



SAIF Corporation

2008 Greenhouse Gas Inventory

Tracy Meyer

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Executive summary

The 2008 scope I and II greenhouse gas (GHG) emissions *increased* by nine percent over the 2007 emissions.

For calendar year 2007, SAIF's Scope I and II emissions totaled 4,095 MT CO_{2e},¹ and for 2008, they totaled **4,461** MT CO_{2e}.

The primary reason for this increase was an escape of fugitive refrigerants, which is discussed in this report.

Part of our strategic plan tactic is to stop the growth of greenhouse gas emissions by 2010 and, over the longer term, decrease emissions. Administrative Services Division (ASD) has worked to make our buildings, fleet, and landscape more environmentally friendly, which has helped keep our emissions fairly even as the company has grown.

We should start to show decreases in 2010 as the work we have done and plan to do lowers our emissions. This includes new energy reduction HVAC systems, employee education, fleet reduction, the addition of hybrid and/or electric cars, specific energy reduction planning, and solid waste audits.

Methodology

The 2007 greenhouse gas inventory was completed by Good Company, who also provided a workbook template for future inventories. The workbook was used to complete the 2008 inventory and to compare the base year of 2007 with the 2008 data.

This report follows the same protocols and guidance as SAIF's 2007 greenhouse gas inventory. Please refer to the 2007 report for detail.

The inventory includes all of SAIF's office locations, which are located in the state of Oregon. The emissions sources by Scope category are as follows:

- **Scope I** includes emissions from natural gas use, fleet fuel combustion, fuel used in generators, and fugitive refrigerants. These are direct sources of greenhouse gas emissions that originate from equipment and facilities owned or operated by SAIF.
- **Scope II** includes emissions from purchased electricity. These are indirect emissions as a result of imported electricity, heat, or steam.
- **Scope III** includes all other indirect sources of GHG emissions that may result from the activities of the institution but occur from sources owned or controlled by another company, such as business travel of employees, outsourced activities and contracts, land-filled waste, purchases, etc.

Scope III was included in the 2007 inventory but not in 2008. The Climate Registry Reporting Protocol² requires including both Scope 1 and Scope 2 emissions data, but

¹ When completing 2008 I found some errors in the 2007 calculations of square footage that changed the totals slightly.

Scope 3 emissions are optional. This is because sources are not always directly controlled by SAIF, the data is not always easily found, and it may already be reported by others. We completed a scope III analysis in 2007 as it was the base year and we wanted to include all emission sources for possible later comparison.

A customized Carbon Calculator was developed by Good Company for SAIF and was used to calculate/estimate all emissions for this inventory. SAIF's emissions sources are shown by Scope category in the figure below.

Summary information

Figure 1: SAIF 2007 and 2008 greenhouse gas (GHG) inventory results by Scope category and emissions source in metric tons of carbon dioxide equivalent (MT CO_{2e})

