FLORIDA SOLAR

Contract Report

ENERGY CENTER®

Improved Duct Systems Task Report with StageGate 2 Analysis

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Abstract

The Building America Industrialized Housing Partnership's work with two industry partners, Cavalier Homes and Southern Energy Homes, in constructing and evaluating prototype interior duct systems is summarized. Issues of energy performance, comfort, DAPIA approval, manufacturability and cost is addressed. A stage gate 2 analysis addresses the current status of project showing that there are still refinements needed to the process of incorporating all of the ducts within the air and thermal boundaries of the envelope.

Executive Summary

In 2006 we began working with our manufactured housing partners, Cavalier Homes and Southern Energy Homes, on a duct system design that brings all duct work within the thermal envelope. A different prototype design was produced by each of the partners. Cavalier Homes featured high side discharge supply register that uses the interior wall cavities as a conduit that connects to the floor trunks. Southern Energy Homes took a radical departure from the standard manufacturer duct system approach. A single soffit located within the conditioned space at the marriage line provides the space to aesthetically place the duct system. Both manufacturers are working on the elimination of the crossover duct as a field installed process.

We also provided training and assistance to design the supply and return duct systems to manual D and size the heating and cooling systems to ACCA Manual J8. This is to help solve some comfort related complaints they get despite having tight ducts. This effort will also produce ductwork that has better airflow and lower noise.

The initial results of the simulation work show up to a 10% savings over conventional attic duct work construction techniques and nearly 7% savings with a conventional floor system.

Field monitoring is in the beginning stage of the Southern Energy prototype and is expected to be concluded in November 2008. Cavalier Homes has prototyped the HSD unit, and results are promising. A full scale monitoring effort is needed to assess the entire system design. That effort has not yet been scheduled.

Introduction

The overall objective of the Building America Industrialized Housing Partnership (<u>www.baihp.org</u>), a USDOE project, is to conduct cost shared research to accelerate the nationwide development of cost effective, production ready energy technologies that can be widely implemented by factory and site builders to achieve 30% to 50% savings in whole house energy use through a combination of energy efficiency and renewable energy measures. BAIHP will focus on factory builders (HUD code, Modular and Panelized), the housing segment not emphasized by the other BA teams. BAIHP will employ BA systems engineering principles to enhance the energy efficiency, comfort, durability, indoor air quality, insurability, affordability, marketability and construction productivity of U.S. housing.

It has been known for a long time that leaky ducts in residential attics are a major cause of excessive energy use in hot humid climates. Leaky ducts in manufactured housing can contribute to mold growth, soft drywall and comfort problems in addition to high cooling and heating energy useⁱ (Moyer et al. 2001). For the last several years we have worked with all our factory builder partners and changed the traditional construction methods from taped ducts to ducts with mastic. This has resulted in excellent air tightness of ducts constructed in the factoryⁱⁱ (Chasar et al., 2004). While we have made significant strides in improving the ductwork construction in the factory there are still significant issues with the site connection of the ductwork between the two halves (crossover duct), belly penetrations and the connections with the external unit with a unitary system. These issues continue to plague some manufacturers.

In 2006 we began working with our manufactured housing partners, Cavalier Homes and Southern Energy Homes, on a duct system design that brings all duct work within the thermal envelope. A different prototype design was produced by each of the partners. Cavalier Homes featured high side discharge supply register that uses the interior wall cavities as a conduit that connects to the floor trunks. Southern Energy Homes took a radical departure from the standard manufacturer duct system approach. A single soffit located within the conditioned space at the marriage line provides the space to aesthetically place the duct system.

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Methodology

The process of design, simulation and prototype construction will provide the needed feedback as to the viability of incorporating all of the duct work within the conditioned space in manufactured housing, especially those built to Title 24 of the HUD code PART 3280--Manufactured Home Construction and Safety Standards. Energy simulation and Building America benchmarking was done using the Florida Solar Energy Center's EnergyGauge[®] USA software. Building loads and duct design completed using ACCA Manual J8 in Elite's RHVAC and Duct design software packages. Mock-ups of the various designs was completed to assess feasibility, performance and appearance. Finally, a prototype full scale

home was built incorporating the new design. The home moved to a test site where performance is monitored.

Energy Analysis Using EnergyGauge® USA

The proposed duct system prototypes and the base case of the manufactured home are analyzed using the FSEC developed EnergyGauge[®] USA (Version 2.7.02) software program. This program predicts building energy consumption using the DOE2 analysis engine with a user friendly front end that develops DOE2 input files and models that are more appropriate for residential building systemsⁱⁱⁱ (Parker, et. al, 1999).

An analytical model was developed for each of the manufactured home specifications. These models were essentially the same with differences only in the duct system location and the duct leakage values. A worst case orientation was chosen for the simulations. The base case and prototypes are similar in geometry, with Baton Rouge, LA chosen for the site location. The EnergyGauge[®] USA simulations for each specification and the Input Summary Sheets are detailed in the Appendix.

The models were selected by the company representative as the one that they wanted to try the prototype duct system design on. These represent a typical model that is built to the HUD Code standard (Title 24—Housing And Urban Development, Part 3280--Manufactured Home Construction And Safety Standards). The homes built by Cavalier and Southern Energy are typically retailed in the Southeastern section of the United States.

Table 1 Summary of Const	Table 1 Summary of Construction of the Existing and Prototype Specifications									
Characteristic	Base Home	Base+ Home	Prototypes							
Floor Insulation	R-11									
	(Cavalier: 2011sqft, Southern: 1732sqft									
Wall Insulation	R-11 (grade II)	R-11 (grade I)								
Ceiling Insulation	R-19 (grade II – R-6 at ducts)	R-19 (grade I)								
Roof	Dark shingle on 3:12 pitch									
Windows	Clear Double Pane, Metal Frame									
Heating System	Electric Resistance Furnace									
Cooling System	Central Air Conditioning: SEER13									
Water Heater	Electric Water Heater: 40 gallon									
Duct system location	Air handler: Interior		Cav: HSD ¹ SEH: Soffit							
	Ducts: Cav: Floor SEH: Attic									
Duct Leakage	$Qn = 0.06^2$	Qn = 0.03	Qn = 0.01							
House infiltration	0.25 ach^3									
Ventilation	0.10 ach^3									
	(Cavalier: 27 cfm Southern: 24 cfm)									

¹Cavalier's HSD (High Side Discharge) uses existing in floor system and discharges the supply air at the ceiling level. It also includes a cross over duct connection within the floor.

² McIlvaine, Janet, David Beal, Neil Moyer, Dave Chasar, Subrato Chandra. Achieving Airtight Ducts in Manufactured Housing. Report No. FSEC-CR-1323-03

³ From TITLE 24--HOUSING AND URBAN DEVELOPMENT, PART 3280--MANUFACTURED HOME CONSTRUCTION AND SAFETY STANDARDS, Sec. <u>3280.103 b1-2</u>

A comparison of the energy costs alone, these prototypes do show an energy savings, 6.9% for the Cavalier design and 10.4% for the Southern Energy design (Table 2). The Base+ case simulations assume that the duct system crossover ducts are leak-free and that the vapor barrier around the duct is properly attached to prevent condensation on the inner liner and subsequent insulation degradation. Additionally, each base case makes a few other assumptions. In the Southern Energy design, it is assumed that when the duct system is located in the attic that the insulation is at a uniform level. In fact, the real world application will have significantly less insulation where the duct system is run. Cavalier's design is that of a floor system where the airflow is not blocked by furniture, carpets or other objects that may hinder the proper operation of the system. These assumptions are roughly accounted for in the Base case, where a real world house might perform.

Table 2 Summary of	Table 2 Summary of Comparisons of Simulated Savings												
End-Use		Cav	alier			Souther	n Energy						
Liiu-Use	Base	Base+	HSD	Savings ¹	Base	Base+	Soffit	Savings ¹					
Annual Energy Use (kWh)	18159	17154	16909	6.9%	23268	22630	20857	10.4%					
Annual Energy Costs (\$)	1453	1372	1352	7.0%	1861	1810	1667	10.4%					
Annual CO ² output (tons)	10.8	10.2	10.03	6.9%	13.8	13.4	12.4	10.1%					
AC Energy (kWh)	3929	3572	3499	10.9%	3687	3575	3189	13.5%					
Heat Energy (kWh)	4421	3774	3602	18.5%	9325	8799	7412	20.5%					

¹ Savings calculated on reduction from Base case.

Duct design

The Title 24 HUD Code Sec. 3280.511 Comfort cooling certificate and information, provides three alternatives for duct system design when cooling is considered:

- *Alternate I.* If a central air conditioning system is provided by the home manufacturer, the heat gain calculation necessary to properly size the air conditioning equipment shall be in accordance with procedures outlined in chapter 22 of the 1989 ASHRAE Handbook of Fundamentals, with an assumed location and orientation.
- *Alternate 2.* Comfort Cooling Certificate. This air distribution system of this home is suitable for the installation of central air conditioning. The supply air distribution system installed in this home is sized for Manufactured Home Central Air Conditioning System of up to _______B.T.U./Hr. rated capacity which are certified in accordance with the appropriate Air Conditioning and Refrigeration Institute Standards. When the air circulators of such air conditioners are rated at 0.3 inch water column static pressure or greater for the cooling air delivered to the manufactured home supply air duct system. Information necessary to calculate cooling loads at various locations and orientations is provided in the special comfort cooling information provided with this manufactured home.
- *Alternate 3.* The air distribution system of this home has not been designed in anticipation of its use with a central air conditioning system.

The team members that we work with rarely supply the air conditioning system with the home. The reasons range from warranty issues to proper sizing of the unit because of not knowing where the final

location will be. Thus Alternate 2 is typically chosen, the duct system is sized for x number of BTU/Hr which is typically larger than what the house will need. In the past, air conditioning systems have been sized for the house based on that number, not on a load calculation for that house in that location. This over sizing of cooling equipment has caused durability concerns (able to lower in interior temperature of the house far below ambient dewpoint conditions), comfort complaints (lack of humidity control), and energy usage (Moyer et al. 2001).

The HUD code is only interested in how many BTUHs the duct system can handle. The code states: "*The refrigerated air cooling supply duct system including registers must be capable of handling at least 300 CFM per 10,000 BTUH with a static pressure no greater than 0.3" of water when measured at room temperature*, Part 3280.715 (a) (3) (ll)". An effort is underway to rewrite the code to provide better guidance in the design of the forced air system. Washington State University, a Building America partner, is taking the lead on this effort.

The industry uses a program called "CertiDuct" copyrighted by Nordyne. The program is a simple, but very restrictive duct calculation program - it is spreadsheet derivative. An output can be seen in Figure 1. The restrictions are:

- Only calculates 300 CFM per 10,000 BTUH with a static pressure no greater than 0.3 inwc of water
- Rectangular duct is not an option
- Common duct fittings are not an option
- Limited on the size of supply registers
- Has no bearing on heat gain calculations

The good point is that it is easy to learn. The bad point is that it does not design a system, the operator can simply enter in duct sizes until he meets the code requirement of 300 CFM per 10,000 BTUH with a static pressure no greater than 0.3 inwc of water.

In an effort to improve performance of the system, and provide better information for the installer of the air conditioning system in the field, it is believed that a tool should be used to assist in the design process (See Appendix 1). Using an ACCA (Air Conditioning Contractors of America) approved Manual J8 software program, such as Elite's <u>Rhvac¹</u> or Wrightsoft's <u>Right-JTM</u>², quickly and accurately calculates the heating and cooling loads for residential and small commercial structures. Comprehensive reports include detailed loads on many levels: the building, each system, each zone, and each room. This data includes the tonnage requirements at each level as well as the CFM requirements for both heating and cooling. The program will also allow you to easily rotate the orientation of existing rooms and calculate the heating and cooling loads based on the new orientation. Automatic, accurate duct sizing is performed for each system, as well as for the run outs leading to the registers of each room. The number of registers in each room can be calculated automatically based on a desired airflow per run out, or the number of registers can be entered manually.

¹ http://www.elitesoft.com/web/hvacr/elite_rhvacw_info.html

² http://www.wrightsoft.com/Products/RightSuiteUniversal/RightJ/tabid/130/Default.aspx

CertiDuct 5.0

Model	ES303	Mfg.	Southern Energy Homes	Date -	2/2/	2007	Source .	Addis	on Plant
Design Ty	pe Flo	w Direction	Plenum Connection	Plenum l	ocation	Ple	num Width X	Plenum Le	ngth
Double-sec	tion (Jp Flow	Furnace	N/	A		N	A	
lata: all the i	inspecified dime		r inches						
lote: all the t		nnection Three		Branches	Flex D	Flex L (ft)	Bend (°)	Tag	Reg. HxV
Furnace Ma	ain Mixer		17 	6	16	1	0	Main	N/A
i dinace mi	Registe		H	1	10	1	0	Reg 1	12 X B
	Mixer	<u> </u>	-	2	9	3	0	Mixer	N/A
	INIAGI	Register	- H	1	5	2	0	Reg 2	8X4
	1	Mixer		2	8	3	0	Mixer	N/A
		- model	Register	1	7	4	90	Reg 3	12 X 6
			Register	1	5	4	90	Reg 4	8X4
	Cros. Mix	(er		1	14	7	0	Cros	N/A
		Mixer	7 F	2	10	3	0	Mixer	N/A
			Register	1	7	1	0	Req5	12 X 6
			Register	1	7	12	135	Reg 6	12 X 6
	Mixer			1	12	6	0	Mixer	N/A
		Register		1	7	1	0	Reg 7	12 X 6
	Mixer			1	10	10	45	Mixer	N/A
		Register] [1	5	1	0	Reg 8	8 X 4
	Mixer			2	10	12	0	Mixer	N/A
		Register		1	7	2	0	Reg 9	12 X 6
		Register		1	7	2	0	Reg 10	12 X 6
Γ	300 cfm per	ated air coolir r 10,000 Btuh	Duct Design F	Performa ding registe reater than	nce rs must be 0.3 inches	capable of h of water whe	andling at le n measured	ast at]
	room tempera		ormance Calculated at a S				60.7 15 (a) (4	5) (11)	J
	Air Flow Rate	(CCEM)	1875	Duct	Capacity (B	thu/Hr)	625	500	

Figure 1 CertiDuct Output

The HVAC sizing design criteria is based in accordance with the (ACCA) Manual J (Residential Load Calculation) and Manual D (Residential Duct Systems). Both manuals are ANSI approved and referenced in most building codes. More information can be found at www.acca.org.

The process starts with the Manual J load calculation. The room by room calculation estimates the sensible loss for winter heating and sensible & latent gain for summer cooling. Manufactured homes are not the leaky tin boxes on wheels of yesteryear, the entry level manufactured home is built to higher standards than most site built homes. They use the same typical materials

and assemble them in a dry plant atmosphere. The building is built very tight, insulated well, and durable enough to go down the highway with very little damage (try that with a site built home). Properly sizing the equipment is very important for comfort and durability. Figure 2 shows a summary of materials used in the calculations, the areas, sensible losses and gains and latent gain. There are people and internal loads also, but no duct loads because the duct is in the conditioned space.

The room by room method calculates the BTUH for each room. Figure 3 is a summary of those loads. The required CFM for each room is based on the required BTUH for each room. The duct design cannot be started until we get to this point. The calculation calls for 1.73 tons, but recommends 1.98 tons because the house has an 86% sensible heat ratio (SHR) and most equipment has a 75% SHR output. Not knowing what orientation the house would face for this calculation, the front door was chosen to face the north. In order to find worst case scenario, a rotation calculation was performed. Figure 4 shows that the home peaks out with front door facing west. The recommended tonnage facing west is 2.54, considering this we decided to design for 1200 CFM which will handle up to 3-tons of cooling and 91,000+ BTUs of heating. Now we can adjust the CFM to the fan output of 1200. Increasing the CFM to each room so that the total will be 1200. Figure 3, the last two columns show the Clg Nom CFM which is based on the sensible load and the Air Sys CFM which is based on the fan output CFM we selected.

The duct calculation starts out by drawing a stick design on scaled blueprint. The lines will go from fan to diffusers with the room CFM written at each diffuser. Then trunk lines and run-out lengths are entered in the program along with fittings, diffuser size and room CFM. The program sizes the duct system based on Manual D procedures. The program calculates the size ducts needed to design a properly operating system.

Figure 5 is the Output Summary and it shows that the duct system including equipment and diffusers will move 1214 CFM at .256 inwc static pressure. The equipment output is based on a total overall static pressure of 0.5 inwc, this leaves 0.239 inwc of available pressure to handle such add-ons as high efficiency filters. Figure 5 is the Duct Connection Tree Diagram which shows the trunk line #, the supply run-out #, CFM, duct size, and diffuser size

Rhvac - Residential & Light Commercial HVAC Loads Calcs-Plus Venice, FL 34293-6060				Eine Sc	Southern Er	pment, Inc. hergy ES303 Page 5	
Total Building Summary Loads							
Component			Area	Sen	Lat	Sen	Tota
Description			Quan	Loss	Gain	Gain	Gain
ID-ob-o: Glazing-Double pane, operable window, metal frame with break, outdoor insect screet 50% coverage, white or reflective color drape tight weave with 50% coverage, u-value 0.65	n with is with		71.6	2,187	0	1,579	1,579
ID-cb-o: Glazing-Double pane, operable window, metal frame with break, outdoor insect screet 50% coverage, u-value 0.65	clear,		80.9	2,471	0	2,122	2,122
1J: Door-Metal - Fiberglass Core			40.2	1.134	0	772	772
2B-0sw: Wall-Frame, R-11 insulation in 2 x 4 stu	id		1267.3	5,778	ő	3,700	3,700
cavity, no board insulation, siding finish, woo				0,.70	0	0,100	5,100
668-21: Roof/Ceiling-Under attic or knee wall, Ve Attic, No Radiant Barrier, Dark Asphalt Shing Dark Metal, Tar and Gravel or Membrane, R- insulation	nted les or	1	1731.6	3,581	0	4,267	4,267
20P-11: Floor-Over open crawl space or garage, Passive, R-11 blanket insulation, any cover			1731.6	6,347	0	2,160	2,160
Subtotals for structure:				21,498	0	14,600	14,600
People:			4	21,400	420	980	1,400
Equipment					1,200	1,200	2,400
Lighting:			0		1,200	0	2,400
Ductwork			0	0	0	ŏ	č
Infiltration: Winter CFM: 57. Summer CFM: 47				2.915	1,247	1.082	2,329
Ventilation: Winter CFM: 07, Summer CFM: 0				2,915	0	1,002	2,328
Total Building Load Totals:				24,413	2.867	17.862	20,729
rotal Building Load Totals.				24,415	2,007	17,002	20,728
Check Figures							693
Total Building Supply CFM: 1,200				er Square			
Square ft. of Room Area: 1,732				eft. Per Tor			873
Volume (ft ^a) of Cond. Space: 15,516			Air Tur	nover Rate	(per hour):		4.6
Building Loads							
Total Heating Required With Outside Air:	24,413			3 MBH			
Total Sensible Gain:	17,862			5 %			
Total Latent Gain:	2,867		14	4 %			
Total Cooling Required With Outside Air:	20,729	Btuh			ased On Sens ased On 75%		

Rhvac - Residential & Light Commercial HVAC Loads Elite Software Development, J Calca-Plus Southern Energy ES Yenice, FL 3423-6060 Page										
Sys	tem 1 Room Lo	ad Sun	mary							
No	Room Name	Area SF	Htg Sens Btuh	Min Htg CFM	Run Duct Size	Run Duct Vel	Clg Sens Btuh	Clg Lat Btuh	Min Clg CFM	Ad Sys CFN
Zo	ne 1	-								
1	Bedroom 2	208	3,400	45	1-7	503	2,002	211	92	134
2	Kitchen	207	2,230	29	1-7	525	2,087	999	96	140
3	Dining Room	113	1,703	22	1-5	577	1,171	61	54	79
4	Foyer	66	1,138	15	1-4	563	731	37	34	49
5	Master Bedroom	239	3,674	48	1-7	546	2,171	224	100	146
6	Master Bath	130	1,635	21	1-5	635	1,289	78	59	87
7	Master Closet	62	1,296	17	1-4	581	755	123	35	51
8	Living Room	346	4,260	56	1-10	535	4,347	456	199	292
9	Laundry	116	1,545	20	1-5	583	1,184	453	54	80
10	Bedroom 3	184	2,872	38	1-6	590	1,725	185	79	116
11	Barh 2	61	660	9	1-4	308	400	40	18	21
	System 1 total	1,732	24,413	320			17,862	2,867	819	1,200
Veloc	em 1 Main Trunk Size: bity: per 100 ft.:			/min wg						
Cool	ng System Summary									
		Cooling	Sensi	ble/Latent		Sensible		Latent		Tota
		Tons		Split		Btuh		Btuh		Btuł
	Required	1.73	8	6% / 14%		17,862		2,867		20,729
Reco	mmended:	1.98	7	5% / 25%		17,862		5,954		23,816

Calculations are based on 8th edition of ACCA Manual J. All computed results are estimates as building use and weather may vary. Be sure to select a unit that meets both sensible and latent loads.

