for other state agencies, private firms, municipalities and organizations that wish to carry out similar studies in hopes of understanding, and reducing their overall contribution to climate change, whatever their impetus may be. For the sake of clarity, the term organizations shall henceforth be used to include public and private firms, and governmental and non-governmental institutions.

The Changing Tide:

Because the federal government has been unable to mount a serious policy response to the issue of climate change, the United States' approach has been notably driven by decentralized, bottom up efforts such as the U.S. Mayors Climate Protection Agreement, and the American College and University President's Climate Commitment (ACUPCC). Additionally, the existence of four separate regional cap and trade initiatives¹ has also increased awareness of the need for climate protection policy in the face of a federal government that has been reluctant to implement or participating in any binding emissions reduction targets. In 2007, the U.S. Climate Action Partnership, which includes 10 of the largest U.S. Corporations including GE, Alcoa, PG&E and Dupont urged Congress to pass a market-based cap on greenhouse gasses to reduce emissions by 10-30 percent over the next 15 years (About Us USCAP, 2009)(Neville, 2007). Climate change mitigation efforts took another significant step forward with the Supreme Court case, *Massachusetts et al v. U.S. Environmental Protection Agency*, in which the EPA's refusal to regulate GHG emissions was challenged and overturned because, according to the majority report, "greenhouse gases fit well within the Clean Air Act's capacious definition of an air pollutant."(*Massachusetts et al. v U.S. EPA et al.*, 2007) While this ruling was essentially ignored by the Bush administration, in April 2009 the EPA announced that it intends to recognize GHG's as pollutants harmful to public health, which could potentially mean their regulation under the Clean Air Act. Thanks to persistent social concern and activism on a global level, and disparate events in political, economic, social and technological spheres, the U.S. is waking up to the realities of climate change and the need for action.

¹ For an excellent introduction to the concepts behind Cap and Trade, see Holmes Hummel's presentation "An Introduction to Cap and Trade Climate Policy" on Slideshare.net <http://www.slideshare.net/grist/capandtrade-thru-musical-chairs-full>

Recent surveys have demonstrated that climate change has shifted from a concern shared by a relative minority of Americans to a mainstream issue. According to a July 2008 poll commissioned by the nonpartisan Presidential Climate Action Project, 62% of U.S. adults believed it important for the next President to initiate strong action to address climate change soon after taking office (Environmental Protection Online, 2009).

The election of President Barack Obama, who ran on a platform that included GHG emissions regulations via cap and trade has greatly raised awareness of climate change and the need to address it in the consciousness of the public and private sectors. Recent policy changes and initiatives undertaken by the Obama administration have demonstrated that climate action has indeed become a key issue for the United States' political center. However the federal government's stance is only now catching up with the level of action that has come from businesses, state government, regional agreements, higher education, and municipalities (Harris, 2009) (Lutsey & Sperling, 2008).

A minor cultural revolution is underway in the private sector as well. While the use of terms such as "green" and "sustainable" has been increasingly co-opted and watered down by their profligate use as marketing terms rather than operating principles, consumers have increasingly demanded true "green" labeling without "green washing". As a result, many actors within the private sector are altering their marketing and branding techniques. For the past 100 years, for example, Good Housekeeping magazine has used its seal of approval to back products that met their rigorous quality standards and to protect readers against product misrepresentation. Products bearing this long-trusted seal are backed by a promise to replace or refund the product if it proves defective within two years of purchase. This year Good Housekeeping will start adding green-labeling to products based on environmental impact criteria developed in

partnership with an independent consultancy firm, illustrating the level of mainstream infiltration the ideals of sustainability have achieved (Greenbiz, 2009).

Another example of sustainability being used as a guiding principle in the private sector is the recent rise in popularity of hybrid automobiles which has been largely motivated by consumers' desire to drive more ethically acceptable cars, climate impact being a key factor in these decisions (Harris, 2009).

Organizations face increasing pressure to demonstrate a commitment to lowered climate impact by both delivering products that leave a lighter carbon footprint, and operating in a manner that exemplifies a commitment to doing so. Thus organizations looking to meet the demands of today's environmentally conscious marketplace or to maintain a positive image with an environmentally conscious public will increasingly need to incorporate GHG accounting into their operating principles.

Climate change policy in the U.S. will be continually driven by a combination of forces both within and without the federal government. A consistent and targeted effort will necessarily involve participation from virtually all economic sectors, and a continuing shift in the minds of the general public.

The GHG Inventory: What is it?

One might draw a parallel between the GHG inventory and an accountant's annual financial records for a business client. In such a study, an accountant seeks to identify each instance where a client's money has been spent or acquired, then gathers this data so that the numbers can be arranged, added up, broken down and organized into readily analyzable chunks to inform future decision-making. Such information adds value to a business because it can be used to

identify possible inefficiencies, facilitate public reporting, and measure effectiveness of new approaches. Any inventory, whether of expenses, widgets, or emissions sources offers decision makers important information about the current situation and how best to proceed in the future.

A GHG inventory seeks to identify each instance, within a defined set of parameters, where GHG's are emitted through the operations of the participating institution and to gather this data into a single inventory. Like the accountant's analysis, a GHG inventory adds value to the participating organization by provision of information about past, present and future emissions, giving rise to corollary benefits that will become increasingly necessary to doing business in the carbon-constrained economy of the 21st century. Thus, depending on what an institution intends to do with the information gained from an inventory, different approaches and different parameters will be set in gathering of the information. How these parameters are defined and the implications of those decisions will be further discussed in subsequent sections of this paper.

Why Conduct an Inventory?

Without the specter of a climate-altered world looming over the public mind, organizations would feel little impetus to conduct a GHG inventory. The reality of living in a carbon-constrained economy is that we will have to become more aware of the GHG emissions associated with our actions. The better the relationship between organizational actions and rising global temperatures is understood, the less acceptable it becomes to implement energy efficiency measures and simply hope for the best. The growing utilization of the GHG inventory in public and private spheres represents the realization that without a baseline emissions inventory, making strategic emissions reductions is increasingly difficult, while making quantified reductions toward an emissions reduction goal is impossible. In other words, without proper measurement there is significantly less ability and incentive to manage GHG emissions.

Rappaport and Creighton put forth a compelling analogy in “Degrees that matter” of a weight loss program. When about to embark on a weight loss program, the first step is to measure and record your weight. The GHG inventory represents that initial step onto the scale, while the climate action plan (CAP) is akin to a targeted weight loss program of diet and exercise. No reduction in personal weight, or GHG’s for that matter, can be quantified without an initial baseline measurement. (Rappaport & Creighton, 2007)

Organizations, depending on their guiding principles and the capacities in which they operate, can be influenced to calculate a GHG inventory for different reasons. The following list details some of the most common reasons for participating in a GHG inventory.

- Regulatory compliance
- Increasing stakeholder value or espoused values of Corporate Social Responsibility (CSR)
- Determining the participating institution’s impact on climate change
- Informing priorities for action
- Measuring results of specific actions and/or progress towards a goal
- Savings on operating expenses
- Communicating information about climate change

I now offer some discussion and clarification on the above points to enable a more comprehensive understanding of the value inherent to a systematic GHG evaluation and mitigation effort.

Regulatory Compliance:

In addition to Executive Orders directed as specific reduction targets, two primary GHG regulation policies can affect organizations both public and private, carbon taxation and cap and trade. Because of significant political barriers, carbon taxes have thus far not seen serious consideration outside of academia in the United States despite solid arguments for such policy. Alternatively, cap and trade however, has been given ample political attention and is a cornerstone to the Obama Administration's suite of climate policy considerations. Though it faces tough opposition in moving through the branches of the federal government, cap and trade looms large on the national political radar. Of equal importance to organizations operating within North America is the existence of the regional emission trading initiatives (cap and trade) currently in various stages of development.

With a federal GHG emissions regulatory program not yet in place, efforts to enact GHG emissions policy have thus-far been spearheaded by regional, state, and local governments. Particularly on the regional level, states have formed partnerships to regulate carbon emissions via a cap and trade system. While in Europe, the European Union Emissions Trading Scheme (EU ETS) has been underway for over 4 years now.

Three regional and one state cap and trade efforts currently exist in North America today: The Regional Greenhouse Gas Initiative (RGGI) which spans 10 Northeastern U.S. states, the Midwestern regional GHG Reduction Accord, spanning 6 Midwest U.S. states, the Western Climate Initiative, spanning 7 western U.S. states and 4 Canadian provinces, and the State of Florida on its own (See [Figure 1](#)). While most of these efforts are still in developmental stages, the RGGI officially began its first compliance period January 1, 2009 (About RGGI: History).

Additionally, the Canadian Province of British Columbia implemented a carbon tax in July of 2008.

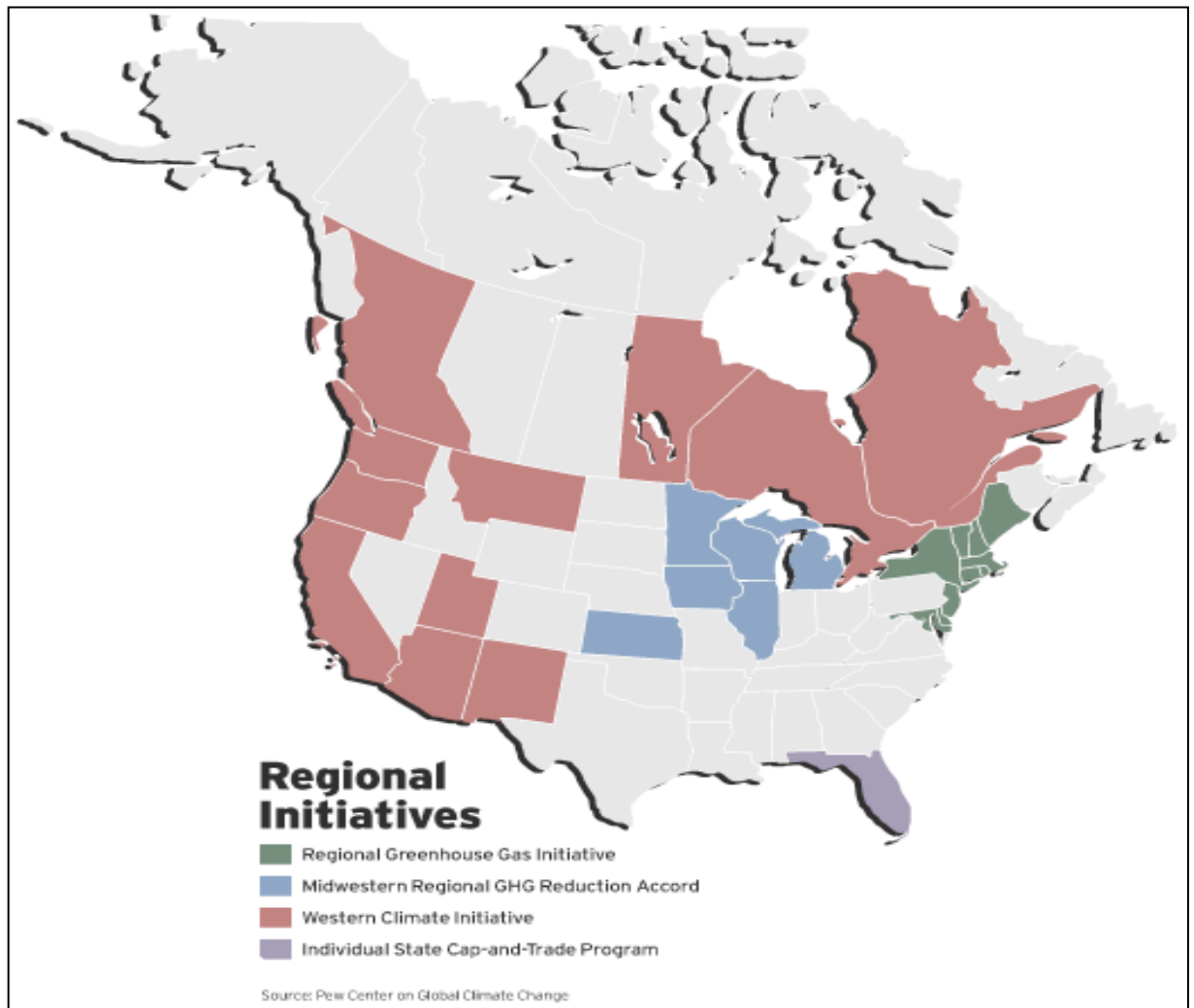


Figure 1: Map of Regional Climate Initiatives in North America

The Obama Administration has made it clear that climate change is a federal priority issue, with the possible culmination of their efforts being a federal cap and trade program aimed at achieving an 80% reduction in GHG emissions by 2050 (Whitehouse.gov, 2008). Obama’s stance on climate policy marks a major departure from that of the Bush Administration. In his first month in office, Obama “requested” that the Administrator for the EPA reconsider its decision, made during the end of the Bush Administration, to deny California and 13 other states

the ability to apply more stringent regulations on tailpipe emissions standards for new vehicles than those of the federal government (Cooney, 2009).

Currently the pendulum of support for a cap and trade system rests somewhere between a federal and a regional effort. With uncertainty of success on both sides, work will likely continue on all levels to create an effective government-led mandatory emissions mitigation policy until the regional efforts expand into a national effort, or the federal government is able to agree on and implement an effective program.

There is strong agreement that those organizations that have already demonstrated a commitment to action on GHG mitigation will weather the transition to a carbon constrained economy much better than those that have not. Furthermore, with an inventory completed, and a CAP in place, a price on carbon could in fact mean that such an organization will be able to capitalize in such a market through the sale of credits based on their existing reduction efforts.

Shareholder Value:

Private sector businesses are increasingly upholding social and environmental values as a key element of their bottom line. According to the Social Investment Forum, roughly 10% of all US investments are screened and managed based on social responsibility. This number is expected to continue rising as managers, CEO's and investors alike heed the growing body of research showing a positive correlation between environmental ratings and financial returns (Russo & Fouts, 1997) (Dowell, Hart, & Young, 2000) (Edmans, 2007).

In fact, many investors now view carbon exposure as a criterion for evaluating the investment value of businesses. As of March 9th 2009, Standard and Poor's, the self professed "world's leading provider of credit ratings, indices, risk evaluation, investment research and data"

(Standardandpoors.com) has begun tracking the carbon intensity of many of its S&P 500 through its efficiency index.² The 100 equities from the S&P 500 with the highest footprints (calculated as annual or quarterly emissions divided by annual or quarterly revenue) at the end of each quarter are removed from the Carbon Efficient Index. Those companies not assigned a carbon footprint through the third party company Trucost, are excluded from the index. (PRNewswire, 2009) In addition to the S&P index, Merrill Lynch Global Research puts out the MLCX Global CO2 Emissions Index, which is designed to provide investors insight into the global CO2 emissions market. Clearly, climate change is a risk for business, and those that do not demonstrate leadership on the issue stand to lose financially. For organizations, a serious effort toward lowering the carbon footprint begins by calculating a GHG inventory and formulating a CAP.

Determining the participating institution's impact on climate change:

There are myriad reasons why an organization would devote time and resources to a proactive climate change mitigation effort, most of which are outlined within these bold-headed sections. Likewise, there are just as many ways to frame the argument for GHG measurement and mitigation within an organization. For an organization whose management is truly and personally concerned about their impact on climate change, commissioning such work has likely already been considered, although the involved parties may not be fully aware of the financial co-benefits that help sell such actions to management. Furthermore, academically based institutions can use this information as a powerful teaching and research tool in preparing its students for the reality of living and working in a carbon constrained world. On the other hand,

² As David Blitzer, managing director of Standard and Poor's Index Committee says, "Organizations around the world are paying greater attention to the impact of greenhouse gases on our climate, as increasingly more investors consider carbon efficiency as an important investment theme."
(<http://news.cnet.com/greentech/?keyword=carbon+footprints>)

organizations that are purely interested in profit and maintaining competitiveness within their respective market or arena, with no inherent concern for the possible ill effects of climate change can see such work as a means of staying competitive, cutting operating costs, anticipating regulations and building an apropos marketing campaign. In either case, failure to formulate a proactive stance on the issue of climate change will not serve the purposes of the organization.

Informing priorities for action:

The inventory is a crucial tool in justifying energy efficiency projects because it allows the user to generate a cost per unit of reduction, the information needed to facilitate the prioritization of mitigation projects. One of the most common metrics in a CAP is a cost-per-ton of carbon for individual mitigation actions. Usually the first round of mitigation actions to take will be what is referred to as “low hanging fruit”. These are the easiest, most cost effective actions, are typically less capital intensive, and involve quick and substantial payback over a business as usual model. Without an inventory and subsequent cost-benefit analysis that must be part of the CAP, there is no way to prioritize an organization’s mitigation efforts so as to achieve the largest, most cost effective emissions reductions as quickly as possible.

Measuring Results of Specific Actions/Cost Savings:

When you know where are, it is much easier to make a conscious decision about where you are going. A GHG inventory gives an organization the knowledge of its current emissions, and by necessity, its energy use patterns. Having this knowledge is a critical step in identifying the areas where reductions are possible and taking steps to address them.

The implementation of mitigation options necessarily effects the bottom line of future projects because, for example a hyper efficient building is much less likely to benefit from additional

efficiency investment than an outdated inefficient one. Additionally, changing technology subject to market forces will mean that new mitigation techniques that were not viable in the past are now cost effective. The speed of technological advances, coupled with changes to an organization's operations and the introduction of new regulations mean that a CAP should be periodically reevaluated. This reevaluation is facilitated through continued calculation of GHG inventories beyond the baseline year.

