Facility Resource Conservation Audit Form

General Information

Name of Institution	Address	
Owner (if other than institution)	Address	
Name of Facility	Address	
Contact Person Position Phone	Administrator Position Phone	
Date of Audit	**Facility Type**	**Facility Usage (s)**
Auditor Address City State Zip Code Phone Fax Number E-mail	Elemntary School _____ Middle School _____ High School _____ Community College _____ University _____ Hospital _____ Other _____	Office _____ Storage _____ Library _____ Gymansium _____ Dormitory _____ Classrooms _____ Shops _____ Other _____
Date of Construction / Date of Last Remodel	Remaining Building Life	
Electric Utility Contact Name Address City, State, Zip Code Phone	Gas Utility Contact Name Address City, State, Zip Code Phone	
Other Fuel Supplier	Is this building on the National Historic Preservation Register? Yes No	
Utility Incentives? (Y/N) ___ Elec. ___ Gas ___ Water ___ Sewer Other _____		
Describe modification or change anticipated in next 15 years:		

Facility Resource Conservation Audit Form

Sketch of Facility - Site Plan

On this page prepare a sketch of your building or building complex that shows the following information:

1) Relative Location and Outline of Building (s)
2) Building Age
3) Building Number
4) Building Size
5) Location of meters and ID #s (Elect., Gas & Water)
6) Fuel Type
7) Location of Heating and Cooling Equipment
8) North Orientation Arrow

Facility Resource Conservation Audit Form

Energy Usage

Table 1 Electric Use and Cost

Utility _____ Gross Building Floor Area _____ sq. ft.
Electric Meter No. _____ Demand Meter No. _____
Year of Record: from_____/_____to_____/_____

From	To	kWh	mmBTU*	Energy Cost	kW	Demand Cost	Total Cost
Totals							

*Multiply kWh by.003413 to convert to mmBTU (10^6BTU)

Table 2 Non-Electric Use and Cost

Utility or Supplier _____
Meter No. _____

Year of Record: from____/____to____/____
Fuel Type 1 _____
Fuel Type 2 _____

Conversion Factors	
Natural Gas	100,000 Btu/therm
No. 2 Oil	138,690 Btu/gallon
Propane	95,500 Btu/gallon
Coal	24.5 million Btu/short ton
Wood	8600 Btu/ pound
Steam	1390 Btu/pound

From	To	Fuel Type 1 Units	Cost	mmBTU	Fuel Type 2 Units	Cost	mmBTU
Total							

Facility Resource Conservation Audit Form

Table 3 Annual EUI Comparison

Target Energy Use Index (EUI) for K-12 Schools

Elementary Schools under 40,000 SF, 2000 HR./YR., kitchen, no cooling, 5 computers

Heating Source	Western Washington	Eastern Washington
Electric Heat Pump	34,400 BTU/SF-YR.	38,200 BTU/SF-YR.
Electric Resistance	38,000 BTU/SF-YR.	43,200 BTU/SF-YR.
Natural Gas	47,200 BTU/SF-YR.	55,900 BTU/SF-YR.

Middle Schools 40.000 to 75,000 SF, 2,200 HR. YR., kitchen, no cooling, 35 computers

Heating Source	Western Washington	Eastern Washington
Electric Heat pump	46,300 BTU/SF-YR.	51,300 BTU/SF-YR.
Electric Resistance	49,000 BTU/SF.YR.	55,100 BTU/SF-YR.
Natural Gas	56,500 BTU/SF/YR.	65,400 BTU/SF-YR.

High Schools over 75,000 SF, 3200 Hr./Yr., kitchen, cooling in office, 60 computers

Heating Source	Western Washington	Eastern Washington
Electric Heat Pump	55,800 BTU/SF-YR.	58,900 BTU/SF-Yr.
Electric Resistance	64,700 BTU/SF-YR.	71,185 BTU/SF-Yr.
Natural Gas	71,000 BTU/SF-YR.	79,925 BTU/SF-Yr.

Note: Values given are typical and a particular school may have a higher or lower EUI.

Target EUIs for Hospitals

Size	Number of Beds	EUI
Small Hospitals	Less than 100 beds	230,000 BTU/SF-Yr.
Medium Hospitals	100 to 300 beds	268,000 BTU/SF-Yr.
Large Hospitals	Over 300 beds	261,000 BTU/SF-Yr.

Target EUIs for Colleges and Universities

100,000 BTU/SF-Yr.

Note: This EUI is the average fro the entire campus; individual buildings may have a higher or lower EUI.

Energy Conservation Potential

Energy Use Index (EUI): _____ BTU/Sq.Ft./Yr.

To determine the EUI for this building add the total mmBTU from Table 1 and Table 2, divide by the building's square footage and then multiply the result by one million. ((mmBTU1+mmBTU2)/SF)x10^6=EUI

Energy Conservation Potential: _____ %

To determine energy conservation potential for this building look up the target EUI for this building TYPE from Table 3. The energy conservation potential is the actual EUI (shown above) minus the target EUI from Table 3, divided by the actual EUI (shown above.)