Figure 2 Total Building Summary Loads

Rhvac - Res Calcs-Plus Venice, FL 3	idential & Light Co 34293-6060	mmercial HV	AC Loads		>		ę.	E lite Softwar Sou	thern Ener	
Building	g Rotation F	Report								
Building or At least on want to ch for System	degree values ir ientation as enter e system with its ange this behavio Air Type for Buil	red (zero de System Air r uncheck ti	grees rotati Type input ne option or	on): Front set to Fixe	door faces d was char	North ged to Aut	o during th	e building ro		
Individual	Rooms									
Rm. Roo No. Nam		0° Rot. CFM	45° Rot. CFM	90° Rot CFM	135° Rot. CFM	180° Rot. CFM	225° Rot CFM	270° Rot. CFM	315° Rot. CFM	High Duc Size
System 1:		2.003/1444	20100000	1200A040515	120400000	- 100×30101	255000000	25310774	2507470	
Zone 1:										
	room 2	82	101	110	100	83	103	*111	101	1-1
2 Kitcl		89	107	115	105	89	108	*116	107	1-
	ng Room	49	79	95	80	50	82	*96	79	1-
4 Foy		30	31	30	30	30	*31	30	31	1-
	ter Bedroom ter Bath	89 *54	108 50	117	107 49	90 54	110	*118	108	1- 1-
	ter Batn ter Closet	31	32	40	49	54	*32	31	31	1-
	ia Room	184	247	276	239	181	247	*278	246	1-1
9 Laur		50	51	50	235	50	*51	50	240	1-
	room 3	70	84	89	81	69	83	*89	83	1-
11 Bart		16	17	16	16	16	*17	16	17	1-
* Indicates	highest CFM of	all rotations.				-				
Mhole Bui										
Rotation	Front door		Supply	Se	nsible	Lat		Net	Recom	
Degrees	Faces North		CFM 743		Gain 6,309	G *3,2	ain	Tons 1.63		Ton 1.8
15°	Northeast		743 906		6,309 9.881	3,2		1.63		2.2
90°	East		968		1,248	3,2		2.04		2.3
135°	Southeast		887		9,465	3,2		1.89		2.5
180°	South		743		6,302	32		1.63		1.8
25°	Southwest		915		0.091	32		1.94		2.2
270°	West		*977		1.439	3,2		*2.05		*2.3
315°	Northwest		903		9,822	3,2		1.92		2.2
					8.222.23 C	3083				

Figure 3 Room Summary Loads

Ductsize - HVAC Duct Sizing Calcs-Plus Venice, FL 34293-6060	3	Elite Software Development, Inc SE303 Overhead Duct Prototype Page 10
System 1 "System 1" - Output Summary	- Supply	
Number of active trunks:	8	
Number of active runouts:	10	
Total system weight (lb.) minus fittings:	0.00	
Total outlet flow	1 2 1 4	
Total outlet flow after heat gain	1 2 1 4	
Size of largest trunk:	16.0	
Size of smallest trunk:	8.0	
Size of largest runout:	10.0	
Size of smallest runout:	5.0	
Maximum static pressure loss occurs in route to runout:	S6	
Cumulative static pressure loss at above runout:	0.261	
solate Return From Supply Option:	No	
Return SP Loss Added to 1st Trunk of Supply:	0.000	
Available static pressure at above runout:	0.239	
Fan static pressure:	0.500	
Fan velocity pressure:	0.048	
Fan total pressure:	0.548	

Figure 5 Output Supply Report

Figure 4 Building Rotation Report

A duct layout is drawn showing the duct sizes, layout and expected flows as shown in Figure 7. Following this layout will ensure adequate airflow to each zone without excess noise and discomfort



Figure 6 Output Supply Report





Figure 7 Duct System Layout

Building America Benchmark

Benchmark analysis was performed using the EnergyGauge USA software.

Tables 3 and 4 compare simulated annual site energy use for the Building America benchmark to the prototypes. The only difference was that of the duct system, there was assumed to be no difference in appliance and plug load usage. Electric energy savings of 18.5% and 19.8% (1.6% improvement associated with duct design) for the Cavalier home. Savings for the Southern Energy home was 15.3% and 20.2% (5.8% improvement for duct design).

Table 3 Cavalier Home	Table 3 Cavalier Homes Annual Site/Source Energy (kWh)										
End Use	BA Benchmark	Base+	% Savings	HSD	% Savings						
Space Heating	8675	6348	26.8%	6094	29.8%						
Space Cooling	6486	4424	31.8%	4334	33.2%						
DHW	3268	2690	17.7%	2690	17.7%						
Lighting	2317	2373	-2.4%	2373	-2.4%						
Appliances + Plug	6118	6016	1.7%	6016	1.7%						
OA Ventilation	227	227	0.0%	227	0.0%						
Total Usage	27091	22078	18.5%	21734	19.8%						
Site Generation	0	0		0							
Net Energy Use	27091	22078	18.5%	21734	19.8%						

Table 4 Southern Energy Homes Annual Site/Source Energy (kWh)											
End Use	BA Benchmark	Base+	% Savings	Soffit	% Savings						
Space Heating	7559	6213	17.8%	5476	27.6%						
Space Cooling	5655	3842	32.1%	3406	39.8%						
DHW	2902	2360	18.7%	2360	18.7%						
Lighting	2094	2144	-2.4%	2144	-2.4%						
Appliances + Plug	5461	5460	0.0%	5460	0.0%						
OA Ventilation	187	187	0.0%	187	0.0%						
Total Usage	23858	20206	15.3%	19032	20.2%						
Site Generation	0	0		0							
Net Energy Use	23858	20206	15.3%	19032	20.2%						

Factory mockups - Duct system, crossover connections

The engineering staff of both companies desired to produce mock-ups of the new systems to show management our concepts. In the case of Southern energy, a crossover connection in the marriage wall was created and cardboard was used to show what the new marriage line soffit would look like. For Cavalier, the crossover connection through the rim joist and HSD wall were created and analyzed.

As a result of these mockups (Figures 8-11), each company has built a full scale prototype in the home. Currently the Southern Energy home being monitored. Cavalier is building in stages, the first stage was to look at field performance as related to durability issues. There was some concern on using interior wall sections as being susceptible to condensation as a result of being used as a part of the supply duct system. In January, a full scale prototype utilizing both the HSD and crossover duct will be produced.



Figure 8 Cavalier crossover mockup



Figure 10 Cavalier HSD mockup





Figure 11 Southern Energy soffit mockup

Factory construction – Costs

Initial cost estimates from both companies to include these enhancements is low. The following question was posed to the Director of Engineering of each company, "What do you think is the approximate cost difference is between current practice and HSD duct (on a per house basis)?"

Cavalier's response, "Depending on the design of the house, it could be as low as \$100.00 per home and as high as \$300.00 per home."

And from Southern Energy, "This is a shot in the dark, I would guess about \$200"

Instrumentation and Monitoring

A monitoring protocol was developed for the project as shown by the detailed instrumentation see Table 1. Measurement of temperature, relative humidity and power usage of the HVAC equipment and total building is done to determine the effectiveness of the new design.



Figure 12 Thermostat w/sensor



Figure 14 Datalogger with power meters



Figure 13 Duct sensors



Figure 15 Ambient air sensors

To compare performance of the prototype and conventional duct systems, the collected data is used to calibrate the simulation results. All measurements were monitored on a 15-minute basis (data sampled at 15 second intervals and averaged or totaled depending on data type). Monitoring included: power use (total building, condenser and air handler), air temperature and relative humidity at the thermostat, supply plenum air temperature, air temperatures entering and leaving coil, and outdoor air temperature, relative humidity and solar radiation. The Campbell Scientific CR10x datalogger was used to collect the data from the various sensors. Power was measured with the Pulse Output WattNode® RMS AC watthour transducer with a pulse output (solid state relay closure) proportional to kWH consumed. Temperatures measurements were done with sensors from Vaisala (INTERCAP® Humidity and Temperature Transmitters HMD 50). A few temperature measurements were done with thermocouples, such as the shingle surface temperature and some of the temperature only duct measurements.

In addition to the above, temperature and relative humidity measurements were done in various locations of the Cavalier Homes HSD duct system to determine sensitivity to moisture.

Monitoring was designed to include a minimum of three months of summer conditions and a maximum of 12 months. The Cavalier home data collection began on December 21, 2006 and concluded on October 12, 2007. The Southern Energy home collection started on November 07, 2007 and is expected to continue through November 2008.





Figure 16 Cavalier HSD prototype home located in Opelousas, LA

Figure 17 Southern Energy Soffit prototype located in Double Springs, AL

Table 5 Monitored and Collected Data	
Cavalier HSD	Southern Energy Soffit
BATTERY VOI	LTAGE (v)
THERMOSTAT	TEMP (F)
THERMOSTA	T RH (%)
SUPPLY PLENUI	M TEMP (F)
SUPPLY PLENU	JM RH (%)
OUTDOOR AIR IN	LET TEMP (F)
BUILDING POWER	R (WATTHRS)
AIR HANDLER/HT P	WR (WATTHRS)
COMPRESSOR POW	ER (WATTHRS)
MASTER BDRM DUCT-WALL TEMP (F)	AMBIENT (RH)
MASTER BDRM DUCT-WALL RH (%)	MASTER BDRM TEMP (F)
DINING ROOM INTERIOR DUCT AIR TEMP (F)	MASTER BDRM (RH)
MASTER BATH DUCT-WALL TEMP (F)	CRAWL SPACE TEMP (F)
NW BDRM DUCT-WALL TEMP (F)	CRAWL SPACE (RH)
SW BDRM DUCT-WALL TEMP (F)	SHINGLE SURF TEMP (F)
RETURN TEMP (F)	DHW POWER (WATTHRS)

Results

"SNAPSHOT" Building Evaluation [Short Nondestructive Approach Providing Significant House Operating Thresholds]³ is a procedure developed by Building Science Corporation. It is a technique of building evaluation will provide necessary information to quantify the building envelope performance and its interaction with the micro climate (interior) and the mezzo climate (exterior). SNAPSHOT is a series

³ http://www.buildingscience.com/bsc/buildingamerica/snapshot_instructions.pdf

of short-term data collection techniques which follow specific protocols to characterize the building and predict long term energy performance.

Table 6 'SNAPSHOT' Results		
Description	Cavalier HSD	Southern Energy Soffit
Building Airtightness (CFM50)	2142	1797
ACH50	7.99	6.95
$C - n - r (Q = C\Delta P^n)$	C=169.5, n=0.65, r=0.998	C=157.8, n=0.62, r=0.999
EqLA@10 (sqin)	221.8	194.1
Duct Leakage Total (CFM25 _{total})	298	-not measured
Duct Leakage Out (CFM25 _{out})	65	0.0^{1}
Qn (CFM25 _{out} /floor area)	0.03	0.00

¹Leakage below what instruments can measure.

Supply Distribution

One of the concerns of the floor duct system with its registers on the floor is that of adequate air flow, especially with furniture placement. The supply register is located near the ceiling and therefore will not be affected by furniture placement.

To verify the airflow pattern, a visualization technique was used to observe the air flow. A regular fiberglass insect window screen was attached to a temporary PVC frame and placed in the airstream of the living room supply. An infrared imaging camera was used to detect the temperature differences on the insect screen – thus visualizing the air flow pattern.





Figure 18 Thermal image of "air flow"

The creation of the HSD went through a few variations to come up with design that would allow adequate airflow and ease of construction. A mock-up was created and tested for airflows, which was shown to be equal to the current design in use. The design was then taken to the factory where various types of materials and insulations were used. The primary concern was that of condensation on the painted drywall. From a manufacturing point of view, the fewer the parts and pieces, the easier and faster the

production. And from a durability perspective, it was desirous to have as much structure and insulation as possible. Therefore the monitoring process would need to look at temperatures at a few critical points to determine whether or not the drywall would be in danger of moisture damage as a result of the operation of the air conditioning system.

Cavalier Data Analysis

As previously mentioned, data was collected on 15 minute intervals. The primary concern on this data set was whether or not the interior drywall would suffer from moisture damage. The prototype house was used as a model on a dealer's lot. The owner was asked to leave the thermostat set in the mid 70's. However, the various sales staff continually adjusted the thermostat. As it turns out, this was a very good test of the system to see if there may be moisture issues. The data clearly shows that the interior dewpoint temperature is always below the supply plenum temperature (Figure 20). Thus, condensation cannot occur (and none was detected when inspected).



Figure 20 HSD prototype temperatures and dewpoint conditions on an hourly average 6/1 to 9/2/07



Figure 21 HSD daily energy usage verses average daily temperature difference across envelope.

Looking at a 24 hour daily profile for that period (June 1st through September 2nd), it can be seen that the interior temperature was about 71°F with a relative humidity of 47% and a dewpoint of 49.7°F. The ambient air averaged 88°F. Note that the duct temperatures vary slightly. This has to do with the location of the sensors and with the fact that this is averaged data, though temperatures and humidity readings related to the duct are averaged only when the air handler operated. The master bath duct temperature is the only sensor in the supply air stream (besides the supply plenum temperature sensor). All other sensors were located just behind the drywall.

The energy usage plot is somewhat offset to the higher side from what might be a normally occupied home. The typical daily ambient to interior temperature difference on a peak summer day would be around 7°F for that area of the country (a range from the low 70's to the mid 90's – TMY data Baton Rouge, LA). The EnergyGauge USA[®] simulation for a peak summer day shows an HVAC usage of 29.3 kWh. That is with an average daily ambient temperature of 85°F and an interior temperature of 78°F.

Southern Energy Data Analysis

Little data has been collected on the Southern Energy prototype duct house. The logger is in place and a data stream is coming in. We have noticed that it appears that the heat pump is not operating correctly. The supply plenum temperature is usually in the low 80's while heating. Also, it appears that the electric strip heating operates quite often. Note the spikes in the supply temperature (Figure 22), the operation of the heat strips seems to occur when ambient temperature is below about 40°F, yet does not always come on at the lower temperatures.



Figure 22 Southern Energy Temperatures: supply, thermostat and ambient

A factory heat pump technician is schedule to commission the system in January 2008. This will verify that the system is operating to factory specifications.

Discussion

The advantages of sealing the air distribution system has many benefits and has been proved by others.⁴ The task of moving all of the duct work within the air and thermal boundaries is a challenge in the factory environment. The movement of the floors down the assembly line means that the various parts and pieces must fit into the

time frame allotted. The task of how to incorporate an interior duct system would be expedited if there were a perceived benefit by the manufacturer. To that end, the following questions were posed to the engineering directors at each company.

1. What do you see as the benefit(s) to the HSD or soffit duct design?

<u>Cavalier</u>: Initial testing has revealed that High Side Discharge enhances the overall CFM of conventional in-floor duct systems and provides optimal placement of registers for air distribution, while at the same time eliminates concerns of furniture placement that often plagues in-floor designs.

Southern: The obvious benefits are: no heat gain or loss on duct work, as we designed it, no site work to complete the duct system, duct leakage while certainly not desirable - has not affect on the home's interior pressures

2. What is the biggest drawback?

<u>Cavalier</u>: Any repairs result in the sheetrock having to be removed by destruction. Replacement is not expensive from a material standpoint, but is time consuming. And do you see it as show stopper? Personally, yes

<u>Southern</u>: Fabrication and installation in a concern on a production level. Conventional in attic duct personnel are not in the way of workers inside the home, while this soffit design causes duct work to be completed while other personnel are working.

3. Do you see any market advantages and/or barriers to the new design?

⁴McIlvaine, Janet, David Beal, Neil Moyer, Dave Chasar, Subrato Chandra. Achieving Airtight Ducts in Manufactured Housing. Report No. FSEC-CR-1323-03.

Withers, C., Chasar, D., Moyer, N., and Chandra, S. "Performance and Impact from Duct Repair and Ventilation Modifications of Two Newly Constructed Manufactured Houses Located in a Hot and Humid Climate", Thirteenth Symposium on Improving Building Systems in Hot and Humid Climates, May 20-22, 2002 Houston, Texas.

<u>Cavalier</u>: Advantages speak for themselves. Barriers are primarily the lack of consumers and retailers to recognize potential in something new.

Southern: Advantages - if marketed properly could make "Energy Star" a breeze. Barriers - some floor plans are not a conducive for this design

4. Your comments on the new crossover design?

<u>Cavalier</u>: Looking forward to having a cross-over that is not located underneath the home, which will be a first for us. Historically the cross-over has been exposed to weather conditions and potential damage from rodents/domestic animals. A cross-over that is located inside the floor will not be subject to such potential detrimental issues.

<u>Southern</u>: As mentioned, this eliminates on-site errors and omissions. It also keeps the crossover in a conditioned space where there is not concern about its longevity

5. Would you be willing to produce another dozen or so homes to work out any defects in the process?

<u>Cavalier</u>: Yes <u>Southern</u>: I am. I hope SEHomes is willing to give it another try too

- 6. Are you planning on incorporating any or all the new design into future buildings? <u>Cavalier</u>: *Yes, absolutely.* Southern: *At this time, there is not movement in that direction.*
- 7. Would you be willing to share any or all of your knowledge gained in this effort with the rest of the industry?

<u>Cavalier</u>: Due to the competitive nature of our business, it would be unlikely. <u>Southern</u>: I would like to keep it for myself if we decide to act on it, if we do not act on it, I think someone should benefit from our experience.

Future Work Planned FY08

2008 should see the next stage of development of the interior duct system in manufactured housing. Both partners have provided input that there is a desire to move forward in this endeavor. Currently, the following tasks are either in progress or are to be given strong consideration.

- Monitoring of the Southern Energy Homes prototype will continue through November. This will provide a full year of data on the system as it operates through the various seasons. The heat pump is to be commissioned by a factory representative in January.
- Southern Energy's Texas plant has expressed interest in incorporating the soffit design in one of their models and to produce a number of them (10 or so) to work out the details of construction on the factory line.
- Cavalier Homes plans on building a complete prototype of the HSD with crossover in January. If this proves successful, plans are to produce additional units.
- DAPIA approval of the use of the Manual J and Manual D has been verbally given. The task remains to provide documentation and get the written approval.
- The MHLab soffit duct will be finished and monitoring of the energy usage will begin as the attic duct and soffit duct are monitored in a flip-flop fashion.

• In general, the interior duct design, including crossover duct for multi-section units will continue to be improved – especially in the factory acceptability.

Conclusions

Working with factory built housing manufacturers is a challenge. Generally, their homes are created for a lower income first time homeowner. This means that the profit margins are less with fewer opportunities for expensive innovations, especially those related to energy. The average cost of a 1750 sqft manufactured home cost about \$41 per sqft compared to an average site built home of 2450 sqft which ran about \$92 per sqft.⁵ Shipments of manufactured homes is in a decline, from 146,800 in 2005 to 117,400 in 2006, further adding to a tighter profit margin.

There is good news, energy prices are increasing. This is causing the manufacturers to reconsider the energy usage of their buildings and trying to find that perfect niche that will find favor in the retail market. In that vein, the interior ductwork has an opportunity. It is slightly more expensive in the manufacturing process, but offers long term energy savings. Also, moving the duct work within the conditioned space will increase the life of the duct by protecting it from the harsh environment that it would otherwise be located in.

StageGate 2

Verification Method: The BP2 work with two industry partners Cavalier Homes and Southern Energy Homes in constructing and evaluating prototype interior duct systems were summarized in this report. Issues of Energy performance, comfort, DAPIA approval, manufacturability and cost were addressed. A complete stage gate 2 analysis was completed. The stage gate analysis covered all of the stage 2 criteria listed below:

Must Meet criteria

Source Energy Savings: new system must provide demonstrated energy and whole building performance benefits relative to current system solutions based on BA test and analysis results.

• Both systems perform better than the BA benchmark. The duct test of the Southern Energy home had no leakage to the exterior, and the Cavalier home had a Qn = 0.03 (and the crossover piece was of standard practice-not the new design).

Performance-Based Code Approval: must meet performance-based safety, health, and building code requirements for use in new homes.

• The materials used in both cases has met the standards for code approval. The use of the ACCA manual J8 and manual D for determine the HVAC needs of the home are in final stages of approval. Currently a verbal approval has been given by one of the DAPIAs.

Should Meet criteria

Prescriptive-Based Code Approval: should meet prescriptive safety, health and building code requirements for use in new homes

⁵ U.S. Department of Commerce, Bureau of Census 2006 data

• Materials used have met the code approval (materials are currently used in the construction of ducts and crossovers).

Cost Advantage: should provide demonstrated cost benefits relative to current systems within a whole building context

• The costs have not yet worked out. There are estimates by both Cavalier and Southern Energy that the costs should be fairly low, less than a few hundred dollars per home. The hard costs have not yet been determined, including whether or not a markup can be added to the home.

Reliability Advantage: should meet reliability, durability, ease of operation, and net added value requirements for use in new homes

• Not yet determined.

Manufacturer/Supplier Commitment: should have sufficient logistical support (warranty, supply, installation, maintenance support) to be used in prototype homes

• There is commitment to the extent of moving forward in further development of the interior duct. Factory runs need to be completed and the homes need to be set in the field to determine reliability issues – especially that of the new crossover designs.

Gaps Analysis and Case Studies: should include systems gaps analysis, lessons learned, and evaluation of major technical and market barriers to achieving the targeted performance level.

- Gaps analysis-
 - There is a gap between marketing and engineering. Marketing tends to lean toward the old days and ways. Sell the units to dealers, little effort in assisting the dealers in selling the product.
- Case studies-
 - A full scale prototype has not yet had a the time in field to determine the strengths and weaknesses of the system.
- Major technical barrier-
 - The factory process. Each company has run only one house. It was awkward at best. A production run is scheduled in Cavalier for a single house in January 2008. Southern Energy has verbal commitment from their Texas plant to consider building up to 10 or so of the soffit duct design.
 - Monitoring in a side by side comparison of old and new duct designs without human occupancy is difficult to do and may not be possible. Therefore, if a comparison is done, it will most likely be with a human component.

