Appendix G
Class 1 Buildings, Blank Forms

Class 1 Building
Project Notification Form

Agency:		Date submitted:
Contact person:	E-mail:	Phone:
Division or user:		ODOE Project ID #:
Project name:		
Project address:		
City:		ZIP:
Project Description:		

Energy systems affected:

Area and Use Information:

Project type: ☐ New construction R = Renovation

Total floor area (sq.ft.)		gross heated or cooled
Affected floor area (sq.ft.)		full area if new, or renovated area
Construction cost	$	total budget, not appropriated amount

Breakdown area by use and schedule; show design occupancy

Area Breakdown (Square Feet)	Use code	Number of occupants	Occupied Hours/Day	Occupied Days/Week	Occupied Weeks/Yr

Use Codes:

A = Food/cafeteria, gym/pool/lockers, library/archives, theater/arena
B = Computer center, education, laboratory, office
I = Clinic, hospital, jail/prison
M = shop/retail
R = Residential/dorm
S = Warehouse

Estimated schedule:	Month/Day/Year		Month/Day/Year
RFP for design services:		Bid date:	
Schematic design begins:		Construction begins:	
Design development begins:		Construction complete:	
Design development complete:			

Class 1 Building
Project Team Contacts Form

Agency:		ODOE Project ID#
Project manager:	E-mail:	Phone:
Billing contact:	E-mail:	Phone:
Billing address:		
City:		ZIP:
Architectural firm:		
Managing Architect:	E-mail:	Phone:
Project architect:	E-mail:	Phone:
Mechanical Engineering Plumbing Firm:		
Mechanical Engineer:	E-mail:	Phone:
Electrical Engineer:	E-mail:	Phone:
Lighting designer:	E-mail:	Phone:
Energy Analyst:	E-mail:	Phone:
Commissioning Agent/Verification Provider:		
E-mail:	Phone:	
Document Reviewer (for ECM Inclusion):		
E-mail:	Phone:	
Other Design Team Member:		
E-mail:	Phone:	

Energy Analyst Qualifications Form
Energy Analyst's Name: List the qualifications of the person(s) responsible for the accuracy of the energy model and the Energy Analysis Report:
Description of experience with a computerized, hourly building modeling tool for energy analysis. How current is this experience?
List computer modeling programs with which the modeler has experience including years of experience with each modeling program:
Provide reference contacts for energy modeling experience:
List name(s) of others who will be working on the model and report:
List projects on which the Energy Analyst has performed computer modeling: Attach a sample of Energy Analysis Reports: List any buildings modeled for the SEED program:
Number of years of full time energy modeling experience:
Has the Energy Analyst taken the ODOE Energy Modeling Workshop? Date of Workshop

Energy Programming and Design Intent Checklist
General Description / Requirements

The following list of energy programming and design intent items should be considered early in the design effort when basic building concepts are being developed. Integration of many of these design concepts is needed early because adoption later in the design is often cost prohibitive or not feasible. Many owner operational requirements and designer design criteria have a significant impact on building energy use and operational costs. Such decisions affect building operating hours, occupant comfort and sizing of energy using equipment.

Information contained in this checklist can be collected from developed programming documents or serve as a reference to what should be included in the programming document. This information needs to be documented so dialog about relevant ECM options can be more clearly defined. Full development of this checklist will evolve as design progresses into schematic and design development phases. It may be necessary to defer decisions on particular efficiency concepts until the energy model is developed in order to address potential energy savings and cost effectiveness.