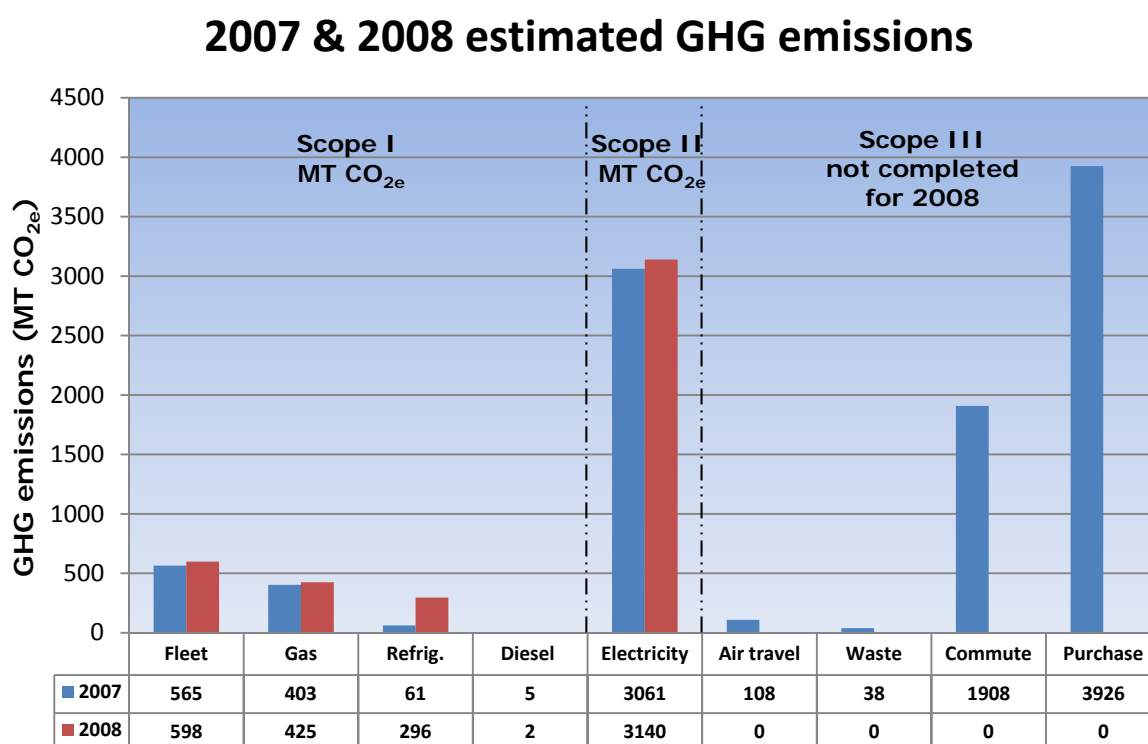
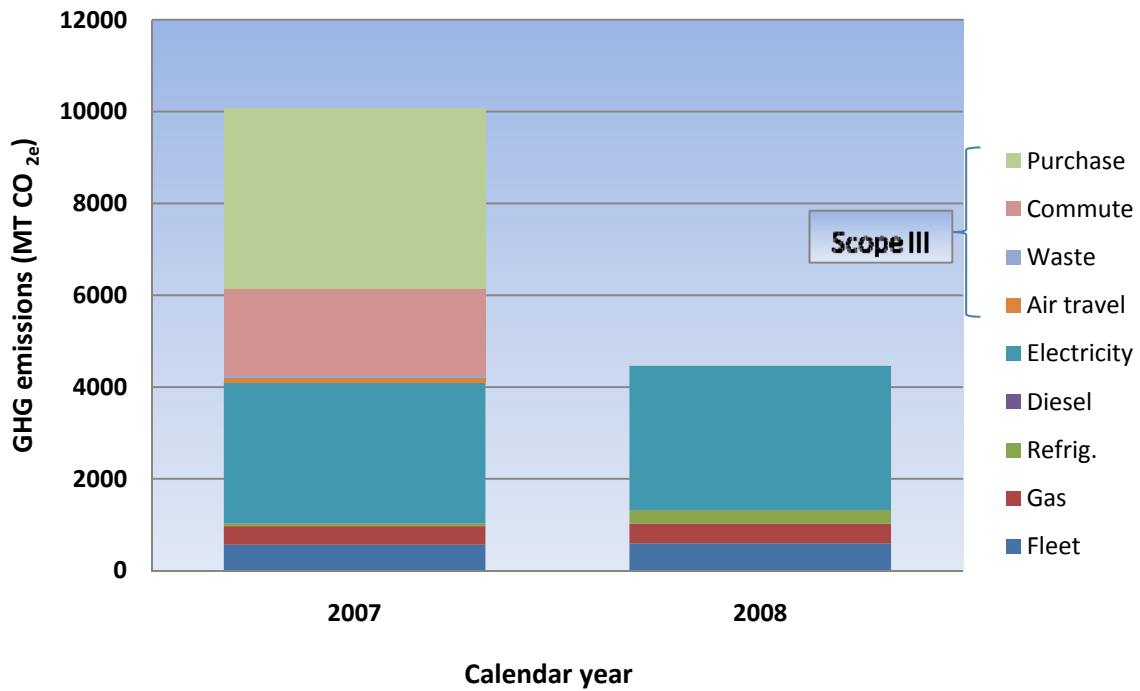