Appendices

Appendix 1 Trip Report: HUD acceptance of ACCA Manual J & D



TRIP REPORT

TITLE

HUD Acceptance of ACCA Manual J and Manual D

TRIP DATE

12-13-07

ATTENDEES

Neil Moyer (BAIHP/Florida Solar Energy Center), Dennis Stroer (BAIHP/Calcs-Plus), Dave Tompos (NTA), Michael Wade (Cavalier Home Builders), Chris ___ (Cavalier Home Builders), and Jim Bauer (Southern Energy Homes)

TRIP REPORT DISTRIBUTION LIST (sent via email)

S. Chandra, N. Moyer, D. Tompos, M. Wade, and J Bauer

PURPOSE

For HUD to accept ACCA Manual J version 8 calculations, ACCA Manual D calculations, and ACCA approved software for those calculations.

BACKGROUND

At this time the HUD code does not recognize any particular HVAC load calculation methods. It does site ASHREA Handbook of Fundamentals 1989 -

"(a) Information, values and data necessary for heat loss and heat gain determinations shall be taken from the 1989 ASHRAE Handbook of Fundamentals, chapters 20 through 27. The following portions of those chapters are not applicable:

21.1 Steel Frame Construction

21.2 Masonry Construction

- 21.3 Floor Systems
- 21.14 Pipes
- 21.16 Tanks, Vessels and Equipment
- 21.17 Refrigerated Rooms and Buildings
- 22.15 Mechanical and Industrial Systems
- 23.13 Commercial Building Envelope Leakage
- 25.4 Calculation of Heat Loss from Crawl Spaces
- (b) The calculation of the manufactured home's transmission heat loss coefficient

(Uo) shall be in accordance with the fundamental principals of the 1989 ASHRAE Handbook of Fundamentals and, at a minimum, shall address all the heat loss or heat gain considerations in a manner consistent with the calculation procedures provided in the document Overall U-values and Heating/Cooling Loads- Manufactured Homes—February 1992–PNL 8006, HUD User No. 0005945."

and the second		
FIO	rida	U more Status – Nacional Di more Status – Nacional Primi Pierrice Manuella Frierga Association – Aduste
		ooling Equipment Sizing Chart (Heat Pumps & Air Conditioner
	Floor Area (square feet)	Up to 840 / 841 to 1,120 / 1,121 to 1,280 / 1,281 to 1,440 / 1,441 to 1,680 / 1,681 to 1,960 / 1,961 to 2,2
	Glazing Percentage	the construction of the co
	St. Augustine	000 000 000 000 000 000 000
	Cape Canaveral	
Alliance	Lakeland, Tampa, West Palm Beach	
Energy	Daytona Beach, Miami, Sarasota, Tallahassee	
Package	Fort Lauderdale	
	Gainesville, Orlando	000 000 000 000 000 000 000 000
	Jacksonville	
	Pensacola	
	St. Augustine	000 000 000 000 000 000
	Cape Canaveral	
HUD	Lakeland, Tampa, West Palm Beach	222 222 222 222 222 333 333 333 333
Standard	Daytona Beach, Miami, Sarasota, Tallahassee	222 223 222 223 223 333 333 333 333
Requirements	Fort Lauderdale	222 222 222 223 333 333 333
	Gainesville, Orlando	
	Jacksonville	2222222222233333330000
	Pensacola	22223333232333333333333333

The only procedure I have seen is the one below which is nothing more

than a close guess. This procedure may have worked in the past but the envelope of manufactured homes of today are as tight as any site built home. Time has proved that over sizing the AC equipment in these homes will has disastrous affects when it comes to condensation issues.

Accepted duct sizing procedures in the manufactured home industry are also non existent. From what I see the HUD accepted program called CertiDuct which calculates the amount of air that is able to flow through a given duct system. From whit can see the program does not size ducts;

it only calculates the airflow and BTU/H based on 300 CFM of airflow per 10,000 BTU/H of cooling.

The procedure is a little backwards. A duct system is drawn based on the calculation above (?) the duct sizes are based on what ever will fit in the duct zone. After the duct sizing is laid out then it is entered into the CertiDuct program to find out how large of a cooling unit the duct system can handle. The results of the CertiDuct duct program become part of the mfg home when it is moved to its location.



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procedure. The mfg home could have a 3-ton load on a design day but if the CertiDuct calculation says 62,500 BTU/H as the one above does then it will get a 5-ton system.

When the home arrives at its final destination and

AC is going to be added

the AC contractor looks at

the CertiDuct results and

assumes that the BTU/H

handle is the system size

the duct system can

without consulting an

approved HVAC sizing

MEETING MINUTES

These issues were

discussed and admitted to during our December 13th meeting. Mr. Tompos told us that he felt that HUD would accept ACCA Manual J and Manual D with some certain requirements.

- Manual J must use the heat transfer multipliers (HTMs) that have already been • established by the mfg home industry and accepted by HUD.
- Provide an MJ8 hand calculation and electronic calculation of the same building and • show results.
- Provide a way to address HUDs required "Duct Capacity Calculation" based on 300 • CFM per 10,000 BTU/H.

We are not looking to replace existing procedures; we would just like to have the Manual J and Manual D procedures accepted by HUD.



Appendix 2 Southern Energy Standard Typical Input Summary

BAIHP / Southern	Energy Home	Title: Southern	Energy Use	ES303 - sto e	d - typic		Elec Út	LA_BATC	na Av	erame	BAIHP / S	uthers =~			NG E							LA_BA	TONP
Registration #:		s	TD cons			R	un Date:	II: Louislar 12/26/200	07 14	06:15			agy Morni	sai T	wa: adutnen	t Energy Up		o - tàbica	1		Elec Ut Gas Ut	il: Louisi il: Louisi	ana Av
End-L				Energy		_	An	inual Co			Registratio	n #:				TD con:	truction			Ru	n Date:	12/26/20	007 14:
Coc	g (33.2 kBtu/hr) ling Fan chanical Vent Far			2998 k 689 k 0 k	Wh				40 55 \$ 0		Rotation	EnergyU	Coolin	g Energy	Cost En-	erory Use	Heating		ost	Total	Energy	HER	
Tota	al Cooling g (29.1 kBtu/hr)			3587 1				\$2 \$7	95		0 45	2769 kš 2934 kš	Mh 63 Mh 63	28 kWh 72 kWh	\$271 3 \$289 3	571 kWh 577 kWh	168 k) 173 k)	Wh \$2 Wh \$3	299 308	24.32 26.44	6 MBtu 8 MBtu	114.0 117.3	3 5
Hea	ting Fan/Pump chanical Vent Far			409 K 0 K	Wh Wh			\$ 9	33 \$ 0		90 135 160	3024 kl 2931 kl 2784 kl	Ah 67	M kWh 70 kWh 34 kWh	\$288 34	534 kWh 191 kWh 193 kWh	166 k) 164 k) 164 k)	Wh \$2	292	24,76	9 MBtu 6 MBtu 6 MBtu	117.2 115.6 113.6	1
Hot Wa				9325 H	Wh			\$3	24		225 270	2977 kl 3033 kl	Mh 68 Mh 69	52 kWh 96 kWh	\$293 3 \$299 3	592 kWh 522 kWh	169 K) 168 K)	Wh \$3 Wh \$2	301 295	25.32	5 MBtu 5 MBtu	117.1	4
	Water Pump al Hot Water			4055	k₩h k₩h			\$3	\$0 24 \$0				present th		\$287 3: cent analysis energy value			as check	ed. F	or rati			ult
Clothe Dishwa	s Washer			01	(Wh				\$0 \$0		the er	tered build	ing. Sele	d Reports	Annual Sim	ulation to	view ener	y use fro	in the	e Guitte	nt buildi	ng.	
Dryer Lightin Miscell				891 k 1840 k 2248 k	Wh				47 80														
Pool P Range	ump			4471	dWh dWh			s	\$0 36														
Refrige				775				-	62														
	kwn) Therms) Oil Gellons)			23268 0 The 0 Gal	rms				\$0 \$0														
	Propane Gallons duced (kWh)* mes net metering)		0 Gal 0 k	lons Wh				\$0 \$0														
Total C	Cost							\$18	861														
	Emission SO2	s (Calculated	as Total	I - PV Produ		80 26 1	ba																
	NOX CO2					64.94 L 13.8 T																	
6/2007 2:07 PM		Energy	auge®/L	J6RR8 v2.7.0	2				0	Page 1 of 1													
											12/26/2007 0	2.22 PM			EnergyGaug	NØ USA -	FlaRes2007/	beta01					Page
Building America Site Energy Summary 2007 Southant Everging Section 1:1 Compared for Compared fo	Prototype Savings MN/h Therms MBTU Cost Step 8877 0 22.784 634 12.7% 8585 0 21.717 609 12.7% 810 0 0.06 504 12.7%	13.457 3 11 2 2.443	2380 0 8.051 189 18.7%	2144 0 7.315 152 -2.4% 1775 0 8.057 128 -2.9% 368 0 1.258 28 0.0%	18.629 436 2.283 5.4	0 0.358 8 8	206 0 0.703 16 0.0% 604 0 2.061 48 0.2% 3041 0 10.378 243 0.0%	187 0 0.636 20772 0 70.874	0 0.000	A27 0 000 0	Building America	Source Energy Summary 2007 Cimeas LA ANONROUGE Regarding: 2007 Cimeas LA ANONROUGE Southern Energy 53303 - and - typical	ŭ	71.998 534 68.627 509 3.369 26	3944 0 42.624 316 29.6% 8228 0 35 28 716 0 7.720 57	2360 0 25,440 169 18.7%	2144 0 23,116 152 -2,4% 1776 0 19,142 128 -2,9% 388 0 3,969 26 0,0%	58.858	0 1.132 8	536 0 9.003 67 0.0% 206 0 2.221 16 0.0%	0 8.512 48 0 32.787 243	0 223.962	0 0 0 0.000 0 91 20772 0 223.962 1641 13.1%
ng An gy Sumn Project Tile:	Cost 612 564	448 382 66	232	148 122 28	436	8 19	16 48 243	1891	0	EnergyGauge US	ng An	Freject Tibe: ergy ES303-	Cost	612 564 48	448 382 66	232	148 122 28	436	8	18	48 243	18	18
Buildi ite Ener SoutramEn	Benchmark ms MBTU 0 28.110 0 24.088	19.104 16 2.825	9.903	7.145 6.888 1.258			0.703 2.064 10.376				Buildi	Urce Ene SouthemEn	Benchmark ms MBTU	82.509 76.056 6.453	60.367 51 8.927	31,293	22.577 18.608 3.969			2.221			267.0
- 0	Ben Dherms	000	0	000	0 0	000	000	00	00	2		So	Ben Therms	000	000	0	000	00	0	00	00	00	
	KWh Tr 7863 7064	5699 4771 828	2062	2094 17.26 368	1915	40 88 88	206 605 3041	187 23895	0					7863 7064 699	5599 4771 828	2905	2094 1726 368	5461	105	206	3041	187 23695	0 23895
BAHP / Southern Energy Homes	End Use: Total Space Heating: Heating: Maxim	Total Space Cooling: Cooling: Cooling Fan:	Total Hot Water:	Ughting Substatic Wired Lighting: Plug Ughting:	Appliance Subtotal: Refrigerator	ClothesViasher: ClothesDryer:	Distrwasher. Cooking Other Apple:	OAVentilation Fan: Total:	Generation(PV):			BAIHP / Southern Energy Hornes	End Use:	Total Space Heating: Heating Heating Farc	Tatal Space Cooling: Cooling: Cosling Fan:	Total Hot Water:	Lighting Subiotat: Wired Lighting: Plug Lighting:	Appliance Subtotal: Refrigerator	Clothes Washer:	ClothasDryer. Distruestver.	Cooking: Other Apple:	OAVentilation Fan: Total:	Generation(PV); Net:

Appendix 3 Southern Energy Standard Typical Output Summaries

	PROJECT		10-11-11-11-11-11-11-11-11-11-11-11-11-1	WALLS a enfered. Actual orientation is modified by rotate angle shown in	Theolog souther share
Tile: Bouthern Energy E6 Bolding Type: User Owner: BAHP / Southern E Bolder Name: Pernst Office: JuriddElon: Family Type: Bingle-Tamily Comment: GTD construction	Newrifficiniting: Newriffirom Plans) Lot Bedrooms: 3 Gut Bathrooms: 2 Plan Conditioned Alea: 1732 Shu Total Steres: 1 Cos	Division: 19ook:	Wall orientation below is as Ornit Adjacent To Wall Type N Extender Frame - W E Extender Frame - W W Extender Frame - W 4 W Extender Frame - W 5 6 Extender Frame - W	R.Vabbe PMMm // ref Hug Nood 11 57.0 0 0 Nood 11 57.0 0 0 Nood 11 15.1 0 9 Nood 11 25.2 0 9 Nood 11 4.8 0 8.4 Nood 11 5.7 0 8	
Comment. GTD construction	CLIMATE		6 E Exterior Frame - W 7 E Exterior Frame - W		0 85.75 t* 0.23 0.8 0 47.17 t* 0.23 0.8
Design Location	Design Temp Int Design Temp Tmy Ste 97.5 % 2.5 % Winter Summer	Heating Design Daily Temp Degree Days Moliture Range		DOORS	
LA, Baton Rouge L	A_BATONROUSE 29 90 70 75 UTILITY RATES	1670 51 Medium	Ont DoorType Insulated	Storms U-Value None 0.6	Width Height Pt In Pt In Area 3 0 67 0 20.1 ft*
Fuel Unit Utility		y Fixed Cost S/Unit	2 Insulated	Note 0.6 WINDOWS	3 0 67 0 20.1 M ^a
Natural Gas Therm Louisi Fuel Oil Gallon Louisi	ana Average ana Average ana Defaut ana Defaut	0 0.08 0 1.09 0 1.1 0 1.4	Omt Plame Panes TIM Double (Clear)	Own	hang Separation Interior Shade Screening 1 ft 0 in Drapes/blinds Exterior 501
	SURROUNDINGS Shade Titles	Adjacent Buildings	2 TIM Double (Clear) 3 TIM Double (Clear)	Yes 0.65 0.97 N 12.517 0.751101 Yes 0.65 0.67 N 22.517 1110 h	2 ft 0 in None Exterior 50
Ornt Type N None	Height Width Distance Exist	Height Width Distance	4 TIM Double (Clear) 5 TIM Double (Clear)	Yes 0.65 0.87 N 22.517 0.751101 Yes 0.65 0.67 N 11.2517 0.751101	2.5 ft 0 in Drapes/blinds Exterior 501
NE None E None SE None			6 TIM Double (Clear) 7 S TIM Double (Clear)	Yes 0.65 0.97 N 45.917 0.751101 Yes 0.65 0.97 N 15.317 0.751101	
S None SW None W None				INFILTRATION & VENTING	
NW None	FLOORS	# # 0#	Method SLA CFM 50 Proposed ACH 0.00356 1623	Forced Ventilator ELA EqLA ACH ACH S0 Supply Exhan 80.1 107.5 0.250 7.03 24 0 MASS	Tertain/Wind ast Run Time Shielding Ø Soborban / Soborbar
# Filtor Type 1 Crawlspace	Exposed Perimeter Wall Ins. R. Value Area Roor Joist R- 177 ft 0 1732 ft" 11	Value Tile Wood Carpet 0 0.25 0.75	Mass Type	Area Thickness Furniture Fraction	
	ROOF Attic Roof Golar	Deck Attic Vent	No Added Mass	01 0.3 COOLING SYSTEM	
Roof Type Able or shed Comp	osition shingles Full attic 1732 th Dark 0.96	RBS Insul. Ratio (1in) Pitch N 0 300 14 deg		Efficiency Capacity Air Flow BEER: 13 36 199u/tr 1090 ctm	GHR WH Fans Cross Ven 0.75
# Ceiling Type	CEILING R-Value Area Fran	ming Fraction Truss Type			
1 Under Attic 2 Under Attic	19 1920 11 6 112 1	8:11 Wess			
12/26/2007 2-27 PM	Energy@auge8// UGRRUB v2.7		12/20/2007 2:27 PM	EnergyGauge®/ USRRiB v2.7	
Pui	ilding Input Summary Po	nort	Puild	ing Innut Summary Pa	nort
	Ilding Input Summary Re	port Heating system	Build	ing Input Summary Re	port
HOT W 8 System Type EF Cap	ATER SYSTEM Use SetPist Credits Ø System Type 80 gal 140 deg None 1 Electric ättip Heat		Applance Schedule: MERS 2006 Reference Schedule Type 1	APPLIANCES & LIGHTING 2 3 4 5 6 7 8	9 10 11 12
HOT W System Type EF Cap 1 Electric 0.87 40 gal Collector	ATER SYSTEM Use & Uther Credits & System Type 00 gal 140 deg None 1 Electic 04th Head SOLAR HOT WATER Gartase Aboop, Trans Tank Tank	HEATING SYSTEM Biffciency Capacity COP: 1 29.1 kBufur Tank Heat PY Purro	Applance Schedsle: HE/R5 2006 Reference Schedule Type 1 Ceiling Fare (Semmer) AM 0.65 % Released: 100 PM 0.33 Annual Use: 0.WMPC	APPLIANCES & LIGHTING 2 3 5 6 7 8 065 065 065 065 065 0.3 0.33 0.33 0.33 1 0.9 0.9 Pauk Yake: Ovars 6 0.3 0.9 0.9	9 10 11 12 0.33 0.33 0.33 0.33 0.9 0.9 0.9 0.5 0.65
HOT W System Type EF Cap 1 Electric 0.87 40 gal Collector	ATER SYSTEM Use & Buffett Creefs B Bystem Type Big U 40 deg None 1 Excel Bitp Heat SoLAR HOT WATER SoLAR HOT WATER Atmnth Area Loss Creef Proct Corr. Volume U Volu	HEATING SYSTEM Biffciency Capacity COP: 1 29.1 kBufur Tank Heat PY Purro	Applance Schedule: HERS 5008 Reference 8 doktive Type 1 Celling Farsformed, AM 0.65 5 N Released: 100 PH 0.03 Anaulue: 0 WMN/r Olshau Waher AM 0.155 5 N Released: 00 PH 2.725 0	APPLIANCES & LIGHTING 2 3 4 5 4 7 8 045 055 055 045 045 05 03 0 9 9 0.33 0.33 0.33 1 0 9 9 Destrict Local Cols 0.54 0.64 0.64 0.64 0.7 2.5 0.51 0.57 <t< td=""><td>9 10 11 12 0 .33 0.33 0.33 0.33 0.9 0.9 0.9 0.5 2 .6445 1 0.977 0.672</td></t<>	9 10 11 12 0 .33 0.33 0.33 0.33 0.9 0.9 0.9 0.5 2 .6445 1 0.977 0.672
HOT W 8 System Type 55 Cap 1 Electe: 0.07 40 gal Celector Type T8 Gepoty	ATER SYSTEM Use SetPit Creefs B System Type Stat day Televe 1 Electro Strap Heat Social Hold Area Loss Cost Hold Water. Gurface Aboody, Trans Task Task Administ Area Loss Cost Prod. Carr Virlame U Virlav DUCTS Retm At	HATING SYSTEM Efficiency Capacity COP: 291 HMAIN Tank Heat PV Pero a Berf Ana Krok BT Hernard Energy Pescent	Applance Schedule: HEIRS 2018 Reference Schedule Tyte T Celling Terry (Semmer) AM 0.85 % Released: 100 PM 0.33 Annual Levic SWINYT Celling Swinyth AM 0.155 Celling Schedule: 0 PM 0.77 Annual Levic SWINYT Annual Levic SWINYT Distribution: AM 0.155 % Released: 00 PM 0.377	APPLIANCES & LIGHTING 2 3 4 7 8 865 965 065 665 065 065 03 803 9.33 9.33 1 9 9 804 9.03 0.33 1 9 9 804 9.05 9.05 0.55 0.57 0.57 0.57 906 0.55 0.57 0	9 10 11 12 0.33 0.33 0.33 0.33 0.9 0.5 0.5 0.5 0.649 1 0.977 0.672 0.57 0.466 0.43 0.198
HOT W System Type EF Cap 1 Electric 0.87 40 gal Collector	ATER SYSTEM Use Sudhit Crocks & Byden Type Big at 16 deg Televe 1 Exceeds the Head SOLAR HOT WATER SoLAR HOT WATER Solar A dos Cost Prof. Carr Walking U Value UUTS DUCTS	HEATING SYSTEM Biffciency Capacity COP: 1 29.1 kBufur Tank Heat PY Purro	Applance Robotole: MERS 3008 Reference Schefnik: Type 1 Chilling Faire (Dermond) AM 0.55 Anssal Use: OWNYY 0.33 Anssal Use: OWNYY 0.35 Felesacd: 00 PM 0.75 Schwaher AM 0.155 Schwaher AM 0.155 Schwaher AM 0.155 Schwaher AM 0.156 Schwaher AM 0.157 Schwaher AM 0.156 Schwaher AM 0.157 Schwaher AM 0.157 Schwaher AM 0.158 Schwaher AM 0.157 Schwaher AM 0.157 Schwaher AM 0.157 Schwaher AM 0.157 Schwaher AM 0.158 Schwaher AM 0.157 Schwaher AM 0.157 Schwaher AM 0.157 Schwaher AM	APPLIANCES & LIGHTING 2 3 4 7 8 265 055 055 056 056 05 05 203 0.33 0.33 1 0 9 05 204 0.46 0.46 0.50 0.55 0.55 0.55 0.55 2041 0.46 0.46 0.46 0.56 0.57 0.57 0.55 0.55 0.57 0.57 0.57 0.57 0.57 0.57 0.52 0.54 0.454 0.494	9 10 11 12 9 10 33 6.33 6.33 6.33 0.9 0.3 0.3 6.3 0.33 0.9 0.3 0.5 0.55 0.646 1 0.977 0.672 0.57 0.466 0.43 0.756 0 0.57 0.666 0.633 0 0.587 0.360 0.43 5 0.5 0.8 0.85 1
HOT W E Cap 8 Rystem Tryle 6.6 Cap 1 Techte 6.87 40 gal celector Tryle Celector Celector celector Tryle Celector Celector 0 Location R-Valee Area 1 Attic 6 346.4 ft	ATER SYSTEM Use SetPit Creefs B System Type Stat day Teste 1 Electro Strap Heat Social Hold Area Loss Cost Hold Water. Ourface Abood, Trans Task Task Administr Area Loss Cost Prod. Carr Virlame U-Virla DUCTS DUCTS Coston Area Number Lealage Type Are Location Area Number Lealage Type Handler Creating and the Strapped On Interior TEMPERATURES	HATING SYSTEM Efficiency Capacity COP 1 29 1 kBlank Tank Heat PV Perroy e Burf Area Such Eff Perroy Percent CPM 55 Lealage QN RLF	Applance Robotile MERS 2008 Reference Schoftler Type 1 Celling Face (Servers) AM 0.55 Pansal Liber (WMP) 0.33 Anstal Liber (WMP) 0.33 Silverseed (to PM 0.75 0.55 Silverseed (to PM 0.77 0.155 Silverseed (to PM 0.77 0.37 Silverseed (to PM 0.77 0.37 Silverseed (to PM 0.77 0.52 Silverseed (to PM 0.75 0.52 Silverseed (to PM 0.77 0.52 Silverseed (to PM 0.75 0.52 Silversee (to PM 0.75 0.52 Silversee (to PM 0.75 0.52	APPLIANCES & LIGHTING 2 3 4 5 Month 655 0.65 0.65 0.65 0.65 0.65 0.03 0.23 0.23 0.23 0.25 0.25 0.66 0.66 0.66 0.66 0.66 0.65 0.27 0.64 0.64 0.65 0.27 0.56 0.27 0.57 0.65 0.628 0.292 0.244 0.66 0.616 0.29 0.29 0.51 0.57	9 10 11 12 0 0.33 0.33 0.33 0.33 0.33 0.5 0.5 0.5 0.65 0.65 0.65 0 0.454 1 0.977 0.027 0.026 0.440 0.198 0 0.57 0.456 0.440 0.508 0.200 0.430 0.198 0 0.5 0.5 0.486 0.55 1 0.5 0.55 0.375 0.375 0.375 0.475 0.12 0.111 0.12 0.111 0.12 0.111 0.12 0.111 0.12 0.111 0.12 0.111 0.12 0.111 0.12 0.111 0.12 0.111 0.12 0.111 0.12 0.111 0.12 0.111 0.12 0.111 0.12 0.111 0.111 0.111 0.111 0.111 0.111 0.111 0.111 0.111 0.111 0.111 0.111 0.111 0.111 0.111 0.111 0
HOT W 9 tystem Type 65 Cap 1 Electic 0.47 40 gal colector 790 78 colector 790 78 in Gappin	ATER SYSTEM Live & & definit Creets & & dystem Type did git Vita deg Texe & 1 Excel data filter Head Bound Standard Control of the Standard Control of	HEATING SYSTEM Efficiency Capacity COD*1 281189047 Table Head PV Pemp as Bof Area Bob Eff Pemped Energy Percent CFM 45 Lealage QN RLF 133.92 of 10.43 % 0.06 0.80	Applance Robotile MERS 2008 Robotile Schoftler Type M 0.85 Cerling Fain (Germer) AM 0.85 Schoftler Type 0.33 0.35 Schoftler Type 0.35 0.35 Schoftler Type 0.35 0.45 Schoftler Type 0.37 0.37 Schoftler Type AM 0.36 Schoftler Type AM 0.37 Schoftler Type AM 0.37 Schoftler Type AM 0.37 Schoftler Type AM 0.36 Schoftler Type AM 0.37 Schoftler Type AM 0.37 Schoftler Type AM 0.37 Schoftler Type AM 0.36 Schoftler Type AM 0.40 Schoftler Type AM 0.40 Schoftler Type AM 0.56 Schoftler Type AM 0.56 Schoftler Type AM 0.56	APPLIANCES & LIGHTING 2 3 4 7 8 265 055 055 055 055 055 055 0.03 0.33 0.33 1.0 0.9 0.9 0.641 0.46 0.446 0.446 0.426 0.51 0.641 0.528 0.257 0.57 0.51 0.59 0.55	9 10 11 12 0 0.33 0.33 0.33 0.33 0.33 0.3 0.3 0.33 0.33 0.33 0.33 0.3 0.3 0.33 0.33 0.33 0.33 0.5 0.466 1 0.577 0.627 0.577 0.57 0.456 0.464 0.520 0.448 0.199 0.466 0.0 0.297 0.030 0.2010 0.308 0.2015 0.468 0.50 0.47 0.0 0.297 0.457 0.456 0.55 1 0.420 0.431 0.420 0.41 0.0 0.297 0.456 0.55 1 0.420 0.41 0.41 0.416 0.12 0.11 1 0.486 0.31 0.28 0.211 0.28 0.211 0.28 0.211 0.28 0.211 0.28 0.211 0.28 0.211 0.28 0.211 0.28 0.211 0.28
HOT W 8 dystam Type 65 Cap 1 bester 627 40 gal 1 bester 628 Cap 2 bystam Type Collector 78 2 bystam Type	ATER SYSTEM Live Suffert Crocks B System Type Object Vid deg Tealer SOLAR HOT WATER SOLAR HOT WATER Ourface Outface Outface DUCTS Du	Hartmo, SYSTEM Biflicknoy Capacity COP 1 29 1 MM/r Tank Heat PV Period Buff-kenzy Period Funget Period CPM 35 Lakage CPM 35 Lakage QM RLF 133.92 of 10.43 IS 0.06 QM RLF 134.92 of 10.43 IS 0.06 QM RLF 126.90 floot Netry QBM RLF CM 35 Lakage QM 10.43 IS 0.06 Merry Difference QBM RLF Line State Ref	Applance Bylachie, HB/RE 2008 Refuere Scholink Type 1 Celling Fairs (Bernard) AM 0.55 Anssal Line: 0.51077 0.33 Anssal Line: 0.51077 0.33 Filesaud: 0.9 P.4 0.75 Cistline Wahrer AM 0.105 0.79 Cistline Wahrer AM 0.125 0.79 Cistline Wahrer AM 0.126 0.79 Sinteaude 0.79 AM 0.76 0.75 Sinteaude 10 PM 0.76 0.76 0.76 Sinteaude 10 PM 0.76 0.76 0.76 0.76 Sinteaude 10 PM 0.26	APPLIANCES & LIGHTING 2 3 4 5 Month 045 046	9 10 11 12 1 0.33 0.33 0.33 0.33 2 0.449 1 0.977 0.827 0.51 0.466 1.4 0.517 0.626 0.54 0.547 0.527 0.526 0.521 0.5 0.5 0.56 1.055 0.561 5 0.5 0.68 0.551 0.565 0.231 5 0.5 0.68 0.551 0.51 0.51 0.51 0.51 0.51 0.51 0.51 0.51 0.51 0.51 0.51 0.51 0.51 0.51 0.51 0.51 0.52 0.52 0.52 0.52 0.51 0.52 0.53 0.52 0.53 0.55 0.55
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HOT W 8 dystam Type 65 Cap 9 dystam Type 69 Cap 9 dystam Type 0.00 Colector 1 dystam Type	ATER SYSTEM # Like BigHolt Crodels # BigHolt Trans Big al 40 deg Nation 1 Excellent trype S Solark HOT WATER Solark HOT WATER Solark HOT Water Like Gerface Associo Trans Taskin Like Outface Associo Trans Taskin Like Outface Nation Leakage Type Art Controlin Area Solark HOT Water Nation Controlin Controlin Solark HOT Water Nation <td>Hart NO. SYSTEM Capacity COP 1 29 1 MM/r Tank Per 1 MM/r Tank Per 1 MM/r Tank Next Propert Per 1 MM/r CPM 5 Percent CPM 55 Lakage QN RLF 130.92 of 10.43 % 0.06 Model Nerv Nerv Differ V 11 12-0 10 Nerv Differ Nerv Differ Nerv Differ Nerv Differ 12-0 11 12-7 78 78 78 78 78 78 78 78 78 78 78</td> <td>Applance R/Achile: MERS 2008 Reference Schoftle: Type 1 Celling Faire (Summer) AM 0.55 Anstal Lise: 01007 MM 0.35 Anstal Lise: 01007 MM 0.35 Scheide: Der Mark 0.35 Scheideard: Der Mark 0.455 Scheideard: Der Mark 0.455 Scheideard: Der Mark 0.46 Scheideard: Der Mark 0.46 Scheideard: Der Mark 0.48 Scheideard: Der Mark 0.52 Scheideard: Der Mark 0.54 Scheideard: Der Mark 0.52 Scheideard: Der Mark 0.54 Scheideard: Der Mark 0.52 Scheideard: Der Mark</td> <td>APPLIANCES & LIGHTING 2 3 4 5 60 0.65 0.55 0.55 0.65 0.65 0.55 0.65 0.55 0.55 0.65 0.65 0.55 0.35 0.84 0.94 0.94 0.31 1 0 0.95 0.84 0.94 0.94 0.95 0.37 0.38 0.37 0.37 0.84 0.94 0.046 0.041 0.96 0.56 0.27 0.37 0.37 0.35 0.28 0.37 0.38 0.37 0.36 0.57 0.37 0.31 0.36 0.36 0.56 0.67 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.35 0.46 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47</td> <td>9 10 11 12 1 0.33 0.33 0.33 0.33 2 0.449 1 0.577 0.827 0.51 0.466 0.43 0.517 0.527 0.52 0.446 1.0527 0.527 0.526 0.51 0.55 0.56 1 0.52 0.626 0.445 1.16 0.51 0.56 0.550 0.46 0.61 0.550 0.53 0.53 0.61 0.55 0.53 0.51 0.79 0.516 0.512 0.77 0.79 0.610 0.55 0.53 0 1 0 1 0 0 0.461 0.55 0.55 0.77 0 1 1 1 0 0 0 1 1 1 1 1 0 0 1 1 1 1 0</td>	Hart NO. SYSTEM Capacity COP 1 29 1 MM/r Tank Per 1 MM/r Tank Per 1 MM/r Tank Next Propert Per 1 MM/r CPM 5 Percent CPM 55 Lakage QN RLF 130.92 of 10.43 % 0.06 Model Nerv Nerv Differ V 11 12-0 10 Nerv Differ Nerv Differ Nerv Differ Nerv Differ 12-0 11 12-7 78 78 78 78 78 78 78 78 78 78 78	Applance R/Achile: MERS 2008 Reference Schoftle: Type 1 Celling Faire (Summer) AM 0.55 Anstal Lise: 01007 MM 0.35 Anstal Lise: 01007 MM 0.35 Scheide: Der Mark 0.35 Scheideard: Der Mark 0.455 Scheideard: Der Mark 0.455 Scheideard: Der Mark 0.46 Scheideard: Der Mark 0.46 Scheideard: Der Mark 0.48 Scheideard: Der Mark 0.52 Scheideard: Der Mark 0.54 Scheideard: Der Mark 0.52 Scheideard: Der Mark 0.54 Scheideard: Der Mark 0.52 Scheideard: Der Mark	APPLIANCES & LIGHTING 2 3 4 5 60 0.65 0.55 0.55 0.65 0.65 0.55 0.65 0.55 0.55 0.65 0.65 0.55 0.35 0.84 0.94 0.94 0.31 1 0 0.95 0.84 0.94 0.94 0.95 0.37 0.38 0.37 0.37 0.84 0.94 0.046 0.041 0.96 0.56 0.27 0.37 0.37 0.35 0.28 0.37 0.38 0.37 0.36 0.57 0.37 0.31 0.36 0.36 0.56 0.67 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.35 0.46 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47	9 10 11 12 1 0.33 0.33 0.33 0.33 2 0.449 1 0.577 0.827 0.51 0.466 0.43 0.517 0.527 0.52 0.446 1.0527 0.527 0.526 0.51 0.55 0.56 1 0.52 0.626 0.445 1.16 0.51 0.56 0.550 0.46 0.61 0.550 0.53 0.53 0.61 0.55 0.53 0.51 0.79 0.516 0.512 0.77 0.79 0.610 0.55 0.53 0 1 0 1 0 0 0.461 0.55 0.55 0.77 0 1 1 1 0 0 0 1 1 1 1 1 0 0 1 1 1 1 0
HOT W 8 dystam Type 65 Cap 9 dystam Type 69 Cap 9 dystam Type 0.00 Colector 1 dystam Type	ATER SYSTEM # Like BigHolt Crodels # BigHolt Trans Big al 40 deg Nation 1 Excellent trype S Solark HOT WATER Solark HOT WATER Solark HOT Water Like Gerface Associo Trans Taskin Like Outface Associo Trans Taskin Like Outface Nation Leakage Type Art Controlin Area Solark HOT Water Nation Controlin Controlin Solark HOT Water Nation <td>Hart NO. SYSTEM Capacity COP 1 29 1 MM/r Tank Per 1 MM/r Tank Per 1 MM/r Tank Next Propert Per 1 MM/r CPM 5 Percent CPM 55 Lakage QN RLF 130.92 of 10.43 % 0.06 Model Nerv Nerv Differ V 11 12-0 10 Nerv Differ Nerv Differ Nerv Differ Nerv Differ 12-0 11 12-7 78 78 78 78 78 78 78 78 78 78 78</td> <td>Applance R/Achile: MERS 2008 Reference Schoftle: Type 1 Celling Faire (Summer) AM 0.55 Anstal Lise: 01007 MM 0.35 Anstal Lise: 01007 MM 0.35 Scheide: Der Mark 0.35 Scheideard: Der Mark 0.455 Scheideard: Der Mark 0.455 Scheideard: Der Mark 0.46 Scheideard: Der Mark 0.46 Scheideard: Der Mark 0.48 Scheideard: Der Mark 0.52 Scheideard: Der Mark 0.54 Scheideard: Der Mark 0.52 Scheideard: Der Mark 0.54 Scheideard: Der Mark 0.52 Scheideard: Der Mark</td> <td>APPLIANCES & LIGHTING 2 3 4 5 60 0.65 0.55 0.55 0.65 0.65 0.55 0.65 0.55 0.55 0.65 0.65 0.55 0.35 0.84 0.94 0.94 0.31 1 0 0.95 0.84 0.94 0.94 0.95 0.37 0.38 0.37 0.37 0.84 0.94 0.046 0.041 0.96 0.56 0.27 0.37 0.37 0.35 0.28 0.37 0.38 0.37 0.36 0.57 0.37 0.31 0.36 0.36 0.56 0.67 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.35 0.46 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47</td> <td>9 10 11 12 1 0.33 0.33 0.33 0.33 2 0.449 1 0.577 0.827 0.51 0.466 0.43 0.517 0.527 0.52 0.446 1.0527 0.527 0.526 0.51 0.55 0.56 1 0.52 0.626 0.445 1.16 0.51 0.56 0.550 0.46 0.61 0.550 0.53 0.53 0.61 0.55 0.53 0.51 0.79 0.516 0.512 0.77 0.79 0.610 0.55 0.53 0 1 0 1 0 0 0.461 0.55 0.55 0.77 0 1 1 1 0 0 0 1 1 1 1 1 0 0 1 1 1 1 0</td>	Hart NO. SYSTEM Capacity COP 1 29 1 MM/r Tank Per 1 MM/r Tank Per 1 MM/r Tank Next Propert Per 1 MM/r CPM 5 Percent CPM 55 Lakage QN RLF 130.92 of 10.43 % 0.06 Model Nerv Nerv Differ V 11 12-0 10 Nerv Differ Nerv Differ Nerv Differ Nerv Differ 12-0 11 12-7 78 78 78 78 78 78 78 78 78 78 78	Applance R/Achile: MERS 2008 Reference Schoftle: Type 1 Celling Faire (Summer) AM 0.55 Anstal Lise: 01007 MM 0.35 Anstal Lise: 01007 MM 0.35 Scheide: Der Mark 0.35 Scheideard: Der Mark 0.455 Scheideard: Der Mark 0.455 Scheideard: Der Mark 0.46 Scheideard: Der Mark 0.46 Scheideard: Der Mark 0.48 Scheideard: Der Mark 0.52 Scheideard: Der Mark 0.54 Scheideard: Der Mark 0.52 Scheideard: Der Mark 0.54 Scheideard: Der Mark 0.52 Scheideard: Der Mark	APPLIANCES & LIGHTING 2 3 4 5 60 0.65 0.55 0.55 0.65 0.65 0.55 0.65 0.55 0.55 0.65 0.65 0.55 0.35 0.84 0.94 0.94 0.31 1 0 0.95 0.84 0.94 0.94 0.95 0.37 0.38 0.37 0.37 0.84 0.94 0.046 0.041 0.96 0.56 0.27 0.37 0.37 0.35 0.28 0.37 0.38 0.37 0.36 0.57 0.37 0.31 0.36 0.36 0.56 0.67 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.35 0.46 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47	9 10 11 12 1 0.33 0.33 0.33 0.33 2 0.449 1 0.577 0.827 0.51 0.466 0.43 0.517 0.527 0.52 0.446 1.0527 0.527 0.526 0.51 0.55 0.56 1 0.52 0.626 0.445 1.16 0.51 0.56 0.550 0.46 0.61 0.550 0.53 0.53 0.61 0.55 0.53 0.51 0.79 0.516 0.512 0.77 0.79 0.610 0.55 0.53 0 1 0 1 0 0 0.461 0.55 0.55 0.77 0 1 1 1 0 0 0 1 1 1 1 1 0 0 1 1 1 1 0
HOT W 8 Bystum Trype 65 Cap 1 Techte 0.87 40 gal 1 Techte 0.87 40 gal Celekotor Trype Techte 0.87 0 Location RVAlize 0 Ref R 0 Ref R 0 Ref R	ATER SYSTEM # Like BigHolt Crodels # BigHolt Trans Big al 40 deg Nation 1 Excellent trype S Solark HOT WATER Solark HOT WATER Solark HOT Water Like Gerface Associo Trans Taskin Like Outface Associo Trans Taskin Like Outface Nation Leakage Type Art Controlin Area Solark HOT Water Nation Controlin Controlin Solark HOT Water Nation <td>Hart NO. SYSTEM Capacity COP 1 29 1 MM/r Tank Per 1 MM/r Tank Per 1 MM/r Tank Next Propert Per 1 MM/r CPM 5 Percent CPM 55 Lakage QN RLF 130.92 of 10.43 % 0.06 Model Nerv Nerv Differ V 11 12-0 10 Nerv Differ Nerv Differ Nerv Differ Nerv Differ 12-0 11 12-7 78 78 78 78 78 78 78 78 78 78 78</td> <td>Applance R/Achile: MERS 2008 Reference Schoftle: Type 1 Celling Faire (Summer) AM 0.55 Anstal Lise: 01007 MM 0.35 Anstal Lise: 01007 MM 0.35 Scheide: Der Mark 0.35 Scheideard: Der Mark 0.455 Scheideard: Der Mark 0.455 Scheideard: Der Mark 0.46 Scheideard: Der Mark 0.46 Scheideard: Der Mark 0.48 Scheideard: Der Mark 0.52 Scheideard: Der Mark 0.54 Scheideard: Der Mark 0.52 Scheideard: Der Mark 0.54 Scheideard: Der Mark 0.52 Scheideard: Der Mark</td> <td>APPLIANCES & LIGHTING 2 3 4 5 60 0.65 0.55 0.55 0.65 0.65 0.55 0.65 0.55 0.55 0.65 0.65 0.55 0.35 0.84 0.94 0.94 0.31 1 0 0.95 0.84 0.94 0.94 0.95 0.37 0.38 0.37 0.37 0.84 0.94 0.046 0.041 0.96 0.56 0.27 0.37 0.37 0.35 0.28 0.37 0.38 0.37 0.36 0.57 0.37 0.31 0.36 0.36 0.56 0.67 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.35 0.46 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47</td> <td>9 10 11 12 1 0.33 0.33 0.33 0.33 2 0.449 1 0.577 0.827 0.51 0.466 0.43 0.517 0.527 0.52 0.446 1.0527 0.527 0.526 0.51 0.55 0.56 1 0.52 0.626 0.445 1.16 0.51 0.56 0.550 0.46 0.61 0.550 0.53 0.53 0.61 0.55 0.53 0.51 0.79 0.516 0.512 0.77 0.79 0.610 0.55 0.53 0 1 0 1 0 0 0.461 0.55 0.55 0.77 0 1 1 1 0 0 0 1 1 1 1 1 0 0 1 1 1 1 0</td>	Hart NO. SYSTEM Capacity COP 1 29 1 MM/r Tank Per 1 MM/r Tank Per 1 MM/r Tank Next Propert Per 1 MM/r CPM 5 Percent CPM 55 Lakage QN RLF 130.92 of 10.43 % 0.06 Model Nerv Nerv Differ V 11 12-0 10 Nerv Differ Nerv Differ Nerv Differ Nerv Differ 12-0 11 12-7 78 78 78 78 78 78 78 78 78 78 78	Applance R/Achile: MERS 2008 Reference Schoftle: Type 1 Celling Faire (Summer) AM 0.55 Anstal Lise: 01007 MM 0.35 Anstal Lise: 01007 MM 0.35 Scheide: Der Mark 0.35 Scheideard: Der Mark 0.455 Scheideard: Der Mark 0.455 Scheideard: Der Mark 0.46 Scheideard: Der Mark 0.46 Scheideard: Der Mark 0.48 Scheideard: Der Mark 0.52 Scheideard: Der Mark 0.54 Scheideard: Der Mark 0.52 Scheideard: Der Mark 0.54 Scheideard: Der Mark 0.52 Scheideard: Der Mark	APPLIANCES & LIGHTING 2 3 4 5 60 0.65 0.55 0.55 0.65 0.65 0.55 0.65 0.55 0.55 0.65 0.65 0.55 0.35 0.84 0.94 0.94 0.31 1 0 0.95 0.84 0.94 0.94 0.95 0.37 0.38 0.37 0.37 0.84 0.94 0.046 0.041 0.96 0.56 0.27 0.37 0.37 0.35 0.28 0.37 0.38 0.37 0.36 0.57 0.37 0.31 0.36 0.36 0.56 0.67 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.35 0.46 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47 0.47	9 10 11 12 1 0.33 0.33 0.33 0.33 2 0.449 1 0.577 0.827 0.51 0.466 0.43 0.517 0.527 0.52 0.446 1.0527 0.527 0.526 0.51 0.55 0.56 1 0.52 0.626 0.445 1.16 0.51 0.56 0.550 0.46 0.61 0.550 0.53 0.53 0.61 0.55 0.53 0.51 0.79 0.516 0.512 0.77 0.79 0.610 0.55 0.53 0 1 0 1 0 0 0.461 0.55 0.55 0.77 0 1 1 1 0 0 0 1 1 1 1 1 0 0 1 1 1 1 0

Appendix 4 Southern Energy Standard Perfect Input Summary

Registration #:	1 Energy Home	Title: Southerr	STD construction	std - perfect	TMY City: I Elec Util	Louisiana	verage	BAIHP / Southern E	BUILD nengy Homes	ING EN Itle: Southern			TMY Cit Elect Gast	y: LA_BATONRO Itil: Louisiana Ave Itil: Louisiana Ave
End-L			Energy Consum	ption	Ani	nual Cost		Registration #:		ST	D construction		Run Date	: 12/26/2007 14:
Coc	g (36 kBtulhr) bling Fan chanical Vent Fa	6	661	5 kWh 9 kWh KWh		\$232 \$54 \$ 0		Rotation Energy	Cooling Use Fan Energy	Cost Ener	Heatin gv:Uze <u>Fa</u>	9	ast Total Energy	HERS Index e-R
Tota	al Cooling g (36 kBtu/hr)		357	5 kWh 3 kWh		\$286 \$672		0 2660 45 2634	kWh 602 kWh kWh 644 kWh	\$261 333 \$279 341	0 kWh 16 9 kWh 16	2 kWh \$2 7 kWh \$2	79 23.018 MBti 87 24.109 MBti	110.48 113.69
Hea	ting Fan/Pump chanical Vent Fa		0	kWh kWh		\$32 \$ 0		90 2928 135 2632 180 2568	kWh 643 kWh	\$278 324	4 kWh 15	0 kWh \$2 6 kWh \$2 9 kWh \$2	73 23.472 MBt	112.07
Hot Wa			405:	5 kWh 5 kWh 5 kWh		\$704 \$324 \$0		225 2877 270 2937	kWh 855 kWh kWh 870 kWh	\$282 334 \$289 321	0 kWh 16 4 kWh 16	3 kWh \$2 0 kWh \$2	80 24.010 MBtr 75 24.031 MBtr	113.55 113.76
	Water Pump al Hot Water		405	5 kWh 5 kWh		\$0 \$324 \$0			kWh 641 kWh epresent the most re is were not used, the	cent analysis v	then worst cas		ed. For ratings w	here default
Clothe Dishwa	s Washer			0 kWh 0 kWh		\$0 \$0		the entered bu	lding, Select Report	s Annual Simu	ation to view e	nergy use fro	m the current buil	ding.
Dryer Lightin Miscell	g laneous		1841	1 kWh 9 kWh 8 kWh		\$71 \$147 \$180								
Pool P Range	ump		44	0 kWh 7 kWh		\$0 \$36								
Refrige			2263	5 kWh		\$62								
Total ((Therms) (Oil Gellons)		0 T 0 G	herms allons		\$0 \$0								
	(Propane Gallon oduced (kWh)* mes net metering)		allons 3 kWh		\$0 \$0								
Total C	lost		-			\$1810								
	SO2	s (Calculated	i as Total - PV Pro	78.	.06 Lbs.									
	NOX CO2				15 Lbs. 42 Tons									
6/2007 2:33 PM		Energy	Gauge® / U&RRB v2.	7.02			Page 1 of 1							
								12/26/2007 02:26 PM		EnergyGauge	5 USA - FlaRes20	07/ beta01		Page
CCa 2007 Clineace LA BATONROUGE fact 12/2/2007	Prototype Savings Vh Therms MBTU Cost Site Sit 0 21.57 610 18.7% Sit 0 20.727 466 18.3% Site 0 20.727 466 34.5%	0 13.061 3 0 13.061 3 0 2.376	530 0 8,051 169 18,7% 114 0 7,315 162 -2.4% 178 0 8,057 7.8 -2.9% 178 0 8,057 7.8 -2.9%	0 18.629 436 0 2.283 54 0 0.358 54	0 2.000 67 0 2.001 67 0 2.001 48 0 10.376 243	60 0 0.036 16 0.0% 60 0 69,468 1609 14,8% 0 0 0.000 0	0 69.458	Ca 2007 Cinese. IA. BATOVROUCE 564 2028/2020-2020	Prototype Savings Whh Therms Barlu Cost Source 8x7 0 84.351 510 18.3% 9x8 0 84.453 46 18.3%	834 0 41337 307 315% 138 0 34 261 898 0 7.504 66	580 0 25,440 169 18.7% 1144 0 23,116 152 -2.4% 1775 0 19.142 158 -2.6%	3.969 58.858 7.213	0 1.132 8 0 9.003 67 0 2.221 18 0 8.512 48 0 3.2.187 243	87 0 2.011 1.6 0.0% 60 0 2.19.5.50 1603 14.8% 0 0 0.000 0 14.8% 60 0 0.000 0 14.8%
ary 2 ad - per	6577 8073 8073	35.5	2 2 2	3 8 4	- २० ४ ७ ७	187 20360	20360 8A2.7	nerica mary 20 ad - perfect	WN 82 05 17	8 15 8	21	N 30	두 16 17 18 28	6 187 1 20360 0 0 1 20360
Building America Site Energy Summary 2007 Project Tels: Southem Energy E3303 - aid - perfect	Cost 612 564 44	448 362 66	232 148 122 28	436 54 8	67 16 48 243	1891 1891	530 1891 EnergyGauge USA		Cost 612 564 48	448 382 66	232 148 122	26 436 54	67 67 16 48 243	011 15 634 1891 634 1891 634 1891
Energ	Benchmark ms MBTU 0 24.110 0 24.088	19.104 16 2.825	9.903 7.145 6.888	18.633 2.263 0.368	2.064 2.064 2.064 10.376	0.636 81.630 0	81.530 Energ	Building / urce Energy S southem Energy Ess	Benchmark ms MBTU 0 82.609 0 76.065 0 6463	60.367 51 8.927	31.293 22.677 18.608	3.969 58.879 7.213	1.132 9.003 8.623 32.767	257.634 257.634 0 257.634
Site B	Bench	000	0 000	000		000		Source		000	0 00	0 00	00000	0 0 0 0
	Ц.	0-5	AL						Ther	A - 7	N			hinar
	KWh 7863 7064	5699 4771 828	2902 2094 1728	5461 688 689	836 206 805 3041	187 23895 0	23896		KWh 7863 7064 899	5599 4771 828	2902 2094 1728	368 5461 689	105 836 805 3041	187 23695 0 23895
	1				ClothesDryer. ClothadDryer. Dishwasther. Cooking Other Apple:		Net:	BAIHP / Southern Energy Homes	End Use: Talai Space Haating: Haating Forc Haating Forc	Total Space Cooling: Cooling: Cooling Fan:		Plug Lighting Appliance Subtrati Refrigerator:	ClothesWasher. ClothesDryer. Dishwasher. Cooking Other Apple:	OAVertilation Fan: Total: Generation(PV); Net:

Appendix 5 Southern Energy Standard Perfect Output Summaries

	ilding Input Summary Report	Building Input Summary Report	
Title: Bouthern Energy E Boliding Type: User Owner: BAHP / Southern I Bolider Name: Perint Office Avridetion: Family Type: Single-family Commet: sofit construction	6303 - soff Adress Type: Btreet Address NewrExisting: New (From Plans) Lot #	Wall conclusion before in an endered. Actual concretation is monofiled by initial angual advant. In "Privace" section also Private To Wall Type. RV value. Private Private Private Private	Framing Fraction Bolar 0.23 0.8 0.23 0.8 0.23 0.8 0.23 0.8 0.23 0.8 0.23 0.8 0.23 0.8 0.23 0.8
	CLIMATE	7 E. Exterior Frame - Wood 11 5.1 0 9.25 0 47.17 M	0.23 0.6
Design Location LA, Baton Rouge I	Design Temp Init Design Temp Heating Design 17my 584 575 % 25% Winter Bummer Degree Days Mosterre LA_BATONROUGE 29 90 70 75 1670 51 UTILITY RATES	1 insulated None 0.6 3 0 62	
Alta liqui licia	y Name Monthly Flead Cost \$/Ur siana Average 0 0.0.0	2 Insulated Note 0.6 3 0 67 WINDOWS	0 20.1 M ^a
Natural Gas Therm Louis Fuel Oil Gallon Louis	slana Average 0 1.0 Isana Defaut 0 1.1 Isana Defaut 0 1.4 SURROUNDINGS	Onit Frame Panes NTRC Li-Factor 6H0C Blom Area Degli Rogandini Internor 1 TM Double (Dead Yes 045 047 N 2254 07581)1831 Douged 2 TM Double (Dead Yes 045 047 N 2254 07581)1831 Douged	blinds Exterior 50
Omt Type	Shade Tieles Adjacent Buildings Height Width Distance Exist Height Width	3 Tim Double (Clean) Yes 045 0.07 N 22517 013101 100 100 100 100 100 100 100 100	e Exterior 50
N None NE None E None SE None		σ π 5 Tani Double (Data) Yes 655 647 N 11.35 D 75.010.25 D 00.000 6 Tani Output Tani Output Yes 655 647 N 11.35 D 15.010.05 D 00.000 D 1600 D	e Exterior 501
S None SW None W None		INFLTRATION & VENTING Forced Ventilation	Tertain/Wind
# RoorType	th th th th th FLOORS Exposed Perimeter Wall Ins. R-Value Area Roor Joint R-Value Tile Wood	Phi Multiod SLA CPM 250 SLA Escl. A ACH 30 Buggby Exhaust Ran Time Proposed ACH 0.00006 1603 86.1 1607.5 2.0 0 0 Carpet MASS MASS MASS MASS MASS MASS MASS	Shielding Suburban / Suburban
1 Crawbpace	177 ft 0 1732 ft 11 0 0.25 ROOF	0.75 Mass Type Area Thickness Furthur Faction No Added Mass 0 #* 0 # 0.3	
# Roof Type	Attic Roof Golar Deck Attic Vent Materials Attic Type Asea Color Absort RB6 Insul. Ratio (11) specifics shincles Fell attic 1722 ff Dank 0.96 N 0. 320		Fans Cross Ven
	CEILING	14 deg 1 Central Unit 0.6567; 13 36 k6nuhr 1080 ctm 0.75	
Cerling Type Under Attic	R-Value Area Firaming Fraction Truze 19 17322 M ⁴ 0.11 W		
12/27/2007 8:46 AM	Energy@auge@/UGRRIBv2.7	ge 1 of 4 12/27/2007 6/46 AM Energy@auge@/ USRRIB v2.7	Page 2 of 4
Bu	ilding Input Summary Peport	Building Input Summary Penort	
	ilding Input Summary Report	Building Input Summary Report	
HOT V 8 System Type EF Cap	VATER SYSTEM HEATING SYSTEM Use: Salfield Crotifs Ø System Type Efficiency Cagao 80 gal 140 deg Noise 1 Electric Brig Heat COP 1 30 1951	APPLIANCES & LIGHTING Applance Boholdile: MER8 2008 Reference Scholdile Type 1 2 3 4 5 6 7 8 9 10	11 12
HOT V System Type EF Cap Electric 0.87 40 gal Collecto	VATER SYSTEM HEATING SYSTEM Use SetPht Credts 5 System Type Efficiency Capaci Bd-gal 140 deg None 1 Electric Strp Heat C.CP-1 36 Mists SOLAR HOT WATER	APPLIANCES & LIGHTING Appliance Boekine 196 12 3 4 7 8 9 10 Childy Fare (Borning) 1 2 3 4 7 8 9 10 Childy Fare (Borning) 4 0.65	0.33 0.33 0.93 0.9 0.65 0.977 0.672
HOT V 8 System Type 65 Cap 1 Electric 087 40 gal Dollecto Cellector Type Tit	VATER SYSTEM HEATING SYSTEM Use Supplier Credits Ø System Type Efficiency Capacity Biggal 16 deg None 1 Excite distributed COP-1 36 distributed SOLAR HOT WATER C Guindage Tank Tank Tank Heat P c Sufface Ableside Corr. Values Sufface Sufface Heat P c Sufface Ableside Corr. Values Sufface Sufface Heat P DUCTS DUCTS Corr. Sufface Sufface <t< td=""><td>APPLIANCES & LIGHTING Applance Schedule: ME/85 2008 Ruference Moars Moars Moars % % 10 Geleg Targe (Semmed) 1 2 3 4 6 7 8 10 Geleg Targe (Semmed) AM 6 65 65 665 65 63 0.34 0.44 4.44 4.44 4.44 4.44 4.45 4.46 6.46 0.64 0.64 0.627 6.27 <</td><td>0.33 0.33 0.9 0.65 0.977 0.672 5 0.43 0.198 6 0.592 0.443</td></t<>	APPLIANCES & LIGHTING Applance Schedule: ME/85 2008 Ruference Moars Moars Moars % % 10 Geleg Targe (Semmed) 1 2 3 4 6 7 8 10 Geleg Targe (Semmed) AM 6 65 65 665 65 63 0.34 0.44 4.44 4.44 4.44 4.44 4.45 4.46 6.46 0.64 0.64 0.627 6.27 <	0.33 0.33 0.9 0.65 0.977 0.672 5 0.43 0.198 6 0.592 0.443
HOT V System Type EF Cap Electric 0.87 40 gal Collecto	VATER SYSTEM HEATING SYSTEM Use SelPhit Credits Ø System Type Efficiency Capaci Biggal 160 deg None 1 Excite distributed COP-1 38 MSta SOLAR HOT WATER Surface Abit of the distributed Capacity Tank Tank Tank Head P Commb Asea Lose Coef Prod Carr. Volume Uvalue Surface Surface <td>Applance Schedule: ME/RS 2000 Ruberence Schedule Type Notice Status Applance Schedule: ME/RS 2000 Ruberence Schedule Type 1 2 3 4 7 8 9 10 Certing Targe Stemmed Elemetry 1 2 4 5 65 0.65 0.33 0.35 0.57</td> <td>0.33 0.33 0.9 0.65 0.977 0.672 5 0.43 0.196 6 0.522 0.443 7 0.363 0.291 0.95 1</td>	Applance Schedule: ME/RS 2000 Ruberence Schedule Type Notice Status Applance Schedule: ME/RS 2000 Ruberence Schedule Type 1 2 3 4 7 8 9 10 Certing Targe Stemmed Elemetry 1 2 4 5 65 0.65 0.33 0.35 0.57	0.33 0.33 0.9 0.65 0.977 0.672 5 0.43 0.196 6 0.522 0.443 7 0.363 0.291 0.95 1
HOT V 5 Rystem Type 55 Cap 1 Eacite: 847 43 gat Celecte: 847 43 gat Celecter Type 74 Celecter Type 74 Location RValue Area 1 Intensor 6 3484	VATER SYSTEM HEATING SYSTEM Use 6x84hrt Creeds 8 System Type Efficiency Capaci 050 gal 140 deg None 1 Excite strip-fixed COP*1 28 Mits 50CLAH FOTWATER Corr Values Social Hot You Watter Task Task Task None	APPLIANCES & LICHTING AppLiance Bounde: MERS 2006 Reference AppLiance B & LiCHTING Balance Bounde: MERS 2006 Reference 1 2 3 4 7 8 9 10 Celling Family Demond 1 2 3 4 5 6 9 10 Celling Family Demond AM 0.65 0.65 0.65 0.65 0.55 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.35 0.55 0.57 0.	0.33 0.33 0.9 0.65 0.977 0.672 0.43 0.196 0.502 0.443 7 0.363 0.281 0.95 1 0.95 1 0.65 0.375 0.12 0.11
HOT V 5 System Type 5F Cap 8 Electric 887 40 gat celector Type T4 	VATER SYSTEM HEATING SYSTEM Use Suthit Crudes & System Type Efficiency Capaci Big of 16 deg None 1 Electric strip Heat COP 1 distribu- SOLAR HOT WATER c Griffice Association of the Strip Heat Capacity Strip Heat Strip Heat Strip Heat Strip Heat Strip Heat Strip	APPLIANCES & LICHTING AppLiance Bounder: MEIRO 3008 Reference Schednich Taylor 1 3 4 3 6 7 8 9 10 Schednich Taylor 1 2 3 4 3 6 7 8 9 10 Collage Family General: Britisher AM 0.65 0.65 0.65 0.65 0.65 0.65 0.57 0.55	1 0.33 0.33 0.33 0.9 0.65 0.657 0.977 0.672 0.672 0.43 0.196 0.335 0.562 0.443 0.196 0.955 1 0.955 1 0.955 0.375 0.375 0.375 0.055 0.375 0.375 0.375 0.051 0.288 0.375 0.288 0.555 0.535 0.535 0.535
HOT V 9 System Type 6.5 Cap 1 Bechte 8.87 40 gal 1 Bechte 8.87 40 gal celector Type T.e. 00 kector	VATER SYSTEM HEATING SYSTEM Use SedPhit Creeds Ø System Type Efficiency Capaci Bid gal Hod eg None 1 Excite strip-fixed COP 1 30 Mbs SOLAR HOT WATER Solark HOT WATER Task Task Task Task Head ega Shoke FP atmost Lose Coef Prod. Corr Visium Uvisiue Burface Solark HOT WATER moder Dubrits Corr Task Task Task Head free Shoke FP atomoth Area None Corr Visium Uvisiue Burf Area Shoke FT Processt moder Mader Off S Prodem CPM S5 Leadage QN mitted #66 #F 1 Propond Qn Interior 7.2.0 dm 10.5. 0.01 Off Mark Off Mark Off Mark Off Mark Off Mark Off Mark Off Mark Off Mark Off Mark Off Mark Off	Applance 8 Subdet Miles Applance 8 Subdets Miles 1 2 3 4 5 Fours Biologic Miles 1 2 3 4 5 6 5 5.33 0.34 0	1 0.83 0.33 0.5 0.977 0.672 0.672 0.672 0 0.30 0.201 0.05 0 0.43 0.196 0.201 0.957 0.652 0.443 0.196 0.955 1 0.55 0.315 0 0.51 0.261 0.55 0.55 0.51 0.263 0.55 0.55 0.55 0.77 0.55 1
HOT V 8 System Tryse 6.5 Cap 9 Berlen 0.27 40 gal 1 Techte 0.27 40 gal celector Trace 0.27 40 gal celector Trace 0.27 40 gal celector Trace 0.28 Colorestor 9 Location RVAse Arec 1 Interior 0.386.4 Programable File Programable Thermostat N State State State Conding Of Ariting Main HERD Stote Arec Arec	VATER SYSTEM HEATING SYSTEM Use 6x69xt Credes 8 system Type Efficiency Capacity 00 gai 140 deg None 1 Excellent strap-field CCP*1 38 Usbs SOLAR HOT WATER SOLAR HOT WATER Task Task Task Task Head P Address Loss Code Prod. Code Volume Uvalue Buf Area & Soch Eff P Address Loss Code Prod. Code None Soch Area & Soch Eff P Loss Code Prod. Code None Code None Soch Area & Soch Eff P Loss Code Prod. Code Marce 12.02 dm 160 % Soch TempEratures Code Soch Prod. Marce 70.02 % Soch Prod. None	APPLIANCES & LICHTING Appliance Boardie: HERE 2016 Reference Statution: Tell Appliance Boardie: HERE 2016 Reference Statution: Tell Norm Pump di Binnyy Celling Tain (Grummed) Annual Use: 01W077 1 2 3 4 5 9 10 Celling Tain (Grummed) di Binnyy AM 0.65 0.65 0.65 0.65 0.55 0.53 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.35 0.51 0.57 0.	1 0.33 0.33 0.33 0.5 0.65 0.65 0.977 0.672 0.443 0 0.562 0.443 0.79 0.55 0.383 0.291 0.955 1 0.55 0.443 0.241 0.41 0.55 0.55 0.55 0.55 0.55 0.55 0.55 0.55 1 1 0 0 0 0.343 0.443 0.443
HOT V 5 bystem Tryse 65 Cap 1 becite 0.27 40 gat 1 becite 0.27 40 gat colector Topolary Colector 0 Location RV-late 0 Location RV-late	VATER SYSTEM HEATING SYSTEM Use Butthit Credels 8 Bydan Type Efficiency Capaci Use Butthit Credels 8 Bydan Type Efficiency Capaci Butthit Credels 1 Efficience may Need CCP+1 DB Mass SOLAR HOT WATER Control Control Task Task Task Task Mark Aeas Soch Efficience a Control Control Valume Livation Stark Aeas Soch Efficience Process Image: Control Feature Leadage Type Art Task Task Feature Child Pencent Pencent Pencent Pencent Pencent Control Feature Control Feature Control Control Stark Control Stark Control	APPLIANCES & LICHTING AppLiance Bounder Ministry 3 4 3 Month Bitelenki Tayle 1 2 3 4 5 8 9 10 Purpo Streteinki Tayle 1 2 3 4 3 4 8 9 10 Gliphing Line (Bornner) Add 0.65 0.65 0.65 0.65 0.65 0.33 0.34	0.33 0.33 0.33 0.9 0.057 0.072 0.077 0.072 0.072 0.037 0.072 0.072 0.030 0.030 0.030 0.030 0.030 0.030 0.030 0.030 0.031 0.11 0.11 0 1 0.121 0.111 1 0.121 0.111 0.121 0.121 0.111
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HOT V 5 Bystem Tryle 55 Cap 1 Techte 0.27 4.9 grd 1 Techte 0.27 4.9 grd Coloration Coloration Coloration 0 Location Notable 0 Marcine 0.346.4 Progenadote Themostate N Progenadote Themostate N Coloration Tryle Notable Notable Society (VD) April 199 Progenadote Themostate N Coloration Tryle Notable Notable Society (VD) April 199 Notable	VATER SYSTEM HEATING SYSTEM Use Butthit Credels 8 Bydan Type Efficiency Capaci Use Butthit Credels 8 Bydan Type Efficiency Capaci Butthit Credels 1 Efficience may Need CCP+1 DB Mass SOLAR HOT WATER Control Control Task Task Task Task Mark Aeas Soch Efficience a Control Control Valume Livation Stark Aeas Soch Efficience Process Image: Control Feature Leadage Type Art Task Task Feature Child Pencent Pencent Pencent Pencent Pencent Control Feature Control Feature Control Control Stark Control Stark Control	APPLIANCES & LICHTING Appliance Bounder: MERS 2010 Reference Statution: Tell Appliance Bounder: MERS 2010 Reference Statution: Tell Norm Pump di Binnyy Celling Tami (Denmini) Annual Use: OWNDY 1 2 3 4 5 8 9 10 Celling Tami (Denmini) di Binnyy Call 0.65 0.65 0.65 0.65 0.55 0.53 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.35 0.51 0.57	0.33 0.33 0.33 0.37 0.427 0.427 0.43 0.55 0.57 0.44 0.59 0.44 0.55 0.44 0.59 0.56 0.386 0.207 0.58 0.205 0.44 0.55 1 0.55 1 0.53 0.28 0.77 0.55 0.33 1 0 0 3 0.571 0.14 0.59 0.543 0.453 0.544 0.544 0.45 0.545 0.45 0.45
HOT V 5 Bystem Tryle 55 Cap 1 Techte 0.27 4.9 grd 1 Techte 0.27 4.9 grd Coloration Coloration Coloration 0 Location Notable 0 Marcine 0.346.4 Progenadote Themostate N Progenadote Themostate N Coloration Tryle Notable Notable Society (VD) April 199 Progenadote Themostate N Coloration Tryle Notable Notable Society (VD) April 199 Notable	VATER SYSTEM HEATING SYSTEM Use Butthit Credels 8 Bydan Type Efficiency Capaci Use Butthit Credels 8 Bydan Type Efficiency Capaci Butthit Credels 1 Efficience may Need CCP+1 DB Mass SOLAR HOT WATER Control Control Task Task Task Task Mark Aeas Soch Efficience a Control Control Valume Livation Stark Aeas Soch Efficience Process Image: Control Feature Leadage Type Art Task Task Feature Child Pencent Pencent Pencent Pencent Pencent Control Feature Control Feature Control Control Stark Control Stark Control	APPLIANCES & LICHTING Appliance Bounder: MERS 2010 Reference Statution: Tell Appliance Bounder: MERS 2010 Reference Statution: Tell Norm Pump di Binnyy Celling Tami (Denmini) Annual Use: OWNDY 1 2 3 4 5 8 9 10 Celling Tami (Denmini) di Binnyy Call 0.65 0.65 0.65 0.65 0.55 0.53 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.35 0.51 0.57	0.33 0.33 0.33 0.37 0.427 0.427 0.43 0.55 0.57 0.44 0.59 0.44 0.55 0.44 0.59 0.56 0.386 0.207 0.58 0.205 0.44 0.55 1 0.55 1 0.53 0.28 0.77 0.55 0.33 1 0 0 3 0.571 0.14 0.59 0.543 0.453 0.544 0.544 0.45 0.545 0.45 0.45
HOT V 5 bystem Tryse 65 Cap 1 becite 0.27 40 gat 1 becite 0.27 40 gat colector Topolary Colector 0 Location RV-late 0 Location RV-late	VATER SYSTEM HEATING SYSTEM Use Butthit Credels 8 Bydan Type Efficiency Capaci Use Butthit Credels 8 Bydan Type Efficiency Capaci Butthit Credels 1 Efficience may Need CCP+1 DB Mass SOLAR HOT WATER Control Control Task Task Task Task Mark Aeas Soch Efficience a Control Control Valume Livation Stark Aeas Soch Efficience Process Image: Control Feature Leadage Type Art Task Task Feature Child Pencent Pencent Pencent Pencent Pencent Control Feature Control Feature Control Control Stark Control Stark Control	APPLIANCES & LICHTING Appliance Bounder: MERS 2010 Reference Statution: Tell Appliance Bounder: MERS 2010 Reference Statution: Tell Norm Pump di Binnyy Celling Tami (Denmini) Annual Use: OWNDY 1 2 3 4 5 8 9 10 Celling Tami (Denmini) di Binnyy Call 0.65 0.65 0.65 0.65 0.55 0.53 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.35 0.55 0.57 0.57 0.57 0.57 0.58 0.52 0.52 0.57 0.57 0.44 Chine Watter AM 0.13 0.13 0.23 0.24 0.24 0.26 0.55 0.52 0	0.33 0.33 0.33 0.37 0.427 0.427 0.43 0.55 0.57 0.44 0.59 0.44 0.55 0.44 0.59 0.56 0.386 0.207 0.58 0.205 0.44 0.55 1 0.55 1 0.53 0.28 0.77 0.55 0.33 1 0 0 3 0.571 0.14 0.59 0.543 0.453 0.544 0.544 0.45 0.545 0.45 0.45
HOT V 5 Bystem Tryle 55 Cap 1 Techte 0.27 4.9 grd 1 Techte 0.27 4.9 grd Coloration Coloration Coloration 0 Location Notable 0 Marcine 0.346.4 Progenadote Themostate N Progenadote Themostate N Coloration Tryle Notable Notable Society (VD) April 199 Progenadote Themostate N Coloration Tryle Notable Notable Society (VD) April 199 Notable	VATER SYSTEM HEATNIG SYSTEM Uba Buthit Credels 6 System Type Efficiency Capaci Uba Staffet Core 1 Electric strap Head OCP 1 Distribution SOLAR HOT WATER Core Table Table </td <td>APPLIANCES & LICHTING Appliance Bounder: MERS 2010 Reference Statution: Tell Appliance Bounder: MERS 2010 Reference Statution: Tell Norm Pump di Binnyy Celling Tami (Denmini) Annual Use: OWNDY 1 2 3 4 5 8 9 10 Celling Tami (Denmini) di Binnyy Call 0.65 0.65 0.65 0.65 0.55 0.53 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.35 0.55 0.57 0.57 0.57 0.57 0.58 0.52 0.52 0.57 0.57 0.44 Chine Watter AM 0.13 0.13 0.23 0.24 0.24 0.26 0.55 0.52 0</td> <td>0.33 0.33 0.33 0.37 0.427 0.427 0.43 0.55 0.57 0.44 0.59 0.44 0.55 0.44 0.59 0.56 0.386 0.207 0.58 0.205 0.44 0.55 1 0.55 1 0.53 0.28 0.77 0.55 0.33 1 0 0 3 0.571 0.14 0.59 0.543 0.453 0.544 0.544 0.45 0.545 0.45 0.45</td>	APPLIANCES & LICHTING Appliance Bounder: MERS 2010 Reference Statution: Tell Appliance Bounder: MERS 2010 Reference Statution: Tell Norm Pump di Binnyy Celling Tami (Denmini) Annual Use: OWNDY 1 2 3 4 5 8 9 10 Celling Tami (Denmini) di Binnyy Call 0.65 0.65 0.65 0.65 0.55 0.53 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.35 0.55 0.57 0.57 0.57 0.57 0.58 0.52 0.52 0.57 0.57 0.44 Chine Watter AM 0.13 0.13 0.23 0.24 0.24 0.26 0.55 0.52 0	0.33 0.33 0.33 0.37 0.427 0.427 0.43 0.55 0.57 0.44 0.59 0.44 0.55 0.44 0.59 0.56 0.386 0.207 0.58 0.205 0.44 0.55 1 0.55 1 0.53 0.28 0.77 0.55 0.33 1 0 0 3 0.571 0.14 0.59 0.543 0.453 0.544 0.544 0.45 0.545 0.45 0.45

Appendix 6 Southern Energy Soffit Input Summary

BAIHP / Southern Registration #:		itle: Southern E	ergy Summa inergy ES303 - soffit duct User	TMY City: LA_BATONROUGE Elec Ull: Louisiana Average Gas Ull: Louisiana Average Run Date: 12/27/2007 06:43:21	BAIHP / Southern E		itle: Southern Er		Elec U	r LA_BATONROU til: Louisiana Aver til: Louisiana Aver
End-U	se		Energy Consumption	Annual Cost	Registration #:		soffe	sonstruction	Run Date	12/27/2007 06:43
Coo	g (25.8 kBtu/hr) ling Fan hanical Vent Fan		2591 kWh 598 kWh 0 kWh	\$207 \$48 \$ 0		···· Cooling ····		Heating		HERS
Tota	I Cooling		3189 kWh	\$255	Rotation Energy 0 2423 46 2591	kWh 561 kWh	Cost Energy \$239 6936 k \$255 7031 k	Wh 375 kV	7h \$685 35.138 MBtu	Index e-Rat
Hea	g (21.6 kBtu/hr) ting Fan/Pump hanical Vent Fan		7031 kWh 381 kWh 0 kWh	\$562 \$30 \$ 0	90 2863 135 2565	kWh 814 kWh kWh 591 kWh	\$262 6829 k \$252 6780 k	Wh 370 kV Wh 367 kV	/h \$576 35.755 MBtu /h \$571 35.164 MBtu	
Tota Hot Wa	al Heating		7412 kWh 4055 kWh	\$592 \$324	180 2437 225 2614 270 2678	kWh 604 kWh	\$240 6545 \$257 6937 \$263 6817	Wh 378 kV	/h \$585 35.942 MBtu	
Tota	Water Pump al Hot Water		0 kWh 4055 kWh	\$0 \$324	315 2568 These results r	kWh 592 kWh represent the most rec	\$252 6839 k ent analysis whe	Wh 370 kV n worst case wa	/h \$577 35.390 MBtu is checked. For ratings wh	
Ceiling Clothea Dishwa	s Washer		0 kWh 0 kWh 0 kWh	\$0 \$0 \$0	appliance valu the entered bu	as were not used, the liding. Select Reports	energy values wi Annual Simulatk	Il represent the in to view energ	building used for the HERS y use from the current build	Score and not ling.
Dryer Lighting	g		891 kWh 1840 kWh	\$71 \$147						
Pool Po Range			2248 kWh 0 kWh 447 kWh	\$180 \$0 \$36						
Refrige	erator		775 kWh	\$62						
	kWh) Therms) Oil Gellons)		20957 kWh 0 Therms 0 Gallons	\$1667 \$0 \$0						
Total (Propane Gallons) duced (kWh)*		0 Gallons 0 kWh	\$0 \$0 \$0						
Total C				\$1667						
	Emissions SO2	(Calculated as	Total - PV Produced)							
	NOX CO2		58	94 Lbs. 21 Lbs. 37 Tons						
27/2007 8:45 AM		EnarrowCaster	pe8 / USRR8 v2.7.02	Page 1						
					12/27/2007 08:45 AM		Energy@auge@U	3A - FlaRes2007/ 1	eta01	Page 1
Climates LA_BATONROUGE	Savings 8 Site 5 27.6%	2 39.8% 3	9 18.7% 2 -2.4% 6 -2.9% 6 0.0% 6 0.0%	50	Chreak, IA, BATONFOUGE	Savings t Source 27.8%	39.8%		8 0.0% 4 0.0% 7 0.0% 8 0.2% 8 0.2% 3 0.0%	6 0.0% 2 20.2% 2 20.2% Pointer 2
Clinate 12/27/2	Cost 438 415 23	NN	25 25 25 25 <u>2</u> 8 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	67 16 48 48 243 243 1502 1502	Climate 12/27/2	Cost 458 415 23	NN	152 128 28	54 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	1502 1502 1502
	MBTU 18.684 17.691	11.623 10 2.110	8.061 7.316 8.067 1.256 1.256 1.256 2.263	2.849 0.703 2.061 10.376 64.937 64.937 64.937 64.937 64.937		MBTU 59.043 56.904 3.139	36.727 30 6.887	23.116 23.116 19.142 3.969	58.868 7.213 1.132 9.003 9.003 8.612 8.512 8.512 3.2.787	205.202 0.000 205.202
	Prototype Therms	000	0 0 0 0 0 0 0			Prototype Therms	000	000		0000
01					2007					
eric ary 20	kWh 5478 5185 291	34.06 27.88 618	2385 1775 3885 3895 889 889 889	836 804 804 9041 187 19032 19032 19032 2.7	mary 2	KWh 5478 5185 291	34.06 27.66 618	2144 2144 368	5480 555 504 504 505 504 505 504 504 504 50	187 19032 0 19032
Building America Site Energy Summary 2007 Southern Energy 85303 - soft duct	Cost 805 667 48	452 386 67	232 148 438 84 84 84 84 84 84 84 84 84 84 84 84 84	4		Cost 805 567 48	452 385 67	232 148 122 26	436 54 67 243 243	011 15 235 1555 1 0 0 0 235 1888 1 EnergyGauge USA 2.7
Energ	MBTU 26.793 23.754 2.038	19.295 16 2.856	9.003 7.145 6.888 6.888 1.258 18.633 2.283	2.049 0.703 2.064 10.378 81.403 81.403 81.403 81.403 81.403 81.403	Suilding /	mark MBTU 81.505 76.084 8.441	60.973 52 9.025	31.293 22.677 18.608 3.969	58.879 7.213 1.132 9.003 2.221 8.623 32.767	257,235 257,235 0 257,235 Energy
Site	5				Source	nch				0 251 0 251
	Ber Therms				00	Therms				
	KWh 7569 6962 597	5856 4818 837	2902 2094 1726 3685 5461 5461	835 206 806 8041 187 23858 23858 23858		KWh 7559 5962 597	5865 4818 837	2902 2094 1728 368	5461 5461 589 589 589 535 505 505 505 505	187 23858 0 23858
BAIHP / Southern Energy Horeas	End Use: Total Space Heating: Heating: Heating Farc	Total Space Cooling: Cooling: Cooling Fan:	Total Hot Wotker: Uptering Survices: Plug Lighting: Plug Lighting: Refinitions Surtication:	Softward Merice Contractions Contractions Contractions Contractions Contraction Contractio	BALHP / Southam Energy Hysnas	End Use: Total Space Heating: Heating: Heating Farc	Total Space Cosling: Cooling: Cosling Fan:	r dan Hot water: Lighting Subiotal: Wired Lighting: Plug Lighting:	Appliance Subdate RefisionerVaahen Coolnaabhen Coolnaabhen Dainnaabhen Coolleing Other Appla:	OAVentilation Fan: Total: Generation(PV); Net:

Appendix 7 Southern Energy Soffit Output Summaries



Appendix 8 Cavalier Standard Typical Input Summary

BAIHP / Southern	i Energy Home T	itle: Southern Er	ergy Sui bergy ES303 - std - User	typical TMY City: I Elec Util	LA BATONROUGE : Louisiana Average : Louisiana Average 12/26/2007 14:06:16	BAIHP / Southern E		NG EN		Elec U	r LA_BATONRO
End-L	lse		Energy Consumption	on Ani	nual Cost	Registration #:		STD	construction		til: Louisiana Aw : 12/26/2007 14:
Coc	g (33.2 kBtu/hr) ling Fan		2998 kV 689 kV	Wh	\$240 \$55		····· Cooling ·····	010	Heating		HERS
Tota	hanical Vent Fan al Cooling		0 KV 3687 KV	Mh	\$ 0 \$295	Rotation Energy 0 2759 45 2934	kWh 628 kWh	Cost Energy \$271 3571 8 \$289 3877 8	Wh 168 kV	/h \$299 24.320 MBtu	114.03
Hea	g (29.1 kBtu/hr) iting Fan/Pump chanical Vent Fan		8916 KV 409 KV 0 KV	/h	\$713 \$33 \$ 0	46 2934 90 3024 135 2931	kWh 694 kWh	\$298 3534 k \$288 3491 k	Wh 168 kV	/h \$296 25.319 MBtu	117.25
	al Heating		9325 kV	Wh	\$746 \$324	160 2764 225 2977 270 3033	kWh 882 kWh	\$274 3493 \$293 3592 \$299 3522	Wh 169 kV	/h \$301 25.325 MBtu	117.14
Hot	Water Pump al Hot Water		0 KV 4055 KV	Nh	\$0 \$324	315 2920	kWh 668 kWh	\$287 3539	Wh 188 kV		115.90
	s Washer		O KV O KV	Wh	\$0 \$0	appliance value	is were not used, the	energy values wi	Il represent the	building used for the HERS y use from the current build	Score and not
Dishwa Dryer Lightin			0 KV 891 KV 1840 KV	Wh	\$0 \$71 \$147						
Pool P Range			2248 KV 0 KV 447 KV	Wh	\$180 \$0 \$36						
Refrige	erator		775 kV		\$62						
	Therms)		23268 kV 0 Therr 0 Gallo	ms	\$1861 \$0						
Total (Oil Gallons) Propane Gallons) duced (kWh)*		0 Gallo 0 Gallo 0 kV	ans.	\$0 \$0 \$0						
Total C			-		\$1861						
		(Calculated as	Total - PV Produce								
	SO2 NOX CO2			80.26 Lbs. 64.94 Lbs. 13.8 Tons							
5/2007 2:07 PM		Francis	pe#/U6RRB v2.7.02		Page 1 of 1						
		man Shows			and a second	12/26/2007 02:22 PM		Energy@auge@U	6A - FlaRes2007/	veta01	Page
Clineae: LA_BATONROUGE	Savings Site 12.7%	29.6%	18.7% -2.4% -2.9%	0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 0.0%	0.0% 13.1% 13.1% page 1	Dives: LA_BATOHPOUGE	Savings Source 12.7%	29.6%	18.7% -2.4% -2.9%	0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 0.0%	0.0% 13.1% 13.1%
Intels: LA_B0 128/2007	504 504 26 26 26 26 26	315 258 57	152 126 26	436 54 8 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7	1641 1: 1641 1: 1641 1	irreats: LA_B6	Cost So 534 So 26		152 126 26 26	436 54 87 843 843 243	1641 1 0 1641 1
95	MBTU 22.784 1.066	13.457 11 2.443	8.061 7.315 8.057 1.256	18.629 2.263 0.358 0.703 2.061 2.061 10.376	0.636 70.874 0.000 70.874	95	MBTU 71.996 68.027 3.399	42.624 36 7.720	26.440 23.116 19.142 3.969	58.858 7.213 1.132 9.003 8.512 8.512 32.767	2.011 223.962 0.000 223.962
			0 0 0 0	0000000	0000		-		0 000		0 22
	Prototype Therms					01	Prototype Therms				
erica try 200	KWh 8877 8585 312	3944 3228 716	2380 2144 388	5480 689 105 835 205 5041	16 187 191 20772 0 0 191 20772 • USA2.7	erica nary 20	6877 6305 312	3944	2360 2144 1775 368	6480 6490 6306 8306 8306 804 804 804	15 187 391 20772 0 0 0 891 20772
Building America Site Energy Summary 2007 Project Tile: Southern Energy E3333 - std - typical	Cost 612 564 48	448 382 66	232 148 122 28	438 54 87 87 87 87 87 243 243	16 1891 1891 Gauge USA:	Building America Source Energy Summary 2007 Southen Energy 5835131-101 - 10156	Cost 612 584 48	448 382 66	232 148 122 26	438 54 87 187 48 243	1891 0 1891
Energy Energy	Benchmark rms MBTU 0 28.110 0 24.088 0 2.042	19.104 15 2.825	9.903 7.145 6.868 1.256	18.653 2.263 0.368 0.703 2.064 10.378	0.038 81.630 155 81.630 18 81.630 18 EnergyGauge	uildin xe Ener.	Benchmark ms MBTU 0 82.609 0 76.065 0 8.453	60.367 61 8.927	31.293 22.577 18.608 3.969	58.879 7.213 1.132 9.003 2.221 8.623 32.767	2011 257.634 18 257.634 18
Site B	Bench	000	0 0 0 0		0000	Sources	Bench 0 0 0	000		0000000	0 0 0 0
	Р.	6699 4771 828	2902 2094 368	5481 589 105 835 206 805 3041	187 395 395		Eer (Wh Therms 7863 0 7064 0 599 0	6699 4771 828	2902 2094 368	5451 5451 589 535 535 505 505 505 505	187 395 395
_	KWh 7863 7064 599	6699 4771 828	2002 2094 1728 368	5481 105 835 208 208 208 3041	187 23895 0 23895	_	KWh 7863 7064	8 17 16	2002 2094 1728 368	2∞-∞40g	187 23895 0 23895
BAIHP / Southern Energy Horees	End Use: Total Space Heating: Heating Heating Fark	Total Space Cooling: Cooling: Cosling Fan:	ul Hot Water: Aing Su biotait Plug Lighting:	Appliance Surfactat Refrigerator: ClothesDhyer CootinaDhyer Datimathor: Cooting Other Apple:	OAVVartiaten Fan: Tolal: Generation(PV); Net:	BAHP / Southern Energy Homas	End Use: Total Space Heating: Heating: Heating: For	Total Space Cooling: Cooling: Cosling Fan:	Total Hot Water: Lighting Subiotal: Wired Lighting: Phys Lighting:	Appliance Subdat: Refrigeraco: Clothes/Mather: Clothes/Mather: Distributer Distributer Cooking Other Applis:	OAVentiation Fan: Total: Generation(PV); Net:

Appendix 9 Cavalier Standard Typical Output Summaries

	PROJECT		Wallerpartnice habes is a set	WALLS level. Actual orientation is modified by rotate angle shown	in "Protect sectors above		
The Ocuthern Energy E6 Bolding Type: User Denot: BAIHP / Gouthern Er Boldes: 1 Boldes:	New/Existing: New (From Plans) Lot #	Street Address	Orest Adjacent To Wall Type N Extends Science + Saveri N Extends Farme - Wood S Extends Farme - Wood W Extends Farme - Wood S Exte	R-Vake Pt In Pt 11 57.6 0 6	Appa Francisco Appa 0 462.4 ft² 0.23 0.8 0 155.5 ft² 0.23 0.8 0 256.6 ft² 0.23 0.8 0 256.8 ft² 0.23 0.8 0 453.2 ft² 0.23 0.8 0 461.5 ft² 0.23 0.8		
	CLIMATE		7 E. Exterior Frame - Wood	11 5.1 0 9.25			
Design Location	Design Temp Int Design Temp Heating Tmy Site \$7.5% 2.5% Winter Summer Degree Dr	ays Moisture Range		DOORS	Width Height		
LA, Baton Rouge LA	ABATONROUGE 29 93 70 75 1670 UTILITY RATES	51 Medium	Omt DoorType Insulated	6torms U-Value None 0.6	3 0 67 0 20.1 ft		
Fuel Unit Utility	oracia actualization	NN 1220343	2 insulated	Note 0.6	3 0 67 0 20.1 M ^a		
Natural Gas Therm Louisia Fuel Oil Gallon Louisia	ana Average 0 ata Average 0 ana Defaut 0 ana Defaut 0	0.08 1.09 1.1 1.4	Ø Omt Frame Pares NFP TIM Double (Clear) Ye	RC U-Factor 8H0C 8tom Area Depth	Nerhang h Separation Interior Shade Screening 0 i 1 ft 0 in Drapes/blinds Exterior 501		
	SURROUNDINGS Shade Trees Adjac	ent Buildings	2 TIM Double (Clear) Ye 3 TIM Double (Clear) Ye	6 0.65 0.67 N 12.519 0.7511	0 1 1 10 in None Exterior501 n 2 11 0 in None Exterior501		
Ornt Type N None	Height Width Distance Exist Height	Width Distance	4 TIM Double (Clear) Ye 5 TIM Double (Clear) Ye		0 i 1 ft 0 in Drapes/blinds Exterior 501 0 i 2.5 ft 0 in Drapes/blinds Exterior 501		
NE None E None		t 01 t 01 t 01	6 TIM Double (Clear) Ye 7 6 TIM Double (Clear) Ye	ns 0.65 0.67 N 45.911° 0.75114	011t0in None Exterior501 011t0in Dzapes/blinds Exterior501		
8 None SW None		n on n on		INFILTRATION & VENTING			
W None NW None		1 01 1 01	1001000 0000 00000 00000 00000 00000 00000 0000		haust Run Time Shielding		
# Floor Type	FLOORS Exposed Perimeter Wall Ins. R-Value Area Floor Joist R-Value	Tile Wood Carpet	Proposed ACH 0.00396 1623 8	39.1 167.5 0.250 7.03 24 MASS	0 0 Suborban / Soborban		
1 Crawbpace	177 ft 0 1732 ft 11 ROOF	0 0.25 0.75	Mass Type No Added Mass	Area Thickness Fumiture Fract	tion		
# Roof Type	Attic Roof Golar E	eck Attic Vent Isul. Ratio (1in) Pitch		COOLING SYSTEM			
		0 300 14 deg		clency Capacity Air Flow ER: 13 36 k9tu/hr 1583 cttv	GHR WH Fans Cross Ven 0.75		
4 Ceiling Type	CEILING R-Value Area Framing Fract	ion Truse Type					
1 Under Attic 2 Under Attic	18 1922 8.11	Wood					
Bui	ilding Input Summary Report	t	Buildir	ng Input Summary R	eport		
HOT W/	ATER SYSTEM HEATIN	IG SYSTEM		APPLIANCES & LIGHTING	eport		
HOT W/ 8ystem Type EF Cap	ATER SYSTEM HEATIN Use Salfest Credits Ø System Type Sitt 80 gal 140 deg None 1 Electric Sittip Heat CI		Appliance Schedsle: HERS 2006 Reference Schedule Type 1 2	APPLIANCES & LIGHTING 3 4 5 6 7	8 9 10 11 12		
HOT W/	ATER SYSTEM HEATIN Live Belfet Credits Ø System Type Effi 80 gal 140 deg None 1 Electric Bitto Heat Cri SOLAR HOT WATER Betricks Adorso, Trais Talk Tank Tai	IG SYSTEM clency Capacity OP: 1 29 1 kBufr nk Heat PV Pamp	Applance 8chedule: H6/R8 2008 Reference Schedue Type 1 2 Ceiling Fans (Semmer) AM 0.65 0.65 % Released: 100 PM 0.33 0.33 Annual Use: 0.WM/Prr	APPLIANCES & LIGHTING 3 4 5 0 7 5 0.65 0.65 0.65 0.65 0.65 0 1 0.03 0.03 0.03 1 0.9 0 4 Vabre 0W25	6 9 10 11 12 1.33 0.33 0.33 0.33 0.33 0.9 0.9 0.9 0.9 0.9 0.85		
HOT W/ System Type EF Cap Electric 0.87 40 gal Collector	ATER SYSTEM HEATIN Use SetPet Creefs S System Type Sitt Sit gal 40 day Nene 1 Event City 64 Sitt SOLAR HOT WATER Software Loss Ceat Prod Cerr Volume U Volume Sitt's	IG SYSTEM clency Capacity OP: 1 20.1 kBtu/tr	Applance Schedule: HE RS 2008 Reference Schedule: 1 2 Celling Taxel (Summar) AM 0.65 0.65 S Released: 100 PH 0.31 0.33 Annual Use: NMM** PM 0.31 0.35 Schedule: 100 NM*** PM 0.155 0.06 Schedule: 0.179 0.05 Schedule: 0.79 0.05	APPLIANCES & LIGHTING 3 4 5 6 7 5 0.65 0.85 0.65 0.65 0.65 0 0.03 0.33 0.33 1 0.9 1 akt Value OWatts 1 0.046 0.046 0.081 0.128 0.256 0	8 9 10 11 12 1.33 0.33 0.33 0.33 0.33		
HOT W/ 9. Bystem Type 5/F C-ce 1. Electric: 0.67 40 gal Collector Type T8 Gappty	ATER SYSTEM HEATIN Live SetPat Crocks 5 System Type Sin 68 gal 49 day Teare 3 Exect days head CT SOLAR HOT WATER Source 20 Control 100 Trains Tank Tank Tank Armoth Area Loss Deat Prod. Contr. Volume UI Value Surf. DUCTS Retro Ar	IG SYSTEM Capacity OP 1 Capacity OP 1 Study New Excli ET Purport Energy Percent	Applance Schedule: HE/RS 2018 Reference Bodeduk Type 1 2 Certing Faces (Summar) AM 0.65 0.65 Stableauer 100 PM 0.33 0.33 Annotal Lauer 0 NMNYr AM 6.779 0.05 Annotal Lauer 0 NMNYr PM 6.139 6.01 Annota Lauer 0 NMNYr PM 0.137 0.27 Chromatolaer 0 NMNYr PM Dithmatolaer 0.137 0.27	APPLIANCES & LIGHTING 3 4 9 5 0.65 0.65 0.65 10 3 3 1 9.5 11 0.45 0.65 0.65 0.65 12 0.33 0.33 1 9.5 14 0.46 0.646 0.656 0.57 15 0.65 0.57 0.58 0.52 0.57 6 1 0.46 0.546 0.658 0.57 0.57 6 0 0.65 0.57 0.58 0.59 0.57 5 0 0.58 0.59 0.57 0.57 6 0 0.55 0.20 0.59 0.57 5 0 0.55 0.35 0.35 0.35 0.35 0.35	8 9 10 11 12 3.33 0.33 0.33 0.33 0.35 0.9 0.9 0.9 0.9 0.5 3.57 0.649 1 0.977 0.672		
HOT W/ B System Type 65 Cap Electric 0.67 40 gal Collector celector Type Tit	ATER SYSTEM HEATIN Use SelPhit Creefs S System Type 670 89 gait 149 day Pense 1 Galeric Gills Head Cri SOLAR HOT WATER Sourch Con XVATER Sourch Con XVATER Sourch Con XVATER DUCTS DUCTS Costing Area Namber Lealage Type Ar Handler 1332 dd	IG SYSTEM Ceiny Capacity OP-1 2011850/r at Feat PV Pemp Fease Excl. Ent Pempet Energy Percent Lealage ON RLF	Applicate Bishedder MSR 2018 Reference 2 Scholmik Type 1 2 Cristies France Scholmik Type 4M 0.65 0.83 Annial Uber OWN/YY 9.33 9.33 9.35 Annial Uber OWN/YY PM 0.55 6.05 9.17 0.57 Childrew Homer AM 0.155 6.05 7.7 0.27	APPLIANCES & LIGHTING 3 4 3 4 7 5 0.65 0.65 0.65 0.65 0.65 0.33 0.33 1 0.95 1 1 0.46 0.46 0.68 0.55 0.65 1 0.46 0.46 0.68 0.55 0.57 0 1 0.46 0.46 0.626 0.68 0.526 0.6 0.60 0.57 0 5 0.528 0.620 0.626 0.626 0.626 0.626 0.626 0.626 0.626 0.626 0.62	8 9 10 11 12 3.33 0.33 0.33 0.33 0.33 0.9 0.9 0.9 0.9 0.85 5.87 0.84% 1 0.977 0.872 5.87 0.54% 0.46 0.43 0.672 5.70 0.57 0.466 0.43 0.522 0.443		
HOT W/ 9 Bystem Type 65 Cap 1 Electric 0.07 40 gal Collector Type Collector 16 	ATER SYSTEM HEATIN Like SetPat Croths S System Type Sm Solar HOT WATER Solar HOT WATER Solar HOT WATER Solar HOT WATER Durfso Annop Tress Task Task Task Task Task Task Task Ta	IG SYSTEM Ceiny Capacity OP-1 2011850/r at Feat PV Pemp Fease Excl. Ent Pempet Energy Percent Lealage ON RLF	Applicate Bishedder MSR 2018 Reference Bishedreib Type 1 Celleging Face Generation AM Old Singer State Generation 0.99 Annial Uber O WM/Yrr 0.33 Previoue 0.45 Annial Uber O WM/Yrr PM Chither Wahner AM Strafficience AM Strafficience Strafficience Annial Uber O WM/Yrr PM Strafficience PM Strafficience PM Annial Uber O WM/Yrr PL Valence 01 WM/Yrr PL Annial Uber Officience PM Lighting AM 0.16 6.11	APPLIANCES & LIGHTING 3 4 5 Morris 3 4 5 Morris 7 5 0.65 0.65 0.65 0.65 0.65 0.33 0.32 0.33 1 0.95 1 14/ VAlace 0VMate 0.81 0.15 0.55 0 5 0.05 0.57 0.81 0.15 0.55 0 14/ VAlace 0VMate 0.32 0.22 0.24 0.48 0.46 0.56 0.57 0 6 0.05 0.57 0.25 0.26 0.68 0.75 0 0.34 0.32 0.275 0 6 0.65 0.65 0.65 0.65 0.65 0.75 0.75 0 6 0.66 0.625 0.65 0.65 0.75 0.75 0 6 0.66 0.655 0.65 0.65 0.65 0.75 0 6	8 9 10 11 12 33 0.33 0.33 0.33 0.33 0.33 53 0.93 0.93 0.63 0.65 0.65 53 0.94 1 0.977 0.466 0.43 0.198 57 0.57 0.466 0.43 0.198 0.201 0.443 1 0.8 0.59 0.462 0.462 0.443 0.198 0.201 175 0.65 0.8 0.905 1 0.275 0.275 0.265 0.472 0.315 0.57 0.475 0.275 0.265 0.375 0.265 0.375 0.265 0.375 0.26 0.375 0.46 0.12 0.115 0.12 0.115 0.12 0.115 0.12 0.115 0.12 0.115 0.12 0.115 0.12 0.115 0.12 0.115 0.12 0.115 0.12 0.115 0.12 0.115 0.12 0.115 0.12 0.115		
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Appendix 10 Cavalier Standard Perfect Input Summary

Registration #:		itle: Southern Ene	ergy Summa ergy ES303 - std - perfect User	TMY Oby: LA BATONROUGE Elec Util: Lõuislana Average Gas Util: Louislana Average Run Date: 12/28/2007 11:39:40	BOILI BAIHP / Southern Energy Homes	Title: Southern Energy ES303 - st User	d - perfect. TMY City: LA_BAT Elec Util: Louisia Gas Util: Louisia	ina Aver
End-U			Energy Consumption	Annual Cost	Registration #:	STD construction	Run Date: 12/26/20	07 14:2
Coo	g (36 kBtu/hr) Iling Fan Ihanical Vent Fan		2906 kWh 669 kWh 0 kWh	\$232 \$54 \$ 0	Cooling Rotation Energy Use Fan Ener	Heating T <u>W Cost Energy Use Fan/Pu</u>		
Tota	al Cooling g (36 kBtu/hr)		3575 kWh 8403 kWh	\$286 \$672	0 2560 kWh 602 kW 45 2534 kWh 644 kW	h \$261 3320 kWh 162 k3	Wh \$279 23.016 MBtu 110.48 Wh \$267 24.109 MBtu 113.66	5
Hea Mec	ting Fan/Pump chanical Vent Fan		396 KWh 0 KWh	\$32 \$ 0	90 2928 kWh 868 kW 135 2632 kWh 643 kW 160 2588 kWh 605 kW	h \$278 3244 kWh 158 kh	Wh \$273 23,472 MBtu 112.07	
Hot Wa			8799 kWh 4055 kWh	\$704 \$324	225 2877 kWh 855 kW 270 2937 kWh 870 kW	h \$282 3340 kWh 163 k0 h \$289 3274 kWh 160 k0	Wh \$280 24.010 MBtu 113.56 Wh \$275 24.031 MBtu 113.76	
	Water Pump al Hot Water		0 kWh 4055 kWh 0 kWh	\$0 \$324 \$0		t recent analysis when worst case w	Wh \$276 23.591 MBtu 112.36 as checked. For ratings where defau building used for the HERS Score an	It
Clothea Dishwa	s Washer		0 kWh 0 kWh	\$0 \$0	the entered building. Select Rep	orts Annual Simulation to view energy	gy use from the current building.	
Dryer Lighting Miscelli			891 kWh 1840 kWh 2248 kWh	\$71 \$147 \$180				
Pool Po Range	ump		0 kWh 447 kWh	\$0 \$36				
Refrige Total (22630 kWh	\$62				
Total (Total (Therms) Oil Gallons)		0 Therms 0 Gallons	\$0 \$0				
	Propane Gallons) duced (kWh)* mes net metering		0 Gallons 0 kWh	\$0 \$0				
Total C				\$1810				
	SO2 NOX	(Calculated as 1		06 Lbs.				
	C02			15 Lbs. I2 Tons				
16/2007 2:33 PM		EnergyGauge	w0/U6RR8 v2.7.02	Page 1 of 1				
					12/26/2007 02:26 PM	EnergyOuoge® USA - FlaRes2007/	beta01	Page 1
Clineader, LA, BATONROUGE 12/29/2007	U Cost Savings U Cost Site 21 486 28 24		51 169 18.7% 15 152 2.4% 16 152 2.4% 17 128 - 2.9% 16 438 0.0% 18 438 0.0% 18 438 0.0% 18 10.0%	67 48 48 48 16 16 16 0 14 16 00 14	Climeter (A, BATONFOUGE 2028/2007 BATONFOUGE 2028/2007 BATONFOUGE 2020 BATONFOUGE 2020 BATONFOUGE			0 1609 14.8% page 2
	MBTU 21.757 20.721 20.721	13.081	8.051 7.315 8.057 1.256 1.2563 2.253 0.3583 0.3583	2.849 0.703 2.061 10.576 0.696 69.468 69.468 69.468	MBTU 167.88 2751	3.272 41.337 84 7.504 7.504 25.440 25.440 25.440 25.440 3.969	58.888 7.213 1.132 9.003 2.221 8.512 3.2.787 3.2.787 2.19.520	219.520
	Prototype Therms	000 0	0 000 000		07 Prototype	0 000 0 000	0000000 000	0
Building America Site Energy Summary 2007 Project Teles Southem Energy E3303 - ad - perfect	6877 8877 8877 8877 8877 8877 8877 8877	29.55 21.55 26.55	2389 2144 388 388 888 888 888 888 888 888	203 203	Building America Source Energy Summary 2007 Source Energy Summary 2007 Southen Energy 55338- 341 - 4964 to Southen Energy 55338- 4964 to Southen Energy 55348- 4964 to Southen Energy 55348- 496	304 3834 3138 596 596 2380 2380 2144 1775 3765 3765	6480 699 105 105 838 838 838 838 838 804 105 20350 20350	20360
g An Summ	Cost 612 684 48	448 362 66	232 148 122 84 84 84 84	612 612 612 612 612	g Am ay Sum mean Tele: mean Tele:	48 448 382 56 56 56 148 122 122 26 26	436 54 67 67 18 243 243 243 243 15 16	1891 Gauge USA
Energy Energy	mark MBTU 24.088 24.088	19.104 16 2.825	9.903 7.145 5.868 1.256 1.256 2.263 0.368	2849 0.703 2.004 10.398 81.5300 81.5300 81.5300 81.5300 81.5300 81.5300 81.5000 81.5000 81.5000 81.5000 81.5000 81.5000 81.5000 81.5000 81.50000 81.50000 81.5000000000000000000000000000000000000	Building / urce Energy S southen Energy ESS southen Energy ESS estate MBTU Co	6.453 60.367 51 8.927 31.293 31.293 31.293 31.293 31.293 31.693	58.879 7.213 1.152 1.152 9.203 8.223 8.223 3.2.767 2.011 2.011 2.011	257.634 18 Energy/Gauge
Site Site	Benchmark rms MBTU 0 28.110 0 24.088 0 2.042	000		0000 0000	Buildi Source Ene southem En Benchmark mBTU o 52,009		300 000000	0 26
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	KWh 7863 7054 599	6699 4771 828	2002 2094 1729 569 569 569 569	835 206 505 3041 187 23895 23895 23895	KWh 7863 7064	599 5599 5296 5294 2902 2094 1729 368	5461 569 105 539 535 505 505 505 505 505 505 505 505 505	23895
					BAHP / Sucham Every Homas - - Toul Xoon Healing:			