Excel forms available at http://www.energy.state.or.us/SEED/Toolbox.htm

State Energy Efficient Design

Energy Programming Considerations

Project Name:

Date of Issue:

Fuels and Utilities

Service	Selection	Name of Utility
Electric	☑	
Natural Gas	☑	
Propane	☐	
Fuel Oil	☐	
Steam	☐	
Other	☐	

Electrical Service Voltage: Primary..... ☐
Secondary..... ☐

Points of service: Centralized / Single Meter..... ☐
Distributed / Multiple Meter..... ☐

Back-up Systems Electric Stand-by Generator..... ☐
Systems to be supported:
- Fire Systems..... ☐
- Selected HVAC..... ☐
- Computers..... ☐
- Elevators..... ☐
- Special Use Equipment..... ☐

Secondary or Alternate Fuel to Primary Fuel..... ☐
Systems to be supported:
- Heating..... ☐
- DHW..... ☐
- Special Use Equipment..... ☐

Comments:

Building Envelope

Building Orientation and Shape

- East-West Axis ☐
- Long and slander shape ☐

Enhance Wall Thermal Mass

- Reduction of peak heating and cooling loads ☐
- Reduction of energy use due to the thermal flywheel effect ☐

Daylighting Architectural Features

- Shadings and Overhangs ☐
- Light Shelves, Clerestories, Skylights ☐

Heat Absorption Prevention

- Color selection of roof and wall surfaces ☐
- Landscape shading ☐

Comments:

Domestic Hot Water (DHW)

Showers: Number of people and use pattern (describe below)

Fixtures: Number and assumed diversity factors (describe below)

Special Equipment: Define water demand and use pattern (describe below)

Fixture controls

- Manual ☐
- Spring return ☐
- Automatic infra-red sensor ☐

DHW generation and distribution ☐

Sizing criteria: loads, recovery rates, storage capacity

Comments:

Equipment Loads

- Office Equipment ☐
  - Owner supplied electronic office equipment.....
    - Sleep Mode, Energy Star or other standard..... ☐
    - Features set-up and controlled by Owner..... ☐
  - Occupancy based controls..... ☐
  - After hours switchable loads..... ☐
- Large equipment or system loads recommended for gas firing
  - Space heat..... ☐
  - DHW heaters..... ☐
  - Food service equipment
    - Grills, fryers, steam kettles, etc..... ☐
    - Dishwasher booster heaters..... ☐
  - Labs equipment
    - Autoclaves..... ☐
    - Steam generators..... ☐
  - Other..... ☐

Comments:

Lighting

- Task lighting, lower ambient light levels..... ☐
- Light-colored interior finishes for walls, partitions and furniture.... ☐
- Defien interior and exterior light sources ☐
- Define fixture types ☐
- Define fixture lamp sources ☐

Comments:

Mechanical Systems

- Distributed mechanical equipment integrated into packaged roof-top equipment..... ☐
- Central mechanical equipment served by boiler(s) and chiller(s)..... ☐
- DHW generation and distribution..... ☐
- Special use HVAC requirements
  - Computer server room..... ☐
  - Telecom switch and electronics room..... ☐
  - Art gallery..... ☐
  - Laboratorium..... ☐
  - Natatorium..... ☐
  - Kitchen..... ☐
  - Gymnasium..... ☐
  - Other..... ☐
- Maintenance Issues
- Longevity

Comments:

Ventilation

- Mechanical..... ☐
- Natural..... ☐
- Hybrid System ☐
- High Occupancy Areas..... ☐

Comments:

Early Planning Session Building Design Criteria

Project name:_____

Programming Team shall complete this document (as much as possible) for use as a basis of discussion during the initial meeting. The completed form shall be submitted one week before the Early Planning Session.

Space Name or Description	Area Sqft	Peak Number of Occupants	Average Number of Occupants	Occupancy Hours per Weekday/ Weekend	Occupancy Weeks per Year	Target Ambient Illumination, Footcandles	Target Task Illumination, Footcandles	Mechanical Cooling Desired?	Automatic Daylighting Controls Desired?	Natural Ventilation Desired?

Early Planning Session Building Interior Load Design Criteria

Project name:_____

Programming Team shall complete this document (as much as possible) for use as a basis of discussion during the initial meeting. The completed form shall be submitted one week before the Early Planning Session.

Space Name or Description	Area Sqft	Ventilation Occupancy Sqft / Person Or CFM / person	Ventilation Rate CFM / Person	Office Equipment Watts / Sqft	Process Equipment Watts / Sqft	Lighting Power Density Watts/ Sqft	Infiltration Air Changes Per Hour (ACH)	Desired Cooling Temperature Occ/Unocc	Desired Heating Temperature Occ/Unocc

Class 1 Building
ECM Checklist

Instructions

The ECM Checklist makes it easier to track ECMs though the analysis process. The energy analyst submits the ECM Checklist two weeks before the scoping meeting. ECMs may be added to the checklist.

An example of an ECM listing follows:

Status Code	ID	Potential ECMs
B A N/A	E111	Add ceiling/roof insulation

Status codes indicate the phase of analysis or recommendation for each ECM. Check the boxes under the appropriate status code as the analysis progresses. Codes include:

B Baseline. The ECM is included in the building baseline design.

A Analyzed. The ECM is selected for analysis at the scoping meeting.

N/A Not applicable.

The ID code includes a category letter and a three-digit number. "R" listed at end of three-digit number indicates ECM is primarily applicable to renovation projects.

Put an "X" under the appropriate code for each ECM.

B = Baseline
A = Analyzed
N/A = Not Applicable

Project Name:					
E100 Envelope					
Status Code					
B	**A**	**N/A**	**ECM#**	**Potential ECMs**	**ECM Description**
			E110	**Reduce Heat Losses**	
			E111	Ceiling/roof insulation	
			E112	Wall insulation	
			E113	Floor/slab insulation	
			E114	Fan penthouse insulation	
			E115	Windows:	
			A	Thermal break in metal window frames	
			B	Wood, vinyl, or fiberglass window frames	
			C	Argon gas-filled glazing panels	
			D	High-performance low-e (e = 0.05) coating	
			E	Tinted glazing or reflective coatings	
			E120	**Reduce Heat Gain**	
			E121	Architectural shading and overhangs	
			E122	Window sizing and orientation	
			E123	Cool roof, green roof	
			E130	**Reduce Infiltration**	
			E131	Seal openings at penetrations of building envelope	
			E132	Air-lock vestibule or revolving doors	
			E190	**Other Envelope Measures**	

L100 Lighting					
Status Code					
B	A	N/A	ECM#	Potential ECMs	
			L110	**Efficient Lighting Systems**	
			L111	Optimize fixture layout, spacing & orientation	
			L112 R	Delamp overlit areas	
			L113	Efficient Fixture Selection, (fixture CU)	
			L114	Optimize Ballast Selection	
			L115	Efficient Lamp Selection	
			A	Compact fluorescents in place of incandescents	
			B	Incandescent IR Halogen vs standard PAR lamps	
			C	Ceramic Metal Halide vs standard PAR lamps	
			D	High-output linear fluorescents in place of HID fixtures	
			E	Pulse Start Metal Halides vs standard Metal Halides	
			F	LED technology, exit signs and other applications	
			L116	Exterior LPD at or below ASHRAE-90.1-2004	
			L120	**Lighting Controls**	
			L121	Occupancy sensors (exceeding code requirements)	
			L122	Selective switching, (control of multiple lamps within fixture)	
			L123	Egress lighting scheduled off during unoccupied periods	
			L124	Exterior lighting controls (exterior lights extinguished after occupied period (i.e. 9PM - 5AM)	
			L130	**Optimize Daylighting**	
			L131	Continuous dimming controls	
			L132	On/off daylighting control	
			L133	Separate circuits for zoning flexibility in daylit zones	

			L190	**Other Lighting Measures**	
W100 Domestic Hot Water (DHW)					
Status Code					
B	**A**	**N/A**	**ECM#**	**Potential ECMs**	
			W110	**Reduce DHW Distribution Losses**	
			W111	Install return-line aquastat (not required by code)	
			W120	**Efficient DHW Generation**	
			W121	90%-plus condensing hot water heaters	
			W122	Summer water heater or small boiler	
			W123	Preheat DHW with reclaimed waste heat (i.e. chiller condenser, direct-contact boiler stack economizer, 24/7 computer server room AC unit)	
			W124	Solar-assisted water heater	
			W125	Heat pump water heater	
			W130	**Process Related DHW Use**	
			W131	Institutional laundry water reuse system	
			W132	Horizontal axis washing machines	
			W140	**Heat Recovery**	
			W141	Waste water heat recovery, i.e.GFX system	
			W190	**Other DHW Measures**	
F100 HVAC - Unitary Equipment					
Status Code					
B	**A**	**N/A**	**ECM#**	**Potential ECMs**	

			F110	**Unitary Equipment**	
			F111	Condensing furnaces	
			F112	Cooling-unit efficiency	
			F113	Air-to air heat pump efficiency	
			F114	Water-source heat pump	
			F115	Radiant heating	
			F116	Other HVAC general/unitary measures	
A100 HVAC - Air Distribution					
Status Code					
B	**A**	**N/A**	**ECM#**	**Potential ECMs**	
			A110	**Reduce Airflow Rates**	
			A111	Variable airflow with VFD	
			A112	Cold air distribution	
			A120	**Reduce Fan Pressure Resistance**	
			A121	Minimize fan unit static pressure-losses: air filters, cooling and heating coils, enlarge cabinet size.	
			A122	Minimize duct static pressure-losses: enlarging ducting & optimize fittings	
			A130	**Reduce Ventilation Loads**	
			A131	Separate make-up air units for high-ventilation areas	
			A132	Heat recovery (air-to- air, run-around loop, heat wheel)	
			A140	**Reduce Air Leaks and Heat Losses**	
			A141	Install low-leakage dampers	
			A150	**Fan Systems and Delivery Systems**	
			A151	Specify efficient fans and select efficient size fan wheel	

			A152	Separate HVAC units for perimeter and core zones	
			A153 R	Change constant air-volume reheat to VAV reheat	
			A154 R	Change multi-zone or dual duct to VAV	
			A155	Parallel fan power VAV boxes to reduce perimeter zone reheat	
			A190	**Other HVAC - Air Distribution ECMs**	
D100 HVAC - Steam and Water Distribution					
Status Code					
B	**A**	**N/A**	**ECM#**	**Potential ECMs**	
			D110	**Reduce Energy Losses**	
			D111	Steam trap monitoring and repair program	
			D112	Insulate piping and valve bodies	
			D120	**Reduce System Flow and Pressure Resistance**	
			D121	Variable primary pumping with VFD	
			D122	Increase cooling coil temperature difference	
			D123	Increase Heating coil temperature difference	
			D124	Reduce pump head pressure	
			D190	**Other Steam or Water Distribution System**	
T100 HVAC Controls					
Status Code					
B	**A**	**N/A**	**ECM#**	**Potential ECMs**	
			T110	**Air-Side Control Strategy**	
			T111	Airflow and temperature setback in unoccupied areas through occupancy sensors or schedules	
			T112	Variable ventilation based on CO_2 control	

			T113	Night-flush cooling cycle	
			T120	**Water Side Control Strategy**	
			T121	Time clock and OSA lockout control of heating and cooling pumps	
			T130	**Misc. Controls**	
			T131	Isolate large sheddable loads and install automated controls to limit electrical demand	
			T190	**Other HVAC Controls**	
C100 Cooling Plant					
Status Code					
B	**A**	**N/A**	**ECM#**	**Potential ECMs**	
			C110	**More Efficient Cooling Equipment**	
			C111	Select efficient kW/ton chillers: 1) centrifugal, 2) screw, 3) reciprocating	
			C112	Select chiller size(s) for efficient sequencing	
			C113	Optimization of chiller sequencing controls	
			C114	Central Heat Pump	
			C120	**Alternate Cooling**	
			C121	Water-side free cooling: cooling tower and P&F heat exchanger	
			C122	Heat recovery chiller	
			C130	**Increase Condenser Efficiency**	
			C131	Specify more efficient cooling tower to reduce LWT	
			C132	Water-cooled versus air cooled	

			C133	Evaporative-cooled versus air cooled	
			C134	Condenser water reset controls	
			C190	**Other Cooling Plant Measures**	
H100 Heating Plant					
Status Code					
B	**A**	**N/A**	**ECM#**	**Potential ECMs**	
			H110	**Improve Boiler Efficiency**	
			H111	Specify efficient boilers	
			H112	Select boiler size(s) for efficient sequencing	
			H113	Optimization of boiler sequencing controls	
			H114	Modulating burner control, specify high turn-down ratio (>5:1)	
			H115	Improve draft controls: turbulators, barometric dampers	
			H116 R	Improve combustion by reducing excess air with O2 trim controls	
			H117	Boiler flue heat recovery to preheat combustion air or feed water	
			H118R	Recover heat from boiler blow-down	
			H120	**Alternate Heating Systems**	
			H121	Condensing hydronic boiler, design at lower supply/return water temp. i.e 140 F supply and 110 F return water temp.	
			H122	Water-source or ground-source heat pumps	
			H190	**Other Heating Plant Measures**	
K100 Hood and Make-up Systems for Kitchens, Labs, Shops, Process Equipment, etc.					
Status Code					
B	**A**	**N/A**	**ECM#**	**Potential ECMs**	
			K111	Minimize exhaust hood airflows, i.e. low flow hoods	

			K112	Minimize exhaust hood run time	
			K113	Separate make-up air unit set at lower temperature	
			K190	**Other Hood and Make-up Systems**	
S100 Swimming Pools					
Status Code					
B	**A**	**N/A**	**ECM#**	**Potential ECMs**	
			S111	Elevate air temperature to reduce pool evaporation rates	
			S112	Air-to-air heat recovery of ventilation air	
			S113	De-humidification heat recovery	
			S114	Variable ventilation based on advanced climate controls sensing humidity, indoor/outdoor/dew-point temperatures	
			S115	Lower ventilation rates during unoccupied hours	
			S116	Low pressure-drop pool water filters/strainers	
			S117	Two-speed circulation/filtration pumping (occupied/unoccupied modes)	
			S190	**Other Swimming Pool Measures**	
P100 Power/Electrical Distribution					
Status Code					
B	**A**	**NA**	**ECM#**	**Potential ECMs**	
			P110	**Premium-efficiency motors**	
			P111	In excess of code (Consortium for Energy Efficiency) i.e.fans, pumps, etc.	
			P120	**Vertical Transport**	
			P121	Hydraulic elevator pump/motor efficiency opportunities	

			P122	Traction Elevator	
			P130	**Server and Telecom Rooms**	
			P131	Multiple small compressors for efficiency and redundancy	
			P132	Air side economizer cooling	
			P133	Water side economizer cooling	
			P134	Wider deadband for humidity and temperature control (based on actual design requirements)	
			P140	**Refrigeration Systems**	
			P141	Select units with high efficiency compressors	
			P142	Increase condensing efficiency and optimize capacity control	
			P143	Install floating-head pressure controls	
			P150	**Appliances**	
			P151	Residential Energy Star- refrigerator, dishwashers, washing machines, etc	
			P152	Commercial Equipment- Pcs, LCD Monitors, copiers, vending misers	
			P190	**Other Power Measures**	

Scoping Process Information Checklist

Project name:_____

Submit this checklist and all listed items to scoping meeting attendees two weeks before the scoping meeting.

A. Information provided by the design team:

- ☐ Schematic plans, including floor plans, sections, and elevations of the building, sufficient for modeling input
- ☐ Description of building envelope components
- ☐ Description of the proposed building mechanical and electrical systems, including preliminary size selection and efficiencies of all major equipment
- ☐ Lighting strategies and connected lighting load
- ☐ Information adequate to verify compliance with Chapter 13 of the *State of Oregon Structural Specialty Code*
- ☐ Connected equipment load and specialized equipment requirements
- ☐ Description of operating criteria and schedules

B. Information provided by the energy analyst and design team:

- ☐ Results of preliminary modeling if any.
- ☐ Descriptions of ECMs that will be included in the Proposed Baseline building
- ☐ Descriptions of potential ECMs suggested for inclusion in the building
- ☐ Completed ECM checklist

Checklist for Appendices to the Preliminary Energy Analysis Report

Project name:_____

The *Preliminary Energy Analysis Report* includes material adequate to review all ECMs for individual cost-effectiveness.

- ☐ A copy of the *ECM Checklist* with notations for baseline and suggested ECMs.
- ☐ Narrative describing the Proposed Baseline Building and the Code Building, the analyzed ECMs, and the recommended ECM package.
- ☐ Tables 2-2, 3-1, 4-1, and 4-2,
- ☐ Preliminary ECM calculations, estimates, and justification for eliminated ECMs, Including *Preliminary ECM Analysis* worksheets for all eliminated ECMs.
- ☐ Cost estimates for all ECMs analyzed
- ☐ *Cost-Effectiveness Analysis* worksheets
  - o Individual ECMs analyzed
  - o ECM packages
- ☐ Electronic version of the building model inputs.
- ☐ A list of modeling inputs and values that have been changed for each building model.
- ☐ Summary output report(s) for the Code Building, the Proposed Baseline Building, all ECM runs, and the SEED Building. including:
  - o A breakdown of energy usage by at least the following components: lights, internal equipment loads, service water heating equipment, space heating equipment, space cooling and heat rejection equipment, fans, and other HVAC equipment (such as pumps).
  - o The amount of time any loads are not met by the HVAC system for both the proposed design and baseline building design
  - o An explanation of any warning messages noted in the simulation program output. Electronic copies of complete model outputs are required.
- ☐ Current energy rate schedules. Where energy is received from a state-operated central plant, cite the rate source used.
- ☐ Manual savings calculations if any.
- ☐ Building-model HVAC zone map
  .

- ☐ Miscellaneous information: equipment catalog sheets, test reports, etc.
- ☐ Modeled energy use of SEED building showing electrical and fossil fuel use on a monthly basis.
- ☐ Building metering plan
- ☐ Performance Verification Plan

Blank Cost-Effective Analysis Spreadsheet forms are available at;
http://www.energy.state.or.us/SEED/Toolbox.htm

Cost-Effective Analysis Spreadsheet

PRELIMINARY ECM COST EFFECTIVENESS ANALYSIS — *State Energy Efficient Design*

Building: | By: | Agency:

ECM Name: | ECM Life: YRS

ECM DESCRIPTION (Compare Baseline Conditions with ECM Changes):

BASELINE CONDITIONS	ECM CHANGES

ECM MAINTENANCE AND OPERATING COST IMPACT

ITEMS	ANNUAL SAVINGS	ANNUAL INCREASE

If page 2 is used, enter Replacement and Periodic Maintenance from page 2: RM1 | RM2

TOTAL = (SAVINGS) - (INCREASE) = $0 MAINT TOTALS: TOTALS $0 $0

PRESENT VALUE COST

CAPITAL COST OF ITEMS:	BASELINE DEDUCTS	ECM COSTS

TOTAL ECM COSTS AND BASELINE DEDUCTS $0 $0

DESIGN COST INCREASE (if any) $ - (ECM COST) - (DEDUCTS) + (DESIGN) = $0 COST

NON ENERGY O&M COST INCREASE — MAINT. $ - X UPW* #N/A = PV O&M COST #N/A

*USE UPW FOR YEAR EQUAL TO ECM LIFE — Total PV cost #N/A PVC

PRESENT VALUE SAVINGS

ANNUAL ENERGY SAVINGS

Fuel Type	Units	MMBtu	Cost $/unit	Annual $	FEF*	PV Savings
Electricity kWh	0	0		$0	#VALUE!	#VALUE!
Natural Gas therms	0	0		$0	#VALUE!	#VALUE!
#2 Oil or Diese gal	0	0		$0	#VALUE!	#VALUE!
				$0	#VALUE!	#VALUE!
Total Energy Savings		0		$0		#VALUE!

*THESE ARE VALUES FOR FEF OR UPW FOR YEAR EQUAL TO ECM LIFE

Total O&M Savings: MAINT. $ - X UPW* #N/A = PV ANNUAL SAVINGS #N/A

Total Annual Savings (Energy + Maint.) $ - Total PV Savings #VALUE! PVS

COST EFFECTIVENESS SUMMARY

Net Present Value Savings PVS #VALUE! -PVC #N/A = #VALUE! NPV

Benefit to Cost Ratio PVS #VALUE! / PVC #N/A = #VALUE! BCR

RESULT OF PRELIMINARY ECM ANALYSIS

[#] Cost Effective - Include in initial ECM Package

[ ] Potential - Add to ECM Package

[#] Non Cost-Effective BCR < 1.0, or other reason

Cost-Effective Analysis Spreadsheet

PRELIMINARY ECM COST EFFECTIVENESS ANALYSIS (Page 2) *State Energy Efficient Design*

Building: By: Agency:

ECM Name: ECM Life: 25 YRS

Use this form only when ECM life is significantly different from baseline system life and there are significant differences between the ECM and Baseline in either periodic maintenance or replacement costs. Baseline Life: 15 YRS

AVOIDED BASELINE REPLACEMENTS

Include only major replacements at end of baseline system life

	ITEM COST

	YRS DIFF	/	BASE LIFE	X	COST	X	SPW BASE	=	REP-PV1
Present Value of Replacements (net of salvage value)	10	/	15	X	$0	X	0.56	=	$0

AVOIDED BASELINE PERIODIC MAINTENANCE

BASELINE PERIODIC MAINTENANCE ITEMS	OCCURS IN YEAR	CURRENT $ COST		SPW AT YEAR		PV COST CURRENT $
			X	0.00	=	0
			X	0.00	=	0
			X	0.00	=	0

SPW is the Single Present Worth factor from Discount Factor Tables for year periodic maintenance occurs in.

Present value of Baseline periodic maintenance: PM-PV1 $0

ADDED ECM PERIODIC MAINTENANCE

ECM PERIODIC MAINTENANCE ITEMS	OCCURS IN YEAR	CURRENT $ COST		SPW AT YEAR		PV COST CURRENT $
			X	0.00	=	0
			X	0.00	=	0
			X	0.00	=	0

SPW is the Single Present Worth factor from Discount Factor Tables for year periodic maintenance occurs in.

Present value of ECM periodic maintenance: PM-PV2 $0

REPLACEMENT AND PERIODIC MAINTENANCE IMPACT (Enter on page 1 under O&M Cost Impact)

	REP-PV1	+	PM-PV1	=	SAVED PV$	/	ECM UPW	=	Equivalent Annual Savings	
Annual Savings	$0	+	$0	=	$0	/	15.6	=	$0	RM1

	REP-PV2	+	PM-PV2	=	ADDED PV$	/	ECM UPW	=	Equivalent Annual Increase	
Annual Increase	$0	+	$0	=	$0	/	15.6	=	$0	RM2

ECM UPW is the Uniform Present Worth factor from Discount Factor Tables for ECM life.

Cost-Effective Analysis Spreadsheet

PRELIMINARY ECM COST EFFECTIVENESS ANALYSIS (Page 3) *State Energy Efficient Design*

Building: By: Package

SELECT ECM PACKAGE COMBINATION (forward data from individual ECM analyses)

ECM Number and Name	O&M SAVINGS	ECM LIFE		ECM COST		LIFE FACTOR
			×		=	0
			×		=	0
			×		=	0
			×		=	0
			×		=	0
			×		=	0
			×		=	0
			×		=	0
			×		=	0
			×		=	0
			×		=	0
			×		=	0
			×		=	0
PACKAGE TOTAL:	$ -			$ -		0

PACKAGE AVERAGE ECM LIFE (Cost Weighted)

	LIFE FACTOR	/	ECM COST	=	PACKAGE LIFE
COST-WEIGHTED PACKAGE LIFE:	0	/	$0	=	1

PRESENT VALUE OF COST

			UPW*		
NON-ENERGY O&M COST INCREASE	$ -	×	1.0	=	PRESENT VALUE $ -
* UPW AT COST-WEIGHTED PACKAGE LIFE					TOTAL PV COST $ - PVC

PRESENT VALUE OF SAVINGS (interactive energy savings)

ANNUAL ENERGY SAVINGS

Fuel Type		Units	MMBtu	Cost $/unit	Annual $	FEF*	PV Savings
Electricity	kWh		0		$ -	1.0	$ -
Natural Gas	therms		0		$ -	1.0	$ -
#2 Oil (Diesel)	gal		0		$ -	1.0	$ -
Propane Gas	gal		0		$ -	1.0	$ -
TOTAL ENERGY SAVINGS			0		$ -		$ -

	MAINT.	UPW*	
NON-ENERGY OPERATING AND MAINTENANCE SAVINGS	$ -	1.0	$ -
Total Annual Savings (Energy + Maint.)	$ -		$ - PVS

* FEF AND UPW AT COST-WEIGHTED PACKAGE LIFE

COST EFFECTIVENESS SUMMARY

Net Present Value Savings	PVS	$ -	- PVC	$ -	= $ -	NPV
Benefit to Cost Ratio	PVS	$ -	/ PVC	$ -	= N/A	BCR

RESULT OF PRELIMINARY ECM ANALYSIS

☐ Recommended Package
Highest NPV with BCR > 1.0

☐ Initial Package

☐ Non Cost-Effective Package
NPV reduced vs. previous pack

Final Energy Analysis Report
Review Checklist

Project:_____ Energy Analyst_____

Report Date:_____ Reviewed By:_____ Review Date:_____

Section 1 -- Executive Summary		Accept	Provide	Revise
1a	Facility description and analysis process			
1b	Table 1-1 -- ECM Package Analysis Summary			
1c	Brief description of recommended ECMs and ECM package			
1d	Description of other results			
1e	List of all ECMs considered			
Comments				
Section 2 – Proposed Baseline Building Description		Accept	Provide	Revise
2a	Building description			
2b	Capacity and efficiency for all systems			
2c	Energy analysis description			
2d	Table 2-1—Baseline ECMs			
2e	Table 2-2 – Proposed Baseline Building Energy Use Summary			
2f	Discussion of modeling results			
2g	List of ECMs in Proposed Baseline Building			
Comments				
Section 3 – Preliminary ECM Analysis		Accept	Provide	Revise
3a	Table 3-1 -- Preliminary ECM Savings Analysis			
3b	Description of cost-effective ECMs			
3c	Description of analyzed ECMs that are not cost effective			
3d	Discuss recommended ECM package			
3e	Table 4-2 -- ECM Package Savings Compared to Code Building			
Comments				

Final Energy Analysis Report
Review Checklist

Project:_____ Page 2

Section 4 – Code Building Description		Accept	Provide	Revise
4a	Describe differences between Proposed Baseline Building and Code Building			
4b	List ECMs removed from Proposed Baseline Building to form Code Building			
4c	Table 4-1 – Code Building Energy Use Summary			
Comments				

Section 5—Final ECM Package Analysis		Accept	Provide	Revise
5a	Discussion of recommended ECM package, agency comments, and reasons for eliminating cost-effective ECMs			
5b	Update changes to previous sections based on review meeting..			
5c	Description of ECM package, implementation, feasibility, related baseline condition, ECM components, etc.			
5d	Table 4-2 -- Recommended Package (SEED Bldg.)ECM Interactive Savings			
5e	Table 5-1 – SEED Building Energy Use Summary			
5f	Discussion of other results			
Comments Add PO spreadsheet in electronic and print form				

Checklist for Appendices to the Energy Analysis Report

Project name:_____

Complete this checklist to ensure all required appendices are included with the *Final Energy Analysis Report*. Attach a copy of the checklist to the final report.

☐ Update all items listed in the Preliminary Energy Analysis Checklist

☐ Meeting minutes:
- Scoping meeting
- ECM review meeting