((EUI Actual - EUI Target)/EUI Actual)x100=Potential %

Facility Resource Conservation Audit Form

Building Name _____

Building Characteristics

Gross Building Floor Area (sq.ft.)	Average Occupancy (number of people)
Gross Wall Area (sq.ft.)	Window Type Single Pane Double Pane
Roof Area (sq.ft.)	Other _____
Roof Type	Window Area (sq.ft.)
Roof Condtion Good Fair Poor	North_____ South_____ East_____ West_____

Lighting

Zone or Area*	Fixture Description**	# of Lamps per Fixture	Lamps Wattage	Approx. # of Fixtures

*Offices, Gymansiums, Classrooms, Kitchen, Patient Rooms, etc. **Incandescent, Compact Fluorescent, 4ft. or 8ft. Fluorescent, High Pressure Sodium, Metal Halide, etc.

Heating System Fuel_____
(Circle the approriate system below.)

1-Boiler, 2-furnace, 3-Water Source Heat pump,
4-Heat Pump, 5-Unitary Rooftop, 6 Electric Resistance
7-Other_____
Condition: Good Fair Poor

Describe the HVAC Control System:

Condition: Good Fair Poor

Cooling System Fuel_____
(Circle the appropriate system below.)
8-Chiller, 9-DX Cooling, 10-Double Bundle Chiller,
11-Other_____
Condition: Good Fair Poor

Kitchen Equipment

	Fuel Type (i.e. Gas, Electric, Steam)		
Ovens		Size(s)	
Grills		Size(s)	
Fryers		Size(s)	
Kettles		Size(s)	

Terminal System
(Circle the appropriate system below.)
A-Dual Duct, B-Multi-Zone, C-Single-Zone, D-Variable
Volume, E-VAV with Reheat, F-Ceiling Induction,
G-Two-Pipe Fan Coil, H-Unit Ventilator, I-Four-Pipe
Fan Coil, J-Other_____
Condition: Good Fair Poor

Misc. Systems (Laundries, Elevators, Pools, etc.)

Condition: Good Fair Poor

Describe Hot Water System:

Condtition: Good Fair Poor

HVAC Temperature Set Points

Occupied: Heating_____F Cooling_____F
Unoccupied: Heating_____F Cooling_____F

Facility Resource Conservation Audit Form

Building Name _____

Schedules

Occupancy/HVAC Operations*

Zone/Area	Sq. Ft.	Weekdays From*	Weekdays To*	# People	Saturdays From*	Saturdays To*	# People	Sundays/Holidays From*	Sundays/Holidays To*	# People
		/	/		/	/		/	/	
		/	/		/	/		/	/	
		/	/		/	/		/	/	
		/	/		/	/		/	/	
		/	/		/	/		/	/	
		/	/		/	/		/	/	
		/	/		/	/		/	/	
		/	/		/	/		/	/	
		/	/		/	/		/	/	

*Enter "From" and "To" times for both Occupancy and HVAC operation times.

How many months per year is this building occupied? _____

If the building is not occupied all year, list the months of occupancy. _____

Facility Resource Conservation Audit Form

Date Updated: _____

Building "A" : _____
Building "B" : _____
Building "C" : _____
Building "D" : _____
Building "E" : _____

Use A,B,C, D, E box to note: *__% = % proposed*
X = potential for measure

BUILDINGS

	I. Building Envelope	A	B	C	D	E	Comments
Projects	1. Install double glazing						
	2. Infill glazing						
	3. Add solar film for glazing						
	4. Weatherstrip/caulk windows						
	5. Add exterior shading device						
	6. Install insulated doors						
	7. Weatherstrip doors						
	8. Insulate roof (rigid)						
	9. Insulate ceiling (batt/blow)						
	10. Insulate wall						
	11. Insulate floor						
	12. Lower ceiling						
	13. Add vestibule entry						
O&Ms	14. Door and windows open*						
	15.Close curtains when vacant						
	16. Repair broken windows						
	17. Repair auto door closers						

*When building is being heated/cooled, check for faulty control sensors, valves or actuators

II. HVAC

A. Boilers

Projects	1. Replace Boilers						
	2. Upgrade existing boilers						
	3. Replace burners						
	4. Install a pony boiler						
	5. Reduce steam distribution pressure						
	6. Install a separate DHW heater						
	7. Insulate shell and piping						
	8. Replace/repair condensate system						
	9. Replace/repair steam traps						
	10. Install boiler flue damper						
	11. Capture waste heat for boiler feed water						
	12. Capture waste heat to preheat combustion air						
	13. Install time clock w/low temp. override						
	14. Install automated zone control valves						
	15. Install boiler temp. reset control						
	16. Switch from a steam to a hot water system						
O&Ms	17. Time clock maintenance						
	18. Tune up boiler						
	19. Ensure adequate OSA for combustion air						
	20. Turn off un-used boilers						

Comments:

