

Chicago Center for Green Technology (CCGT)

445 N. Sacramento Ave., Chicago, Illinois

ECO-#	Energy Conservation Options - ECO	Million Btu/Hr/Year				Million Btu/Hr/Year				Million Btu/Hr/Year		KWH/yr	% Energy		Electric Cost \$ / Year			Nat-Gas \$/Year		% Costs			
		Lights	Equip	Heatng	Heatng	Coolng	Ht-Rej	Pumps	Fans	DHW	DHW		Total	Total	% of	%	Fixed/Month = \$600			\$	\$	% of	%
		Electric	Electric	Electric	Nat-Gas	Electric	Electric	Electric	Electric	Electric	Nat-Gas		Energy	Energy	Base	Svngs	Energy	Demand	Total	Nat-Gas	Total	Base	Svngs
ECO-EQ	Base - eQUEST Wizard Defaults	308.6	156.5		449.5	110.0		1.5	41.5					68	32	23,625	11,159	35,384	5,031	40,415	89	11	
ECO-0	Base ASHRAE Std 90-89. OA-Econ	291.9	172.6		949.4	124.0		1.5	48.8				100	0	23,345	12,823	36,768	8,625	45,393	100	0		
ECO-1	ECO-0 + Windw OvrHngs South	291.9	172.6		994.8	111.6		1.5	49.4				102	-2	22,877	12,500	35,977	8,949	44,926	99	1		
ECO-2	ECO-1 + Std 90-04 Glass & Lights	248.9	172.6		941.7	97.8		1.5	44.7				95	5	20,696	11,120	32,416	8,571	40,987	90	10		
ECO-3	ECO-2 + Day-Lighting	139.7	172.6		992.9	83.5		1.5	44.8				90	10	16,270	9,216	26,086	8,937	35,023	77	23		
ECO-4	ECO-3 + PhotoVoltaics (S-Wall/Roof)	75.0	89.0		992.9	29.9		1.2	23.0				77	23	7,929	7,979	16,508	8,937	25,445	56	44		
ECO-4a	ECO-3 + PhotoVoltaics (Fixed-Shade)	137.8	168.5		1,007.8	78.7		1.5	44.2				91	9	15,840	9,005	25,445	9,044	34,489	76	24		
ECO-5	ECO-4 + GSHP (200' deep 8x4 config)	92.3	110.6		127.6	29.9		9.9	99.9				30	70	25,185	12,863	38,648	1,656	40,304	89	11		
ECO-5a	ECO-4 + GSHP (100' deep 2x2 config)	88.5	105.8		77.5	40.4		8.4	93.6				27	73	14,931	13,683	29,214	1,657	30,871	68	32		

GSHP KWH goes down but Electric Cost goes up ??

How did the PV analysis determine these numbers ?? Distributed to End-Uses?? Does it adjust Demand Costs ??
 Is the solar light energy from the TMY weather file ?? Is it adjusted for Cloud-Cover & Atmospheric conditions ??
 ECO-4 KWH from PV attached to S-Wall & Roof= ECO-3 less ECO-4 = 425,669 360,019 65,650
 ECO-4a KWH from PV attached to Fixed-Shades= ECO-3 less ECO-4a = 425,669 426,637 -967

GSHP KWH Energy Decrease =	-217,114	% Decrease =	-60
GSHP Electric Cost Increase =	22,140	% Increase =	134
GSHP Nat-Gas Cost Decrease =	-7,281	% Decrease =	-81
GSHP Total Net Cost Increase =	14,859	% Increase =	58

200' deep 8x4 config uses more energy than 100' deep 2x2 config ??

ASHRAE Std 90 Base = 1989 Prop = 2004

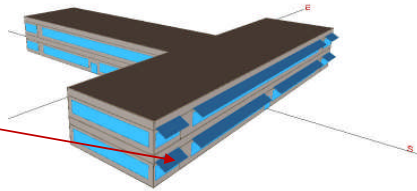
Building Model	Value
Fir-Fir Hgt (ft)	13.5
Fir-Ceilg Hgt (ft)	10.0
Window Hgt (ft)	6.0
Windw Wdth (ft)	
Window Percent	50.0

Properties	1989		2004	
	Base	Prop	Base	Prop
Wall - U	0.123	0.123		
Roof - U	0.064	0.064		
Glass - U	0.67	0.45		
Glass - SC	0.40	0.30		
Glass-VLT used	0.40	0.30		

Internal Heat-Gains

Internal HGs	Perimeter		Inter/Core	
	Base	Prop	Base	Prop
Lights W/sf	1.3	1.1	0.8	0.7
Occup sf/P	144	144	200	200
Equip W/sf	0.7	0.7	0.3	0.3

PV-Modules are attached to OverHangs. Not possible with eQUEST. Some are on Roof

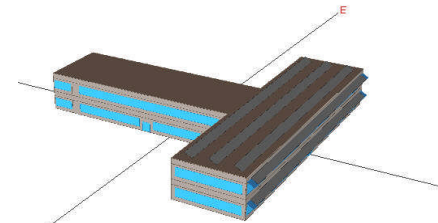


"PV-Mod L1-B-W Swall" = PV-MODULE
 TYPE = MC-SI
 HEIGHT = 5
 WIDTH = 15
 VOLTS-OPEN-CKT = 110
 VOLTS/T-OPEN-CKT = -0.004
 AMPS-SHORT-CKT = 10
 AMPS/T-SHORT-CKT = -0.0015
 VOLTS-MAX-PWR = 75
 AMPS-MAX-PWR = 5

"PV-GEN L1-B-Swall PV-Shade-1" = ELEC-GENERATOR
 TYPE = PV-ARRAY CAPACITY = 1
 MIN-TRACK-VOLTS = 0
 MAX-TRACK-VOLTS = 110
 PV-MODULE = "L1-B-Swall-PV 165'W x 5'H"
 MOUNT-TYPE = BUILDING-SHADE
 BUILDING-SHADE = "Level-1 Bldg-B S-Wall PV Shad"
 MOUNT-AZIMUTH = MOUNT-TILT = 30

"PV-GEN L1-B-W Surface" = ELEC-GENERATOR
 TYPE = PV-ARRAY CAPACITY = 1
 MIN-TRACK-VOLTS = 0 MAX-TRACK-VOLTS = 110
 PV-MODULE = "PV L1-B-W Swall"
 MOUNT-TYPE = BUILDING-SURFACE
 EXTERIOR-WALL = "L1-B-W South Wall (G.W6.E6)"
 MOUNT-TILT = 30

MOUNT-TYPE = BUILDING-SURFACE



MOUNT-TYPE = BUILDING-SHADE

Required for each PV wall??

Need documentation on the meaning of all the terms used. Need examples, defaults. These are all guesses

Given a Building SURFACE or SHADE, how does the program determine the number modules in series & parallel and the number of inverters ??