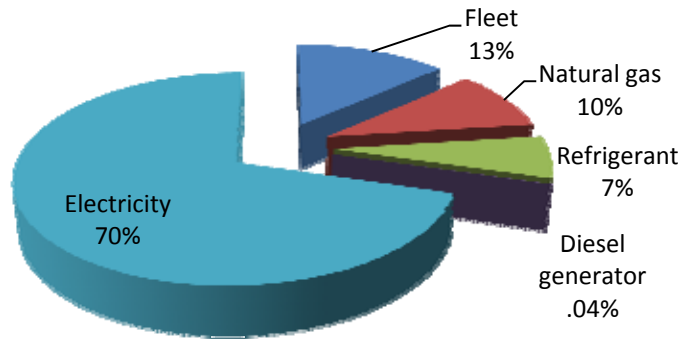
Figure 2: SAIF 2007 and 2008 greenhouse gas (GHG) inventory results by Scope category and emissions source in metric tons of carbon dioxide equivalent (MT CO_{2e})

² This inventory follows the methods described in the Climate Registry General Reporting Protocol, Version 1.1, May 2008. www.theclimateregistry.org

GHG emissions



2008 Scope I & II



As noted above, purchasing and employee commute were not calculated for 2008 as they are not required as part of an emissions report.

Table 1: Summary of base year emissions by Scope category, as well as normalized emissions per employee, per occupied building square footage, and per million dollars of revenue

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Calendar year	Scope I	Scope II	Scope III	Annual emissions per employee (Scope I&II)	Annual emissions per occupied sq foot (Scope I&II)	Annual emissions per \$1 million of revenue (Scope I&II)
	MT CO _{2e}	MT CO _{2e}	MT CO _{2e}	MT CO _{2e} /ee	kg CO _{2e} /hund sqft.	MT CO _{2e} /mil\$
2007	1,034	3,061	5,980	4.6	15	6.7
2008	1,321	3,140	na	5.0	16	8.0
Difference	287 28%	79 3%	na	0.4 9%	1 7%	1.3 19%

Scope I emissions

Fleet

In 2008, the SAIF-owned fleet consisted of 116 vehicles that ranged in model year from 1993 to 2009 and in class from automobiles to light trucks. The average fuel efficiency for the owned fleet was 20.6 (20.9 in 2007) miles per gallon (MPG) with a range in fuel efficiency from 8 – 45 MPG³. The average MPG went down slightly from 2007 to 2008 even though we increased the number of hybrids and small cars. This appears to be due to the higher MPG cars being added late in 2008. 2009 should show improvement.

The model year range and vehicle class of the employee-owned vehicles is unknown. The fuel efficiency for all employee-owned vehicles is estimated to be 23.7 MPG⁴. Approximately 13 percent of the totals in this report are personal cars used for business.

Table 2: Annual fleet distance and fuel consumption converted to carbon dioxide equivalent (CO_{2e}) and percentage of total scope I and II emissions

	Total miles	Total gallons	Emission MT CO _{2e}	Percentage of total Scope I & II emissions
2007	1,343,978	63,239	565	14%
2008	1,398,283	66,806	598	13%
Difference	54,305	3,567	33	-1%

The emissions calculation uses total number of gallons, so to lower fleet emissions we must lower the number of gallons used. This could be done by driving fewer miles or improving gas mileage. We will work to improve gas mileage by selecting appropriate vehicles for the job and location, including hybrids, electrics, and other appropriate lower-miles-per-gallon vehicles.

In 2007 we had one Toyota Prius hybrid and in 2008 we added four more. In late 2009 SAIF is planning to decrease fleet size in Salem and Portland. Eliminating vehicles with lower average miles per gallon will assist in reducing our emissions. The use of Zipcar and personal cars count in our emissions, so depending on the types of cars used, we could see an increase or decrease in our emissions.

With the new Service Center loss control representatives located in Portland but serving the whole state, we may see an increase in mileage, gallons, and emissions.

Natural gas

Natural gas is used to heat buildings and water (in some buildings) at seven offices (four owned, three leased). NE Portland is not shown below as it is minimal and we don't have actual usage numbers.