	II. HVAC continued	A	B	C	D	E	Comments
	B. Furnace/U.V./Roof Top/Radiators						
Projects	1. Install high efficiency units						
	2. Recondition units						
	3. Replace inefficient burners						
	4. Install electronic ignition						
	5. Install auto flue damper						
	6. Replace/repair linkages						
	7. Install thermostatic control valves						
O&Ms	8. Clean unit/replace filters						
	9. Repair/replace steam traps						
	10. Reduce/eliminate simultaneous heating/clg.						
	C. Heat Pumps						
Projects	1. Install new heat pumps						
	2. Install economizer cycle						
O&Ms	3. Repair heat pumps						
	4. Clean unit/replace filters						
	D. Cooling Systems						
Projects	1. Upgrade inefficient chillers						
	2. Install variable speed chiller motor						
	3. Add head pressure controls						
	4. Install strainer cycle to chillers						
	5. Install evaporative cooling						
	6. Install cooling tower stage control						
	7. Upgrade cooling tower						
	8. Install local air conditioners						
	9. Install economy cooling						
	10. Install chiller by-pass for free cooling						
O&Ms	11. Set controls for night purge						
	E. Controls						
Projects	1. Install an EMCS						
	2. Install time clock						
	3. Install CO2/VOC sensors for OSA control						
	4. Install occupancy sensors for OSA control						
	5. Install HVAC shut-off switch on garage door						
O&Ms	6. Set night and weekend setback						
	7. Set load shedding						
	8. Set deadband to 4+ degrees						
	9. Set warm up cycle						
	10. Set deck temperature reset						
	11. Set EMCS for optimum start/stop						
	12. Repair thermostats						
	13. Program thermostats						
	14. Repair excessive leaks in pneumatic controls						
	Comments:						

	II. HVAC continued	A	B	C	D	E	Comments
	F. Vent/Dist/Term. Equipment						
Projects	1. Convert to VAV						
	2. Reduce ventilation rates						
	3. Increase ventilation rates						
	4. Install automated OSA dampers						
	5. Reduce air stratification						
	6. Insulate pipes and/or ducts						
	7. Modify zoning						
	8. Reduce/eliminate heat to hallways						
	9. Reduce/eliminate air to unoccupied areas						
	10. Install T-stat control valves on radiators						
	11. Install progrmbl. controls on exhaust fans						
O&Ms	12. Rebuild/replace steam traps						
	13. Repair leaky ductwork/plenum						
	G. Domestic Hot Water						
	1. Install flow restrictors						
	2. Install auto-off faucets						
	3. Decentralize hot water heating						
	4. Insulate HX piping and tank						
	5. Install summer heater						
	6. Lower temperature and install boosters						
	7. Install instant DHW heaters						
	8. Install DHW pump/tank timers						
	III. Lighting						
Projects	1. Change incandescent to fluorescent/HID						
	2. Change MV to MH/HPS						
	3. Install efficient ballasts and lamps						
	4. Lower fixtures						
	5. Install occupancy sensors						
	6. Install local switches						
	7. Retrofit/replace exit signs with LED signs						
	8. Install photocells on exterior lighting						
	9. Install timer controls for exterior lighting						
	10. Install light level sensors on interior						
O&Ms	11. Promote lights out with custodians/occupants						
	12. Delamp and disconnect ballasts						
	IV. Electric Equipment						
Projects	1. Convert to efficient motors						
	2. Install VFD controllers on motors						
	3. Replace oversized motors						
	4. Install a time clock on the bus block heaters						
O&Ms	5. De-energize vending machines when not in use						
	6. De-energize computers when not in use						
	7. De-energize copiers when not in use						
	8. De-energize coffee pots when not in use						
	9. Ensure equip. (ie kilns) are off during peak						
	Comments:						

	V. Kitchen	A	B	C	D	E	Comments
Projects	1. Install a steam gen. for steam ketters						
	2. Replace electric equip. w/ gas equip.						
O&Ms	3. Reduce the time for oven preheat						
	4. De-energize equipment when not in use						
	5. Minimize electrical use during peak consump.						

	VI. Water						
Projects	1. Replace equip. w/ water using condensers						
	2. Install a separate meter for irrigation						
	3. Install water efficient showers and facets						
	4. Install water efficient toilets/urinals						
	5. Install a smaller water meter						
O&Ms	6. Irrig. in early am or late pm						
	7. Repair water leaks						

	VII. Garbage/Recycling						
Project	1. Purchase a trash compactor						
O&Ms	2. Institute mixed paper recycling						
	3. Institute white ledger paper recycling						
	4. Institute carboard recycling						
	5. Institute wood recycling						
	6. Institute aluminim can recycling						
	7. Institute metals recycling						
	8. Institute composting						

	VIII. Administrative Measures						
	1. Stop irrig. water service over wet season						
	2. Stop electricity to portables, etc. not in use						
	3. Stop garbage collection during vacations						
	4. Combine after hour activities to efficient facilities with individual zoning.						

	IX. Visual Est. Potential Savings						(1=low, 5=high)

	X. Training Needs	A	B	C	D	E	
	HVAC ____						
	EMCS ____						
	O & M ____						
	BOC _____						
	Other						

Comments: