

ASHRAE Standard 140-2023

Test Results Comparison for

Section 7 - Building Thermal Envelope and Fabric Load Cases 195-995 & 600FF-980FF

Results for VibeArch V1
(VibeArch)
vs.
Example Results

Prepared By
Chang Heon Cheong
(Individual)

Results Developed
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ASHRAE Standard 140-2023

Computer Programs, Program Authors, and Producers of Example Results for Section 7 - Building Thermal Envelope and Fabric Load Cases 195-995 & 600FF-980FF

The programs used to generate the example results for Section 7 are described in Table B11-1. Under the "Computer Program" column, the first entry in each cell is the proper program name and version number. The entries in parentheses are the abbreviations for the programs used in the tables and charts of this workbook.

The second column ("Authoring Organization") indicates the national research facility, university, or industry organization with expertise in building science that wrote the simulation software.

The third column ("Example Results Produced By") indicates the national research facility, university, or industry organization with expertise in building science that performed the simulations. Most of the organizations that performed simulations are members of the development team for the simulation model that they ran.

See Standard 140, Annex B11 for further details.

TABLE B11-1

Computer Programs, Program Authors, and Producers of Example Results

Computer Program (Abbrev.)	Authoring Organization	Example Results Produced by
BSIMAC 9, Version 9.0.74 (BSIMAC)	Alec Johannsen Consulting Engineers, South Africa	Alec Johannsen Consulting Engineers, South Africa
California Simulation Engine, Version 0.861.1 (CSE)	J.R. Barnaby/C.S. Barnaby/Big Ladder Software LLC/Wrightsoft Corp., United States	Big Ladder Software LLC, United States
DeST 2.0, Version 20190401 (DeST)	Tsinghua University, China	Southeast University, China Tsinghua University, China
EnergyPlus, Version 9.0.1 (EnergyPlus)	U.S. Department of Energy, Building Technologies Office, United States	GARD Analytics, Inc., United States
ESP-r, Version 13.3 (ESP-r)	University of Strathclyde, United Kingdom	University of Strathclyde, United Kingdom
TRNSYS, Version 18.01.0001 (TRNSYS)	Transsolar Energietechnik GmbH, Germany; Thermal Energy System Specialists, United States	Transsolar Energietechnik GmbH, Germany
TRNSYS, Versions 17.02.0005 and 18.00.0017 (N/A)	Transsolar Energietechnik GmbH, Germany; Thermal Energy System Specialists, United States	Ecole Polytechnique Montréal, Canada ^{a,b}

^a Ecole Polytechnique and GARD also worked on simulations for developing alternative constant interior and exterior surface coefficients, applying TRNSYS and EnergyPlus, respectively.

^b Also checking input files versus the Transsolar participant's files and vice versa.

Note: Results for "TestSpec-Alt" are shown in Table B8-16 and in Figures B8-6, B8-H10, and B8-H11; contents of tables and figures are further described in sheet tabs labeled "Table List" and "Figure List". "TestSpec-Alt" results are alternative values resulting from optional alternative inputs for sky temperature provided in the test specification (see Section 7.2.1.1.1.2 and Annex A1, Section A1.1.1.2).

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Note: The statistics in the tables below are based on the listed example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B8-1. Annual Heating Loads (MWh)

Simulation Model: Case	BSIMAC	CSE	DeST	EnergyPlus	ESP-r	TRNSYS	Statistics for Example Results				VibeArch
							Min	Max	Mean	(Max-Min)/ Mean** (%)	
600 Base Case, South Windows	4.050	3.993	4.047	4.324	4.362	4.504	3.993	4.504	4.213	12.1%	4.386
610 S. Windows + Overhang	4.163	4.066	4.144	4.375	4.527	4.592	4.066	4.592	4.311	12.2%	4.479
620 East & West Windows	4.370	4.094	4.297	4.485	4.514	4.719	4.094	4.719	4.413	14.2%	4.603
630 E&W Windows + Overhang & Fins	4.923	4.356	4.677	4.784	5.051	5.139	4.356	5.139	4.821	16.2%	5.026
640 Case 600 with Htg Temp. Setback	2.682	2.403	2.619	2.662	2.654	2.653	2.403	2.682	2.612	10.7%	2.631
650 Case 600 with Night Ventilation	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	----	0.000
660 Low-E Windows	3.574	3.602	3.821	3.707	3.787	3.790	3.574	3.821	3.713	6.7%	3.803
670 Single-Pane Windows	5.484	5.300	5.573	5.616	5.975	6.140	5.300	6.140	5.681	14.8%	6.196
680 Case 600 with Increased Insulation	2.219	1.786	1.732	2.180	2.132	2.286	1.732	2.286	2.056	27.0%	2.223
685 Case 600 with "20/20" Thermostat	4.532	4.574	4.646	4.877	4.904	5.042	4.532	5.042	4.763	10.7%	4.941
695 Case 685 with Increased Insulation	2.709	2.415	2.385	2.802	2.732	2.892	2.385	2.892	2.656	19.1%	2.814
900 South Windows	1.726	1.379	1.591	1.664	1.585	1.814	1.379	1.814	1.626	26.8%	1.740
910 S. Windows + Overhang	2.163	1.648	1.860	1.956	2.067	2.132	1.648	2.163	1.971	26.1%	2.038
920 East & West Windows	3.500	2.956	3.259	3.337	3.300	3.607	2.956	3.607	3.326	19.6%	3.479
930 E&W Windows + Overhang & Fins	4.270	3.524	3.933	3.994	4.278	4.384	3.524	4.384	4.064	21.2%	4.235
940 Case 900 with Htg Temp. Setback	1.389	0.863	1.149	1.067	1.015	1.169	0.863	1.389	1.109	47.4%	1.145
950 Case 900 with Night Ventilation	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	----	0.000
960 Sunspace	2.522	2.522	2.771	2.689	2.624	2.860	2.522	2.860	2.693	12.5%	2.755
980 Case 900 with Increased Insulation	0.720	0.246	0.266	0.411	0.351	0.450	0.246	0.720	0.407	116.4%	0.456
985 Case 900 with "20/20" Thermostat	2.801	2.120	2.279	2.369	2.283	2.536	2.120	2.801	2.398	28.4%	2.482
995 Case 985 with Increased Insulation	1.330	0.755	0.770	1.006	0.905	1.077	0.755	1.330	0.974	59.0%	1.067
195 Solid Conduction	4.217	3.990	4.157	4.070	3.951	4.094	3.951	4.217	4.080	6.5%	
200 Surface Convection (Int & Ext IR="off")	5.041	4.813	5.226	5.105	4.920	5.143	4.813	5.226	5.042	8.2%	
210 Infrared Radiation (Int IR="off", Ext IR="on")	5.627	5.966	6.531	6.047	6.317	6.429	5.627	6.531	6.153	14.7%	
215 Infrared Radiation (Int IR="on", Ext IR="off")	5.652	5.307	5.697	5.405	5.181	5.443	5.181	5.697	5.448	9.5%	
220 In-Depth Base Case	6.377	6.666	7.178	6.455	6.726	6.868	6.377	7.178	6.712	11.9%	
230 Infiltration	9.851	9.812	10.417	9.930	9.939	10.234	9.812	10.417	10.031	6.0%	
240 Internal Gains	5.116	5.443	5.944	5.279	5.539	5.657	5.116	5.944	5.496	15.1%	
250 Exterior Shortwave Absorptance	4.733	5.044	5.373	4.899	4.935	5.105	4.733	5.373	5.015	12.8%	
270 South Solar Windows		4.346	4.273	4.385	4.576	4.631	4.273	4.631	4.442	8.1%	
280 Cavity Albedo		4.525	4.619	4.570	4.738	4.870	4.525	4.870	4.664	7.4%	
290 South Shading		4.424	4.381	4.424	4.745	4.725	4.381	4.745	4.540	8.0%	
300 East/West Window		4.318	4.460	4.425	4.668	4.726	4.318	4.726	4.519	9.0%	
310 East/West Shading		4.580	4.846	4.691	5.240	5.163	4.580	5.240	4.904	13.4%	
320 Thermostat		3.677	3.599	3.771	3.970	4.031	3.599	4.031	3.810	11.3%	
395 Low Mass Solid Conduction	4.565	4.855	5.145	4.641	4.866	4.908	4.565	5.145	4.830	12.0%	
400 Low Mass High Cond. Wall Elements	5.906	6.536	7.047	6.348	6.610	6.769	5.906	7.047	6.536	17.5%	
410 Low Mass Infiltration	7.630	8.045	8.661	8.080	8.212	8.445	7.630	8.661	8.179	12.6%	
420 Low Mass Internal Gains	6.399	6.834	7.433	6.906	7.027	7.236	6.399	7.433	6.973	14.8%	
430 Low Mass Ext. Shortwave Absorptance	5.171	5.454	5.954	5.620	5.545	5.851	5.171	5.954	5.599	14.0%	
440 Low Mass Cavity Albedo		4.156	4.330	4.500	4.504	4.721	4.156	4.721	4.442	12.7%	
450 Constant Interior and Exterior Surf Coeffs	3.743	3.990	3.375	3.962	3.850	3.871	3.375	3.990	3.799	16.2%	
460 Constant Interior Surface Coefficients	3.828	4.056	3.873	4.194	4.263	4.290	3.828	4.290	4.084	11.3%	
470 Constant Exterior Surface Coefficients	4.042	3.899	3.540	4.094	3.960	4.075	3.540	4.094	3.935	14.1%	
800 High Mass High Cond. Wall Elements	5.141	4.906	5.403	5.116	4.980	5.369	4.906	5.403	5.152	9.7%	
810 High Mass Cavity Albedo		2.038	2.454	2.342	2.185	2.610	2.038	2.610	2.326	24.6%	

** ABS[(Max-Min) / (Mean of Example Simulation Results)]

**ASHRAE Standard 140-2023, Test Results Comparison for Section 7 - Building Thermal Envelope and Fabric Load Cases 195-995 & 600FF-980FF
(VibeArch) vs. Annex B8, Section B8.1 Example Results
By Chang Heon Cheong (Individual), 22-Sep-2026**

Note: The statistics in the tables below are based on the listed example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B8-2. Annual Sensible Cooling Loads (MWh)

Simulation Model: Case	BSIMAC	CSE	DeST	EnergyPlus	ESP-r	TRNSYS	Statistics for Example Results				VibeArch
							Min	Max	Mean	(Max-Min)/ Mean** (%)	
600 Base Case, South Windows	5.822	5.913	5.432	6.027	6.162	5.780	5.432	6.162	5.856	12.5%	5.800
610 S. Windows + Overhang	4.299	4.382	4.173	4.333	4.233	4.117	4.117	4.382	4.256	6.2%	4.302
620 East & West Windows	4.404	4.079	3.909	4.060	4.246	3.841	3.841	4.404	4.090	13.8%	3.992
630 E&W Windows + Overhang & Fins	3.074	3.020	2.787	2.836	2.595	2.573	2.573	3.074	2.814	17.8%	2.793
640 Case 600 with Htg Temp. Setback	5.804	5.644	5.237	5.763	5.893	5.477	5.237	5.893	5.636	11.6%	5.528
650 Case 600 with Night Ventilation	4.629	4.654	4.186	4.817	4.945	4.632	4.186	4.945	4.644	16.3%	4.623
660 Low-E Windows	3.014	3.340	3.260	3.232	3.219	2.966	2.966	3.340	3.172	11.8%	3.070
670 Single-Pane Windows	6.539	6.578	5.954	6.623	6.520	6.198	5.954	6.623	6.402	10.4%	6.013
680 Case 600 with Increased Insulation	5.938	6.430	5.932	6.444	6.529	6.310	5.932	6.529	6.264	9.5%	6.208
685 Case 600 with "20/20" Thermostat	9.130	8.859	8.238	9.119	9.121	8.851	8.238	9.130	8.886	10.0%	8.900
695 Case 685 with Increased Insulation	8.755	8.974	8.386	9.172	9.149	9.039	8.386	9.172	8.912	8.8%	8.960
900 South Windows	2.714	2.464	2.383	2.489	2.488	2.267	2.267	2.714	2.467	18.1%	2.325
910 S. Windows + Overhang	1.484	1.415	1.490	1.383	1.283	1.191	1.191	1.490	1.374	21.8%	1.342
920 East & West Windows	3.128	2.789	2.706	2.731	2.814	2.549	2.549	3.128	2.786	20.8%	2.696
930 E&W Windows + Overhang & Fins	2.161	2.075	1.908	1.919	1.654	1.672	1.654	2.161	1.898	26.7%	1.867
940 Case 900 with Htg. Temp. Setback	2.613	2.397	2.343	2.424	2.428	2.203	2.203	2.613	2.401	17.1%	2.254
950 Case 900 with Night Ventilation	0.586	0.598	0.618	0.707	0.656	0.642	0.586	0.707	0.634	19.1%	0.618
960 Sunspace		0.926	0.909	0.907	0.950	0.789	0.789	0.950	0.896	17.9%	0.987
980 Case 900 with Increased Insulation	3.501	3.995	3.758	3.712	3.775	3.519	3.501	3.995	3.710	13.3%	3.512
985 Case 900 with "20/20" Thermostat	7.273	6.234	5.880	6.359	6.249	6.113	5.880	7.273	6.351	21.9%	6.219
995 Case 985 with Increased Insulation	7.482	7.202	6.771	7.203	7.149	7.064	6.771	7.482	7.145	10.0%	7.058
195 Solid Conduction	0.712	0.606	0.628	0.612	0.611	0.592	0.592	0.712	0.627	19.2%	
200 Surface Convection (Int & Ext IR="off")	0.839	0.800	0.835	0.814	0.800	0.788	0.788	0.839	0.813	6.2%	
210 Infrared Radiation (Int IR="off", Ext IR="on")	0.688	0.503	0.496	0.560	0.519	0.459	0.459	0.688	0.537	42.6%	
215 Infrared Radiation (Int IR="on", Ext IR="off")	0.952	0.946	0.922	0.877	0.895	0.850	0.850	0.952	0.907	11.2%	
220 In-Depth Base Case	0.803	0.611	0.550	0.610	0.576	0.498	0.498	0.803	0.608	50.2%	
230 Infiltration	1.184	0.991	0.929	0.991	0.955	0.897	0.897	1.184	0.991	29.0%	
240 Internal Gains	1.287	0.982	0.876	0.979	0.922	0.834	0.834	1.287	0.980	46.2%	
250 Exterior Shortwave Absorptance	3.612	3.429	3.471	3.182	3.467	2.904	2.904	3.612	3.344	21.2%	
270 South Solar Windows		7.271	6.698	7.522	7.309	7.289	6.698	7.522	7.217	11.4%	
280 Cavity Albedo		4.996	4.215	5.183	5.206	4.808	4.215	5.206	4.882	20.3%	
290 South Shading		5.610	5.310	5.743	5.321	5.461	5.310	5.743	5.489	7.9%	
300 East/West Window		5.055	4.805	5.152	5.038	4.913	4.805	5.152	4.993	7.0%	
310 East/West Shading		3.752	3.402	3.669	3.128	3.324	3.128	3.752	3.455	18.1%	
320 Thermostat		4.859	4.420	4.986	4.913	4.788	4.420	4.986	4.793	11.8%	
395 Low Mass Solid Conduction	0.021	0.008	0.006	0.010	0.006	0.004	0.004	0.021	0.009	193.7%	
400 Low Mass High Cond. Wall Elements	0.063	0.023	0.017	0.031	0.024	0.013	0.013	0.063	0.028	176.6%	
410 Low Mass Infiltration	0.096	0.048	0.041	0.057	0.052	0.035	0.035	0.096	0.055	110.6%	
420 Low Mass Internal Gains	0.228	0.141	0.119	0.153	0.142	0.109	0.109	0.228	0.149	79.8%	
430 Low Mass Ext. Shortwave Absorptance	1.084	0.906	0.944	0.856	0.953	0.739	0.739	1.084	0.914	37.8%	
440 Low Mass Cavity Albedo		3.985	3.458	4.085	4.414	3.741	3.458	4.414	3.937	24.3%	
450 Constant Interior and Exterior Surf Coeffs	6.172	5.689	6.161	6.507	6.613	6.531	5.689	6.613	6.279	14.7%	
460 Constant Interior Surface Coefficients	6.260	5.940	5.929	6.475	6.729	6.243	5.929	6.729	6.263	12.8%	
470 Constant Exterior Surface Coefficients	5.987	5.644	5.649	6.029	6.005	6.056	5.644	6.056	5.895	7.0%	
800 High Mass High Cond. Wall Elements	0.473	0.380	0.362	0.374	0.391	0.282	0.282	0.473	0.377	50.6%	
810 High Mass Cavity Albedo		1.481	1.357	1.508	1.606	1.295	1.295	1.606	1.449	21.5%	

** ABS[(Max-Min) / (Mean of Example Simulation Results)]

ASHRAE Standard 140-2023, Test Results Comparison for Section 7 - Building Thermal Envelope and Fabric Load Cases 195-995 & 600FF-980FF

(VibeArch) vs. Annex B8, Section B8.1 Example Results

By Chang Heon Cheong (Individual), 22-Sep-2026

Note: The statistics in the tables below are based on the listed example results.