Communicating Information About Climate Change:

There are a number of reasons an organization may desire to communicate information about climate change. It may be that an organization has come under a regulatory process and so is required to report their annual emission to a state or federal authority. Other organizations may wish create a culture of environmental awareness within its employee base. Regardless, a strategic starting point for such an effort would be to quantify emissions. Educational institutions especially stand to benefit by knowing their annual emissions as quantification and analysis of such information makes for an extremely powerful teaching tool, while simultaneously informing the decision makers on possible reduction strategies.

While the positive reasons for GHG measurement and mitigation are many, finding the personnel, funding and time to devote to such a pursuit can be a major hurdle for any organization. A comprehensive knowledge of the organization itself will be indispensable to any individual seeking to measure and then find the resources to create and see through the implementation of mitigation actions. Thus the compelling reasons for engaging in such actions outlined in this chapter have little meaning without the organization's ability to devote resources to such efforts. The next chapter will delve into the AGO as an organization, outlining past environmental action, possible reasons for as well as barriers against GHG mitigation. As a case

study, it is my desire that this next section will educate the reader about the various elements of an organization that are important to acquaint oneself with before beginning any GHG mitigation work.

The AGO:

Gaining an Understanding of the Organization

The AGO Explained:

The Attorney General's Office of the State of Washington acts as the official law office for the state. This means that the AGO is responsible for providing legal counsel to the government and agencies within the state. In total, the AGO serves over 230 state agencies, boards, commissions, colleges and universities as well as the Governor and Legislature (AGO). The larger state agencies of Washington have dedicated AGO employees who represent only that Agency as a client, whereas smaller agencies such as the Department of Information Services share dedicated AGO representation.

The AGO is charged with administering to a varied list of responsibilities as the State's legal representation which include: upholding the Consumer Protection Act, enforcing laws against anti-competitive business practices, proposing legislation to protect citizens, conducting education campaigns on subjects such as identity theft and illegal drug use, pursuing civil commitment of sexual predators, representing the State of Washington before the Supreme Court, the court of appeals, and the trial courts, investigating and prosecuting persons accused of crimes if it is requested by the governor or county prosecutor, advising the governor, legislature and state officers on legal issues, providing formal written opinions on constitutional or legal issues and representing the public interest in utility matters and energy facility siting (AGO).

Elected in 2004, the 17th State Attorney General Rob McKenna is currently serving his second four year term. His job is to manage the largest public law office in the State, with roughly 1,300 employees comprising over 500 attorneys and offices in 12 cities around the state (AGO).

One of Seattle Magazine's 26 most influential people in Seattle in 2006, and one of Security Magazine's Top 25 most influential people of the security industry, McKenna was recently appointed as co-chair of the Energy and Environment Committee for the National Association of Attorney's General (NAAG). The implication of his appointment is that the Washington State AGO is now to be seen as a model among all state Attorney Generals for environmental and responsible energy use. Thus, the poignancy and possible ramifications of this study are now heightened. Additionally, McKenna's appointment provides great impetus to respond to and utilize this study to its fullest possible purpose.

McKenna holds himself and his staff to the highest of standards, exemplified by the guiding principle of THRICE, to which all AGO staff are held.

From the Strategic plan for 2009-2013,

Mission: As an independent constitutional office and legal counsel to state government, we serve the citizens of Washington with the highest standards of *excellence, ethics and effectiveness*.

Vision: The Office of the Attorney General will be the best public law office in the United States, proudly contributing to the greatness of Washington.

Values: All staff of the Office of the Attorney General are guided by the following core values:

Transparency

Honesty

Respect

Innovation

Competition

Ethics

“THRICE”

Environmental Regulation of State Government In Washington:

In many ways, former Governor Gary Locke ushered in the new era of sustainability in the State of Washington during his tenure in office from 1997-2005. During his second term of office, Locke issued two Executive Orders³ that had the effect of elevating sustainability reporting to a mandated task within state agencies. In 2002, Locke issued EO 02-03 “Sustainable Practices By State Agencies”. For the first time, the Washington State Government was now required to consider itself a model of sustainable practices. EO 02-03 defined sustainability through a single line stating “Whereas, Sustainability provides for current needs without sacrificing the needs of future generations.” Also significant was EO 02-03’s nod toward “the regional and global

³ An Executive Order is a unilateral decision that does not require Congressional approval, but carries the same legal weight as a law approved by Congress. EO’s are often directed at agencies of the state, and, as in the cases outlined in this chapter, often give more detailed direction on how Congressional laws should be executed (*About Us USCAP*. (2009). Retrieved April 3, 2009, from US Climate Action Partnership: <http://www.us-cap.org/about/index.asp>.)

implications of climate change...” which “require us all to examine and change behaviors...”

Ultimately, this Executive Order directed that:

Each state agency shall establish sustainability objectives and prepare a biennial Sustainability Plan to modify its practices regarding resource consumption; vehicle use; purchase of goods and services; and facility construction, operation and maintenance.

Plans should be guided by the following long-term goals:

- *Institutionalize sustainability as an agency value;*
- *Raise employee awareness of sustainable practices in the workplace;*
- *Minimize energy and water use;*
- *Shift to clean energy for both facilities and vehicles;*
- *Shift to non-toxic recycled and remanufactured materials in purchasing and construction;*
- *Expand markets for environmentally preferable products and services;*
and
- *Reduce or eliminate waste as an inefficient or improper use of resources.*

(Executive Order 02-03 Sustainable Practices By State Agencies, 2002)

While 02-03 set the stage for sustainability as a core value in Washington state agencies, it still lacked clear language regarding the specific methods and avenues through which sustainable practices could and should be integrated into a state agency’s operations. In 2005, his last year in office, Locke came back with Executive Order 05-01 which both outlined specific targets for various sustainability efforts and redefined sustainability using an adaptation from the oft-cited definition attributed to former Prime Minister of Norway and Director-General of the World

Health Organization, Gro Harlem Brundtland's report, "Our Common Future". The EO states "Whereas sustainability means meeting the needs of the current generations without impairing the ability of future generations to meet their own needs, and is an important strategy for the long-term health of the state's environment economy and citizens; and Whereas efficiency and cost effectiveness are continuing objectives of state government". This EO served as yet another step for Washington's ascension toward and maintenance of its environmental early-adopter status, and by using an internationally recognized definition for sustainability, gave credence to environmental action occurring in the international community.

EO 05-01 was essentially an addendum to its predecessor in that it merely set more specific criteria for pursuing sustainability through the recommendation of specific points that should be addressed, namely building practices, transportation, paper and energy use. Furthermore, EO 05-01 gave greater direction to state agencies through specific target goals and a format with specific metrics for the biennial sustainability reports. The most significant points within EO 05-01 included mandates that all new buildings over 25,000 sq ft should be LEED silver or equivalent, a call for 20% reduction in petroleum used for state business transport, a 30% reduction in use of office paper, and a 10% reduction in energy purchases (Executive Order 05-01 And Superseding 04-06 Establishing Sustainability and Efficiency Goals for State Operations, 2005).

The LEED silver or equivalent language in EO 05-01 has since been superseded by RCW 39.35D.030, which states that new building projects over 5,000 square feet and major renovations must now conform to LEED silver standard or better (Chapter 39.35D RCW High Performance Public Buildings).

In 2005, Christine Gregoire, 22nd Governor for the State of Washington took up where Locke had left off. A former director of the Washington Department of Ecology, and former Attorney General of the State of Washington, Gregoire's impressive political resume and pro-environmental stance has helped Washington maintain its environmental leadership position among the states. From her blog on www.governor.wa.gov-

“Climate change is the great challenge of our time. Our environment, our economy, our very way of life is threatened by a changing climate. I am committed to making Washington the leader in developing policies to reduce harmful greenhouse gas emissions.”

(Gregoire, Governor Chris Gregoire Newsroom, 2009)

Executive Order 07-02, the Washington Climate Change Challenge is a testament to Gregoire's environmentally proactive stance, setting forth relatively aggressive emissions reductions goals for the state of 1990 levels by 2020, 25% below 1990 levels by 2035, and 50% below 1990 levels by 2050 or 70% below expected emissions for that year under a business as usual scenario.

EO 07-02 cleverly refers to the ongoing efforts that are a result of past legislation as a roadmap for making the stated emissions reductions. Efforts outlined in the EO include

- *Working to ensure cars sold in Washington meet stringent emission standards beginning with 2009 models;*
- *Retrofitting the most polluting diesel engines in school buses and local government vehicles;*
- *Promotion of biofuel feedstock production in the state;*
- *Construction of high performance buildings;*
- *Maintaining the highest levels of efficiency in our state's energy code and*

- regularly updating and enhancing those standards;*
- *Examining compliance with appliance efficiency standards and updating and enhancing those standards;*
 - *Implementing the requirements of the Energy Independence Act by adopting rules that help utilities to succeed in meeting their renewable energy targets*
 - *Pursuing new water resources in Eastern Washington including water conservation projects, developing new storage and new creative water management alternatives;*
 - *Reducing energy use by state agencies by achieving the goals established in Executive Order 05-01, Establishing Sustainability and Efficiency Goals for State Operations.*

(Executive Order 07-02 Washington Climate Change Challenge, 2007)

Environmental Action at the AGO:

The AGO has made substantial efforts toward sustainability since the passing of EO 02-03, and has continued to grow in their scope and level of outreach since that bill passed in 2002. Here I will outline the successes and significant ongoing environmental efforts being made at the AGO, with particular attention to those that have mitigated or have the potential to significantly mitigate the agency's climate impacts.

Transportation:

Reduce petroleum consumption by 20% from FY 2003 levels by September 2009 as required by

EO 05-01(FY 2008

Sustainability Report, 2009).

In the year 2007, the AGO used 53,302 gallons of gasoline to power its own personal motor vehicle fleet.

This does not include the use of personal vehicles for business travel and the

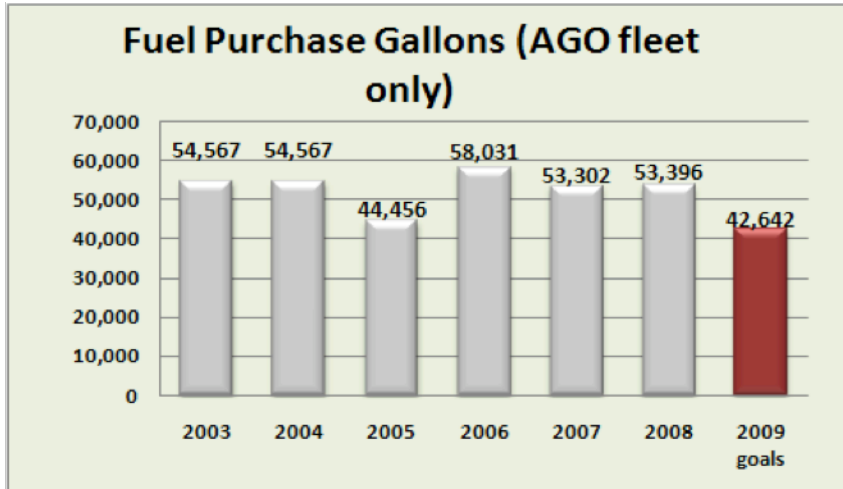


Figure 2.1: AGO Fuel Purchase Tracking and Target Amount Needed To Comply With EO 05-01

General Administration (GA) fleet, which accounts for 36% of total vehicle miles for the year 2007.

In the year 2008, the 132 vehicles in the AGO-owned fleet drove a total of 1,456,367 miles for an average of 11,033 miles per vehicle that year, or roughly 1,000 less than the estimated national average yearly mileage of 12,000 for passenger vehicles (U.S. EPA, 2009). The evolution of the AGO's vehicle fleet over the past 6 years is a good example of a sustainability effort that has brought about significant change since the issuance of EO 02-03. As of 2007, fully 68% of the AGO's vehicular fleet uses hybrid engines, resulting in an overall average of nearly 27 miles per gallon. This exceeds the 2006 national average fuel efficiency for passenger cars by roughly 5 miles per gallon(Bureau of Transportation). The progressive transition toward a hybrid-dominated vehicular fleet has been facilitated through the work of GA, which has negotiated state contracts for both Toyota and Ford hybrid vehicles, the first state in the nation to

do so(Bremer, 2008). AGO and other state agencies will continue to move in the direction of higher fuel efficiency in the future, barring any major departure from the current trend, as such we can expect even better fuel efficiency as older vehicles are continually replaced. As of June 2009, progress toward EO 05-01 fuel reduction goals have been hampered by a growing agency work force that has basically negated the progress made by increased agency vehicle fuel efficiency. The progress made in the vehicle fleet fuel efficiency levels will only result in overall fuel use reductions if it is coupled with a strategic campaign to reduce the overall miles being driven. Such a strategy will be discussed in the next section.

The AGO has actively incorporated a number of different technologies that allows employees to conduct meetings without the need for travel. GoToMeeting technology (<https://www1.gotomeeting.com/?Portal=www.gotomeeting.com>) allows multiple participants to view the contents of any one participant's screen and is ideal for situations where computer-based presentations need to be shared and presented across different facilities. Video conferencing is also available, and is used as a viable alternative to vehicular travel to a meeting location. The AGO, as stated in its 2006 Sustainability Plan Objectives for September 2006 to June 2009 is "making an effort to reduce trips outside the office by encouraging greater use of conference calls and alternative communication technologies such as video telecommunication and real-time networking." (Perry, 2006)

I would be remiss to discuss transportation at the AGO without giving sufficient explanation of the Commute Trip Reduction (CTR) program that is a requirement of all large employers in Washington according to the 1991 State law RCW 70.94.521-551. The original intent of this bill was to reduce traffic congestion, reduce reliance on imported fuels and alleviate air pollution

through facilitation of alternatives to driving alone during commutes (AGO CTR Program, 2008).

Through CTR, AGO employees working at least 50% of a fulltime (40 hour) workweek and commuting in some manner other than driving alone for at least 50% of their total roundtrip mileage can choose one of three types of reimbursement: a Flexpass, an incentive payment, or a subsidy. The Flexpass provides the employee access to unlimited bus and rail travel within the Sound Transit and King County Metro Transit systems, as well as access to a Vanpool fare subsidy (Tools to Keep You Moving: FlexPass Program, 2008). Incentives come in the form of taxable benefits paid quarterly through the AGO payroll system. Employees electing to use this

AGO Employees By CTR Participation			
CTR Non-Participants	Total CTR Participation		
811	499		
61.91%	38.09%		
AGO Employees by Alternative Commute Type (CTR)			
Bus or Train	Ferry	Walk ,Carpool, or Bike	Vanpool
306	12	145	36
23.36%	0.92%	11.07%	2.75%

Figure 2.2: Results From Latest CTR Survey Showing Program Participation

option are eligible for \$1 each way reimbursement for each alternative commute up to a maximum of \$40 each month. Subsidies give a reimbursement of up to 75% of the

monthly cost of either bus, ferry or vanpool for commuting purposes. In order to make the CTR program more attractive, the emergency ride home program is offered to employees who used an alternative commute mode but may be faced with an emergency and needs to get home quickly.

State agencies are required to have a CTR program manager responsible for administering the CTR program who is appointed by the chief of staff. The CTR manager at the AGO as of 2009 is Quincy Walker, who came to the position after serving as the employee transportation coordinator under the former CTR manager. Individuals appointed to serve as the program manager do so in addition to their primary duties at the AGO and can expect a pay raise of roughly \$2-3,000 for the added responsibilities(Walker, 2009). Each location at AGO that

participates in CTR is required to have an Employee Transportation Coordinator who can field questions and concerns about the program.

Additionally, AGO uses a ride-share program based on its AGO Collaboration Environment (ACE) sustainability committee website where employees can post their travel plans in advance and can find fellow employees to share the ride. The program seems to be moderately utilized, with someone looking for or offering a ride on nearly half of business days. I believe that with the correct emphasis on less carbon intensive methods of transportation, a strategy that I will discuss in the following chapter, this program will see increasing usage in coming years.

Reuse & Recycling:

Every one of the AGO facilities now incorporates some form of recycling into its waste disposal practices. It is AGO policy to recycle materials where available, affordable and feasible within the facility, and it is up to a building coordinator in each facility to execute the provisions of this policy. Metals, papers and plastics are all to be recycled, as are batteries, toner cartridges, fluorescent light bulbs, plastic bags and “other items for which recycling is available.”

(McKenna, 2005)

Compost collection has also been implemented at the AGO Tumwater and Bristol Court facilities and is expected to expand to the Highway licenses buildings (HLB) and the Capitol Court within the next year. The compost pickup service is offered through LeMay’s campus program, and is brought to Silver Springs Organics for composting. It is within the current sustainability plan to implement this at additional facilities.

Reuse efforts have been substantial at AGO, with the hallmark of these efforts being the AGO Reuse center. The Reuse center is an online-based system where staff can request needed items

such as office furniture and supplies and list items they are no longer using. Items are posted on the ACE Sustainability site and those looking for certain items can browse the offerings. This program saves the AGO time, money, resources, and the environmental impact associated with orders of new supplies.