Appendix 11 Cavalier Standard Perfect Output Summaries

	PROJECT			g Input Summary Report WALLS Med. Actual countries in modified by rotate angle shown in "Project" section above		
Title: Bouthern Energy E6 Botting Type: User Dener: BAIHP / Southern Ei Bottler Name Perint Office Avriedcion; Farrity Type: Bingle-farrity Comment: cefit construction	New/Existing: New From Plans) Lot #		Wall creating before is an entried 0 Ont Adjacent To Wall Type 1 N Exterior Fame - Wood 2 E Exterior Fame - Wood 3 W Exterior Fame - Wood 4 W Exterior Fame - Wood 5 6 Exterior Fame - Wood 0 E Exterior Fame - Wood	No. Pract Exclusion Privact	80lar Absor 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	
	CLIMATE		7 E. Exterior Frame - Wood	11 5.1 0 9.25 0 47.17 M 0.23	0.8	
Design Location	Design Temp Int Design Temp Heating Tmy Ste 97.5 % 2.5 % Winter Summer Degree D	g Design Daily Temp Jays Molsture Range		DOORS		
LA, Baton Rouge L/	BATONROUGE 29 98 70 75 1670 UTILITY RATES	51 Medium	Omt DoorType Insulated	Gtorms U-Value Pt In Pt In None 0.6 3.0 6.7 0 5	Area 20.1 ft*	
Foel Unit Utility	Product Andrews	ost S/Unit	2 insulated	None 0.6 3 0 67 0 5	20.1 11	
Natural Gas Therm Louisi	ana Average 0 ana Average 0	0.08		WINDOWS		
Fuel Oil Gallon Louisi Propane Gallon Louisi	ana Defauit 0 ana Defauit 0	1,1 1,4	Omt Frame Panes NFR TIM Double (Clear) Yes	C U-Factor 6H0C 6torm Area Depth Separation Interior 6hade 6 9 0.65 0.67 N 22.519 0.7511.01111.0 in Drapes/binds Ext	creening lerior 50%	
	SURROUNDINGS Shade Tites Adiac	cent Buildings	2 TIM Double (Clear) Yes 3 TIM Double (Clear) Yes	a 0.65 0.67 N 22.517 1110 in 2110 in None Ext	letior 50%	
Ornt Type N None	Height Width Distance Exist Height	Width Distance	4 TIM Double (Clear) Yes S TIM Double (Clear) Yes	a 0.65 0.67 N 11.251™ 0.751t012.51t0 in Drapes/blinds Ext	lerior 50%	
E None		t 01 t 01	6 TIM Double (Clear) Yes 7 6 TIM Double (Clear) Yes	s 0.65 0.67 N 45.911 0.751t0 i11t0 in None Ext	letior 50%	
SE None S None SW None		11 011 11 011 11 011		INFILTRATION & VENTING		
W None NW None		1 01 1 01	Method SLA CFM 50 EL	Forced Ventilation Ternain LA EqLA ACH ACH 50 Supply Exhaust Run Time Shield		
# Floor Type	FLOORS Exposed Perimeter Wall Ins. R-Value Area Floor Joist R-Value	Tile Wood Carpet	Proposed ACH 0.00036 1623 86	0.1 167.5 0.250 7.03 24 0 0 8uburban/6 MASS	Saburban	
Floor Type Crawlspace	177 ft 0 1732 ft* 11	Tile Wood Carpet 0 0.25 0.75		Area Thickness Furniture Fraction		
-		Deck Attic Vent	No Added Mass (COOLING SYSTEM		
Roof Type Able orshed Comp		0 300 14 deg		kenzy Capacity Air Flow GHR WH Fans Cr R: 13 36 Mittentin 1000 ctm 0.75	oss Vent	
	CEILING		1 Central Unit SEE	n ra an katarar 1989 (13) 0.73		
4 Ceiling Type 1 Under Attic	R-Value Area Framing Fract 19 1732 # 0.11	tion Truss Type Wood				
12/26/2007 3:34 PM	Energy@auge@/UGRRIB v2.7	Page 1 of 4	12/26/2607 3:34 PM	Energy@auge@/USRRIBv2.7 Pag	ge 2 of 4	
Bui	Iding Input Summary Repor	t	Buildin	g Input Summary Report		
	Ilding Input Summary Repor	t No system	Buildin	g Input Summary Report		
HOT W.	ATER SYSTEM HEATIN Use Bathet Creeks & System Type SR 60 gal 140 deg None 1 Excite Site Neat C		Applance 8chedsle: HER8 2008 Reference Schedule Type 1 2	APPLIANCES & LIGHTING 3 4 5 6 7 8 9 10 11	12	
HOT W. System Type EF Cap Electric 0.87 40 gal Collector	ATER SYSTEM HEATIN Use Belfrit Croths Ø System Type Eff B0 gal 140 deg None 1 Electric Strip Heat C SOLAR HOT WATER Belfrice Advorg Trans Tank Tank Tan	NG SYSTEM fickercy Capacity COP: 1 36 MBtuffr unk Heat PV Pump	Applance 8chedule: HERS 2014 Reference Schedule Type 1 2 Ceiling Fans (Remmer) AM 0.85 0.65 % Released: 100 PM 0.33 0.33 Annual Use: 0.WMP/T Peak	APPLIANCES & LIGHTING 3 4 5 4 7 8 9 10 11 045 045 065 053 0.33<	0.33 0.65	
HOT W. 1 System Type EF Cap 1 Electric 0.87 40 gal Collector	ATER SYSTEM HEATIN Use SetPat Credts 9 System Type 511 69 gal 49 deg Teare 3 Electric ditts theat Credts SOLAR HOT WAITER Southaw Association Trans Tank Tan Association South Post Corr. Volume U-Value Berl	NG SYSTEM tclency Capacity CP: 1 36 185uhr	Applance 8chedule: HE/R0 2006 Reference 8chedule Type 1 2 Ceinig Face (Sermed) AM 0.65 0.65 Sin Released: 10 PM 0.33 0.33 Anstal Use: 0.WMIN*** PM 0.45 0.65 Schebes Washer: AM 0.165 0.64 Schebes Weather: AM 0.776 0.78	APPLIANCES & LIGHTING Norming Norming 3 4 5 6 7 8 9 10 11 965 965 965 965 963 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.34 0	0.33	
HOT W. 1 System Type 5F Cap Electric 8-87 40 gal celector Type Tit Gappty	ATER SYSTEM HEATIN Use SelPhit Crofts 8 System Type 51 Social Hot Age Social Hot Age Social Hot WATER Social Hot WATER Social Hot Water UVision Social Hot Water UVision Social Hot Water DUCTS	NG SYSTEM Reanoy Capacity Car 1 36 IdStaft Car 1 36 IdStaft Internet Price Parto Area Soch Eff Pumped Energy Percent	Applance Schedule: MERS 2018 Reference 1 2 Cerking Tave (Summer) AM 0.5 0.55 Na Released: 100 PM 0.33 0.33 Annal Use (Summer) AM 0.105 0.65 Childs Tave (Summer) AM 0.105 0.64 Childs Wather AM 0.105 0.05 Annal Use (SUMMY) AM 0.105 0.06 Marker (SUMMY) AM 0.138 0.05 Annal Use (SUMY) AM 0.137 0.79 Disheather AM 0.137 0.275 0.79	APPLIANCES & LIGHTING 3 4 9 10 11 0.65 0.65 0.66 0.65 0.33 0.34 0.46	0.33 0.65	
HOT W. Bysten Type 5F Cap Recto: 0.07 40 gal Collector oflector Type Tit	ATER SYSTEM HEATIN Lise Selfnit Criefts 9 System Type 511 Solar Hot Water 1 Electric Strate 1 Solar Hot Water Solar Hot Water Solar Hot Water DUCTS 	NG SYSTEM Toteling Capacity CRI 1 38 MSN/M and Nadi PV Patto Area Sach St Pumped Exergy Percent Lastage OH RL5	Applance Schedule: MERS 2018 Reference 1 2 Cerling Tarver (Summer) AM 0.55 0.55 Schedule: Type PM 0.33 0.33 Annal Use (Summer) AM 0.105 0.65 Childs Rever (Summer) AM 0.105 0.64 Childs Watare: AM 0.105 0.60 Annal Use (SWMY) AM 0.138 0.63 Schwarter: AM 0.138 0.77 0.796 Deliverative: OWN Participant Control Participant Control Participant Control Driver AM 0.138 0.027 0.796 Participant Control Driver AM 0.20 0.11 Participant Control	APPLIANCES & LIGHTING 3 4 9 7 8 9 10 11 0.65 0.65 0.66 0.65 0.63 0.34 0.35 0.25 0.37 0.466 0.497 0.35 0.25 0.35 0.466 0.466 0.264 0.4791 1 0.46 0.264 0.479 0.334 0.244 0.464 0.791 1 0.46 0.264 0.354 0.264 0.4791 1 0.46 0.354 0.324 0.344 0.464 0.791 1	0.33 0.65 0.872 0.198 0.443 0.281	
Bystum Type 6.6 Cap Bystum Type 6.8 Cap Exercic 6.87 40 gal otector 5.87 40 gal otector Train Collector 0 Lecation RVAter Asa 1 Interior 6 346.41	ATER SYSTEM HEATIN Use SelPhit Crofts S System Type Sit Sog at 140 day Tense 1 Destric Kits Heat O SOLAR HOT WATER SOLAR HOT WATER Ourface Advocs Triss Task Task Task Ta Ammuth Ame Loss Deet Prod. Cerr. Velume ULValue Burf. DUCTS	NG SYSTEM Toteling Capacity CIP 1 38 MStuhr ant Heat PV Pano Area Soch ST Pumped Energy Percent Leakage ON RLF	Application Scheduler, MERS 3004 Rulermone Scheduler Type 1 2 Cerling Faux (Serviced) AM 0.85 6.83 Scheduler Type M 0.85 6.83 Scheduler Type M 0.85 6.83 Scheduler Type M 0.85 6.83 Celler Wolfford 0.83 6.83 6.83 Anneal User O WMOYr Pad 0.77 0.76 Schelauster AM 6.13.8 6.63 7.7 0.76 Schelauster M 6.75 6.65 6.77 0.77 0.76 Schelauster M 6.75 6.65 6.77 0.76 0.76 Schelauster 0.9007 M 0.7 0.76 0.76 0.75 Schelauster 1.900707 Feas 0.75 0.76 0.76 0.75 0.76 0.76 0.76 0.76 0.76 0.76 0.76 0.76 0.76 0.76 0.76 0.76 0.76 0.76	APPLIANCES & LIGHTING 4 Monty a 9 10 11 2.6 0.55 0.65 0.65 0.65 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.33 0.34 0.34 0.34 0.34 0.34 0.34 0.34 0.35 0.35 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.27 0.37 0.37 0.36 0.446 0.446 0.446 0.446 0.446 0.446 0.446 0.52 0.37 0.37 0.37 0.37 0.36 0.52 0.57 <t< td=""><td>0.33 0.65 0.672 0.198 0.442</td></t<>	0.33 0.65 0.672 0.198 0.442	
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HOT W. Bystem Type 65 Cap Buchte 687 40 gal Buchte 687 40 gal extente 687 40 gal extente 687 40 gal extente 687 40 gal extente 68 Collector # Location RVAte # Location REB # Location REB	ATER SYSTEM HEATIN Use Skiphel Crochs 8 Skytken Type ER Staget 140 dag Tarse 1 Exercit Gibs Head Crochs ER Solution Tarse 1 Exercit Gibs Head Crochs ER EXERCIT Gibs Head Crochs ER EXERCIT Gibs Head Crochs Exercit Gibs Head Exerci Gibs Head <	NG SYSTEM Rearroy Capacity CP 1 38 UBUR CP 1 38 UBUR Note Even for Processor Prompo Areas Such BT Prompo Processor Bull Bull 11	Application Scheduler, MERS 2010 Rulefronier Scheduler Type 1 2 Cerling Targe (Serviced) Scheduler Type AM 0.85 0.85 Scheduler Type M 0.85 0.85 Scheduler Type M 0.85 0.85 Scheduler Type M 0.85 0.85 Scheduler Scheduler AM 0.85 0.85 0.85 Scheduler OWNOTY Peak 0.87 0.86 Scheduler OWNOTY Peak 0.87 0.87 Scheduler OWNOTY Peak 0.87 0.86 Scheduler OWNOTY Peak 0.77 0.10 Scheduler OWNOTY Peak 0.87 0.86 Scheduler OWNOTY Peak 0.87 0.86 Scheduler OWNOTY Peak 0.77 0.10 Scheduler OWNOTY Peak 0.77 0.10 Scheduler OWNOTY Peak 0.76 0.15 Scheduler OWNOTY Peak 0.76 0.15 Scheduler OWNOT Peak 0.76 0.15 <	APPLIANCES & LIGHTING Monty Nonty Nonty 3 4 5 6.5 0.65 0.31 0.33 0.34 0.44	0.33 0.65 0.672 0.196 0.443 0.201 1 0.375 0.11 0.28 0.53	
Bystem Type 6.5 Cap Bystem Type 6.87 40 gal Exects 6.82 40 gal elector Type 7.8 # Location 6.9244e # Location 6.9244e # Location 6.9244e # Instance 6 # Location 6.9246e # Instance 6 # Location 6.9246e # Instance 6 # Instance 1 # Instance 1 # Instance 1 # Instance 1	ATER SYSTEM HEATIN Use Selfhat Crootis 8 Sigdam Type Sill Objast Valo degi Tame 1 Exection (Staps Head Crootis Sill Solura Hot Wark 1 Exection (Staps Head Crootis Sill Sill </td <td>NG SYSTEM Team of the second second</td> <td>Application Scheduler, MERS 3014 Ruferment AM 0.85 3.25 Schedule Type 1 2 2 Cerling Faur (Serment) AM 0.85 6.35 Annual Use (Serment) AM 0.85 6.35 Annual Use (Serment) AM 0.85 6.45 Annual Use (SWNPY) Part 6.179 0.96 Annual Use (SWNPY) AM 6.128 6.55 9.65 Annual Use (SWNPY) AM 6.77 0.76 2.76 0.76 Ortherwater AM 6.128 5.5 5.5 5.5 5.6 5.5 5.6<td>APPLIANCES & LIGHTING Monty Normal 3 4 5 9 0 1 0.65 0.65 0.65 0.65 0.33 0.33 0.33 0.33 0.63 0.65 0.65 0.65 0.65 0.57</td><td>0.33 0.65 0.672 0.196 0.443 0.281 1 0.375 0.11 0.28 0.53 0.55 1</td></td>	NG SYSTEM Team of the second	Application Scheduler, MERS 3014 Ruferment AM 0.85 3.25 Schedule Type 1 2 2 Cerling Faur (Serment) AM 0.85 6.35 Annual Use (Serment) AM 0.85 6.35 Annual Use (Serment) AM 0.85 6.45 Annual Use (SWNPY) Part 6.179 0.96 Annual Use (SWNPY) AM 6.128 6.55 9.65 Annual Use (SWNPY) AM 6.77 0.76 2.76 0.76 Ortherwater AM 6.128 5.5 5.5 5.5 5.6 5.5 5.6 <td>APPLIANCES & LIGHTING Monty Normal 3 4 5 9 0 1 0.65 0.65 0.65 0.65 0.33 0.33 0.33 0.33 0.63 0.65 0.65 0.65 0.65 0.57</td> <td>0.33 0.65 0.672 0.196 0.443 0.281 1 0.375 0.11 0.28 0.53 0.55 1</td>	APPLIANCES & LIGHTING Monty Normal 3 4 5 9 0 1 0.65 0.65 0.65 0.65 0.33 0.33 0.33 0.33 0.63 0.65 0.65 0.65 0.65 0.57	0.33 0.65 0.672 0.196 0.443 0.281 1 0.375 0.11 0.28 0.53 0.55 1	
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Appendix 12 Cavalier HSD Input Summary

BAINP / Southern Energy Home Title: Southern Energy ES303 - adfit duct Patie08 Rate08 Registration #: The Constant Average Care Utic Louistant Average Registration #:			ergy Summ inergy ES303 - soffit duct Rated05	TMY City: LA_BATONROUGE Elec Util: Louisiana Average	BAIHP / Southerm Energy Homes Title: Southerm Energy E3303 - softi duct. TMY Clty: LA_BATONRO User Elec Util: Locietana Ave		
-		sofft construction Energy			User Registration #:	Elec Util: Louisiana Ave Gas Util: Louisiana Ave Run Date: 12/26/2007 14:	
End-U Cooling	se j (36 kBtu/hr)	2680 kWh		Annual Cost \$214	soffic construction		
Cooling Fan Mechanical Vent Fan Total Cooling Heating (36 kBtuhr) Heating Fan/Pump Nechanical Vent Fan Total Heating Hot Water Hot Water Ceiling Fans Ciothos Washer Dishwasher Dishwasher Dishwasher Dishwasher Dishwasher Dishwasher		607 KWh 0 KWh 3287 KWh 2801 KWh 153 KWh 0 KWh 2855 KWh 0 KWh 0 KWh 0 KWh 0 KWh 0 KWh 1840 KWh 1840 KWh		348 \$0 \$283 \$224 \$12 \$0 \$236	Cooling Heating Rotation Energy Use Fan Energy Cost Energy Use Fan/Pur		
					0 2425 kWh 545 kWh 5235 2838 kWh 156 kW 46 2592 kWh 563 kWh \$254 2928 kWh 190 kW 90 2872 kWh 804 kWh \$282 2811 kWh 154 kW	h \$247 21.341 MBtu 106.09	
					135 2582 kWh 582 kWh \$254 2774 kWh 152 kW 180 2450 kWh 550 kWh \$240 2774 kWh 152 kW	h \$234 20,785 MBtu 104,66 h \$234 20,226 MBtu 102,91	
				\$228 \$0	225 2817 KWh 591 kWh \$255 2858 kWh 157 kW 270 2880 kWh 807 kWh \$283 2801 kWh 153 kW 315 2572 kWh 500 kWh \$252 2814 kWh 154 kW	h \$236 21.301 MBtu 106.23	
				\$228 \$0	These results represent the most recent analysis when worst case was checked. For railings where default appliance values were not used, the energy values will represent the building used for the HERS Score and not the entered building. Select Reports/Annual Simulation to view energy use from the current building.		
				\$0 \$0			
				\$71 \$147 \$180			
Pool P Range Refrige			0 kWh 447 kWh 775 kWh	\$0 \$36 \$62			
Total (15297 kWh	\$1223			
Total (Therms) Total (Oil Gallons) Total (Propane Gallons)			0 Therms 0 Gallons	\$0 \$0			
	Propane Gallons) duced (kWh)* mes net metering		0 Gallons 0 kWh	\$0 \$0			
Total C				\$1223			
	SO2	(Calculated as		.76 Lbs.			
	NOX CO2		43	.69 Lbs. 07 Tons			
16/2007 2:41 PM		EnergyGaug	pe0 / U&RRIB v2.7.02	Page 1 of 1			
					1228/2007 02.39 PM EnergyQuoge6 U8A - FluRes2007 / 5	fuði Page	
America mmary 2007 555edf. det (2235255) - edf. det	Prototype Bawings kiwin Therms MBTU Cost Step 5/38 0 13.884 438 27.6% 28 0 13.884 438 27.6% 291 0 0.993 23	0 11.623 272 3 0 10 223 0 2.110 49	Zalation 0 8,051 159 16,75 Z144 0 7,315 162 2,4% 1775 0 0.051 152 2,4% 1775 0 0.055 126 2.9% 1860 0 1,256 20 0.9% 1860 0 1,356 4,46 0.0% 989 0 2,335 54 0.0%	105 10 2.08 6 7 206 0 2.049 6.7 16 204 0 2.043 16 4.8 3044 0 2.043 16 4.8 16 0 2.043 2.64 2.43 3044 0 2.043 2.62 2.43 16 0 0.379 2.62 2.43 0002 0 0.000 10 0 2.04 0022 0 64.937 1502 2 2	Building America Source Energy Summary 2007 Source Energy Summary 2007 Source Energy 2005 Source Energy 2005 Source 2005 Source Energy 2006 Source 2005 Source Energy 2007 Source 2005<	540 0 64.868 459 0.0% 159 0 1.123 84 0.0% 156 0 1.123 84 0.0% 203 0 1.123 84 0.0% 203 0 0.0% 94 0.0% 203 0 0.273 84 0.0% 204 0 2.273 34 0.0% 344 0 2.27 34 0.2% 344 0 2.043 16 0.0% 187 0 2.011 16 0.0% 1902 0 2.012 15.02 20.2%	
Building America Site Energy Summary 200 Southam Ewrory 55393 - south duct	Cost 605 557 48	452 385 67	232 148 122 436 436	849 87 849 87 703 48 879 48 879 243 103 1555 11 103 10 103 11 103 11 10 103 11 10 10 10 10 10 10 10 10 10 10 10 10 1	10 Am 19 Am 19 Am 19 Am 19 Am 19 Am 148 148 148 148 148 148 148 148 148 148	879 436 1223 436 123 84 123 84 123 44 101 15 135 135 138 135 138 138 1	
	Benchmark rms MBTU 0 26.793 0 23.754 0 2.039	19.295 16 2.856	9.903 7.145 6.888 1.258 18.633 2.283	0.000 2.649 0.703 2.004 10.376 0.659 81.403 81.403 81.403 Energy	Building / Source Energy Source Energy Sourc	68.879 7.213 1.132 9.003 9.003 2.221 8.623 32.767 2.211 2.0110 2.0110 2.0110 2.0110 2.0110 2.0110 2.0110 2.0110 2.0110 2.010000000000	
	Benc Dherms	000	0 000 00				
	KWh The 7569 6962 597	5655 4518 837	2902 2094 368 5461 5461	109 806 806 3041 187 23858 23858 23858 23858	KWh The KWh The 7559 997 998 998 1431 2018 2018 2018 2018 2018 2018 2018 201	64.61 869 105 8.05 8.05 8.05 8.05 8.05 8.05 1.87 1.87 1.87 1.87 2.3855 3.0451 3.0551 3.04510 3.04510 3.04510 3.04510 3.04510 3.04510 3.045100000000000000000000000000000000000	
BAHP / Southern Energy Homes	End Use: Total Space Heating: Heating Heating Far	Total Space Cooling: Cooling: Cooling Fan:	Tolai Hot Water: Uptering Sulticitati: Virred Lightling: Plug Lightling: Refrigerator: Refrigerator:		Bure' / Southam Eurory, Homas End User, Total Southaming: Hauling: Hauling: Cosing Fark Cosing Fark Total Har Wear: Total Har Wear:	Appliance Subtaut Registerer: Technerics Determingterer: Determingter Determingter Determingter Determingter Determingter Total: Total: Net:	

Appendix 13 Cavalier HSD Output Summaries



Appendix 14 Southern Energy Homes Floorplan



Appendix 15 Cavalier Homes Floorplan

References

ⁱ Moyer, N., D. Beal, D. Chasar, J. McIlvaine, C. Withers Jr., S. Chandra, "Moisture Problems in Manufactured Housing: Probable Causes and Cures ", Florida Solar Energy Center, Rpt: FSEC-GP-212-01, Nov. 01, 2001, http://www.fsec.ucf.edu/en/publications/pdf/FSEC-GP-212-01.pdf

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ⁱⁱⁱ Parker, D., P. Broman, J. Grant, L. Gu, M. Anello, R. Vieira and H. Henderson, "*EnergyGauge USA*: A Residential Building Energy Design Tool." <u>Proceedings of Building Simulation '99</u>, Kyoto, Japan. International Building Performance Simulation Association, Texas A&M University, College Station, TX, September 1999.