These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B8-3. Annual Hourly Integrated Peak Heating Loads

Simulation Model: Case	BSIMAC				CSE				DeST				EnergyPlus				ESP-r				TRNSYS				Example Result Statistics				VibeArch			
	kW	Mo.	Day	Hr	kW	Mo.	Day	Hr	kW	Mo.	Day	Hr	kW	Mo.	Day	Hr	kW	Mo.	Day	Hr	kW	Mo.	Day	Hr	Min kW	Max kW	Mean kW	(Max-Min)/ Mean** (%)	kW	Mo.	Day	Hr
600 Base Case, South Windows	3.255	Nov	26	8	3.020	Jan	1	1	3.035	Jan	1	0	3.204	Dec	31	24	3.228	Jan	1	1	3.359	Jan	1	1	3.020	3.359	3.184	10.6%	3.218	Dec	31	24
610 S. Windows + Overhang	3.166	Nov	26	8	3.021	Jan	1	1	3.039	Jan	1	0	3.192	Dec	31	24	3.233	Jan	1	1	3.360	Jan	1	1	3.021	3.360	3.168	10.7%	3.219	Dec	31	24
620 East & West Windows	3.145	Dec	31	24	3.038	Jan	1	1	3.068	Jan	1	0	3.229	Dec	31	24	3.253	Jan	1	1	3.385	Jan	1	1	3.038	3.385	3.186	10.9%	3.290	Dec	31	24
630 E&W Windows + Overhang & Fins	3.252	Dec	31	24	3.039	Jan	1	1	3.072	Jan	1	0	3.207	Dec	31	24	3.259	Jan	1	1	3.388	Jan	1	1	3.039	3.388	3.203	10.9%	3.303	Dec	31	24
640 Case 600 with Htg. Temp. Setback	4.633	Feb	8	9	4.222	Nov	26	8	4.658	Nov	26	7	4.559	Nov	26	8	4.101	Nov	26	8	4.039	Nov	26	8	4.039	4.658	4.369	14.2%	4.734	Nov	26	8
650 Case 600 with Night Ventilation	0.000				0.000	Jan	1	1	0.000				0.000	Jan	1	1	0.000	Jan	1	1	0.000	Dec	31	0	0.000	0.000	0.000	----				
660 Low-E Windows	2.620	Nov	26	8	2.758	Jan	1	1	2.798	Jan	1	0	2.831	Dec	31	24	2.846	Jan	1	1	2.955	Jan	1	1	2.620	2.955	2.801	12.0%	2.838	Dec	31	24
670 Single-Pane Windows	4.122	Nov	26	8	3.655	Jan	1	1	3.812	Jan	1	0	3.854	Nov	26	7	3.992	Nov	26	7	4.221	Nov	26	8	3.655	4.221	3.943	14.3%	4.212	Nov	26	7
680 Case 600 with Increased Insulation	2.126	Nov	26	8	1.778	Feb	9	6	1.811	Jan	1	1	2.052	Nov	26	7	2.022	Feb	9	7	2.115	Nov	26	8	1.778	2.126	1.984	17.6%	2.099	Nov	26	7
685 Case 600 with "20/20" Thermostat	3.169	Nov	26	8	3.032	Jan	1	1	3.054	Jan	1	0	3.223	Dec	31	24	3.247	Jan	1	1	3.374	Jan	1	1	3.032	3.374	3.183	10.8%	3.256	Dec	31	24
695 Case 685 with Increased Insulation	2.138	Nov	26	8	1.795	Jan	1	1	1.855	Jan	1	1	2.072	Dec	31	24	2.025	Nov	26	7	2.118	Nov	26	8	1.795	2.138	2.000	17.1%	2.110	Nov	26	7
900 South Windows	2.551	Feb	8	24	2.443	Feb	9	6	2.453	Feb	9	5	2.687	Feb	9	6	2.633	Feb	9	7	2.778	Feb	9	7	2.443	2.778	2.591	12.9%	2.682	Feb	9	6
910 S. Windows + Overhang	2.761	Feb	8	24	2.469	Feb	9	6	2.474	Feb	9	5	2.699	Feb	9	6	2.684	Feb	9	7	2.799	Feb	9	6	2.469	2.799	2.648	12.5%	2.711	Feb	9	6
920 East & West Windows	2.895	Nov	26	8	2.512	Feb	9	6	2.513	Feb	9	5	2.770	Feb	9	6	2.706	Feb	9	7	2.864	Feb	9	6	2.512	2.895	2.710	14.1%	2.797	Feb	9	6
930 E&W Windows + Overhang & Fins	2.968	Dec	31	24	2.537	Feb	9	6	2.549	Feb	9	5	2.785	Feb	9	6	2.765	Feb	9	6	2.900	Feb	9	6	2.537	2.968	2.751	15.7%	2.843	Feb	9	6
940 Case 900 with Htg. Temp. Setback	3.882	Feb	8	9	3.052	Jan	1	9	3.659	Feb	9	7	3.143	Dec	31	9	3.122	Feb	9	9	3.405	Jan	1	9	3.052	3.882	3.377	24.6%	3.604	Nov	26	8
950 Case 900 with Night Ventilation	0.000				0.000	Jan	1	1	0.000				0.000	Jan	1	1	0.000	Jan	1	1	0.000	Dec	31	0	0.000	0.000	0.000	----				
960 Sunspace					2.132	Feb	9	6	2.085	Jan	1	0	2.259	Feb	9	6	2.201	Feb	9	6	2.300	Feb	9	6	2.085	2.300	2.196	9.8%	2.387	Feb	9	6
980 Case 900 with Increased Insulation	1.693	Feb	8	24	1.254	Feb	9	6	1.382	Feb	9	5	1.538	Feb	9	6	1.473	Feb	9	7	1.592	Feb	9	7	1.254	1.693	1.489	29.5%	1.580	Feb	9	6
985 Case 900 with "20/20" Thermostat	2.754	Feb	8	24	2.452	Feb	9	6	2.458	Feb	9	5	2.695	Feb	9	6	2.642	Feb	9	7	2.785	Feb	9	6	2.452	2.785	2.631	12.7%	2.693	Feb	9	6
995 Case 985 with Increased Insulation	1.711	Nov	26	8	1.370	Feb	9	6	1.462	Feb	9	5	1.622	Feb	9	6	1.560	Feb	9	7	1.662	Feb	9	6	1.370	1.711	1.564	21.8%	1.649	Feb	9	6
195 Solid Conduction	1.802	Dec	31	24	1.791	Jan	1	1	1.799	Jan	1	0	1.794	Dec	31	24	1.802	Jan	1	1	1.796	Jan	1	1	1.791	1.802	1.797	0.6%				
200 Surface Convection (Int & Ext IR="off")	2.272	Nov	26	8	2.226	Nov	26	8	2.308	Jan	1	0	2.341	Nov	26	8	2.275	Dec	31	24	2.353	Nov	26	8	2.226	2.353	2.296	5.5%				
210 Infrared Radiation (Int IR="off", Ext IR="on")	2.374	Dec	31	24	2.629	Jan	1	2	2.605	Jan	1	0	2.565	Dec	31	24	2.671	Jan	1	1	2.750	Jan	1	1	2.374	2.750	2.599	14.5%				
215 Infrared Radiation (Int IR="on", Ext IR="off")	2.521	Nov	26	8	2.420	Nov	26	8	2.520	Jan	1	0	2.478	Nov	26	8	2.390	Nov	26	8	2.489	Nov	26	8	2.390	2.521	2.470	5.3%				
220 In-Depth Base Case	2.631	Nov	26	8	2.839	Jan	1	1	2.863	Jan	1	0	2.692	Dec	31	24	2.788	Jan	1	1	2.879	Jan	1	1	2.631	2.879	2.782	8.9%				
230 Infiltration	4.219	Dec	31	24	4.133	Jan	1	1	4.223	Jan	1	0	4.316	Dec	31	24	4.160	Jan	1	1	4.315	Jan	1	1	4.133	4.316	4.228	4.3%				
240 Internal Gains	2.431	Nov	26	8	2.651	Jan	1	1	2.685	Jan	1	0	2.507	Dec	31	24	2.605	Jan	1	1	2.693	Jan	1	1	2.431	2.693	2.595	10.1%				
250 Exterior Shortwave Absorptance	2.631	Nov	26	8	2.837	Jan	1	1	2.855	Jan	1	0	2.687	Dec	31	24	2.780	Jan	1	1	2.874	Jan	1	1	2.631	2.874	2.777	8.8%				
270 South Solar Windows					2.611	Jan	1	2	2.560	Jan	1	1	2.597	Dec	31	24	2.748	Jan	1	1	2.843	Jan	1	2	2.560	2.843	2.672	10.6%				
280 Cavity Albedo					2.612	Jan	1	2	2.568	Jan	1	1	2.602	Dec	31	24	2.752	Jan	1	1	2.849	Jan	1	1	2.568	2.849	2.677	10.5%				
290 South Shading					2.611	Jan	1	2	2.561	Jan	1	1	2.583	Dec	31	24	2.750	Jan	1	1	2.843	Jan	1	2	2.561	2.843	2.670	10.6%				
300 East/West Window					2.614	Jan	1	1	2.589	Jan	1	0	2.603	Dec	31	24	2.766	Jan	1	1	2.854	Jan	1	1	2.589	2.854	2.685	9.9%				
310 East/West Shading					2.615	Jan	1	1	2.592	Jan	1	0	2.580	Dec	31	24	2.771	Jan	1	1	2.856	Jan	1	1	2.580	2.856	2.683	10.3%				
320 Thermostat					2.609	Jan	1	1	2.546	Jan	1	1	2.573	Dec	31	24	2.733	Jan	1	2	2.834	Jan	1	2	2.546	2.834	2.659	10.8%				
395 Low Mass Solid Conduction	1.948	Dec	31	24	2.157	Jan	1	2	2.085	Jan	1	1	1.952	Dec	31	24	2.090	Jan	1	2	2.161	Jan	1	2	1.948	2.161	2.066	10.3%				
400 Low Mass High Cond. Wall Elements	2.559	Nov	26	8	2.839	Jan	1	1	2.863	Jan	1	0	2.692	Dec	31	24	2.788	Jan	1	1	2.879	Jan	1	1	2.559	2.879	2.770	11.5%				
410 Low Mass Infiltration	3.338	Dec	31	24	3.441	Jan	1	1	3.543	Jan	1	0	3.504	Dec	31	24	3.473	Jan	1	1	3.597	Jan	1	1	3.338	3.597	3.483	7.4%				
420 Low Mass Internal Gains	3.138	Dec	31	24	3.256	Jan	1	1	3.365	Jan	1	0	3.319	Dec	31	24	3.290	Jan	1	1	3.411	Jan	1	1	3.138	3.411	3.297	8.3%				
430 Low Mass Ext. Shortwave Absorptance	3.300	Dec	31	24	3.254	Jan	1	1	3.360	Jan	1	0	3.316	Dec	31	24	3.285	Jan	1	1	3.409	Jan	1	1	3.254	3.409	3.321	4.7%				
440 Low Mass Cavity Albedo					3.027	Jan	1	1	3.060	Jan	1	0	3.219	Dec	31	24	3.237	Jan	1	1	3.374	Jan	1	1	3.027	3.374	3.183	10.9%				
450 Constant Interior and Exterior Surf Coeffs	2.989	Nov	26	8	2.978	Jan	1	1	2.753	Jan	1	0	3.100	Dec	31	24	3.042	Jan	1	1	3.037	Jan	1	1	2.753	3.100	2.983	11.6%				

ASHRAE Standard 140-2023, Test Results Comparison for Section 7 - Building Thermal Envelope and Fabric Load Cases 195-995 & 600FF-980FF
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Note: The statistics in the tables below are based on the listed example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

460 Constant Interior Surface Coefficients	3.055	Nov	26	8	2.971	Jan	1	1	2.980	Jan	1	0	3.091	Dec	31	24	3.101	Jan	1	1	3.160	Jan	1	1	2.971	3.160	3.060	6.2%	
470 Constant Exterior Surface Coefficients	3.118	Nov	26	8	3.001	Jan	1	1	2.807	Jan	1	0	3.207	Dec	31	24	3.169	Jan	1	1	3.231	Jan	1	1	2.807	3.231	3.089	13.7%	
800 High Mass High Cond. Wall Elements	2.957	Dec	31	24	2.778	Feb	9	6	2.864	Feb	9	5	2.924	Feb	9	6	2.840	Feb	9	7	2.967	Feb	9	6	2.778	2.967	2.888	6.6%	
810 High Mass Cavity Albedo					2.500	Feb	9	6	2.512	Feb	9	5	2.749	Feb	9	6	2.695	Feb	9	7	2.845	Feb	9	6	2.500	2.845	2.660	13.0%	

** ABS[(Max-Min) / (Mean of Example Simulation Results)]

**ASHRAE Standard 140-2023, Test Results Comparison for Section 7 - Building Thermal Envelope and Fabric Load Cases 195-995 & 600FF-980FF
(VibeArch) vs. Annex B8, Section B8.1 Example Results
By Chang Heon Cheong (Individual), 22-Sep-2026**

Note: The statistics in the tables below are based on the listed example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B8-4. Annual Hourly Integrated Peak Sensible Cooling Loads

Simulation Model: Case	BSIMAC				CSE				DeST				EnergyPlus				ESP-r				TRNSYS				Example Result Statistics				VibeArch			
	kW	Mo.	Day	Hr	kW	Mo.	Day	Hr	kW	Mo.	Day	Hr	kW	Mo.	Day	Hr	kW	Mo.	Day	Hr	kW	Mo.	Day	Hr	Min kW	Max kW	Mean kW	(Max-Min)/ Mean** (%)	kW	Mo.	Day	Hr
600 Base Case, South Windows	5.650	Jan	22	15	6.481	Jan	22	14	5.422	Jan	22	14	6.352	Jan	22	14	6.193	Jan	22	14	6.046	Jan	22	14	5.422	6.481	6.024	17.6%	6.424	Jan	22	14
610 S. Windows + Overhang	5.466	Jan	22	15	6.432	Dec	1	14	5.331	Jan	22	14	6.135	Dec	1	14	5.934	Jan	22	14	5.868	Dec	1	14	5.331	6.432	5.861	18.8%	6.324	Jan	22	14
620 East & West Windows	4.704	Jun	26	18	4.493	Jun	26	17	3.955	Jun	26	17	4.797	Jun	26	17	4.622	Jun	26	17	4.588	Jun	26	17	3.955	4.797	4.527	18.6%	4.767	Jun	26	17
630 E&W Windows + Overhang & Fins	4.121	Jun	26	18	3.998	Jun	26	18	3.526	Jun	26	17	4.212	Jun	26	17	3.971	Jun	26	17	3.949	Jun	26	17	3.526	4.212	3.963	17.3%	4.221	Jun	26	17
640 Case 600 with Htg. Temp. Setback	5.650	Jan	22	15	6.429	Jan	22	14	5.365	Jan	22	14	6.297	Jan	22	14	6.127	Jan	22	14	5.967	Jan	22	14	5.365	6.429	5.973	17.8%	6.348	Jan	22	14
650 Case 600 with Night Ventilation	5.648	Jan	22	15	6.290	Dec	1	14	5.045	Oct	18	14	6.138	Oct	18	14	5.961	Oct	18	14	5.797	Oct	18	14	5.045	6.290	5.813	21.4%	6.180	Oct	18	14
660 Low-E Windows	3.343	Oct	18	15	3.933	Oct	1	13	3.355	Oct	11	14	3.770	Oct	18	14	3.530	Oct	1	14	3.457	Oct	18	14	3.343	3.933	3.565	16.6%	3.828	Oct	18	14
670 Single-Pane Windows	6.217	Oct	18	14	6.925	Oct	1	13	5.839	Oct	10	13	6.806	Jan	22	14	6.482	Oct	18	14	6.401	Oct	18	14	5.839	6.925	6.445	16.9%	6.664	Oct	18	14
680 Case 600 with Increased Insulation	5.761	Jan	22	15	7.051	Jan	22	14	5.861	Jan	22	14	6.770	Jan	22	14	6.676	Jan	22	14	6.557	Jan	22	14	5.761	7.051	6.446	20.0%	6.800	Jan	22	14
685 Case 600 with "20/20" Thermostat	6.318	Jan	22	15	7.159	Jan	22	14	6.071	Jan	22	14	7.107	Jan	22	14	6.934	Jan	22	14	6.867	Jan	22	14	6.071	7.159	6.743	16.1%	7.219	Jan	22	14
695 Case 685 with Increased Insulation	6.232	Jan	22	15	7.541	Jan	22	14	6.355	Jan	22	14	7.334	Jan	22	14	7.239	Jan	22	14	7.175	Jan	22	14	6.232	7.541	6.979	18.8%	7.421	Jan	22	14
900 South Windows	3.039	Oct	1	15	3.376	Oct	1	14	2.556	Sep	11	14	3.040	Oct	1	14	2.896	Oct	12	15	2.940	Oct	1	14	2.556	3.376	2.975	27.6%	3.070	Oct	1	14
910 S. Windows + Overhang	2.493	Oct	18	14	2.722	Oct	2	15	2.103	Oct	12	14	2.222	Oct	18	15	2.212	Oct	2	15	2.081	Oct	12	15	2.081	2.722	2.306	27.8%	2.404	Oct	2	15
920 East & West Windows	3.481	Jun	26	18	3.057	Jun	26	18	2.710	Jun	26	17	3.260	Jun	26	18	3.099	Jun	26	18	3.154	Jun	26	18	2.710	3.481	3.127	24.7%	3.311	Jun	26	18
930 E&W Windows + Overhang & Fins	3.052	Jun	26	18	2.662	Jun	26	18	2.335	Jun	26	17	2.782	Jun	26	18	2.494	Jun	26	18	2.613	Jun	26	18	2.335	3.052	2.656	27.0%	2.880	Jun	26	18
940 Case 900 with Htg. Temp. Setback	3.158	Oct	1	15	3.376	Oct	1	14	2.556	Sep	11	14	3.040	Oct	1	14	2.891	Oct	12	15	2.938	Oct	1	14	2.556	3.376	2.993	27.4%	3.069	Oct	1	14
950 Case 900 with Night Ventilation	2.366	Sep	10	15	2.364	Sep	4	15	2.054	Sep	11	14	2.388	Sep	11	15	2.202	Sep	10	15	2.236	Sep	11	15	2.054	2.388	2.268	14.7%	2.283	Sep	11	15
960 Sunspace					1.377	Jun	26	17	1.367	Jun	26	16	1.480	Jun	26	17	1.403	Jun	26	17	1.338	Jun	26	17	1.338	1.480	1.393	10.2%	1.597	Jun	26	16
980 Case 900 with Increased Insulation	3.384	Oct	18	14	3.668	Oct	2	14	2.930	Oct	18	14	3.450	Oct	18	15	3.341	Oct	12	15	3.313	Oct	12	14	2.930	3.668	3.348	22.0%	3.509	Oct	18	14
985 Case 900 with "20/20" Thermostat	3.977	Oct	18	14	4.225	Oct	1	14	3.208	Oct	11	14	3.915	Oct	18	15	3.736	Oct	12	15	3.885	Oct	1	14	3.208	4.225	3.824	26.6%	3.985	Oct	18	15
995 Case 985 with Increased Insulation	4.129	Jan	22	14	4.224	Jan	22	15	3.315	Jan	22	14	4.177	Jan	22	15	3.954	Jan	22	15	4.115	Jan	22	15	3.315	4.224	3.986	22.8%	4.282	Jan	22	15
195 Solid Conduction	1.118	Jun	26	17	0.994	Jun	26	17	0.973	Jun	26	16	1.041	Jun	26	17	0.944	Jun	26	17	0.994	Jun	26	17	0.944	1.118	1.011	17.2%				
200 Surface Convection (Int & Ext IR="off")	1.271	Jun	26	17	1.215	Jun	26	17	1.239	Jun	26	16	1.307	Jun	26	17	1.198	Jun	26	17	1.259	Jun	26	17	1.198	1.307	1.248	8.8%				
210 Infrared Radiation (Int IR="off", Ext IR="on")	1.193	Jun	26	17	0.946	Jun	13	15	0.937	Jun	26	16	1.084	Jun	26	17	0.877	Jun	14	14	0.884	Jun	26	18	0.877	1.193	0.987	32.0%				
215 Infrared Radiation (Int IR="on", Ext IR="off")	1.393	Jun	26	17	1.369	Jun	26	17	1.386	Jun	26	16	1.400	Jun	26	17	1.366	Jun	26	17	1.352	Jun	26	17	1.352	1.400	1.378	3.5%				
220 In-Depth Base Case	1.336	Jun	26	18	1.108	Jun	13	15	1.040	Jun	26	16	1.184	Jun	26	18	1.012	Jun	14	15	0.968	Jun	26	18	0.968	1.336	1.108	33.2%				
230 Infiltration	1.994	Jun	26	17	1.728	Jun	26	17	1.734	Jun	26	16	1.841	Jun	26	17	1.701	Jun	26	17	1.694	Jun	26	17	1.694	1.994	1.782	16.9%				
240 Internal Gains	1.534	Jun	26	18	1.295	Jun	13	15	1.218	Jun	26	16	1.366	Jun	26	18	1.192	Jun	14	15	1.150	Jun	26	18	1.150	1.534	1.292	29.7%				
250 Exterior Shortwave Absorptance	2.913	Sep	12	14	2.790	Sep	12	14	2.751	Sep	3	14	2.867	Sep	12	14	3.034	Sept	12	14	2.688	Sep	12	14	2.688	3.034	2.840	12.2%				
270 South Solar Windows					7.011	Jan	22	14	5.832	Jan	22	14	6.839	Jan	22	14	6.613	Jan	22	14	6.637	Jan	22	14	5.832	7.011	6.586	17.9%				
280 Cavity Albedo					4.765	Jan	22	14	3.768	Dec	1	13	4.727	Jan	22	14	4.676	Jan	22	14	4.400	Jan	22	14	3.768	4.765	4.467	22.3%				
290 South Shading					6.872	Jan	22	14	5.739	Jan	22	14	6.595	Jan	22	14	6.411	Jan	22	14	6.402	Jan	22	14	5.739	6.872	6.404	17.7%				
300 East/West Window					4.163	Jun	26	17	3.695	Jun	26	17	4.475	Jun	26	17	4.221	Jun	26	17	4.278	Jun	26	17	3.695	4.475	4.167	18.7%				
310 East/West Shading					3.796	Jun	26	18	3.252	Jun	26	17	3.970	Jun	26	18	3.618	Jun	26	18	3.701	Jun	26	18	3.252	3.970	3.667	19.6%				
320 Thermostat					6.473	Jan	22	14	5.304	Jan	22	14	6.209	Jan	22	14	5.993	Jan	22	14	5.949	Jan	22	14	5.304	6.473	5.986	19.5%				
395 Low Mass Solid Conduction	0.547	Jun	26	18	0.357	Jun	14	18	0.308	Jun	14	16	0.377	Jun	26	19	0.294	Aug	5	18	0.265	Jun	14	18	0.265	0.547	0.358	78.7%				
400 Low Mass High Cond. Wall Elements	0.798	Jun	26	18	0.494	Jun	14	15	0.457	Jun	26	17	0.607	Jun	26	18	0.456	Aug	5	17	0.372	Jun	14	17	0.372	0.798	0.531	80.3%				
410 Low Mass Infiltration	1.011	Jun	26	17	0.700	Jun	26	18	0.709	Jun	26	16	0.828	Jun	26	18	0.624	Jun	26	18	0.604	Jun	26	18	0.604	1.011	0.746	54.6%				
420 Low Mass Internal Gains	1.208	Jun	26	17	0.909	Jun	26	18	0.917	Jun	26	16	1.033	Jun	26	18	0.836	Jun	26	17	0.814	Jun	26	18	0.814	1.208	0.953	41.3%				
430 Low Mass Ext. Shortwave Absorptance	2.167	Jun	26	16	1.840	Jun	26	15	1.840	Jun	26	15	1.929	Jun	26	16	1.874	Jul	17	14	1.704	Jun	26	15	1.704	2.167	1.892	24.5%				
440 Low Mass Cavity Albedo					4.666	Oct	1	13	3.766	Oct	11	13	4.686	Oct	18	14	4.679	Oct	18	14	4.308	Oct	18	14	3.766	4.686	4.421	20.8%				
450 Constant Interior and Exterior Surf Coeffs	5.812	Jan	22	15	6.180	Jan	22	14	6.063	Jan	22	13	6.466	Jan	22	14	6.501	Jan	22	14	6.313	Jan	22	14	5.812	6.501	6.223	11.1%				

ASHRAE Standard 140-2023, Test Results Comparison for Section 7 - Building Thermal Envelope and Fabric Load Cases 195-995 & 600FF-980FF
(VibeArch) vs. Annex B8, Section B8.1 Example Results
By Chang Heon Cheong (Individual), 22-Sep-2026

Note: The statistics in the tables below are based on the listed example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

460 Constant Interior Surface Coefficients	5.804	Jan	22	15	6.243	Jan	22	14	5.902	Jan	22	13	6.374	Jan	22	14	6.304	Jan	22	14	6.069	Jan	22	14	5.804	6.374	6.116	9.3%	
470 Constant Exterior Surface Coefficients	5.695	Jan	22	15	6.388	Jan	22	14	5.570	Jan	22	14	6.444	Jan	22	14	6.407	Jan	22	14	6.320	Jan	22	14	5.570	6.444	6.137	14.2%	
800 High Mass High Cond. Wall Elements	1.286	Jun	26	16	1.102	Aug	5	15	1.157	Aug	5	14	1.046	Jun	26	16	1.052	Aug	5	15	0.936	Aug	5	15	0.936	1.286	1.096	32.0%	
810 High Mass Cavity Albedo					2.410	Sep	4	15	1.940	Sep	11	14	2.270	Sep	11	15	2.179	Sep	4	15	2.113	Sep	11	15	1.940	2.410	2.183	21.6%	

** ABS[(Max-Min) / (Mean of Example Simulation Results)]

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(VibeArch) vs. Annex B8, Section B8.1 Example Results
By Chang Heon Cheong (Individual), 22-Sep-2026**

Note: The statistics in the tables below are based on the listed example results.
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Table B8-5. Free-Float Temperature Output

MAXIMUM ANNUAL HOURLY INTEGRATED ZONE TEMPERATURE																		Example Result Statistics				VibeArch										
Simulation Model:		BSIMAC				CSE				DeST				EnergyPlus												ESP-r				TRNSYS		
Case	T (°C)	Mo.	Day	Hr	T (°C)	Mo.	Day	Hr	T (°C)	Mo.	Day	Hr	T (°C)	Mo.	Day	Hr	T (°C)	Mo.	Day	Hr	T (°C)	Mo.	Day	Hr	T (°C)	T (°C)	Mean	(Max-Min)/ Mean** (%)	T (°C)	Mo.	Day	Hr
600FF - Low Mass with S. Windows	63.4	Oct	18	17	68.4	Oct	1	16	65.0	Oct	11	15	63.8	Oct	18	16	64.6	Oct	1	16	62.4	Oct	1	15	62.4	68.4	64.6	9.3%	64.8	Oct	18	15
900FF - High Mass with S. Windows	46.0	Oct	1	17	45.1	Sep	4	15	44.5	Sep	11	15	44.3	Sep	12	15	44.3	Sep	12	16	43.3	Sep	12	15	43.3	46.0	44.6	6.2%	43.9	Sep	12	15
650FF Case 600FF with Night Ventilation	62.1	Oct	18	17	66.8	Oct	1	16	62.6	Oct	11	15	62.5	Oct	18	16	63.3	Oct	1	16	61.1	Oct	1	15	61.1	66.8	63.1	9.1%	63.2	Oct	18	15
950FF Case 900FF with Night Ventilation	37.1	Oct	1	17	36.8	Sep	11	15	36.4	Sep	11	15	36.7	Sep	11	16	36.4	Aug	5	16	36.1	Sep	11	16	36.1	37.1	36.6	2.7%	36.8	Sep	11	15
680FF Case 600FF with Increased Insulation	72.5	Jan	22	17	78.5	Jan	22	16	75.0	Oct	12	15	70.1	Jan	22	16	72.2	Oct	12	16	69.8	Jan	22	16	69.8	78.5	73.0	12.0%	72.9	Jan	22	16
980FF Case 900FF with Increased Insulation	49.7	Oct	1	17	52.2	Sep	12	15	52.8	Oct	21	14	49.6	Sep	12	16	50.2	Sep	12	15	48.5	Sep	12	15	48.5	52.8	50.5	8.5%	49.7	Oct	21	15
960 Sunspace					48.9	Oct	2	16	53.2	Oct	20	14	49.9	Oct	12	15	49.5	Oct	12	15	48.1	Oct	12	15	48.1	53.2	49.9	10.2%	52.2	Oct	12	15

MINIMUM ANNUAL HOURLY INTEGRATED ZONE TEMPERATURE																		Example Result Statistics				VibeArch										
Simulation Model:		BSIMAC				CSE				DeST				EnergyPlus												ESP-r				TRNSYS		
Case	T (°C)	Mo.	Day	Hr	T (°C)	Mo.	Day	Hr	T (°C)	Mo.	Day	Hr	T (°C)	Mo.	Day	Hr	T (°C)	Mo.	Day	Hr	T (°C)	Mo.	Day	Hr	Min T (°C)	Max T (°C)	Mean T (°C)	(Max-Min)/ Mean** (%)	T (°C)	Mo.	Day	Hr
600FF - Low Mass with S. Windows	-9.9	Nov	26	8	-12.9	Feb	9	7	-13.5	Feb	9	6	-12.6	Feb	9	7	-13.5	Feb	9	7	-13.8	Feb	9	7	-13.8	-9.9	-12.7	31.1%	-12.2	Feb	9	6
900FF - High Mass with S. Windows	0.6	Feb	8	11	2.2	Feb	9	7	1.3	Feb	9	7	1.2	Feb	9	7	1.6	Feb	9	7	0.6	Feb	9	7	0.6	2.2	1.3	124.2%	1.2	Feb	9	7
650FF Case 600FF with Night Ventilation	-16.7	Dec	31	24	-17.8	Jan	1	1	-17.4	Dec	30	23	-17.1	Dec	31	24	-17.5	Jan	1	1	-17.5	Dec	31	24	-17.8	-16.7	-17.3	6.1%	-17.5	Dec	31	24
950FF Case 900FF with Night Ventilation	-13.2	Dec	31	24	-13.2	Jan	1	1	-13.4	Dec	30	23	-12.8	Feb	9	7	-12.5	Feb	9	6	-12.8	Feb	9	6	-13.4	-12.5	-13.0	6.6%	-14.0	Jan	1	1
680FF Case 600FF with Increased Insulation	-5.7	Feb	8	11	-6.2	Feb	9	7	-6.9	Feb	9	7	-7.1	Feb	9	7	-7.2	Feb	9	7	-8.1	Feb	9	7	-8.1	-5.7	-6.9	34.6%	-7.1	Feb	9	7
980FF Case 900FF with Increased Insulation	7.3	Feb	8	11	12.5	Nov	4	7	12.4	Nov	5	6	9.9	Nov	4	7	10.5	Nov	4	8	9.5	Nov	4	7	7.3	12.5	10.4	50.6%	9.7	Nov	4	7
960 Sunspace					8.0	Feb	9	8	6.7	Feb	9	6	5.1	Feb	9	7	5.0	Feb	9	7	4.2	Feb	9	7	4.2	8.0	5.8	65.0%	7.0	Feb	9	7

AVERAGE ANNUAL HOURLY INTEGRATED ZONE TEMPERATURE																		Example Result Statistics				VibeArch										
Simulation Model:		BSIMAC				CSE				DeST				EnergyPlus												ESP-r				TRNSYS		
Case	T (°C)				T (°C)				T (°C)				T (°C)				T (°C)				T (°C)				Min T (°C)	Max T (°C)	Mean T (°C)	(Max-Min)/ Mean** (%)	T (°C)			
600FF - Low Mass with S. Windows	26.1				25.6				25.3				24.9				25.3				24.3				24.3	26.1	25.2	7.3%	24.7			
900FF - High Mass with S. Windows	25.5				25.7				25.3				25.1				25.3				24.5				24.5	25.7	25.2	4.9%	24.8			
650FF Case 600FF with Night Ventilation	17.6				18.5				18.0				18.4				18.9				18.4				17.6	18.9	18.3	7.3%	18.4			
950FF Case 900FF with Night Ventilation	15.0				14.7				14.4				14.8				14.8				14.7				14.4	15.0	14.7	4.4%	14.6			
680FF Case 600FF with Increased Insulation	31.8				33.1				33.3				31.0				31.7				30.2				30.2	33.3	31.8	9.8%	30.4			
980FF Case 900FF with Increased Insulation	30.7				33.3				33.3				31.2				31.8				30.5				30.5	33.3	31.8	8.8%	30.5			
960 Sunspace					28.6				29.5				27.7				27.7				26.8				26.8	29.5	28.1	9.5%	28.4			

** ABS[(Max-Min) / (Mean of Example Simulation Results)]

**ASHRAE Standard 140-2023, Test Results Comparison for Section 7 - Building Thermal Envelope and Fabric Load Cases 195-995 & 600FF-980FF
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Note: The statistics in the tables below are based on the listed example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B8-6. Low Mass Basic Sensitivity Tests

ANNUAL HEATING [MWh]							Statistics for Example Results				VibeArch
Case	BSIMAC	CSE	DeST	EnergyPlus	ESP-r	TRNSYS	Min	Max	Mean	(Max-Min)/ Mean** (%)	
610-600 Heat, S. Shade	0.113	0.074	0.097	0.050	0.165	0.089	0.050	0.165	0.098	117.0%	0.092
620-600 Heat, E&W Orient.	0.320	0.101	0.250	0.161	0.152	0.215	0.101	0.320	0.200	109.6%	0.216
630-620 Heat, E&W Shade	0.553	0.262	0.380	0.298	0.536	0.420	0.262	0.553	0.408	71.2%	0.424
640-600 Heat, Htg. Setback	-1.368	-1.590	-1.428	-1.663	-1.708	-1.851	-1.851	-1.368	-1.601	30.2%	-1.755
660-600 Heat, Low-E Win.	-0.476	-0.391	-0.226	-0.618	-0.575	-0.714	-0.714	-0.226	-0.500	97.6%	-0.584
670-600 Heat, 1-Pane Win.	1.434	1.307	1.526	1.292	1.613	1.636	1.292	1.636	1.468	23.5%	1.810
680-600 Heat, > Ins. 20/27	-1.831	-2.207	-2.315	-2.145	-2.230	-2.217	-2.315	-1.831	-2.157	22.4%	-2.163
685-600 Heat, 20/20 tstat	0.482	0.582	0.599	0.553	0.542	0.539	0.482	0.599	0.549	21.3%	0.555
695-685 Heat, > Ins. 20/20	-1.823	-2.159	-2.261	-2.075	-2.171	-2.150	-2.261	-1.823	-2.107	20.8%	-2.127
ANNUAL SENSIBLE COOLING [MWh]							Statistics for Example Results				VibeArch
Case	BSIMAC	CSE	DeST	EnergyPlus	ESP-r	TRNSYS	Min	Max	Mean	(Max-Min)/ Mean** (%)	
610-600 Cool, S. Shade	-1.523	-1.531	-1.259	-1.694	-1.929	-1.663	-1.929	-1.259	-1.600	41.9%	-1.499
620-600 Cool, E&W Orient.	-1.418	-1.834	-1.523	-1.968	-1.916	-1.939	-1.968	-1.418	-1.766	31.1%	-1.808
630-620 Cool, E&W Shade	-1.330	-1.059	-1.122	-1.223	-1.650	-1.268	-1.650	-1.059	-1.275	46.4%	-1.199
640-600 Cool, Htg. Setback	-0.018	-0.269	-0.195	-0.264	-0.269	-0.302	-0.302	-0.018	-0.220	129.5%	-0.272
650-600 Cool, Night Vent	-1.193	-1.259	-1.246	-1.210	-1.217	-1.147	-1.259	-1.147	-1.212	9.2%	-1.178
660-600 Heat, Low-E Win.	-2.808	-2.573	-2.172	-2.796	-2.943	-2.813	-2.943	-2.172	-2.684	28.7%	-2.730
670-600 Heat, 1-Pane Win.	0.717	0.665	0.522	0.596	0.358	0.418	0.358	0.717	0.546	65.7%	0.213
680-600 Heat, > Ins. 20/27	0.116	0.517	0.500	0.417	0.368	0.530	0.116	0.530	0.408	101.6%	0.407
685-600 Heat, 20/20 tstat	3.308	2.946	2.806	3.092	2.960	3.072	2.806	3.308	3.031	16.6%	3.100
695-685 Heat, > Ins. 20/20	-0.375	0.115	0.148	0.053	0.028	0.188	-0.375	0.188	0.026	2164.0%	0.060
PEAK HEATING [kW]							Statistics for Example Results				VibeArch
Case	BSIMAC	CSE	DeST	EnergyPlus	ESP-r	TRNSYS	Min	Max	Mean	(Max-Min)/ Mean** (%)	
610-600 Heat, S. Shade	-0.089	0.001	0.004	-0.013	0.005	0.001	-0.089	0.005	-0.015	616.7%	0.001
620-600 Heat, E&W Orient.	-0.110	0.018	0.033	0.025	0.025	0.026	-0.110	0.033	0.003	5355.3%	0.073
630-620 Heat, E&W Shade	0.107	0.002	0.004	-0.023	0.006	0.003	-0.023	0.107	0.016	786.0%	0.013
640-600 Heat, Htg. Setback	1.378	1.202	1.623	1.354	0.873	0.680	0.680	1.623	1.185	79.6%	1.517
660-600 Heat, Low-E Win.	-0.635	-0.262	-0.237	-0.373	-0.382	-0.404	-0.635	-0.237	-0.382	104.1%	-0.379
670-600 Heat, 1-Pane Win.	0.867	0.635	0.777	0.649	0.764	0.862	0.635	0.867	0.759	30.5%	0.994
680-600 Heat, > Ins. 20/27	-1.129	-1.243	-1.224	-1.152	-1.206	-1.244	-1.244	-1.129	-1.200	9.6%	-1.119
685-600 Heat, 20/20 tstat	-0.086	0.012	0.019	0.019	0.019	0.016	-0.086	0.019	0.000	29982.6%	0.038
695-685 Heat, > Ins. 20/20	-1.031	-1.237	-1.199	-1.151	-1.222	-1.257	-1.257	-1.031	-1.183	19.1%	-1.146
PEAK SENSIBLE COOLING [kW]							Statistics for Example Results				VibeArch
Case	BSIMAC	CSE	DeST	EnergyPlus	ESP-r	TRNSYS	Min	Max	Mean	(Max-Min)/ Mean** (%)	
610-600 Cool, S. Shade	-0.184	-0.049	-0.091	-0.217	-0.259	-0.178	-0.259	-0.049	-0.163	129.0%	-0.100
620-600 Cool, E&W Orient.	-0.946	-1.988	-1.467	-1.554	-1.571	-1.457	-1.988	-0.946	-1.497	69.6%	-1.657
630-620 Cool, E&W Shade	-0.583	-0.495	-0.429	-0.585	-0.651	-0.639	-0.651	-0.429	-0.564	39.4%	-0.545
640-600 Cool, Htg. Setback	0.000	-0.052	-0.057	-0.054	-0.066	-0.079	-0.079	0.000	-0.051	153.3%	-0.076
650-600 Cool, Night Vent	-0.002	-0.191	-0.377	-0.213	-0.232	-0.248	-0.377	-0.002	-0.211	178.0%	-0.244
660-600 Heat, Low-E Win.	-2.307	-2.548	-2.067	-2.581	-2.663	-2.588	-2.663	-2.067	-2.459	24.2%	-2.596
670-600 Heat, 1-Pane Win.	0.567	0.444	0.417	0.455	0.289	0.356	0.289	0.567	0.421	66.0%	0.240
680-600 Heat, > Ins. 20/27	0.111	0.570	0.439	0.419	0.483	0.511	0.111	0.570	0.422	108.8%	0.376
685-600 Heat, 20/20 tstat	0.668	0.678	0.649	0.755	0.741	0.822	0.649	0.822	0.719	24.0%	0.795
695-685 Heat, > Ins. 20/20	-0.086	0.381	0.284	0.228	0.305	0.308	-0.086	0.381	0.237	197.5%	0.202

** ABS[(Max-Min) / (Mean of Example Simulation Results)]

**ASHRAE Standard 140-2023, Test Results Comparison for Section 7 - Building Thermal Envelope and Fabric Load Cases 195-995 & 600FF-980FF
(VibeArch) vs. Annex B8, Section B8.1 Example Results
By Chang Heon Cheong (Individual), 22-Sep-2026**

Note: The statistics in the tables below are based on the listed example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B8-7. High Mass Basic Sensitivity Tests