Paper:

Office paper has been addressed on some level by the AGO, and currently the majority of the paper the AGO purchases is 35% recycled. The recycled content of AGO's paper purchases is limited by a contract with Ikon, the multi function device (MFD) service provider. At the time that this contract was negotiated nearly six years ago, 35% recycled content paper was relatively cutting edge, and according to Melody Younglove, AGO's sustainability coordinator way beyond what any other agency was requiring (2009). However as recycled paper has improved in its compatibility with print machines, many service providers now allow 100% recycled content in their machines and experience no negative consequences. Efforts have been made to persuade Ikon to increase the recycled content allowed in their machines under the state contract with no results. IKON's unwillingness to adapt to a higher level of recycled content in their machines is a contributing factor to AGO's desire for a new MFD service contract. This contract is set to go through the middle of 2010, at which time AGO will be selecting a new MFD service provider.

Despite the institutional barriers to high recycled content paper, the AGO has made significant strides in reducing its overall paper use through the implementation of targeted policies. The agency has a double-sided printing policy that is default for almost all MFD's. This was implemented despite significant technological barriers with the Canon brand MFD's which were counting the blank backside of all double sided printing jobs as an impression, resulting in

increased machine wear and increased print costs. A letter was written to Canon regarding this limitation and in response, Canon provided a Microsoft patch to resolve the issue(Feek, 2007). The successful efforts made to overcome this technological barrier are a testament to AGO's willingness to take time and resources in order to be more environmentally friendly. Additional paper use reduction policies have included a "Don't Print This Email" message at the end of emails, as well as the elimination of printed earning statements and the widespread integration of electronic funds transfer for paychecks in lieu of checks and paper statements.

Energy:

The importance of addressing energy use in buildings cannot be overstated. Energy use in commercial buildings and industrial facilities is responsible for nearly 50% of U.S. CO₂ emissions. It is estimated that as much as 30% of that energy use is unnecessary or due to inefficiency (Energy Star: Learn About the Challenge). Likewise, at the AGO, 48% of the total GHG emissions can be attributed to heating/cooling and energy use at the facilities. Therefore facility energy use represents the single source of GHG emissions with the greatest potential for improvements at the AGO and most organizations worldwide.

Beginning in mid-2008, all state agencies have access to use of Verdiem's SURVEYOR computer energy management software, which has the potential to save a considerable amount of wasted energy through automatically placing desktop and laptop computers in lower power settings when they are not in use. The AGO was the first of all state agencies to fully implement this software, another testament to the agency's eagerness to embrace environmental action. As a result of Verdiem's SURVEYOR technology, the AGO has saved an average of \$13.44 per computer, or \$22,518.27 annually for the 1,675 computers reportedly in use at the agency. This roughly equals 484,400 pounds in avoided GHG emissions(Verdiem, 2009).

There have also been sporadic efforts toward deploying some energy efficiency measures at AGO occupied facilities, such as motion-sensor lights and programmable heating and lighting systems. In the AGO's Tumwater Facility, which houses over 25% of the agency's total workforce, a programmable lighting system was implemented, reducing overall lighting hours by 10% in 2008(Younglove, FY 2008 Sustainability Report, 2009). The efficacy and worth of such systems thus far has not been measurable, though the ability to track the energy savings of such investments in the future is a major benefit resulting from this inventory. Given the importance of this issue, and the potential for vast improvements that can lead to significant reductions in GHG's while also saving money on reduced energy costs, energy consumption is an area that is due to receive much more attention and will be a focus of the CAP.

Other Environmental Initiatives:

The AGO has a sustainability committee that meets on a regular basis. Each division has an established point of contact that acts as the liaison to the committee, reporting to the committee at large and implementing policies decided on by the committee.

Most recently, Melody Younglove, AGO sustainability coordinator, was able to secure funding to hire a graduate student (the author) from the Masters in Environmental Studies program at the neighboring Evergreen State College to calculate the agency's first ever GHG inventory and to make recommendations to the agency on ways they could make reductions, despite the looming economic crisis we now find ourselves in. Funding came from the operations committee and was approved by Mike Bigelow the AGO Chief of Staff. Funding for the position was approved just prior to the hiring freeze(Younglove, AGO sustainability coordinator, 2009). The fact that this funding was approved demonstrates a considerably receptive attitude at the AGO toward taking on a cutting edge and proactive role as an environmentally responsible state agency. In

fact, the only other agencies in Washington State to have completed a comprehensive GHG inventory at the time of writing this are the Community Trade and Economic Development (CTED) and Washington State Department of Transportation (WSDOT). The latter of which, due to a vehicular fleet that results in scope II emissions in excess of 25,000 MTCDE⁴ annually, will be subject to mandatory reporting laws in the near future. WSDOT is also different from AGO in that they have four dedicated fulltime staff members working on various climate change research subjects under the heading of the Air, Noise, and Energy group, which is part of their Environmental Services department. Karin Landsberg, the author of the WSDOT GHG inventory is the Climate Change Technical Program Lead (Landsberg, 2009).

AGO Facilities:

The Attorney General's Office leases 16 of the facilities that it occupies from a mix of General Administration and private property management companies. Additionally, AGO employees are housed in two state university facilities for which no rent is paid because the respective schools are clients.

All lease contracts for AGO facilities are negotiated through GA's Real Estate Services (RES) division, which acts as the real estate agent for state agencies. The Assistant Attorney General (AAG) in GA creates the legal documents that guide these agreements, and sustainability criteria are integrated via the mandates of past Executive Orders. For instance, according to Ron Major, GA's Resource Conservation Manager for the Capitol Campus, which encompasses 21 buildings for a total of 2.8 million square feet, RES is aggressive in incorporating LEED criteria into new

⁴ MTCDE or Metric Tons of Carbon Dioxide Equivalent is the common accounting unit for GHG measurement on any large scale. There are 6 officially recognized GHG's, each with its own warming potential some. Methane, for instance, is 21 times more potent of a GHG than CO₂ and so would take a proportionally less amount of methane gas to equal a ton of CO₂ in terms of its ability to warm the atmosphere. However to put it into perspective, one MTCDE of CO₂ is equal in volume to 264,555 full party balloons.

and existing buildings. Furthermore, as a requirement of GA leases, property managers are required to fill out an Energy Consumption Survey at the time of any lease renewal. However the extent to which the information on these surveys actually guides GA's decision may be hampered due to the logistical details associated with leasing from private real estate owners. This problem, and possible alternatives to it will be discussed at greater length in the CAP chapter.

GA is responsible for seeing to the negotiation of building maintenance agreements as well. Two of the AGO's facilities are owned directly from GA, these are the Capitol Courthouse building, and the Highway License Building, or HLB. These facilities are close enough in proximity to the capitol campus that it behooves GA to own them outright. The remaining 14 facilities that AGO occupies are owned by individual property management firms. Additionally, most facilities occupied by AGO are shared with any combination of other tenants. This is a major confounding factor when it comes calculating a GHG inventory and creating a CAP, something that will be discussed in great detail in later sections.

There are a number of different ways that AGO's facility leases are carried out, though it's important to note that all AGO-occupied facilities are leased either from GA or from third parties. AGO is the sole occupant in two of its facilities, and shares the remainder of its facilities with any number of other tenants. One of these solely AGO occupied buildings, the Tumwater Building, is a Leadership in Energy and Environmental Design (LEED) silver⁵ certified facility. Utility payment options are negotiated at the outset of the lease, and are handled in one of two distinct fashions. In the first case, the property management company handles some or all of the utility bills (here defined as electric, gas, water and trash) and these utilities are included in the

⁵ To learn more about LEED and its rating system, go to www.usgbc.org/leed/.

total monthly rent statements, this is the case in 11 of the 18 buildings. For the seven remaining facilities, the lease terms define which aspects of the utilities the lessee (AGO) is responsible for, in which case utility statements come directly to the AGO's billing department and do not pass through the property management, or are paid by the client housing the AGO employees.

General Administration:

General Administration (GA) acts as the central support agency for the state government. Their support services are multifaceted and reach every aspect of public sector infrastructure and operations in the state. To mention just some of their capacity, GA acts as the purchasing contract negotiator, landlord, real estate agent, travel services manager, surplus program organizer, and facilities manager for the state (General Administration, 2009). In short, their efforts and operations are far reaching and the importance of a state agency's relationship with GA in designing and implementing a CAP cannot be overstated.

In many ways, GA represents the gatekeeper to implementing many aspects of a state agency's CAP. For instance, for every one of the 18 buildings that AGO occupies (save WSU and WU, as we are housed with the client there) GA has either negotiated the lease terms with the landlord, or GA is the landlord and the AGO rents directly from them. Within GA, Real Estate Services is the branch that is responsible for finding building space for other agencies and developing lease terms. They are also instrumental in securing purchasing contracts through which state agencies can make large-scale purchases at a leveraged price. Examples of such purchases that can make a significant difference in a state agency's carbon budget include Toyota Priuses for the state motorpool, and purchase of paper with a high or 100% recycled content.

Ron Major is the Resource Conservation Manager for the Capitol Campus and AGO's main contact within GA for sustainability and energy efficiency measures. He has helped GA to

develop a checklist of elements to look at when considering a new lease. Ron is an invaluable resource for the AGO in that he is motivated and passionate about reducing energy use in capitol campus buildings.

GA also has a long running energy program whereby they have negotiated contracts with Energy Service Companies (ESCO's) that state agencies can now choose from. An agency can then ask for an audit on a building and hire an ESCO from one of the companies on the list. The result of such an audit is the identification of cost effective, energy reducing efforts. If the agency has ample capital funds it can utilize them as a source to pay for the energy efficiency upgrades recommended by the ESCO. In most cases, however, and especially in the current economic climate, it is more likely that the agency will borrow the funds necessary for the efficiency measure from the state Treasurer. Bonds are typically available based on a certificate of participation (COP). The participating agency will submit a notice of intent to the treasury, declaring the nature of the project and the probable term of the bond requested. The agency will then spend money from their office of procurement. In either case, it is important to always consider incentives and grant money that local utility providers such as PSE offer for state agencies looking to make energy saving improvements to their facilities. These incentives can significantly reduce the payback period of a project making cost effective a project that may not have been before utility incentives were considered.

Understanding the organization's history is crucial to identifying sources of data, deciding which data is most important to include in your inventory, and developing mitigation recommendations that are viable within the social-economic, environmental and political realities of your organization. While recommendations will be largely developed based on the results of your

inventory process, deciding just how to go about mitigating those targeted sources will largely draw upon your knowledge of what works for your organization.

The next section will detail the process of defining an inventory as it pertains to the AGO, how I collected data, and how I interpreted that data into valuable information.

The AGO GHG Inventory

The following sections will detail my methodology in collecting, calculating and analyzing the data for the Attorney General's Office of Washington State's GHG inventory. Not all inventories will be carried out in the same manner due to inherent variability in GHG emissions and sources between different organizations and firms. As such, this section should be treated merely as a case study for your own inventory; although office-based organizations will likely follow this process more closely than non-office based ones. While there is significant literature detailing GHG inventory methods and considerations to be taken in such a study⁶, very little literature exists that deals specifically with State Agencies. This paper represents the first such case study to be made available outlining the process of inventory and climate action planning at a state agency. A lot of the material covered here has little precedent, and as such the information found here should be used as a means of reflective transfer which, according to Schon and Rein is a process by which patterns are carried over from one situation and are subjected to another one as a sort of projective model. This thesis should provide the uninitiated with a framework of understanding and a plethora of resources and situations with which to make educated decisions in one's own work. It is my hope that this paper will allow the reader a vicarious GHG inventory and CAP experience. Novel and unique situations in your own inventory work should in turn generate new causal inferences, and should be constantly subjected to situation-specific tests of internal validity (Schon & Rein, 1995). In other words, through insight into my work with the AGO, you should be better prepared for the types of situations, difficulties, and possible solutions that you will encounter on your own, though not

⁶ You will find a rich source of literature on internationally recognized GHG inventory methods and standards through the International Standards Organization (ISO), World Resources Institute (WRI) and World Business Council for Sustainable Development (WBCSD) partnership site, <http://www.ghgprotocol.com>.

every one of my methods will be appropriate in your unique situation. I would urge others engaged in this work to share their findings as well, thereby adding to the general knowledge base and creating a more clear-cut methodology for individuals involved in GHG inventories and Climate Action Planning at other organizations.

I will lay out the following section in such a way as to introduce my methodology by giving a general overview of the key terms, methods, and processes for gathering and analyzing the data. These introductory sections will err on the side of brevity, as a significant body of work already exists regarding best practices in inventory methods.⁷ I will then detail the methodology I used specifically with the AGO's GHG inventory. These sections are listed in an intuitive and sequential manner that most other inventories will more or less follow. Once again however, this should be treated as a case study, the needs of your own organization may lead you to following a different order or to employ different methodology.

Framing Your Inventory:

What do you, or your organization want out of your inventory? Answering that question can be easy or difficult, depending on your particular situation. Essentially, it is crucial to understand why you are doing this work, and if someone is paying you for your time or for a finished product, to find out exactly what is expected of you and how your work will be used in the future.

Often times, in the case of a contractor or outside consultant, a written agreement will spell out the terms of your contract and clearly define what is expected from your work. It is important to be aware of implied duties or deliverables that may be expected but not explicitly defined within

⁷ See www.ghgprotocol.org/standards/publications for a comprehensive list of documents regarding methods and protocols from this standard setting organization.

the terms of the contract. Contract language works best when it grows out of mutual discussion, and eventually it should serve to remind the involved parties what has been agreed upon, thereby helping to maintain focus and poignancy of the intended work throughout its duration. For this reason, it is critical to have detailed discussions about your work with the people who will be directly supervising or have commissioned the work you are about to begin.

Furthermore, as the field of organizational climate action planning is rather groundbreaking as of 2009, the organization may not really know what they need and may merely request a “greenhouse gas inventory”, a “carbon footprint” or a “climate action plan” without a real understanding of what they are asking for.

No matter the level of detail your guiding mission is initially, gaining a deep understanding of the organization for which you are about to conduct an inventory is a critical first step. For instance, a state parks-and-wildlife agency will have very different goals, and different types of emissions than a printing office, or a car dealership. At the AGO, both the contract language and detailed discussion before and throughout the process gave me an understanding of just what kind of deliverable my employers envisioned. The concern for the AGO study was less on compliance for regulatory measures than it was a way of maintaining the agency’s early adopter pattern and to be proactive in obtaining a baseline measurement against which future inventories could be compared.

Getting copies of the organization’s guiding documents like a current *Strategic Plan*, or any *Master Plans* will get you on your way toward a comprehensive understanding and help you anticipate the kind of information you will be seeking and where it will likely come from.

Generally, this will have you working across a diverse group of individuals within an organization, from human resources, to accounting, to upper management and facilities. This

last group, the facilities staff, will most likely become your biggest ally in the data collection process and also in the formulation of CAP details that deal with physical space. In this paper's final section, I will give recommendations for actions dealing with AGO facilities, none of which are feasible without the support and guidance of facilities staff.

Defining Inventory Boundaries:

Oftentimes the first decisions in an inventory address the limits to the emissions you will count, and how you will choose to count them. For instance, an organization responding to mandatory reporting under a regional cap and trade may require the calculation of only a limited scope of emissions sources, while an inventory carried out to inform an organization's entire sustainability efforts may go far beyond that. These are all decisions that should be made based on the individual needs of the participating organization, which are questions you should feel comfortable answering based on your research and knowledge of the organization.

Emissions are broken down into three categories referred to as scopes. Organizations involved in any sort of official reporting will at a minimum be required to calculate scopes I and II. The World Resource Institute (WRI) GHG Protocol, who, in partnership with World Business Council for Sustainable Development (WBCSD) promotes the use of International Standards Organization (ISO) 14064 standards for GHG inventories defines scope I emissions as direct GHG emissions that must come from sources that are directly owned or controlled by the organization (International Standards Organization, 2007). Examples of common scope I emissions include on-site fuel combustion in furnaces and boilers, as well as emissions from organization-owned vehicles.