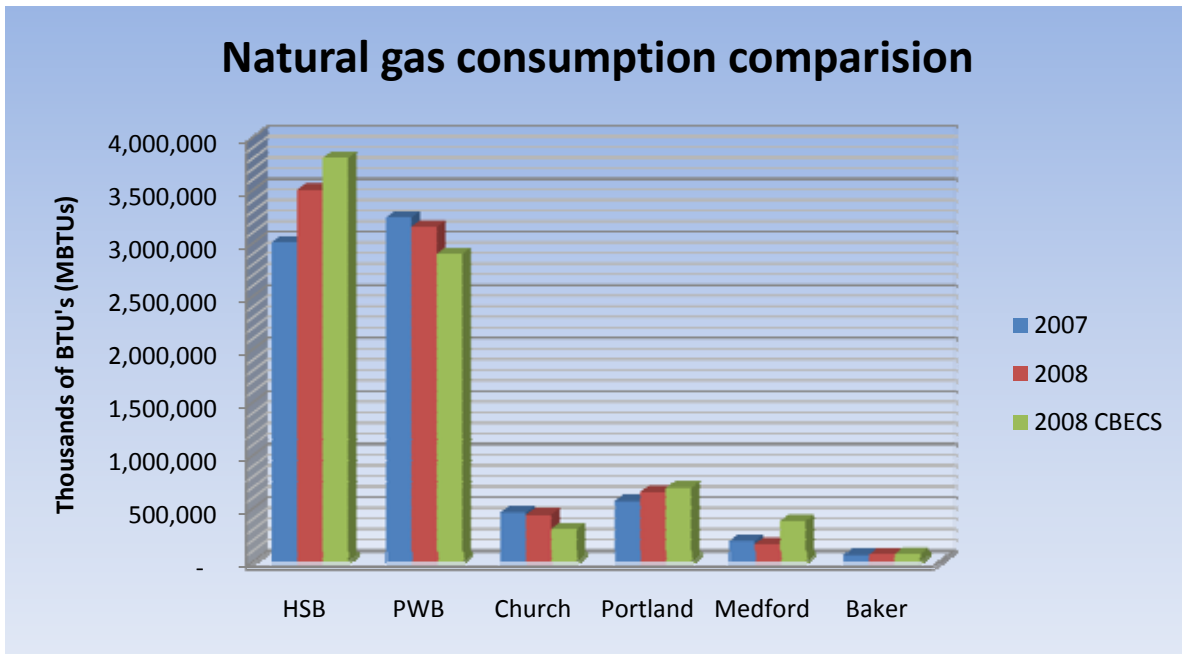
The graph below uses MBTUs⁵ instead of therms; electricity and natural gas are measured differently, so converting both to MBTUs allows more effective comparisons.

³ This information is calculated annually by SAIF with fleet management software.

⁴ This information was determined by conducting an employee commute survey for the 2007 GHG inventory.

⁵ MBTU stands for one million British Thermal Units (BTU). BTUs are measurements of energy consumption.

Figure 3: Comparison of actual natural gas consumption with an estimated benchmark based on the Commercial Buildings Energy Consumption Survey (CBECS)



In both 2007 and 2008, Parkway and Church Street offices exceed the national average, but both reduced usage of natural gas in 2008 from 2007. Portland and Baker City were under the national average but their usage did increase from 2007 to 2008.

Small reductions or increases in the amount of natural gas used could be due to the weather. Many of the positive changes listed below under Electricity also affect and reduce natural gas emissions. As we plan for electricity reduction we will also consider natural gas usage.

Fugitive refrigerants

Refrigerants are compounds used in air conditioning and refrigeration units. They efficiently absorb heat undergoing a phase change from liquid to gas, which allows for the cooling of indoor space. Most refrigerants are in closed looped systems with no emissions. However, when new refrigerants are added, or refrigerants escape, there are emissions. These emissions are hundreds to thousands of times as powerful as carbon dioxide. A small amount of fugitive refrigerants can make a big difference in emissions.

Table 3: The refrigerant types, associated emissions, and percentage of total scope I and II emissions

	Emissions from: HCFC-22	Emissions from: HFC-134a	Total emissions	Percentage of total Scope I & II emissions
2007	59	2	61	1%
2008	296	0	296	7%
Difference	237	-2	235	6%

In 2008, a valve failed on chiller #1 at the High Street Building, resulting in fugitive refrigerants. The chiller is being replaced with an energy-efficient model. The air conditioning units on owned buildings are maintained quarterly and leaks are immediately repaired after discovery.

Diesel generator emissions

Diesel fuel is purchased for back-up power generators that are used during testing and power outages. These generators are located at the Salem offices (Church Street and High Street) and when diesel is purchased it is a scope I emission source.

Table 4: Diesel consumed by back-up power generators, the associated emissions, and percentage of total scope I and II emissions

	Diesel fuel gallons	Total GHG emissions MT CO_{2e}	Percentage of total Scope I & II emissions
2007	500	5.10	0.12%
2008	160	1.63	0.04%
Difference	-340	-3.47	-0.08%

Scope II emissions

Purchased electricity

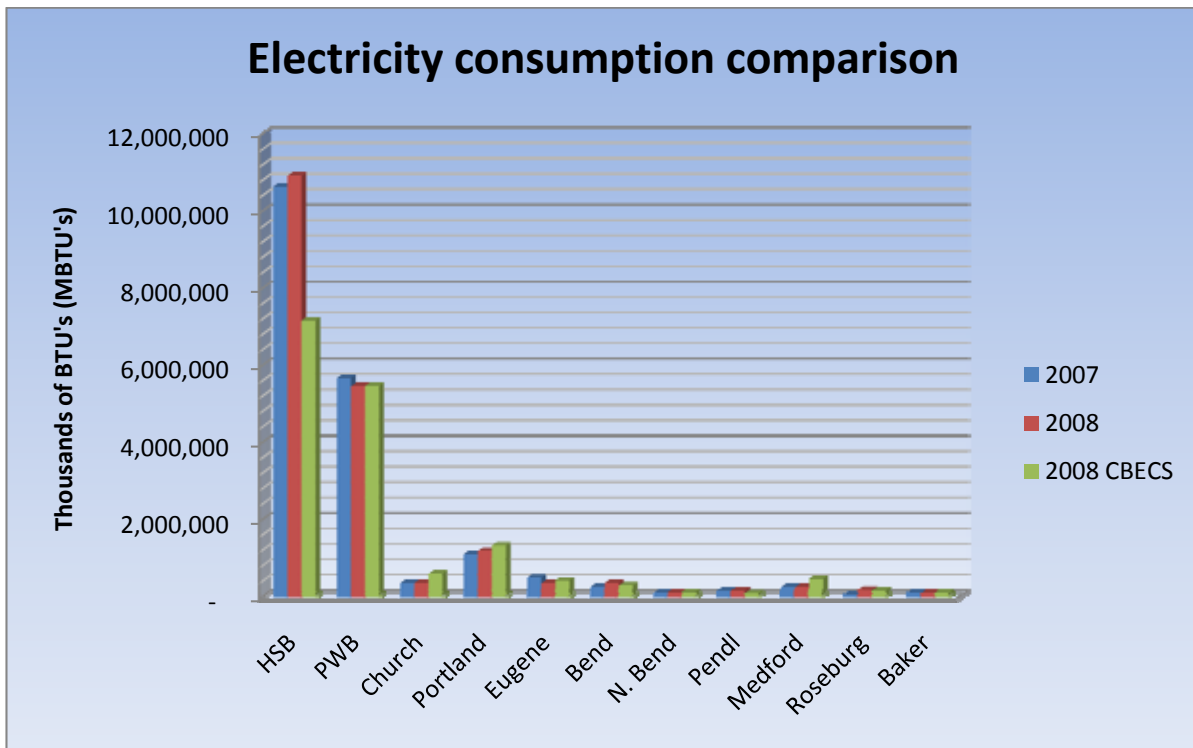
The electricity purchased by SAIF at its 12 office buildings and one parking structure is the only Scope II emissions source.

Table 5: Total kWhs used by SAIF, the associated emissions, and percentage of total scope I and II emissions

	Purchased electricity kWh	Total GHG emissions MT CO _{2e}	Percentage of total Scope I & II emissions
2007	5,948,131	3,061	75%
2008	6,023,911	3,140	70%
Difference	75,780	79	-5%

SAIF purchases electricity from four Oregon utilities: Portland General Electric (PGE), Eugene Water & Electric Board (EWEB), Pacific Power, and Oregon Trail Electric. Each of these utilities has a unique generation mix, which is the type and percentage of resources used to produce electricity (hydro, coal, nuclear, natural gas, etc). This mix results in a unique utility emissions factor based on the percentage of fossil fuels in the mix and the type of fuel combusted. This is relative because some offices may use more electricity but their emissions are lower because their mix of electricity comes from more environmentally friendly sources.