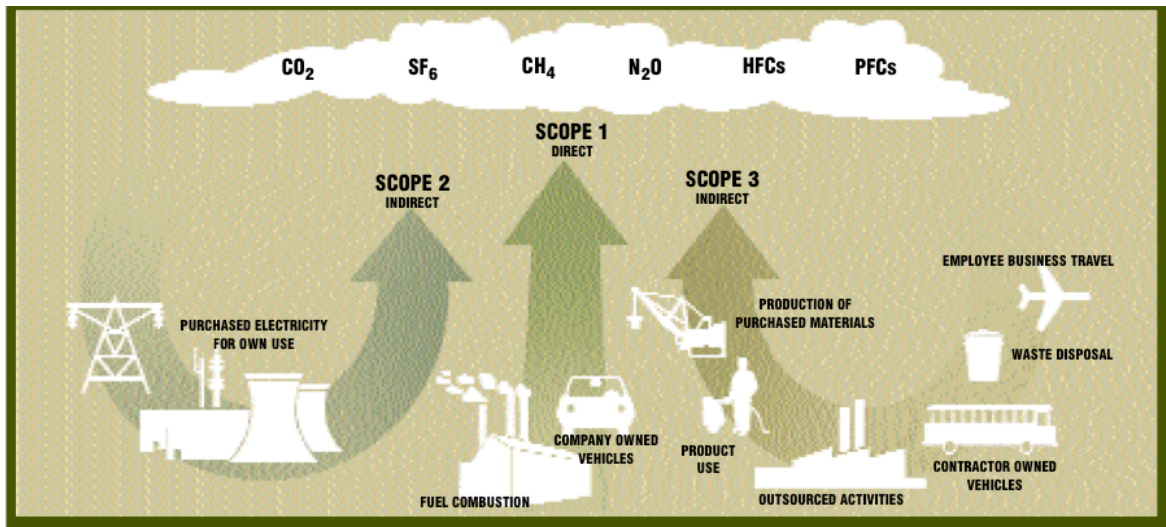


Figure 3.1 Source: *The GHG Protocol: A Corporate Accounting And Reporting Standard. Revised Edition*

Scope II emissions result from the production of electricity that is purchased by the organization and will be a very significant source of emissions for most office-based organizations. These emissions are defined by the WRI as “electricity that is purchased or otherwise brought into the organizational boundary of the company [and] physically occur at the facility where the electricity is generated.” (World Resources Institute and World Business Council for Sustainable Development, 2004)

Finally, scope III emissions represent the remainder of GHG’s that are produced as a result of an organization’s operations. Scope III will be comprised of entirely indirect sources not owned or controlled by the organization but emitted as an indirect result of organizational operations. Examples of typical emissions in this category include organizational air travel, commuting, and materials purchasing. Scope III emissions are optional in most cases of mandatory reporting at this time, but can serve as a valuable source of information for organizations looking to take their sustainability efforts beyond mandates. The boundaries to scope III emissions are not firmly established by the WRI or any standard setting group, thus what gets included in your study

should be based on the emissions information that will ultimately be of most value to your organization.

When setting inventory boundaries, deciding whether or not to limit the study to scope II emissions or to delve into scope III will be based on many contributing factors.

- **Time:** Will you be able to complete the study in the time allotted? Will the organization be able to devote the time in subsequent studies to gathering the same data? If reporting is mandatory, will you have sufficient time to seek third party verification if it is required?
- **Budget:** Can the organization afford the additional time and resources needed? Can it be justified in potential savings or some other value added?
- **Calculation Tool:** Are you using a tool that will be able to convert the scope III data into emissions? If not, are you willing to research the associated emissions factors and input those calculations into your final tally?
- **Need:** Is the intent of the study solely to gather a baseline for Scopes I and II, or did it include elements of scope III as well? Will this additional information add value to the organization?
- **Organizational Goals:** Does your organization have the impetus to make reductions that go beyond mandatory reporting? Does it have personnel who can devote their time and effort to achieving those reductions once sources and reduction strategies have been identified?
- **Regulations:** Are there any mandatory regulations for scope III emissions that affect your organization?

- **Compatibility with other studies:** Will regulations, business competition, membership within certain organizations or a collaborative partnership mean that your inventory will be compared to those of other organizations? If so, an apples-to-apples approach should be taken so that your results lend themselves to side-by-side comparison with other organizations.

When considering whether or not to include scope III emissions in the study, it is critical to keep in mind that it would be nearly impossible to produce an exhaustive list of scope III emissions. For instance, an employee purchases a plane trip from Seattle to San Francisco for a two-day business trip. En route to the airport she takes a cab, and from the airport, a shuttle. With her per diem food allowance, she purchases three meals, stays two nights in a hotel, and participates in a conference. In this example there are possible scope III emissions imbedded in the conference, hotel, meals, the ground transportation, and the plane flight. Furthermore, the depth to which one measures emissions from such sources is openly debated, for example, does an accounting of the employee's steak dinner involve the gas used to cook the meat, the fuel used to transport it and the methane produced by the cow during its lifetime? How are emissions shared in an airport shuttle that picks up and drops off passengers along the way? Would counting the airport shuttle be considered a double count if the shuttle service does not inventory its emissions?⁸ As you can see, calculating upstream emissions from purchases becomes a complicated matter, and deciding who "owns" such associated emissions in order to avoid double counting is an ongoing debate. As a co-designer of your inventory (along with the organization that has commissioned it) you have the ability to pick and choose from the list of

⁸ For a good synopsis on this discussion see: SETAC Europe LCA Steering Committee (2008): Standardisation Efforts to Measure Greenhouse Gases and 'Carbon Footprinting' for Products (Editorial). *Int J LCA* 13 (2) 87–88

potential emissions sources that comprise scope III. Defining the boundaries of your scope III emissions is important, and should be based on sound, transparent judgments that are easily communicable to the individuals that will be viewing the finished product.

Boundaries of AGO Study:

In this section I will detail why I chose to include all three emissions scopes in my study and particularly my reasons for including certain scope III emissions.

I was hired by the AGO on a contract to produce a GHG inventory in October of 2008. Before hiring me, sustainability coordinator Melody Younglove wrote and sought approval on the contract for my services in which the preliminary expectations for my contract were spelled out.

Gather and analyze all data available to calculate green house gas emissions for the Washington State Attorney General's Office. This may include visits or telephone communications with landlords to gather necessary information. Once the data has been gathered and organized, the relevant information will be placed in a green house gas calculation tool. The calculation tool can be one that has already been developed. After the data is in the calculation tool, the Sustainability Project Manager will be instructed on how to update the tool and interpret its information. This project may lend itself to making recommendations to reduce the emissions, suggesting or developing outreach and education programs, and methods to lower the emissions within the Agency. The results of the work would be presented in some forum, yet to be determined.

At the contract's outset, it was clearly communicated to me that the AGO was looking to maintain its standing as an environmentally proactive agency in the State of Washington, and that it was concerned about the possibility of mandatory reporting as part of the WCI or through

House Bill 2815 which essentially creates the framework for a cap and trade system in the State of Washington to be implemented by 2012.⁹ Given the fact that the AGO would be the second agency to have a comprehensive GHG inventory after the Department of Transportation (DOT), merely obtaining a baseline year measurement that could be added upon and compared to in subsequent years while adding informational value to the agency emerged as a guiding principle when choosing the elements of scope III to be included. The AGO's scope I and II emissions levels will not exceed likely thresholds for mandatory reporting in Washington State, which is reported to be at or above 10,000 MTCDE annually for scope I emissions or a collective vehicle fleet emissions of at least 25,000 MTCDE (Moir, 2009).

The main factors affecting which scope III emissions to pursue included potential contribution to overall emissions totals, time and effort required to gather the information, and the potential for accurate results based on the information given. (A fourth factor that did not affect my decision process because of the fact that similar inventories have not been carried out, but one that may apply to inventories in the future is comparability, or what have other similar and comparable organizations included in their inventories so that my results can lend themselves to an apples to apples comparison.) While it is beneficial to try to forecast these decisions from the start, often times it will take some investigation to understand just how something like office supply purchasing will affect the final figures in your inventory, and what sort of time commitment will be required to obtain the data. [Figure 3.2](#) provides a visual flowchart of this decision making process.

⁹ See <http://apps.leg.wa.gov/billinfo/summary.aspx?bill=2815&year=2007> or http://www.martenlaw.com/news/?20090107-wa-ghg-tracking-required_-_edn11 for more on this bill and what it proposes.

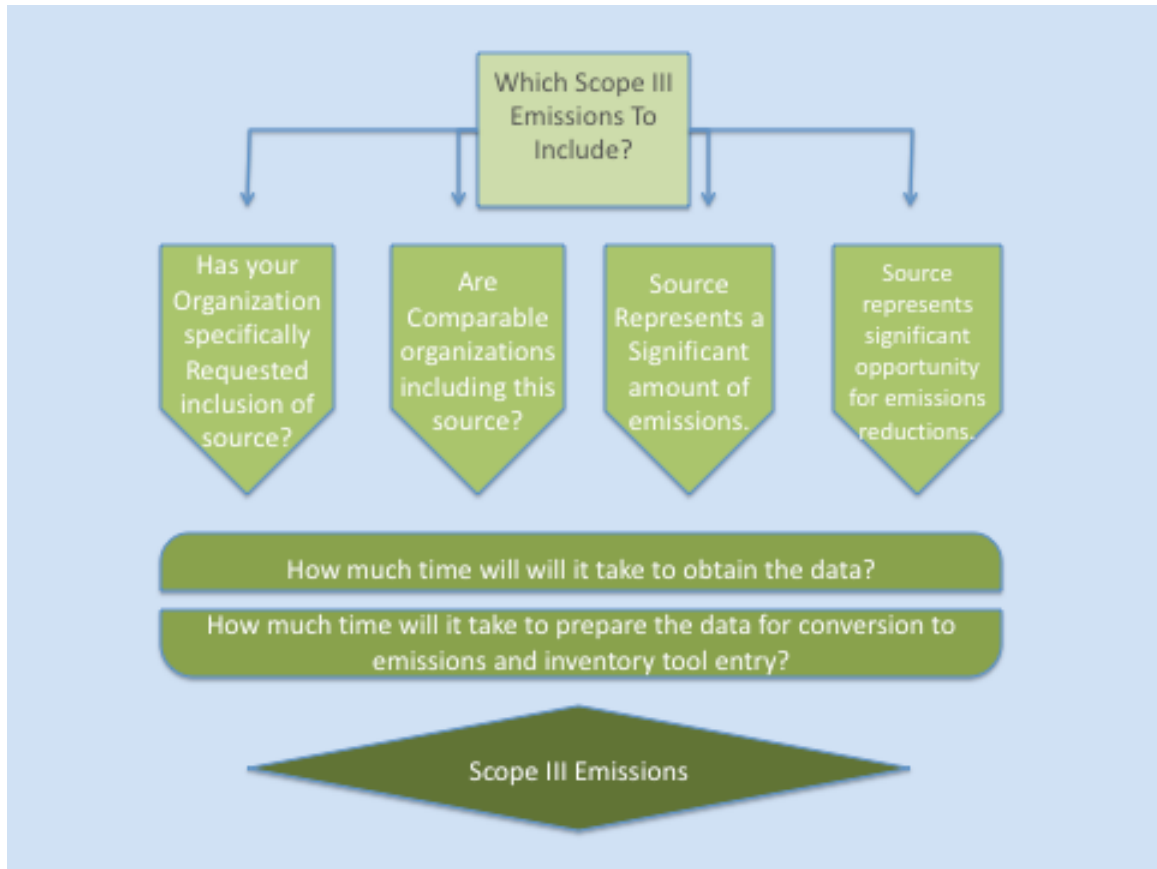


Figure 3.2: Flowchart of decision-making process for scope III emissions boundaries.

Data Collection:

Depending on the structural complexity of your organization, the time available for completing the process, and the data collection boundaries that are decided upon, data collection will most likely be the most time consuming part of the inventory process.

As detailed in chapter 2, a close knowledge of the organization for which you are working will help you identify where emissions will be coming from and the key players who will have access to the data that you need. If you are an outside contractor or otherwise unfamiliar with the organization, a close alliance with veteran personnel who are enthusiastic about your work will be of great assistance as you identify and begin to contact data sources. These veteran personnel

likely have connections that will facilitate your ability to find and gain access to the data you will be seeking.

Before data collection begins, you must select a base year on which to focus your study. The base year will be the year that you measure all subsequent inventories against. It may behoove you to make the base year the first year for which complete data is available, or you may choose to measure a past year based on mandated “baseline emissions reductions” which will be measured against that year. In the case of government agencies, it’s important to distinguish between fiscal years and calendar years, as sometimes data is compiled on one timeline but not the other. It would be best to avoid setting a baseline year as a fiscal year, as this is not typical practice, and it could prohibit comparison to other inventories or participation in reduction mandates based on baseline years. However, if you are collecting data for the most recent year, be aware that the fiscal year unit is often used, and may lead to incomplete data if, for example, you are searching for last year’s energy data that is collected on fiscal year basis, as it may not be complete until halfway through the current calendar year. In some cases, you may have to combine two half-fiscal years to get a complete calendar year’s worth of data. It’s important to document any such decisions and make mention of them in your final report.

Many times you will need to make contact with individuals outside of your organization such as property management companies or travel agents who are unfamiliar with what you are trying to achieve. Furthermore, many of these individuals may have scheduling conflicts or otherwise lack the impetus to prioritize gathering the information that you have requested. As a result, you may find yourself contacting certain individuals on a repeated basis.

At this point in the process, you should be close to a final decision on how you will convert your data into emissions figures. In most cases you will be utilizing an existing tool, or using

individual spreadsheets for each emissions category such as those available at www.ghgprotocol.com. In most cases a GHG inventory tool will be used which allows for the input of emissions data and will automatically convert and compile your data into a standard unit of Metric Tons of Carbon Dioxide Equivalent (MTCDE). Not all tools are created equally, and in choosing one it is important to keep these key factors in mind.

- Does the tool use standard setting emissions factors established by WRI or the United Nations Framework Convention on Climate Change (UNFCCC)?
- Do other organizations with which you will potentially compare emissions use the same tool?
- If you are likely to come under mandatory GHG reporting, will this tool be acceptable under that mandate, or will some other tool be recommended or required? See footnote for a list of commonly used tools.¹⁰

Calculating Emissions from Internal Combustion of Natural Gas
Step 1: Natural gas produces 3 greenhouse gasses, each with an associated global warming potential (GWP) $N_2O=296, CH_4=23, \text{ and } CO_2=1$
Step 2: Every source of GHG's has an emissions factor (EF) that measures the amount of each GHG emitted per unit, in the case of natural gas that unit is Million British thermal units (MMBtu) $N_2O=0.00011\text{kg/MMBtu}, CH_4=0.00528\text{ kg/MMBtu}, \text{ and } CO_2=52.8\text{ kg/MMBtu}$
Step 3: Calculate an Emissions Coefficient by multiplying EF x GWP for each GHG and adding the products $(296 \times .00011) + (23 \times .00524) + (1 \times 52.8) = 52.95 \text{ kg/MMBtu}$
Step 4: Convert this number to MTCDE $52.95 \times .001 = .05295 \text{ MTCDE/MMBtu}$
Step 5: Your organization's natural gas consumption in MMBtu x .05295 = associated GHG emissions

How does a tool take a given service or product and turn that information into units of MTCDE? The conversions performed by an inventory tool are typically quite simple, yet the beauty of the tool is its ability to organize, store and concatenate the many pieces of information you will be gathering during

Figure 3.3: Shows just how an activity is converted into a unit of emissions. This is example of the types of background calculations an inventory tool has embedded in it.

¹⁰ www.theclimateregistry.org
www.cleanair-coolplanet.org
www.ghgprotocol.org/calculation-tools
www.seattle.gov/climate/SCPresources.htm

your inventory process. Because Carbon Dioxide is the standard, all units are converted to Carbon Dioxide equivalents. [Figure 3.3](#) gives an example of just how the embedded numbers in an inventory tool are calculated, and how units of energy are converted to emissions.

Once you have collected the data for your organization's various emissions sources this information would be entered into the appropriate space in your tool and what you would get as an output is a corresponding mass of GHG emissions, displayed in MTCDE. The way this is calculated depends on your tool, and the emissions factors selected or contained therein. For the SCIP tool, if I had chosen Puget Sound Energy as the particular utility provider for that facility, the emissions factor would be .39 (based on the particular fuel and energy production mix of that utility provider). Ultimately it's a matter of multiplying the energy use by the emissions factor in an equation that would appear thusly **Unit of Energy (kWh) x Emissions Coefficient = Amount of CO₂ Equivalent**. It is critical to always pay close attention to units related to mass and energy use as you may be converting between different measures regularly for a single set of calculations.

It is advisable to become familiar with your tool before data collection begins to avoid organizing the data in a way that is redundant or not ultimately useful. For example, the SCIP tool accepts company flight data in three different categories, short, medium and long, so I correspondingly organized my data compilation process by these categories.

Data Collection And Analysis for AGO Study:

The first step in my data collection process was to identify every facility, and discover the terms of the lease by looking over the lease document archives. The lease agreement language represented the first clue in tracking down the data. For instance, where lease documents indicated that the lessee pays for electric and gas bills, I then knew that this data would be found

somewhere in AGO records, as opposed to having to put a call into the real estate management company to request that information. There are several different permutations of standard lease agreements at AGO occupied facilities: those that are wholly occupied, those that are partially occupied and pay utilities separately, and those for which utilities are included in the lease payments.

Depending on the nature of the facilities lease, I collected data from archived utility bills at the AGO's financial services department, from property managers, or from utility providers. On several occasions property managers and utility providers asked for credentials in order to establish my legitimacy, in which case I could refer them to Cami Feek, the AGO Facilities Director of whom they were most likely already aware.

I found that going through utility providers as opposed to property managers usually saved a significant amount of time as utility providers are used to such requests and can often fax or email copies of utility data for the year requested immediately, though sometimes this requires written or phoned permission by the property management company.

In the cases where AGO did not wholly occupy the building, it was also necessary to determine the square footage that AGO leased (found on the lease contract), and if that area was individually metered. If AGO's leased space was not on its own metering, then it was also necessary to determine the square footage served by that meter. In such instances, the area occupied by AGO was calculated as a percentage of the total area served by the meter, and that percent was also applied to the meter readings.

Because establishing contact with the correct individuals for each facility and then obtaining all of the necessary information sometimes required multiple calls and emails to different individuals, I found it imperative to keep a spreadsheet account of every communication that I

had in order to keep track of the myriad emails and phone conversations that were necessary to obtain facility utility data. In addition, obtaining records in electronic form allowed me to file them efficiently for future reference.

Like any GHG inventory tool, the Seattle Climate Partnership (SCIP) tool ultimately handled a lot of the calculations necessary to convert the raw data into emissions and to put it together in a single place. The convenience and organizational assistance provided by such a tool is invaluable. Yet as I will show in the analysis section, in order to truly make the data comprehensible and useful to your organization, further massaging will be necessary. As such, it is advisable to become familiar with the types of equations that are used to convert your inventory data into emissions figures.

Much of the data analysis that you perform will be instructed by the individual needs of your organization. For instance, if you would like to show carbon intensity per facility based on square footage, or per capita as a means of obtaining an idea of the average energy use and to identify outliers, you will likely already have access to the data needed for such calculations. Creating data that compares operations at different facilities may point out anomalies that otherwise would have gone unnoticed. Furthermore, juxtaposing facilities in that are in different geographic locations or can otherwise be measured individually can help spur action for mitigation efforts based on a friendly sense of competition. Informing competitions is just one example of an end use that will affect the types of analysis you perform with your data.

Analysis of AGO Data:

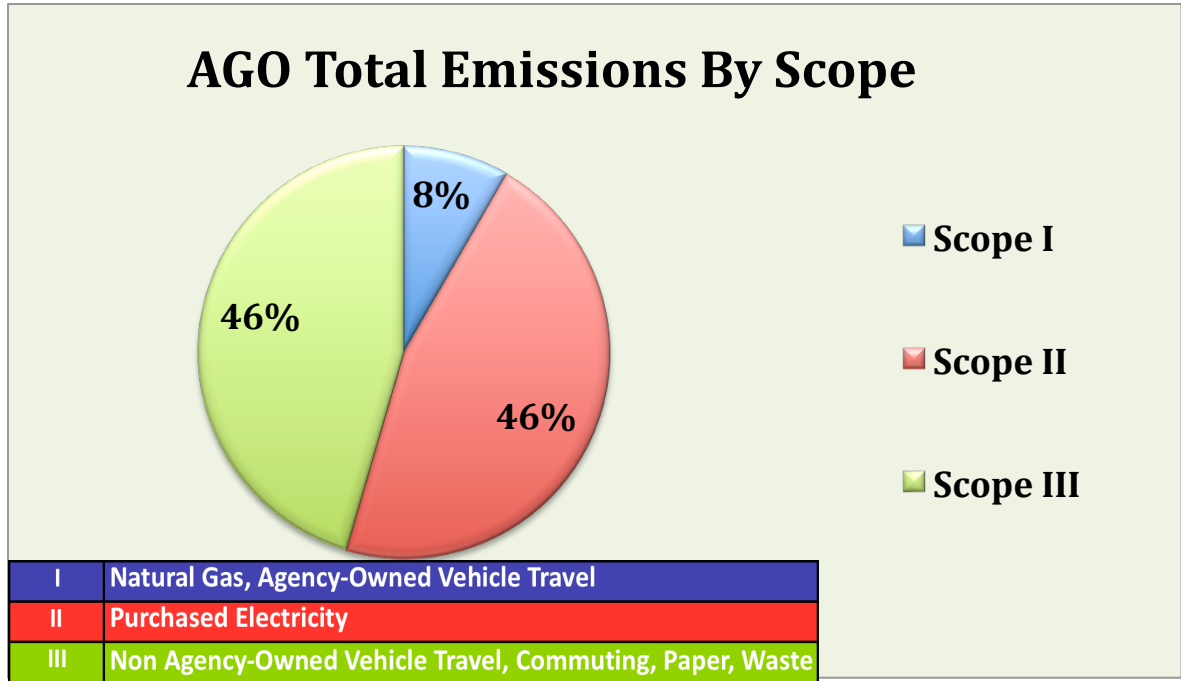


Figure 3.4: The AGO’s Total Emissions Profile By Scope

As a preliminary breakdown, assembling emissions by scope is probably the most basic, and perhaps the most important analysis you can perform. The SCIP tool did not automatically break down emissions by scope, so this had to be

	MTCDE	Percent total (emissions)
Scope I	591.71	8.30%
Scope II	3,293.88	46.22%
Scope III	3,241.31	45.48%
Total	7,126.91	100.00%

Figure 3.5: Table of Total Emissions Profile by Scope

done by hand using Excel. As you can see from Figures 3.4 and 3.5, scopes II and III are nearly identical in total value. Of course the limits to which emissions sources I included in scope III was a decision based on personal discretion, however this does give a valuable perspective on the types of emissions created by the AGO, and will eventually help guide recommendations for mitigation strategies. Yet these figures only represent the most wide scaled views of the AGO

emissions profile. In order to make recommendations, further breakdown of the data will be required.

Figure 3.6 is a further breakdown of Figure 3.4, and shows a more generally comprehensible view of the AGO's emissions sources. This breakdown goes beyond mandatory reporting

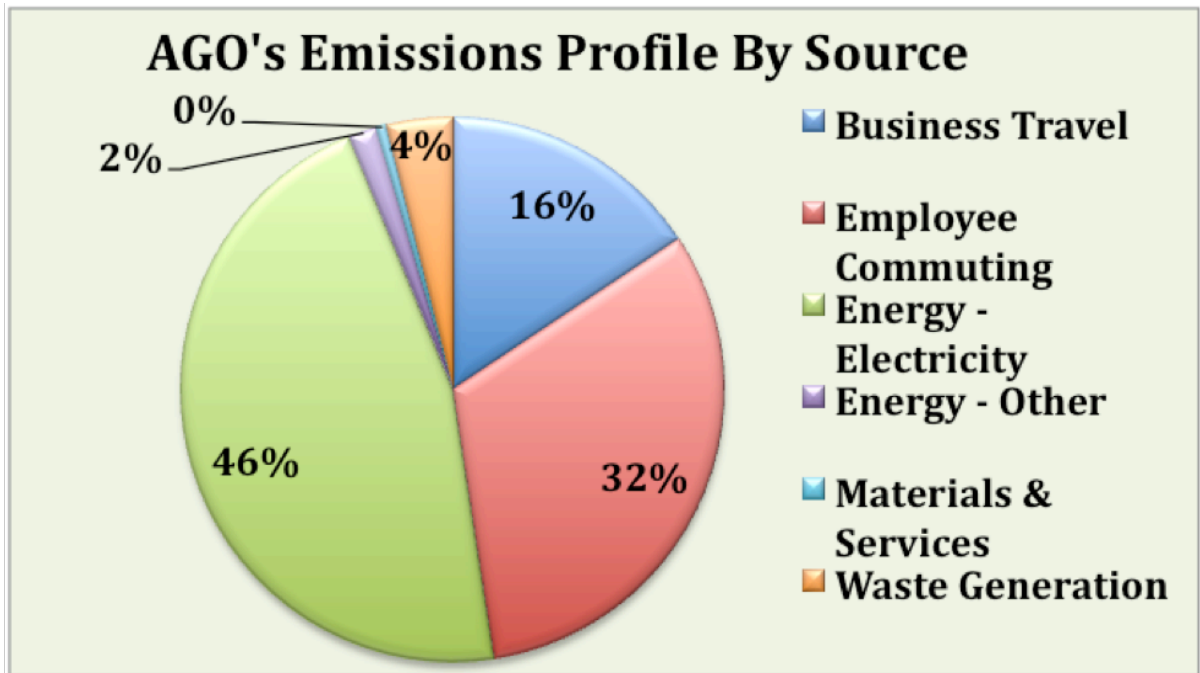


Figure 3.6: AGO Emissions Profile Broken Down by Source

guidelines and starts to clarify which of the AGO's activities can lead to quantifiable emissions. When presenting to AGO staff and management, communicating data only by scope may be confusing because the terminology is outside of the general knowledge base, whereas Figure 3.6 is set in contextually appropriate units for the layperson to follow along with.

Figure 3.7 takes the sources of emissions represented in Figure 3.6 and gives a better idea of how and where efforts should be focused in order to achieve reductions. The Relative Reduction Potential is a metric that came from the SCIP inventory tool and, while not as straightforward as a mere reporting of emissions sources, can be helpful by indicating at which emissions sources reduction efforts should be aimed. The SCIP tool informs the user that reduction potentials can

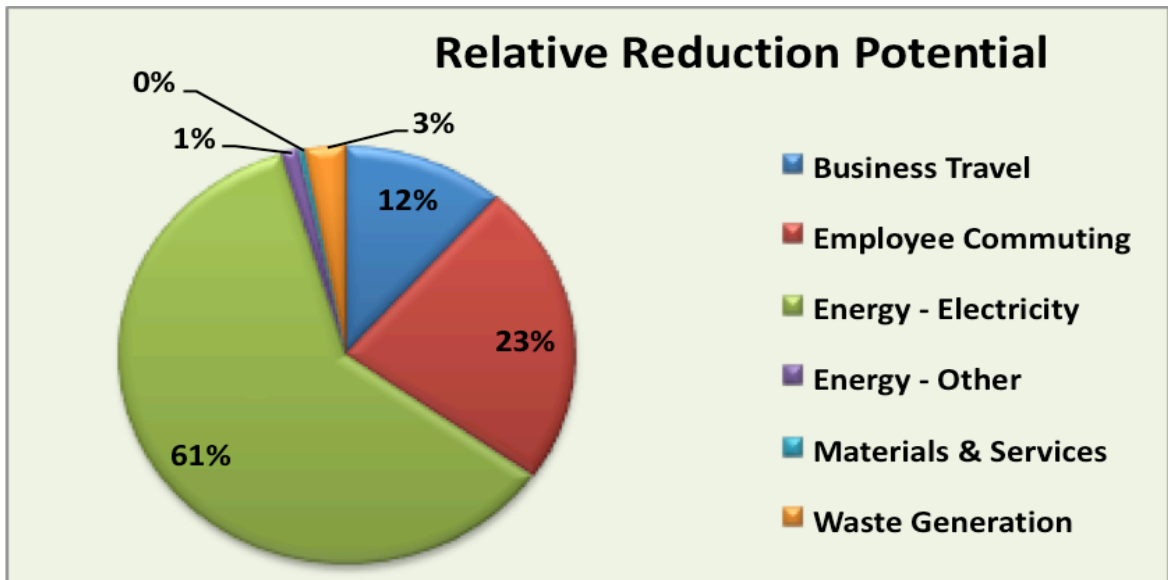


Figure 3.7: Relative Reduction Potential at AGO

actually be higher than the emissions value for that category. For instance, while AGO’s electricity use in 2007 comes to 3,293.9 MTCDE, its reduction potential is actually much higher than that, at 5,904.2 MTCDE. The reason for this, as explained in the SCIP tool:

“In the Northwest, reductions in electricity demand free up clean hydropower to provide to another utility, resulting in an existing fossil fuel plant running less and a resulting reduction in GHG’s. In the “Reduction Potential” column above, emission reduction calculations account for this reduction using an emission factor of 0.6 kg CO₂ per kWh of electricity saved, which are the emissions avoided by not powering up a natural-gas-fired combustion turbine, the dominant marginal source of electricity supply in our region.”

For an institution under mandatory reporting, the reduction of demand on hydrocarbon based electricity generation cannot be reported as a relative reduction potential, due to the high likelihood of double counting should both the energy user and producer count the emissions reductions resultant from lower utility demand.

Ultimately, this metric can help inform the possible environmental co-benefits of various targeted emissions mitigations efforts, and will be useful within the AGO because the agency’s

reasons for calculating a GHG inventory and making reductions are based on the agency’s culture of environmental protection and not because of mandates. However it should not be used as a sole metric when deciding on mitigation strategies, and organizations not operating within the U.S. Northwest region should not rely on this metric at all.

Tip: Be sure to enter data in the units specified. Also, don't forget to specify your facility location and heat source on the *Company_Info* tab.

	Method 1: Energy Purchased Directly Use if you know energy use (from bills or building management)	OR	Method 2: Building Averages Use if you can acquire energy use data for the entire building (e.g., from building management) but not for your company's space	OR	Method 3: Simple Estimation Use if you cannot acquire any energy data particular to your business or building. Sample energy intensities for natural gas and electricity are pre-filled based on national and regional sources. To use method 3, enter your company area.
	Energy purchased directly		Total facility energy use Company area (square feet) Total building area (square feet)	Estimated energy use by company	Similar facility energy use (per square foot) Company area (square feet) Estimated energy use by company
FST Warehouse					
Natural Gas (therms)	4,103			-	0.14
Electricity (kWh)	127,365			-	15
Steam (thousand lbs)				-	

Figure 3.8: Screen clip from Seattle Climate Partnership Facility Energy Worksheet. The first facility is also included to give an idea of how data is entered. The FST Warehouse is an example of a facility where AGO space is metered separately, giving the most accurate type of energy data.

Because the largest source of emissions comes from facility energy use, analysis of data from this source of emissions should prove to be the most important in informing elements of a viable CAP. Yet before useful data for this category can be presented, it is important to remember a few things about the AGO facility lease situations, and the methodology of collecting this data.

To reiterate from chapter II, out of the 18 facilities occupied by AGO employees, only two of those are buildings solely occupied by the agency, the remaining 16 of which we share space with any number of other organizations. The SCIP tool does a good job of anticipating these less-than-ideal situations by allowing three different levels of data input for facility energy use. The implications the various types of shared-space lease agreements are twofold, because these logistically complicated lease situations tend to affect both facility data robustness and the ability

to affect change in these facilities as a result of emissions mitigation efforts. The former issue is merely a result of the fact that many of the AGO offices housed in shared facilities are not individually metered, and so some level of estimation is necessary in order to arrive at a total emissions number for those facilities (see [Figure 3.8](#) for a visual explanation of how the SCIP tool incorporates different levels of facility data accuracy). The latter is due to a well-studied dilemma known as the principal-agent problem, where the desires and goals of the principal (the tenant, in this case AGO), may not be shared with the agent (the property management company, and the other tenants). In other words, property managers and co-tenants may not have the same impetus or desire as the AGO to work toward lowered energy use, or to invest in energy efficiency upgrades regardless of the potential for swift payback. This issue will be revisited in greater detail in the next and final section, the CAP. However it's worth mentioning here because it represents another confounding factor that shared leased facilities present to the GHG inventory process.

Once its limitations have been made clear, a breakdown of emissions per unit of facility space like the one in [Figure 3.9](#) is an extremely useful tool in analyzing and comparing the energy intensity of facilities within an organization. Limitations of organizing data in this way include differences in the ways that some spaces are utilized.

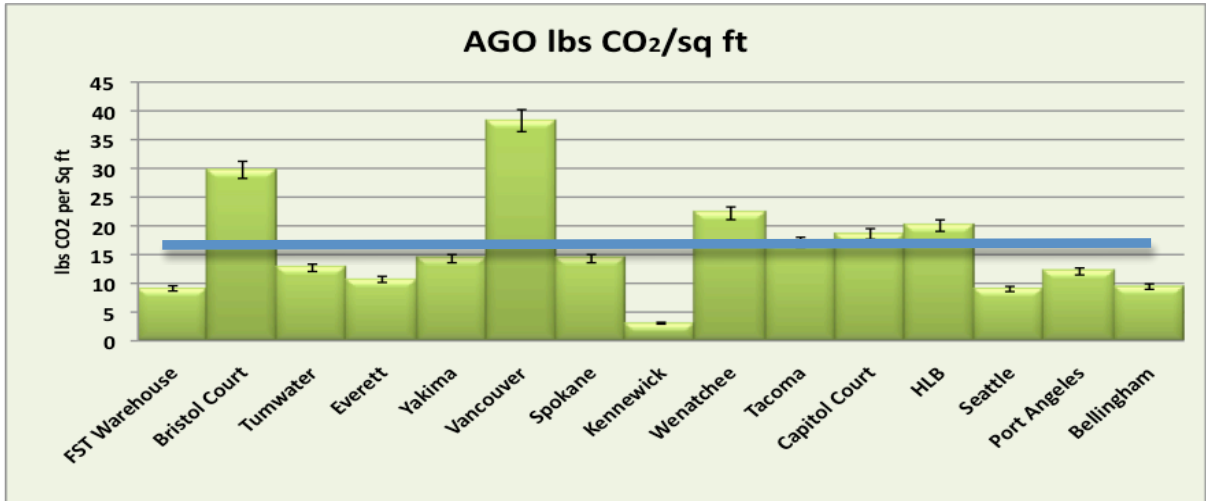


Figure 3.9: Pounds of CO₂ per square foot at AGO Facilities. Blue line indicates facility average.

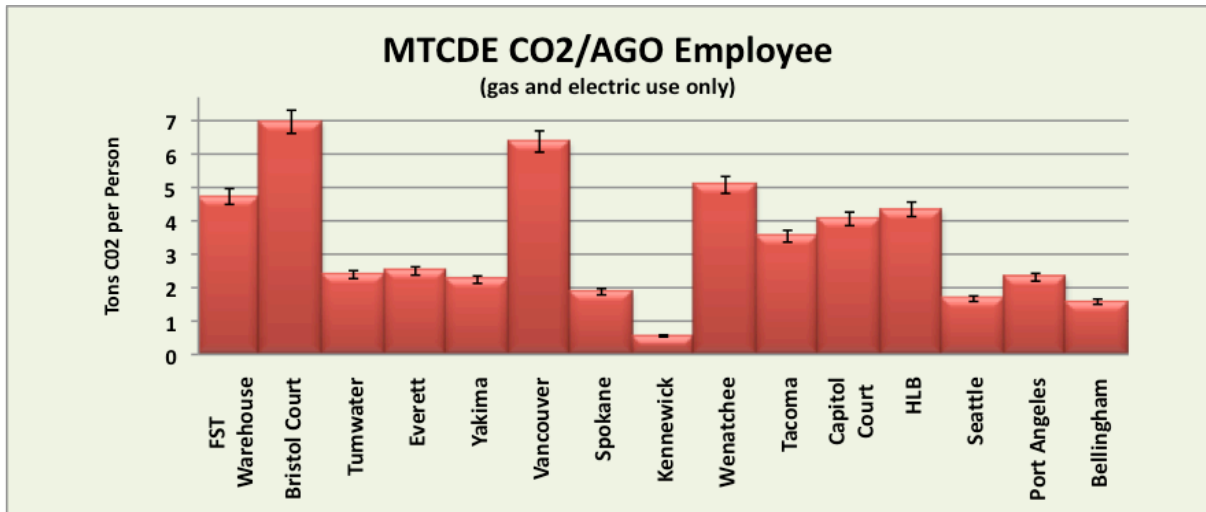


Figure 3.10: MTCDE CO₂ per employee at each AGO facility.

For instance, while the energy intensity per square foot of the FST Warehouse appears quite low, much of this facility’s area is used for storage and so the density of energy-using devices in this space is much lower than the average AGO facility. Without an understanding of the individual characteristics of your organization’s facilities, such a graph could result in misguided efforts to prioritize energy efficiency upgrades at the wrong facilities.

One way to double check against potentially misleading data is to graph emissions levels in relation to employee population working there. Though one must be wary again of any unique energy demands, such as running a kitchen, or a copy center, for example, at individual facilities to avoid drawing errant conclusions.

In [Figure 3.10](#) it becomes apparent which facilities that appeared to be above average in [Figure 3.9](#) are truly energy hogs and which were misleading because of unique space usage at the facility. In particular, both graphs feature the Vancouver and Bristol Court facilities clearly as above-average outliers, with Wenatchee and the HLB also exhibiting higher than average GHG emissions in both measures.

It should be noted that a 5% error bar was included in these graphs because of the potential for errors in measuring energy use, especially in, but not limited to those facilities where tenants are not individually metered. The genesis for assumed errors in the data come from several possible sources. For one, data in shared spaces, especially those where meters are shared and energy use is calculated as a percentage of square footage. Such calculations involve a level of assumption of equal energy use when in actually one workspace could possibly be using much more energy than the next, without any way of tracking it. There are 8 total facilities for which energy use is calculated as a percent based on square footage. Another reason for possible error is the fact that different utility districts derive power from different energy sources. To some extent this is addressed in the SCIP tool on the first worksheet, where it allows entry of the specific utility emissions factors for facilities serviced by Seattle City Light or Puget Sound Energy.

Unfortunately many of the AGO's facilities are located in utility districts outside of this rather limited area, in which case the option for Northwest Power Pool (NWPP) was selected. This NWPP figure is an estimate of the emissions factor for electricity production throughout the

northwest region, which includes Utah, Idaho, Nevada, Montana, Oregon, Washington, and parts of Wyoming and California. Specific emissions factors for local Washington utility districts such as the Benton PUD may be rather different than this one size fits all regional estimation and represents another source of estimation and possible error.

Agency paper use data was collected from the 2007 Sustainability report and entered into the SCIP tool by the number of reams (1 ream=500 pages) and its associated recycled content. The vast majority of AGO paper purchasing is 35% recycled content, the reasons for which and possibilities for a greater recycled content will be discussed in the CAP section. Paper shows up in [Figure 3.6](#) under Materials and Services, and at 45 MTCDE for 2007 represents less than 1% of total overall emissions.

Agency travel data was collected through a number of different sources and individuals, dictated by the source of the emissions. Car travel data, which included miles driven in agency vehicles, GA vehicles, and employee owned vehicles (for business-related travel) and gasoline purchases

Miles Driven					
Year (FY)	2003	2004	2005	2006	2007
Personally Owned Vehicles	651,584	289,282	703,185	696,504	763,826
Agency Owned Vehicles	1,427,431	1,425,000	1,259,772	1,427,431	1,429,407
Motor Pool Managed Vehicles	55,231	Unknown	Unknown	49,936	41,524
Total	2,134,246	*1,714,282	*1,962,957	2,173,871	2,234,757
Units	miles				

Comments: FY04 and FY05 don't include miles driven by motor pool-managed vehicles.

Figure 3.11: Mileage Report from AGO 2007 Sustainability Progress Report

for company vehicles was collected from the 2007 sustainability reports (see [Figure 3.11](#)). Scope I emissions were defined as only those driven in company-owned vehicles, the rest fall under scope III.

Agency air travel data was

obtained via a request for records from Adrian Schleuter, financial analyst for the AGO. All work related air travel is reported to AGO and entered into a spreadsheet, which is broken down by month. This data was extremely tedious to unravel in its current state to the point where it may be prohibitive to individuals in the future seeking to quantify air travel emissions on a limited time budget. Both travel debits and credits (reimbursements for flights booked but later cancelled) were listed on the same sheet, with no identifying characters or transaction numbers for each individual incident. As such, the system is vulnerable to mistakes, inaccurate

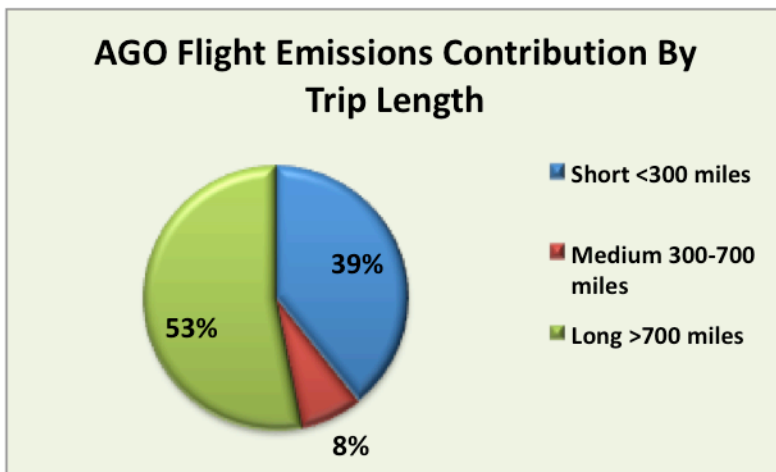


Figure 3.12

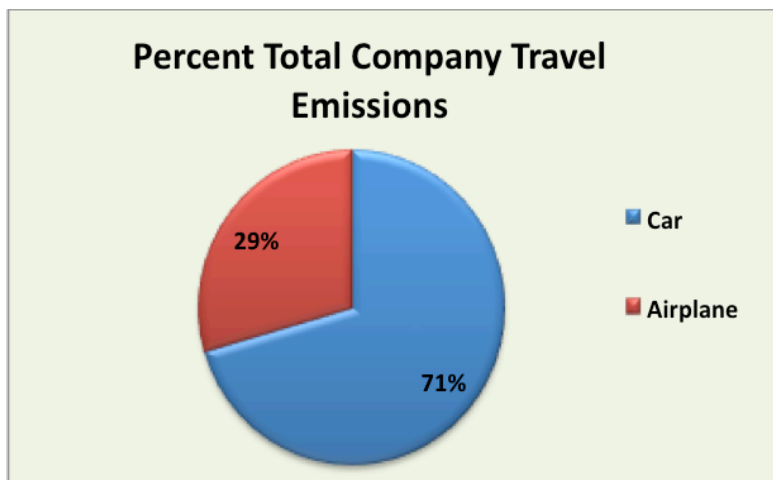


Figure 3.13: AGO business travel emissions separated by type. Car travel includes AGO owned, GA owned and employee owned vehicle travel, but excludes commuting. Note the high proportion of car emissions versus plane emissions.

accounting, and fraud and should be addressed in such a way that streamlines the data collection process for flights.

Despite the difficulties associated with obtaining flight travel data, I am relatively confident that the results of my data collection are accurate enough to reflect a valuable knowledge base and starting point for mitigation action. Flight data was entered into the SCIP tool in three different flight distance

categories: Short (<300 miles per flight), Medium (300-700 miles

per flight), and Long (>700 miles per flight). SCIP chose to follow this protocol because the majority of flight fuel is burned during taxi, takeoff and landing. The result is that longer flights actually achieve a measurably better fuel efficiency than short, “commuter” flights. Thus the emissions factors used for short flights is different than those used for long flights (Putt Del Pino, Levinson, & Larson, 2006). One thing to keep in mind when compiling flight data is to pay close attention to round trip versus one-way flights. The majority of flights are round trip, however this is not always the case, especially when it comes to shorter flights. In the case of the flight data for the AGO, there was no indication whether flights were one way or round trip other than from the price. Flights generally fell within a predictable range of prices, which gave good indication if they were one way or round trip. The result is that there may be a measurable, but ultimately rather insignificant (estimated error is <5%) error in the data. Another possible source of inaccuracy involves trips with multiple legs. For instance, the flight data I was working with only reported departure and destination cities, and so, using a distance calculation tool found online at www.webflyer.com/milemarker. I would calculate the distance from these two airports. Unfortunately, especially in the case of medium and long distance flights, there are often layovers that could significantly alter the final trip length, for instance a flight beginning in Seattle and ending in Houston that stops in St. Louis. Given the data set I was working with, these possible errors are unavoidable. Future inventories should take this into account as data collection methodology hopefully improves.

Commute behavior data was collected via a survey sent out on the AGO Collaborate Environment (ACE) system. The data was then entered into a worksheet on the SCIP tool. The SCIP tool’s commute survey data analysis is built according to the specifications of the WRI commute behavior survey. The SCIP tool was specifically designed to work with survey results

	Survey Respondents				Scaled to All Employees	
	Annual Miles Traveled	Annual Emissions (kg CO2)	Average Emissions Factor (w/ carpool)	Average Emissions Factor (ex. carpool)	Annual Miles Traveled	Annual Emissions (kg CO2)
Car	3,318,283	944,824	0.28	0.36	6,237,988	1,776,159
Bus	803,358	219,745	0.27	0.27	1,510,221	413,096
Bike-walk	50,009	-	-	0.00	94,011	-
Train	185,089	41,369	0.22	0.22	347,945	77,768
Ferry	6,462	2,391	0.37	0.37	12,148	4,495

Figure 3.14: Screen clip of commute behavior survey results from SCIP tool.

that came from Survey Monkey, an online survey service. Thus designing a survey and entering data in such a manner to be analyzed by the SCIP tool took some extra patience.

Ultimately the AGO commute behavior survey garnered 691 responses in an agency of roughly 1,300 individuals. I found this to be an acceptable and encouraging response rate.

An added benefit to reworking the original survey to be compatible with the ACE survey site was that I was able to add a comments section to the survey. The replies I received from this section added a great deal of value overall to the data collection process. A number of responses dealt with addressing questions that were unclearly worded, or had response fields that did not clearly portray the responder's commute habits. These are issues that I have addressed to the WRI in a letter in hopes that the survey will be better crafted in the future, and that these changes will also be reflected in the SCIP tool. Another interesting outcome of the comments section

2007 Travel Emissions by Scope (Scope I = AGO owned vehicles only)				
	Miles Traveled	CO2 (Metric Tons)	Percent total (miles traveled)	Percent total (emissions)
Scope I	1,429,407.00	469.72	12.07%	13.86%
Scope III	10,414,762.19	2,918.91	87.93%	86.14%
Total	11,844,169.19	3,388.63	100.00%	100.00%

Figure 3.15: Table of AGO Travel Emissions By Scope.

was that I received a surprising number of requests for increased telecommuting options for AGO employees. This is a strategy that I will

follow through with in the CAP section of this paper.

Overall, the travel data represented here will form the basis for a targeted and effective suite of

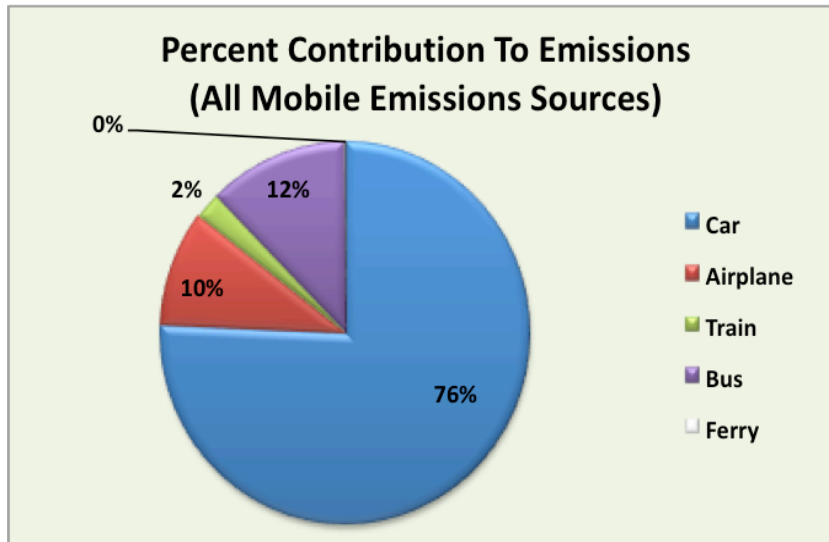


Figure 3.16: Pie Chart of All Mobile Emissions Sources.

mitigation strategies. These will be revealed in the CAP section, however I'd like to point out a few important aspects of the data before moving on. A second look at Figures 3.13 and 3.16 will reveal that for both agency-related travel alone, and for

all travel including commuting, cars represent the vast majority of emissions. Without taking into account commute data, Figure 3.13 shows that vehicles alone account for a full 71% of AGO (non-commute) travel emissions, and when commuting is taken into account, as in Figure 3.16, car emissions represent a total of 76% of all transportation emissions at the AGO. The take home point here is that if we are to focus on a specific mode of transportation for which mitigation strategies have the largest reduction potential, it is car travel at the AGO.

When developing targeted emissions reductions strategies, it is best to focus on Scope I emissions if and when possible. The reason is that the AGO essentially "owns" these emissions, because it owns the asset that created them (the cars). These emissions cannot then be double counted in the future, and represent a more direct form of reductions than would be achieved, for instance, via reducing use of GA owned vehicles, which could eventually be considered a scope I emission in a GA commissioned GHG inventory. Either way, emissions reductions are a good

thing regardless of ownership, but it would be wrong to assume we could just switch to using GA vehicles instead of our own as this would represent a form of leakage, or movement of emissions from one source to another based on regulatory pressure. It's always best to begin reduction strategies with emissions that you have real control over.

Throughout the data collection and interpretation phase, you should be focusing on creating data and information that is transparent, replicable, and accurate as possible. Leaving a figurative trail of breadcrumbs for the implementation of subsequent inventories is just as important as any other aspect of your data collection and emissions calculation process.

Good, reliable data will be an extremely powerful and valuable tool as the organization moves toward implementing emissions reductions efforts, and can be reconfigured into countless different graphs, metrics and comparisons to help inform the next stage in the process, which is the CAP.

The Climate Action Plan

Creating a roadmap toward meeting AGO mitigation goals

This final section represents the culmination of the inventory process. A Climate Action Plan (CAP) seeks to take a step beyond an inventory number and lay out a process that will ultimately end up reducing the GHG emissions of the participating organization. Many times a CAP seeks to achieve a specific reduction goal that has been set by the organization, other times, an organization may just be looking for a set of viable suggestions to choose from when the time is right. In its comprehensive form, a CAP assists the participating organization by identifying potential projects and strategies, analyzing the costs and benefits of those strategies, prioritizing the strategies and establishing goals and timelines for their implementation(Pumilio, 2009).

The CAP is a natural extension of the GHG inventory, and thus the reasons for carrying one out are much the same. A CAP should ultimately:

- Reduce organizational contributions to climate change
- Reduce operating costs and benefit the bottom line
- Create a hedge against uncertain future energy supplies, prices and mandates
- Encourage sustainability awareness and environmental stewardship with employees
- Increase the “green” image and public profile of organizational sustainability efforts
- Appeal to current and prospective employees (Eagan, Keniry, & Schot)

This chapter will represent an abbreviated version of a CAP in that it will lay out a beginning framework for mitigation actions at the AGO, but will not represent the full scope of potential

projects, and cost-benefit analyses. To reiterate from chapter III, one must tailor the extent of one's work to the parameters of one's organization's desires and the scope of the current contract. As such, while a full and comprehensive CAP is a valuable guiding document to very specifically focus the efforts of an organization, the parameters of the present AGO contract were specifically designed for a detailed emissions inventory and the facilitation of future inventories with less emphasis on the specifics of recommendations. Thus due to time and budget constraints, the following chapter is characterized by a general indication of the direction AGO should be moving to realize emissions reductions. While specific suggestions will be made, this should not be taken as an example of a comprehensive CAP.

The consideration of GHG reduction goals for an organization must strike a balance between what is attainable and what is ideal. Ideally our entire economy could go carbon neutral as soon as possible, yet the stark reality is that our economic vitality is currently, but not irrevocably reliant on the burning of fossil fuels. The truth is that most organizations, if they chose to, could declare themselves "carbon neutral" tomorrow if they devoted enough funding to purchase carbon offsets to cover all of their emissions. There are problems with such a strategy; one being that few organizations have the funding available to make this switch, and two is that carbon offsetting represents an interim strategy at best, until organizations can convert their operations to less carbon intensive methods.¹¹ As a result, development and adoption of GHG reduction goals should involve both short and long-term goals that are periodically re-evaluated in light of ever-evolving technological and regulatory changes. Additionally, organizational goals will be informed by other guiding documents such as the financial plans, master plans and facilities plans (Rappaport & Creighton, 2007).

¹¹ For a good discussion on the Carbon offsets, their benefits and downsides, see www.wikipedia.org/wii/carbon_offset

GHG emissions levels should be seen not as a problem, but rather as an opportunity for the organization to evolve with our changing world and seek new levels of excellence and performance. The efforts associated with a CAP are often publicity worthy, and making sure that such efforts, no matter what the impetus behind them, are made public will be good PR for the organization and another selling point for the action itself. Thus the basis for involving the drivers of change (upper management, directors) within your organization can be framed in any combination of positive lights. Should these tactics fail, there are often existing or looming regulatory requirements that must be satisfied (Olshifski & Cunningham, 2008).

In order to avoid the potentially dangerous global consequences of temperatures increasing more than 2°C (3.2°F), numerous studies indicate that global CO₂ levels will have to stabilize before exceeding 450 parts per million (ppm). As of April 2009, atmospheric CO₂ levels were 389.47 ppm (CO₂ Now, 2009). According to the Union of Concerned Scientists, this means that industrialized nations will have to reduce their emissions 70-80% below 2000 levels by 2050. Under this assumption, industrial nation emissions will peak in 2010 and decline thereafter (Union of Concerned Scientists, 2007). The Obama administration has seconded these reduction goals by proposing a cap and trade system with the purpose of reducing U.S. emissions to 80% of 2000 levels by 2050, or in other words, about a 2% reduction annually. The State of Washington has set similar reduction goals of 50% below 1990 levels, or 70% below expected emissions for the year 2050.

The formulation of emissions reductions goals at state agencies in Washington and otherwise have been virtually non-existent to this point. However, in their 2008 sustainability progress report, the executive management team at Washington Department of Community Trade and Economic Development (CTED) over-ambitiously declared that they would reduce their carbon

footprint (2008 being the baseline year) 50% by 2012 (Black G. , 2008). There are in fact very few State Agencies who have been as proactive on the issue of climate change as the AGO, and thus emissions reduction goals are not widespread or widely set at this point. Because of this, any emissions reductions targets decided on by the AGO will likely serve as a model for other agencies looking to set their own goals in the future.

I would recommend to the AGO, as well as any organizations participating in such work to seek emissions reduction goals that are consistent with the urging of climate scientists, and the overall consensus reductions needed to avoid the most catastrophic climate change scenarios. As such, organizations serious about reducing their contributions to climate change should seek to reduce their emissions by 70-80% by 2050. In more digestible numbers, this equates to roughly 2% reduction per year for the next 40 years.

The following sections will outline some initial strategies that I have identified for the AGO to consider adopting in order to achieve a lower carbon footprint. When the necessary information is available, projects will be evaluated based on a number of standard metrics and criteria I will explain here. Doing the math for mitigation strategies will primarily involve looking at two types of numbers, MTCDE and dollars. More specifically, which strategies will have the highest payback while simultaneously eliminating the most carbon from organizational operations.

More qualitative analysis will involve the evaluation of project feasibility by identifying possible project barriers as well as project benefits. As has been previously stated, these recommendations must necessarily be based within the political and socio-economic realities of the organization or there will be no momentum to actually see them carried out. Thus these factors will need to be taken into account when prioritizing specific actions. It is helpful to conceptualize this section through a list of barriers and benefits associated with each proposed

project, which can be further broken down into the following three categories: Social, Economic, and Environmental.

The following suggestions should be viewed only as a starting point. This list should give a good idea of the types of projects that are considered under a CAP, but it is by no means exhaustive. These suggestions should be presented to management, and made available to the organization as a whole with the expectation of comments and suggestions to help focus existing recommendations and to formulate new ones. Additionally, these suggestions will be strongly influenced upon the eventual adoption of GHG reduction targets by the participating organization. Often the best suggestions come from deep within an organization, and such human capital should not be overlooked. For instance, holding an idea competition for ways to reduce an organization's annual driving miles or to use less electricity in facilities, necessarily includes the opinions and ideas of employees who collectively can see the organization from every possible angle (Hawken, Lovins, & Lovins, 1999).

Like sustainability itself, a CAP is a constantly evolving journey, not a destination. This document and the suggestions herein should be periodically re-evaluated in light of organizational and regulatory changes as well as new developments in sustainable technologies and practices that could necessarily alter the efficacy of previous assumptions. Subsequent GHG inventories and progress toward GHG reduction goals will also be a major reason to reevaluate GHG mitigation strategies.

Additionally, Intra-organizational efforts will not meet 100% of an organization's long-term emissions reduction goals. Developments in cleaner, more renewable and efficient technologies being carried out throughout the world today give hope that the technologies that we rely on to conduct business will have an increasingly lessened impact on the planet and climate. As such,

emissions factors, the amount of GHG's emitted per unit of energy used or fuel burned, will decrease with more widespread adoption of cleaner, renewable energy sources.

AGO Climate Action Plan

Section I: Facilities

Addressing the Limitations of Leased Facilities:

In order to make possible the technological upgrades that are necessary to improve energy efficiency at AGO facilities, the methods by which leases are sought, conducted and agreed upon need addressing. In many of the AGO-occupied facilities, the property owner does not pay the energy bills, there is therefore insufficient incentive for landlords to invest in upgraded energy efficiency (Jaffe & Stavins, 1994). This common catch 22 is known as the principal-agent problem and is not unique to the AGO. I would conjecture that addressing this issue at the source, General Administration (GA), would facilitate a much greater extent of energy efficiency investments at Washington State Agency occupied facilities. As such, I can only offer several suggestions as to how lease agreements negotiated by GA for other Washington state agencies could be handled in a way as to facilitate greater investment in building efficiency.

At the AGO, 16 of the 18 buildings that we occupy are privately owned, meaning that our ability to modify the physical space in those areas is severely limited by lease contract terms. Here is a list of possible suggestions that could facilitate the investment in energy and money-saving upgrades in such facilities.

1. When seeking new facilities for occupation, focus on moving away from short-term leased and shared lease arrangements. In these situations, little incentive exists for facilities upgrades because the payback is not always realized directly by the investing lessee, and installed capital equipment such as windows and HVAC systems cannot be moved if an investing lessee decides to move to a new facility. Thus it will be easier to

implement money, energy and GHG saving measures in facilities that are owned or are leased on long-term contracts. This could potentially happen through:

- a. Purchasing of property for long-term occupation, either by AGO or by GA.
- b. Rentals where AGO is sole occupier of GA owned facility with a long-term lease.

Long term leases are more beneficial because of the inherent time period associated with recouping capital costs of projects, thus making these investments financially attractive. Such capital costs could possibly be contractually shared between lessee and lessor based on the percentage of space occupied by the investing lessee and the time period said party plans to remain a tenant.

2. Investigate the use of “triple-net-leases” whereby the tenant is responsible for their proportionate share of the property taxes, property insurance, operating expenses, utilities and upgrades (RealTech). These agreements would be best entered into when AGO plans to occupy the facility for an extended time period, due to the previously mentioned inherent time commitment involved with recouping capital costs of efficiency upgrades.
3. The implementation of “green leases” starts well before the site-selection process. Choosing the right service provider, communicating the agency’s needs as they pertain to sustainable building space, and drafting enforceable and realistic lease language should all be part of this process.(California Sustainability Alliance, 2009)
 - a. Through the use of specific language in lease agreements, make it known to potential lessors that the AGO is very concerned about its GHG emissions, and as such will only rent space from property managers who have a proven commitment to and successful record of adopting energy efficiency measures at their facilities. Giving contractual preference to “green” property management companies, with a

proven concern for the environmental impact of their operations could serve as an alternative *or* additional strategy to numbers 1-3.

4. Make it known to *current* property managers that the AGO demands an effort toward ever increasing energy efficiency and/or procurement of green energy for the facilities that it occupies. Currently the AGO requires the completion of an energy use worksheet upon renewal of a facilities lease. These documents should form the basis for entering into such a discussion with property managers/owners. At present, my experience has shown that either these documents provide insufficient leverage to spur action on the part of building lessors (or lessees who could choose to terminate a lease and find a more efficient facility), or that they are not used to their full potential to call attention to the need for higher efficiency.
5. Develop an exit plan for the most energy-intensive facilities that AGO currently occupies. A withdrawal plan for facilities with an above average emissions level like Vancouver, Bristol Court, and Wenatchee (see [Figure 4.1](#)) should be developed, with an emphasis on exchanging these facilities for ones with more leeway for efficiency measures.

Currently, the U.S. EPA estimates that 30% of building energy use is wasteful and could be eliminated with insignificant impact on the occupants. Addressing and overcoming the barriers that stand in the way of eliminating this wasted energy is a crucial first step in lowering the organization's GHG emissions levels.

The following [Figure 4.1](#) represents a scenario where the AGO vacates its 3 most wasteful facilities in favor of 3 facilities with average emissions levels based on per person emissions. As

Facility	Current Annual MTCDE per Employee	Average	Difference	# Individuals Moved	Total Savings Realized (MTCDE Annually)
Wenatchee	5.08	3.35	1.73	9	15.57
Vancouver	6.37	3.35	3.02	25	75.5
Bristol Court	6.97	3.35	3.62	106	383.72
Total Annual Savings (MTCDE)					474.79
% Total Annual Emissions Reduced					6.66%
% Scope I and II Annual Emissions Reduced					12.21%

Figure 4.1: Calculations based on MTCDE per person at AGO’s three most wasteful facilities, if the employees were to be moved to facilities with average emissions levels based on this same metric.

can be seen from the chart, this move could eliminate a significant percentage (6.66%) of annual emissions merely based on human energy use. Given the yearly emissions reductions level of 2% annually for the next 40 years needed to achieve an 80% reduction in emissions, this equates to more than 3 years worth of reduction efforts. It is possible that finding a location based on its accessibility to employees and

public transit could also provide the ancillary benefit of reducing commute miles.

Address Facility Energy Use:

When possible, and this may be only after some elements of the “limitations of leased facilities” have been addressed, it is time to consider what can be done to reduce energy use in the spaces that AGO occupies.

1. Consider commissioning or retro-commissioning facilities through an approved Energy Service Company (ESCO) under State contract through GA. Commissioning is like a tune up for your building, and can lead to significant improvements in occupant comfort and energy efficiency by making sure that major systems such as HVAC and lighting are

running at optimal efficiency.¹² The “Actions” page of the SCIP tool presents the following illustrative example of a retro-commissioning of a 30,000 sq foot space at the AGO that uses electricity as its primary fuel source.

Area of conditioned space:	30,000	square feet
Primary heating fuel:	electricity	
Retro-commissioning cost:	\$0.27	per square foot
Expected annual savings:	\$0.18	per square foot
CO₂ (tons):	44.7 tons or 0.1% of Total Scope II Emissions	
Up-front cost:	\$8,100	
Simple payback:	1.5 years	
Return on investment:	62%	
Net cost per ton:	\$(69)	

Thus, the agency could realize a 62% return on investment annually.

Commissioning will also save the agency \$69 per ton of CO₂ that is avoided.

2. In addition to commissioning existing systems, a GA approved ESCO can also recommend and install-upgraded systems to existing facility space.
3. Eliminate incandescent bulbs at AGO facilities and workspaces. This top-down order can and should apply to both building-maintained spaces (those spaces that are

Lighting upgrades - CFLs		
Number of lamps replaced:	500	
Efficiency of old lamps:	60	watts
Efficiency of new lamps:	15	watts
Per-unit cost, installed:	\$5.00	per lamp
CO₂ (tons):	33.8	
Up-front cost:	\$2,500	
Simple payback:	0.6 years	
Return on investment:	155%	
Net cost per ton:	\$(83)	

maintained by property management, GA or otherwise) and to employee workspaces.

Incandescent bulbs use about 3 times as much energy per lumen as a compact fluorescent

¹² For an informative powerpoint on commissioning and retro-commissioning practices in Washington, go to www.ga.wa.gov/EAS/bex/Retro-Commissioning.ppt

lightbulb (CFL). If the AGO were to replace 500 incandescent bulbs throughout its 18 facilities, it could save 33.8 MTCDE and roughly \$5,000.00 per year on energy costs given the following assumptions.

Financing Facility Measures:

Given the tight economic realities facing all state government entities in the 2009-11 biennium, it is difficult to imagine how the capital costs of hiring an ESCO, or mandating bulb replacements across the agency could be realized. However through a combination of public initiatives and innovative private ventures such as ESCO's, many sources of viable funding currently exist. This section will discuss some of the options available to help finance such measures.

When following through with a CAP, the low hanging fruits are often the first to be addressed. In the case of organizations looking to lower emissions, these low hanging fruits equate to the easiest and most economically feasible projects to be carried out. More specifically, the initial set of actions taken by an organization will often save money while reducing emissions once the capital cost has been recouped, rather than cost money on a recurring basis. Even so, most projects still come at a capital cost. Where should these funds come from? Looking further ahead, how does a cash-strapped agency expect to take the necessary actions once the cost/ton CO2 reduced begins to cost money rather than save it?

Finding financial backing for such projects can take a number of forms, depending on the nature of the organization seeking it. In this section I will identify a few likely sources where a Washington State Agency might seek funding from for capital projects. To answer the second question, regarding funding projects that will facilitate the continued reduction of organizational emissions once the low hanging fruits have been plucked; one of the best ways to do this is through the savings realized by the initial round of emissions reduction projects. [Figure 4.2](#)

represents a visual example of how Duke University plans to achieve its most cost-savings emissions reductions strategies first. In this example, each colored bar below the \$0 line represents emissions reduction measures that will

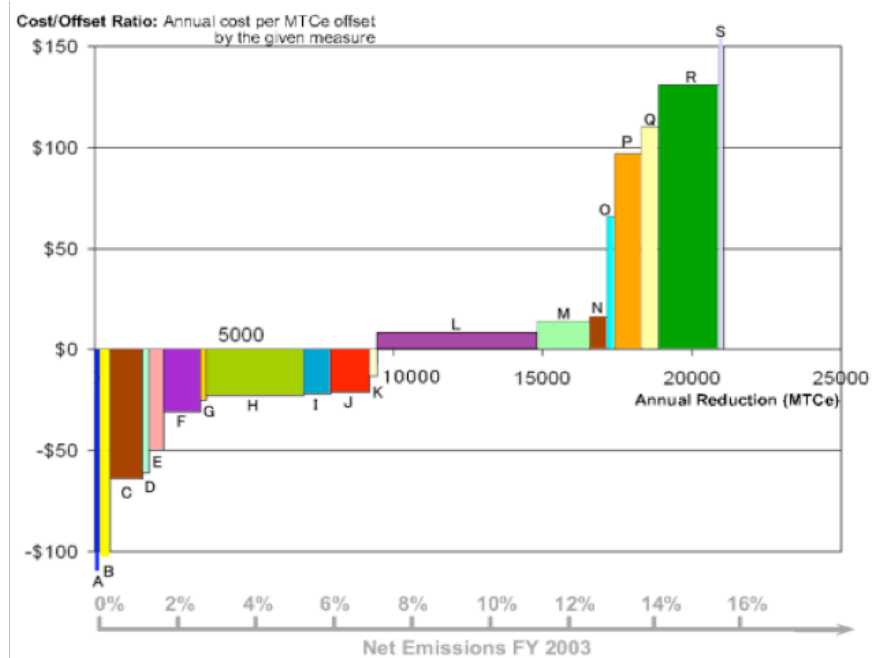


Figure 4.2: Reprinted from “Creating a Path To Greenhouse Gas Reductions” from Duke University.

result in overall cost savings. The lower the bar, the lower the figurative fruit hangs. As these initial projects are eventually completed, the return on each emissions reduction investment lessen until eventually all the money savings projects are completed and efforts thenceforth cost the organization per MTCDE avoided. Notice that the amount of colored space below the zero line is roughly equal to that above it. If Duke invests the savings realized with the cost effective projects to finance the more expensive measures, it can realize its entire suit of savings at little or

no total cost. In other words, the funds saved over the business as usual scenario for these initial projects can then be redirected to help finance future projects that come at an annual cost. The viability of such a strategy obviously depends on the financial structures and commitments the organization is bound to, especially in the case of public entities such as state agencies.

The following is a list of possible funding sources that could reduce the capital costs of many energy efficiency upgrades at the AGO.

1. *COP loans issued by the State Treasurer for equipment purchases.* The initial capital costs are financed by the participating agency, at which point they would submit a letter of intent to the State Lease Program for reimbursement via the loan. Such loans are issued quarterly and debt is serviced bi-annually, with interest based on competitive market rates, and the length of the lease term. According to Wendy Kancianich of the Washington State Treasurer, a 5-year loan might see rates of around 3.45%, while a 10 year would be in the neighborhood of 4.2%.¹³
2. *Seek grants through participating utilities.* Many of the utility providers in Washington State provide substantial grant funding for customers seeking to improve the energy efficiency of facilities within their service area.
 - a. Puget Sound Energy (PSE) provides customized incentives for energy efficiency upgrades at commercial facilities. Their streamlined rebate program has incentives for pre-determined basic efficiency upgrades such as lighting, HVAC, and commissioning. PSE is able to work with the customer to customize the

¹³ For a synopsis of state COP loans see http://www.tre.wa.gov/BondDebt/bnd_state-lp.htm

incentive/rebate program to meet special needs. Additionally PSE will also provide energy audits and facility efficiency planning services free to customers.¹⁴

- b. Seattle City Light also provides free energy audits, and can help finance up to 70% of the capital cost of energy saving measures in facilities within its service area, or 20 cents per kilowatt-hour (kWh) saved.¹⁵
- c. A more comprehensive list of all utility rebates and incentive programs for efficient facilities can be found at the database of state incentives and renewable energy DSIRE.¹⁶

3. *Project financing through an ESCO.* As discussed in section II, a qualifying ESCO can help finance an energy efficiency upgrade through a number of different methods. Often, an energy savings project conducted by an ESCO will guarantee energy savings through implementation of a project. The ESCO is able to profit by guaranteeing energy savings at a level sufficient to finance its own operations through splitting the returns on investment (in this case, lowered utility costs) with the organization it is contracting with. Additionally, as part of their energy and money savings guarantees, ESCOs will finance or assist in arranging finance for an energy project (REEEP, 2009).

¹⁴ <http://www.pse.com/solutions/forbusiness/Pages/efficiencyComPrograms.aspx>

¹⁵ http://www.ci.seattle.wa.us/light/consERVE/business/cv5_fi.htm

¹⁶ <http://www.dsireusa.org/>

Section II: Travel

The current trajectory of AGO's vehicle fleet represents a very positive potential for automobile emissions reductions at the agency. Reducing travel as a State Agency should be motivated in part as a response to EO 05-01, which mandates a 20% reduction in fuel use for state business transport by September, 2009. Unfortunately, at this time the increased Miles Per Gallon of the AGO fleet has not yet resulted in the kind of fuel purchase reductions mandated by the EO 05-01 (see [Figure 2.1](#)). Most likely this is due to an 8% increase in the size of the AGO workforce between 2002 and 2007. So while fuel economy of the AGO fleet has increased, so have the annual miles driven. As a result, the following travel recommendations will focus more on how to get AGO employees to drive less, and where applicable, to drive instead of flying.

Incorporating reduced vehicle miles into organizational procedures means less cost for the agency, and a hedge against fluctuating oil prices. I would contend that reduced fuel use can also be connected to increased worker productivity because employees are now spending more time in the office instead of being out on the road. Thus, the transition of AGO's vehicle fleet represents but one of a suite of actions that can and should be taken to meet state mandated goals, while also achieving AGO's sustainability and emissions reductions goals.

Reducing Travel Emissions:

1. *Continue to pursue increased use of teleconferencing at the AGO.* Identify barriers to its implementation through agency-wide survey and seek technologies and implementation methods that can avoid these barriers.

In my experience with the AGO, individuals are sometimes reluctant to use features associated with the GOTO Meeting technology, simply because they have not been fully explained and thus employees do not want to risk a technical issue during a meeting. Holding regular agency-wide

webinars on the use of new technologies could help to undo some of the perceived technological barriers to widespread adoption of this and other teleconference and video-teleconferencing technology. Additionally, reminding employees that a call to IT tech support can also help explain technical features that they are not comfortable with.

2. Aim for a major (at least 50%) reduction in intra-state air travel. In 2007 the AGO travelled over 450,000 miles on flights of 300 miles or less in distance, resulting in 129.3 tons of CO2 emissions. Emissions factors for short flights are higher than those for long flights due to the inefficiencies associated with taxi, takeoff and landing. While a single employee flying roundtrip between Spokane and Seattle, for instance, emits roughly the same amount as a single occupancy drive between the same cities, three employees flying will emit more than three times

AGO Generated Travel Emissions Spokane-Seattle	Flying x1	Driving x1	Flying x2	Driving x2	Flying x3	Driving x3	Flying x4	Driving x4
One Way (lbs of CO2)	220	202	440	202	660	202	880	202
RoundTrip (lbs of CO2)	440	404	880	404	1320	404	1760	404
Multiple Drivers assumes carpool, e.g. driving x3= 3 occupants in vehicle. MPG assumed at 26.8, the AGO average for 2008								
Multiple Flyers have same emissions factor whether assumed to be on the same plane or different planes.								
Emissions factors and conversions for flights handled via SCIP tool v2.0								
Emissions factors and conversions for driving handled via GHGprotocol "ef's for revised mobile tool"								

Figure 4.3: AGO Generated Travel Emissions. This Chart Compares The Emissions Associated With A Spokane To Seattle Trip. Emissions Generated Via Flights Double With Each Passenger While A Carpooled Trip Remains The Same (Slight Increase in Emissions Due to Extra Weight in Car not Taken Into Account).

the GHG's than those same three employees carpooling together. The implication here is that a hierarchy of options should be applied when applicable: teleconferencing should be used in place of travel, followed by travel via multiple-occupant vehicles, and finally air travel, in that order. Of course, road travel is much less applicable for long distance due to time constraints.

- Benefits
 - Social:
 - Time spent together in vehicle fosters relationships.
 - Teleconference can reduce stress associated with actual travel.
 - Carpool passengers can catch up on work and calls.

- Economic:
 - Significant financial savings for AGO of roughly \$125 per employee driving vs. flying. This calculation uses \$150 for a Spokane-Seattle flight minus \$25 in estimated fuel cost when driving. This is conservative given that dollar savings from carpooling is even higher per person.
 - Reduced vehicle wear and maintenance.
- Environmental:
 - Significant reduction in associated emissions, particularly when carpooling.
- Barriers
 - Social:
 - Employees and clients may require face-to-face meeting over teleconference option.
 - Employees may prefer convenience of flying over driving.
 - Economic:
 - May require additional vehicles in fleet upon widespread adoption.
 - May require upgraded teleconference and videoconference capabilities in some facilities.
 - Environmental:
 - Driving is not without its environmental impacts.

Reducing Commute Miles:

In 2008, Governor Christine Gregoire asked representatives from state agencies for suggestions on saving energy and taxpayer dollars in state government. As a result of the recommendations she received in reply, several state agencies are now undergoing a test run of a 10-hour, four-day compressed workweek. According to personal communication with Greg Black, sustainability coordinator for the state agency of Community Trade and Economic Development (CTED), one of the pilot agencies, the compressed workweek has been a great success there and the policy has actually been maintained beyond the original pilot period. In a recent agency-wide survey at CTED, 85% of staff expressed that they like, or really like the compressed workweek program and wish it to continue. It was also found that many of the employees who expressed displeasure with the program did so because of family obligations such as children in childcare that made the long workday difficult to manage. Coupling this program with a telecommute option further improves the acceptance of such a program because it allows those employees with special needs to modify their schedule to work a normal workweek, with one day working from home (Black G. , 2009). Over time, childcare arrangements might even evolve or warrant development as a result of a critical mass of employees with children using compressed workweeks. The proven benefits of telecommuting alone make this option well worth the effort of a more widespread adoption at organizations such as the AGO (Gajendran & Harrison, 2007).

The possible environmental benefits of such a program are immense and include a 20% reduction in commute miles among participating employees, and reduced energy use at facilities. While figures will vary, Utah recently introduced a compressed workweek at all state agencies as part of a yearlong pilot program. As a result, Utah agencies are reporting an average 13% energy

savings at facilities (Brundin, 2009). Coordinating with facility property management to schedule for building systems such as HVAC and lighting to be turned off, or running at absolute minimal levels during “off days” is crucial to realizing the full benefits of a compressed workweek. Thus, facilities where the agency is the sole occupier will particularly benefit from such a strategy.

- Benefits
 - Social:
 - For Employees:
 - Increased worker productivity and satisfaction, better family/work balance for employees.
 - Allows employees to work where most productive.
 - For Employers:
 - Additional recruitment tool, staffing flexibility, improved supervisor-staff relationships.
 - Economic:
 - For Employees
 - Reduced car maintenance, reduced commuting costs.
 - For Employers
 - Reduced utility costs, increased worker productivity, increased employee retention.
 - Environmental:

- Significantly reduced Scope II and III emissions, workspaces can be shared, allowing for less facilities or avoided growth in number of facilities.
- Barriers
 - Social
 - Possible perception of unequal treatment for those employees not able to telecommute or work compressed hours.
 - Need for increased coordination for shared workspaces.
 - Economic:
 - Possible initial investment to allow employees to access work files from home.
 - Environmental:
 - Employee's personal emissions may grow as a result of private activities on extra day off.

Section III: Behavioral Changes:

Every action mentioned thus far will necessarily involve an element of behavioral change as employees adapt to new ways of working, commuting, or interacting with their surroundings. Promulgating behavioral change will not only serve to better facilitate changes with facilities and organizational travel, it can also create a cycle of innovation as employees come to view their organization as a true environmental leader and seek less ecologically deleterious ways of doing things.

In my experience with state agencies and academia, most programs aimed at fostering sustainable behavior have focused on the dissemination of information about the effects of the behavior in question, and offering education on alternatives. However as noted by McKenzie-Mohr, “Unfortunately, a variety of studies have established that enhancing knowledge and creating supportive attitudes often has little or no impact upon behavior.”(McKenzie-Mohr, 2000) Advertising, or informational campaigns that take the form of advertising are effective at altering consumer preferences, such as switching brands, however promoting a new activity such as carpooling or a compressed workweek is much more complex since these often involve significant changes to established schedules and lifestyles that are often associated with perceived unpleasantness such as decreased autonomy, or a ten hour work day. Fortunately, at most organizations there are two distinct avenues through these barriers to behavioral change.¹⁷

The first stems from the hierarchical structure of the AGO and most other organizations that allow for executive level actors to make decisions that necessarily alter the behavior of those who work under them. For instance, should an organizational leader such as Rob McKenna of

¹⁷ For an *excellent* source of academic papers and information on fostering sustainable behavior I recommend a visit to <http://www.cbsm.com/public/world.lasso>

the AGO decide that all travel under 300 miles distance be conducted by driving, that should serve as sufficient impetus for this to be immediately adopted and implemented given sufficient organizational and logistical support. This point also goads the author to reiterate the point that executive level support for emissions reductions is crucial to successful implementation beyond the work and influence scope of sustainability coordinators and directors (unless those individuals are at an executive level themselves).

The second, and more difficult than an across-the-board executive level order, is more in line with McKenzie-Mohr's use of social modeling to affect environmentally proactive behavior. Through the use of incentives and disincentives both economic and social, there is a rich and effective arsenal of means to affect organizational change.¹⁸ Social incentives take the form of social modeling, or playing on people's inherent gravitation toward modeling behavior that has reached sufficient critical mass to allow it to become a norm. Some proposed changes might be facilitated through the use of pilot programs, such as the compressed workweek currently being piloted by CTED. Such programs provide a concrete experience of an envisioned change, and allow leaders within an organization to achieve their own conceptual shift toward a new behavior before convincing followers to adopt it as well (Wells & Betz, 2005).

Such leading individuals that are wont to adopt environmentally proactive behaviors should make every effort to make their actions known within the organization. Additionally, the organization will benefit from seeking out, recognizing, and rewarding the efforts of these individuals.

¹⁸ For a very informative and useful set of case studies regarding individuals who are driving change in their organizations and the strategies they employ to be effective, see "Making Your Impact At Work: A Practical Guide To Changing The World From Inside Any Company." Free Download at <http://netimpact.org/displaycommon.cfm?an=1&subarticlenbr=2745>

Another program to utilize the powerful effects of peer modeling at the AGO might include an AGO sustainability pledge where signatories are given some sort of designating sticker to display prominently at their workspace. Individuals now labeled as having made a pledge to follow certain sustainable behaviors such as turning lights and monitors off whenever stepping out of the office are more likely to adhere to these pledges if others are taking notice. Non-social incentives can include economic incentives such as those associated with participation in the CTR program, or disincentives to certain behaviors such as an increase in parking rates, (though such disincentives should be coupled with a concurrent increase in incentive for an alternative behavior such as carpooling).

In summation, the dissemination of relevant information is an important aspect to creating environmentally beneficial behaviors at an organization, however merely informing people of the environmental consequences of their actions or how to do something is usually not enough to bring about widespread adoption. In considering how to create change, actions and programs should be seen as part of a larger effort of instilling an environmentally aware and proactive organizational ethos.

1. A sustainability pledge

- a. Potential specific actions to include in pledge

- i. Phantom plugload reduction,
 - ii. Turning off lights and monitors when leaving room even for a minute,
 - iii. Printing only when necessary,
 - iv. Not idling in vehicles,

- v. Seeking alternatives to single occupant vehicles wherever and whenever possible,
 - vi. Continually seeking new ways to make AGO the leader in environmentally responsible agencies in Washington.
- b. Each action that is included should be backed up with resources and facts that show potential impact of 1300 employees doing this.
 - c. Signatories' names should be included in a prominent place on the AGO intranet, as well as those employees receiving some sort of sticker or other token of their pledge that shows others that they have made the pledge.
2. *Expand recycling and composting to all facilities.* Organic wastes decompose anaerobically in landfills, creating methane, a GHG 21 times more potent than carbon dioxide. This will have an effect on the overall emissions at AGO and is a highly visible action that will help to demonstrate the environmental efforts of the agency.

Additional Recommendations:

As the contract with IKON that services the agency's Multi Function Devices (MFD's) is nearly complete, and because this contract only allows for the use of 35% recycled paper in its machines, it is important that the AGO seek to find an MFD service provider that allows for the use of 100% recycled paper. I would recommend Gray's Harbor Paper as a supplier under state contract with GA because they are Washington-based and they have a demonstrated commitment to being a leader in sustainable practices within the paper and pulp industry.

According to the SCIP tool, switching from 35% to 100% recycled paper for the purchase of 45,000 reams of paper (roughly the amount used in 2007) would result in the decrease of 147.5

MTCDE previously attributable to the AGO. This would represent a 4.5% reduction in scope III emissions, and a 2% reduction in overall emissions.

2007 marks the baseline year for AGO's GHG inventory. An inventory is useful as a baseline, however its true worth is realized through the calculation of subsequent inventories. Post-baseline inventories not only allow for the tracking of the success of efforts that is needed for periodic reevaluation of goals and reduction strategies, but also becomes easier as the pathways for obtaining such data are blazed and key sources become accustomed to providing that information.

At the AGO, subsequent inventories would be well served by the facilitation of better data management in a few key areas. Foremost in need of such attention is the agency's method of recording flight data. With individual flights numbering in the thousands annually, and a significant number of cancelled or rescheduled flights, all charged to the taxpayers of the State of Washington, it would behoove both the accounting department and future inventories to manage this data in a manner that allows for, at the very least, the ability to instantly know the number of flights taken between two destinations in a year, which employee flew in each instance, and how much was paid for that travel. Assigning a coding system involving this information and requiring its use by travel agents and AGO accounting could radically improve the accountability and accessibility of this data.

Another area that could benefit from an effort to facilitate information retrieval is facility energy use. Because of the disparate sources of information, and the various methods that lease agreements and utility payments are set up through AGO facilities, there is not a single cut and dried method to gain the information needed for an inventory. Fortunately, through the work of this inventory, I have tracked and recorded data sources and have compiled a list of contacts and

other pertinent information needed to obtain necessary utility data at AGO facilities. This spreadsheet will be presented to the AGO with the final report, though for proprietary reasons is not included in this thesis.

Conclusion:

In summation, the suggestions included in this section should represent a viable suite of actions that will take some dedicated personnel to work through. Given the gravity of the global climate crisis, the current trends in regulation, and the paradigmatic shift currently underway in our society, organizations such as the AGO will need to dedicate personnel to facilitating the changes necessary to mitigating their impact on climate change.

Without dedicated individuals who find it within their job description to spearhead the implementation GHG mitigation efforts at the organization, there will likely be insufficient impetus to achieve emissions reduction targets of 2% reduction annually. At the AGO and other Washington State agencies, the likely position to take on these responsibilities is the sustainability coordinator. However it seems that a close alliance and working relationship with individuals such as Ron Major of GA will also be necessary to ensure consistent and measurable emissions reductions and all of the corollary benefits that come with them.

Throughout this paper, I have dealt primarily with the single issue of climate change. I have outlined the steps that should be taken in order to gain an understanding of organizational emissions and how to go about taking action at reducing them. What the reader must keep in mind is that climate change is but one environmental issue that a sustainable organization must consider, albeit a very important one. While it is true that creating emissions reductions will also have positive impacts on aspects of an organization's overall ecological footprint, such as

increasing recycling and compost, or decreasing water use, it is important not to ignore issues such as water quality, pollution, or the accumulation of toxic substances in our ecosystems.

At the AGO, operations necessarily bring employees into contact with a significant and diverse cross section of the State of Washington. As such, espousing a commitment to sustainability, particularly through the development of specific and publicly stated emissions reduction goals will necessarily help to introduce these concepts into the minds of client and other organizations with whom the agency has contact. Additionally, an organizational commitment to emissions reductions will help to drive markets in the State and beyond toward an awareness of and proactive commitment to building a less carbon intensive, and more robust economy.

I sincerely hope that this document will be helpful to not only the AGO and other Washington State Agencies, but that it may be a useful source for organizations of all kinds. If nothing else, this paper should provide a helpful case study to those charged with addressing climate change at their organization.

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