Figure 4: Comparison of actual electricity consumption with an estimated benchmark based on the Commercial Buildings Energy Consumption Survey (CBECS)



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This chart compares electricity usage in each location for 2007 and 2008 and shows the overall average for an office of similar size in the same region. High Street Building has increased the usage of electricity from 2007 to 2008 and far exceeds the average for a similar-size building in the region (CBECS). However, it is more important for us to compare year-to-year on this building instead of against the average, because the average is for office buildings, and High Street houses our computer operations, print shop, and cafeteria.

There have been changes made in 2008 and 2009 that should affect our emissions, but those positive changes won't be evident until the 2009 and 2010 greenhouse gas inventories.

Administrative Services (ASD) has worked on the following which should provide energy savings (electricity and natural gas) in 2009 going forward.

2008:

- New building automation system for tighter building controls for PWB and HSB
- Relief fan for HSB to reduce static pressure, allowing us to bring in more outside air to cool the building and reduce carbon dioxide
- Increased the size of the outside air intake grill to allow us to take in more outside air for HSB
- Replaced the outside air, return air, and relief dampers with higher efficient dampers for tighter control to enable the use of outside air to cool HSB
- Installed variable frequency drives on exhaust fan and cooling tower fans in HSB, which provides increased control on heating and cooling loops
- Removed all the T12 magnetic ballast from the light fixtures and replaced with T8 electronic in Roseburg
- Replaced all incandescent lamps with compact fluorescent light bulbs in Roseburg
-

Future plans include:

- Install high efficiency Liebert air conditioner in HSB computer room, with an expected energy savings of 2 percent of the building's total usage annually
- In fourth quarter, will install high efficiency 250-ton air conditioner in HSB and variable frequency drives on chilled water and condenser water pumps with an expected energy savings of 12% of the total building's usage annually.
- Remove chilled water loop and remote chiller and replace with point-of-use refrigerated water dispenser in HSB
- Replace outside air and return dampers on floors three and four at PWB for tighter control and to provide more outside air for cooling
- Replace all incandescent lights at CSB with compact fluorescent light bulbs
- Although ASD has been proactive and the green team has worked to educate employees on ways to save energy, in 2010 we will work to create a strategic plan for energy reduction.

Total energy consumption

Figure 5: Comparison of actual total energy consumption (natural gas and electricity) with an estimated benchmark based on the Commercial Buildings Energy Consumption survey CBECS)

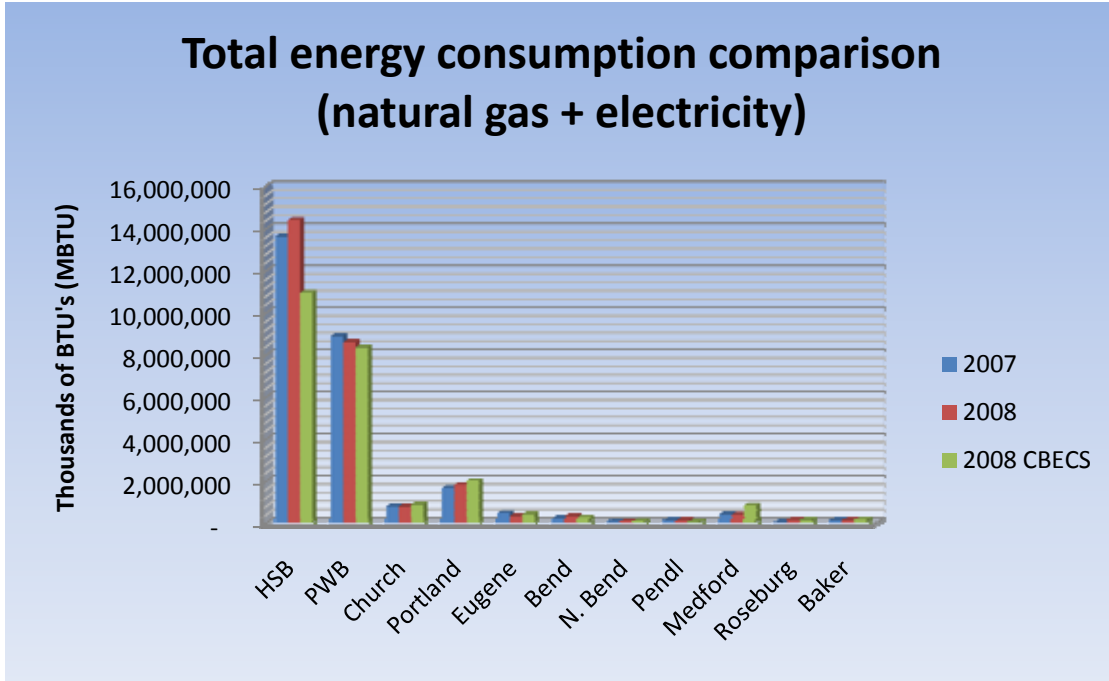


Table 6: Combined MBTUs of natural gas (converted from therms) and electricity (converted from kWh)

MBTUs	MBTU change		Sq ft change	Empl# change	CBECS (average for region)	
	2007	2008				
High St	13,640,088	14,408,904	6%	0	-3%	10,951,820
Parkway	8,900,316	8,601,599	-3%	0	4%	8,357,097
Church St	806,306	787,292	-2%	0	0	885,763
Portland	1,663,885	1,824,171	10%	0	6%	2,011,066
Eugene	474,631	332,500	-30%	0	-13%	412,228
Bend	245,719	344,954	40%	0	13%	274,859
N. Bend	84,294	102,334	21%	0	100%	105,026
Pendleton	151,980	144,511	-5%	0	0	73,093
Medford	428,242	394,483	-8%	0	-5%	839,743
Roseburg	44,211 ⁶	169,283	283%	94%	0	147,503
Baker City	158,077	155,247	-2%	0	0	185,365

This is the same numerical information shown in figure 5. The green copy shows the lowest, and most favorable, amount of energy used. Four offices have the lowest usage in 2007, six in 2008, and four offices have higher use in both years compared to an average office building of the same size. Our goal would be that 2008 (or the most recent year) would have the lowest energy usage.

⁶ 2007 data for Roseburg cannot be verified as the space was leased and we did not pay the electric bill. The amount of energy used is very low and does not appear to be correct.

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Pendleton and High Street continue to use much more energy compared to an average office building in their geographic areas. Both are due to electricity, as High Street's natural gas usage is less than average and Pendleton does not use natural gas. The Pendleton building has an older furnace and a newer air conditioner instead of a heat pump, which would make the building much more efficient. It is also brick and may not be insulated well. It is doubtful this situation will improve without major changes (vacating the building or asking the owner to make expensive changes).

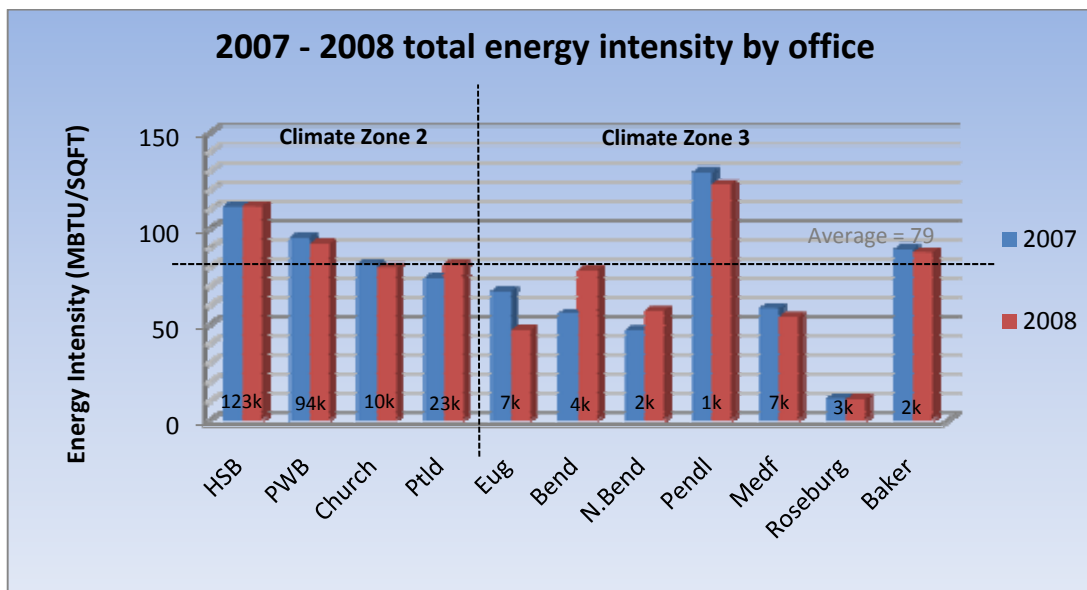
Eugene shows a large decrease in energy use, but no operations changes. It has been difficult to obtain the information from the building owner in Eugene and we received a lump sum amount instead of month-by-month statements verifiable from the utility. For 2009 we will begin receiving the information directly from the utility.

Bend had a large increase in electricity use for an unknown reason. Almost every month shows an increase from 2007 to 2008. There was an increase of two employees to the branch, but the remodel didn't occur until 2009.

North Bend had a sizable increase in electricity use, with the only apparent change a doubling of their employee base from two to four.

Roseburg changed locations in 2008 (from leased to owned) and increased its space. The 2007 electricity totals cannot be verified and seem extremely low. We received this information from the building owner at the time. Starting in 2008 we own the space and have utility bills for accuracy. The 283 percent increase is not due to the larger space, but apparent inaccurate information in 2007 usage.

Figure 6: Comparison of individual SAIF office energy intensity (BTU's of energy consumed per square foot of office space); values at the bottom of the bars show the building area in thousands of square feet.



Per square foot, Pendleton is still the heaviest user of electricity. Pendleton, Baker City, all the Salem offices, and Portland were above average for similar-size buildings (average is 79 MBTU's per square foot).

Scope III Emissions

Scope III emission sources include air travel, solid waste disposal in landfills, employee office commute, and embodied emissions within purchased office goods and services. As stated in the introduction, Scope III measurement and recording are not required in greenhouse gas inventories, as the sources are not always directly controlled by the reporting entity, the data is not always easily found, and it may already be reported by others.

Scope III data was collected in 2007 to create a full baseline, but has not been collected in 2008.

Air travel

Because SAIF's business requires a relatively small amount of air travel, we do not currently track flown miles, it is not required by the Climate Registry, and we have not completed the emissions calculations.

Solid waste

The solid waste calculation is based on the number of SAIF employees, the type of disposal plan in each geographical area, and a California Integrated Waste Management Board factor. Because it is not based on actual SAIF waste, it is marginally instructive and we have not completed the emissions calculations.

Employee-to-office commute emissions

We conducted an all-employee commute survey for the 2007 greenhouse gas inventory, but not for the 2008 inventories. We plan to conduct a survey in 2010 or 2011 on commute information in order to facilitate comparison of 2007 data.

Embodied emissions of purchased office goods and services

The responsibility for embodied emissions in purchases is not equal to the responsibility for emissions produced directly by SAIF's operations and owned equipment, such as the burning of fossil fuels. We have not completed the emissions calculations for purchases because the information is not required by the climate registry.

Conclusion

Although overall emissions slightly increased from 2007 to 2008, the increase was primarily in one area (refrigerants) and most other areas were fairly static.

This second year of measurement has raised our awareness and focused the corporation on the importance of managing emissions. High points include forming an employee green team to build awareness and education in what causes greenhouse gas emissions and how each employee can assist in reduction. We also implemented energy audit recommendations for HVAC systems and airflow, which will reduce energy usage in the long run, and completed the necessary steps to become EarthWISE-certified by Marion County.

Clearly, more work needs to be done, especially in the area of energy use.

In 2010 we will focus on energy reduction, as that is the area of greatest potential for change. We will also focus on understanding the impact of operations on employee emissions and pay more attention to employee choices (i.e. use of resources).