ANNUAL HEATING [MWh]							Statistics for Example Results				VibeArch
CASES	BSIMAC	CSE	DeST	EnergyPlus	ESP-r	TRNSYS	Min	Max	Mean	(Max-Min)/ Mean** (%)	
900-600 Mass, Heat	-2.324	-2.614	-2.456	-2.661	-2.777	-2.690	-2.777	-2.324	-2.587	17.5%	-2.646
910-900 Heat, S. Shade	0.437	0.269	0.269	0.292	0.483	0.318	0.269	0.483	0.345	62.0%	0.298
920-900 Heat, E&W Orient.	1.774	1.577	1.668	1.673	1.715	1.793	1.577	1.793	1.700	12.7%	1.739
930-920 Heat, E&W Shade	0.770	0.568	0.674	0.657	0.978	0.777	0.568	0.978	0.737	55.6%	0.755
940-900 Heat, Htg. Setback	-0.337	-0.516	-0.442	-0.596	-0.570	-0.645	-0.645	-0.337	-0.518	59.5%	-0.595
960-900 Heat, Sunspace		1.143	1.180	1.025	1.039	1.046	1.025	1.180	1.087	14.2%	1.015
980-900 Heat, > Ins. 20/27	-1.006	-1.133	-1.325	-1.253	-1.234	-1.364	-1.364	-1.006	-1.219	29.3%	-1.284
985-900 Heat, 20/20 tstat	1.075	0.741	0.688	0.706	0.699	0.722	0.688	1.075	0.772	50.1%	0.742
995-985 Heat, > Ins. 20/20	-1.471	-1.365	-1.509	-1.363	-1.379	-1.459	-1.509	-1.363	-1.424	10.3%	-1.415
ANNUAL SENSIBLE COOLING [MWh]							Statistics for Example Results				VibeArch
CASES	BSIMAC	CSE	DeST	EnergyPlus	ESP-r	TRNSYS	Min	Max	Mean	(Max-Min)/ Mean** (%)	
900-600 Mass, Cool	-3.108	-3.449	-3.049	-3.538	-3.674	-3.512	-3.674	-3.049	-3.389	18.4%	-3.475
910-900 Cool, S. Shade	-1.230	-1.049	-0.893	-1.105	-1.205	-1.076	-1.230	-0.893	-1.093	30.8%	-0.983
920-900 Cool, E&W Orient.	0.414	0.325	0.323	0.242	0.327	0.282	0.242	0.414	0.319	53.9%	0.371
930-920 Cool, E&W Shade	-0.967	-0.714	-0.798	-0.812	-1.161	-0.877	-1.161	-0.714	-0.888	50.3%	-0.830
940-900 Cool, Htg. Setback	-0.101	-0.067	-0.040	-0.064	-0.060	-0.064	-0.101	-0.040	-0.066	92.3%	-0.071
950-900 Cool, Night Vent	-2.128	-1.866	-1.765	-1.782	-1.832	-1.626	-2.128	-1.626	-1.833	27.4%	-1.708
960-900 Cool, Sunspace		-1.538	-1.474	-1.582	-1.538	-1.478	-1.582	-1.474	-1.522	7.1%	-1.338
980-900 Heat, > Ins. 20/27	0.787	1.531	1.375	1.223	1.287	1.251	0.787	1.531	1.242	59.9%	1.187
985-900 Heat, 20/20 tstat	4.559	3.770	3.497	3.870	3.762	3.846	3.497	4.559	3.884	27.3%	3.894
995-985 Heat, > Ins. 20/20	0.209	0.969	0.891	0.844	0.900	0.950	0.209	0.969	0.794	95.7%	0.839
PEAK HEATING [kW]							Statistics for Example Results				VibeArch
CASES	BSIMAC	CSE	DeST	EnergyPlus	ESP-r	TRNSYS	Min	Max	Mean	(Max-Min)/ Mean** (%)	
900-600 Mass, Heat	-0.704	-0.577	-0.582	-0.517	-0.595	-0.580	-0.704	-0.517	-0.593	31.6%	-0.536
910-900 Heat, S. Shade	0.210	0.026	0.021	0.011	0.051	0.021	0.011	0.210	0.057	350.6%	0.029
920-900 Heat, E&W Orient.	0.344	0.069	0.060	0.083	0.073	0.086	0.060	0.344	0.119	238.5%	0.115
930-920 Heat, E&W Shade	0.073	0.025	0.036	0.015	0.059	0.036	0.015	0.073	0.041	143.7%	0.046
940-900 Heat, Htg. Setback	1.331	0.609	1.206	0.455	0.489	0.626	0.455	1.331	0.786	111.4%	0.922
960-900 Heat, Sunspace		-0.311	-0.368	-0.428	-0.432	-0.478	-0.478	-0.311	-0.404	41.3%	-0.295
980-900 Heat, > Ins. 20/27	-0.858	-1.190	-1.071	-1.150	-1.160	-1.186	-1.190	-0.858	-1.102	30.1%	-1.102
985-900 Heat, 20/20 tstat	0.203	0.009	0.005	0.008	0.009	0.007	0.005	0.203	0.040	493.6%	0.012
995-985 Heat, > Ins. 20/20	-1.043	-1.083	-0.996	-1.073	-1.082	-1.123	-1.123	-0.996	-1.067	11.9%	-1.044
PEAK SENSIBLE COOLING [kW]							Statistics for Example Results				VibeArch
CASES	BSIMAC	CSE	DeST	EnergyPlus	ESP-r	TRNSYS	Min	Max	Mean	(Max-Min)/ Mean** (%)	
900-600 Mass, Cool	-2.611	-3.105	-2.866	-3.311	-3.297	-3.106	-3.311	-2.611	-3.049	23.0%	-3.354
910-900 Cool, S. Shade	-0.546	-0.654	-0.453	-0.818	-0.684	-0.859	-0.859	-0.453	-0.669	60.7%	-0.666
920-900 Cool, E&W Orient.	0.442	-0.320	0.154	0.220	0.203	0.214	-0.320	0.442	0.152	500.5%	0.241
930-920 Cool, E&W Shade	-0.429	-0.395	-0.375	-0.479	-0.605	-0.541	-0.605	-0.375	-0.471	48.9%	-0.430
940-900 Cool, Htg. Setback	0.119	0.000	0.000	0.000	-0.005	-0.002	-0.005	0.119	0.019	669.9%	-0.001
950-900 Cool, Night Vent	-0.673	-1.013	-0.502	-0.653	-0.694	-0.704	-1.013	-0.502	-0.706	72.3%	-0.787
960-900 Cool, Sunspace		-1.999	-1.189	-1.561	-1.493	-1.602	-1.999	-1.189	-1.569	51.7%	-1.473
980-900 Heat, > Ins. 20/27	0.345	0.292	0.374	0.410	0.445	0.372	0.292	0.445	0.373	41.1%	0.439
985-900 Heat, 20/20 tstat	0.938	0.849	0.652	0.874	0.840	0.945	0.652	0.945	0.850	34.4%	0.915
995-985 Heat, > Ins. 20/20	0.152	-0.001	0.107	0.263	0.218	0.230	-0.001	0.263	0.161	163.7%	0.297

** ABS[(Max-Min) / (Mean of Example Simulation Results)]

ASHRAE Standard 140-2023, Test Results Comparison for Section 7 - Building Thermal Envelope and Fabric Load Cases 195-995 & 600FF-980FF

(VibeArch) vs. Annex B8, Section B8.1 Example Results

By Chang Heon Cheong (Individual), 22-Sep-2026

Note: The statistics in the tables below are based on the listed example results.

These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B8-9. Low Mass In-Depth (Cases 395 thru 440) Sensitivity Tests

ANNUAL HEATING [MWh]							Statistics for Example Results				VibeArch
CASES	BSIMAC	CSE	DeST	EnergyPlus	ESP-r	TRNSYS	Min	Max	Mean	(Max-Min)/ Mean** (%)	
400-395 Surf. Conv. & IR	1.341	1.681	1.902	1.707	1.744	1.861	1.341	1.902	1.706	32.9%	
410-400 Infiltration	1.724	1.509	1.614	1.733	1.602	1.676	1.509	1.733	1.643	13.6%	
420-410 Internal Gains	-1.231	-1.211	-1.228	-1.175	-1.185	-1.209	-1.231	-1.175	-1.206	4.7%	
430-420 Ext Solar Abs.	-1.228	-1.380	-1.479	-1.286	-1.482	-1.386	-1.482	-1.228	-1.374	18.5%	
600-430 South Windows	-1.121	-1.461	-1.907	-1.296	-1.183	-1.347	-1.907	-1.121	-1.386	56.7%	
440-600 Cavity Albedo		0.163	0.283	0.176	0.142	0.217	0.142	0.283	0.196	71.9%	
450-600 Const Int&Ext Surf Coefs	-0.307	-0.002	-0.672	-0.362	-0.512	-0.633	-0.672	-0.002	-0.415	161.5%	
460-600 Const Int Surf Coefs	-0.222	0.063	-0.174	-0.131	-0.099	-0.214	-0.222	0.063	-0.130	219.8%	
460-450 Auto Ext Surf Heat Transf	0.085	0.065	0.498	0.231	0.412	0.419	0.065	0.498	0.285	151.9%	
470-600 Const Ext Surf Coefs	-0.008	-0.093	-0.507	-0.231	-0.402	-0.429	-0.507	-0.008	-0.278	179.3%	
470-450 Auto Int Surf Heat Transf	0.299	-0.091	0.165	0.131	0.109	0.204	-0.091	0.299	0.136	286.2%	
ANNUAL SENSIBLE COOLING [MWh]							Statistics for Example Results				VibeArch
CASES	BSIMAC	CSE	DeST	EnergyPlus	ESP-r	TRNSYS	Min	Max	Mean	(Max-Min)/ Mean** (%)	
400-395 Surf. Conv. & IR	0.042	0.016	0.011	0.020	0.019	0.009	0.009	0.042	0.019	168.7%	
410-400 Infiltration	0.033	0.025	0.024	0.027	0.028	0.022	0.022	0.033	0.027	39.8%	
420-410 Internal Gains	0.132	0.092	0.078	0.095	0.090	0.074	0.074	0.132	0.094	61.7%	
430-420 Ext Solar Abs.	0.856	0.766	0.825	0.703	0.811	0.630	0.630	0.856	0.765	29.6%	
600-430 South Windows	4.738	5.007	4.488	5.171	5.209	5.040	4.488	5.209	4.942	14.6%	
440-600 Cavity Albedo		-1.928	-1.974	-1.942	-1.748	-2.038	-2.038	-1.748	-1.926	15.1%	
450-600 Const Int&Ext Surf Coefs	0.350	-0.224	0.729	0.480	0.451	0.751	-0.224	0.751	0.423	230.6%	
460-600 Const Int Surf Coefs	0.438	0.027	0.497	0.448	0.567	0.464	0.027	0.567	0.407	132.9%	
460-450 Auto Ext Surf Heat Transf	0.088	0.251	-0.232	-0.033	0.116	-0.287	-0.287	0.251	-0.016	3319.8%	
470-600 Const Ext Surf Coefs	0.165	-0.269	0.217	0.002	-0.156	0.276	-0.269	0.276	0.039	1392.5%	
470-450 Auto Int Surf Heat Transf	-0.185	-0.045	-0.512	-0.478	-0.608	-0.475	-0.608	-0.045	-0.384	146.6%	
PEAK HEATING [kW]							Statistics for Example Results				VibeArch
CASES	BSIMAC	CSE	DeST	EnergyPlus	ESP-r	TRNSYS	Min	Max	Mean	(Max-Min)/ Mean** (%)	
400-395 Surf. Conv. & IR	0.611	0.682	0.778	0.740	0.698	0.717	0.611	0.778	0.704	23.7%	
410-400 Infiltration	0.779	0.601	0.680	0.812	0.685	0.718	0.601	0.812	0.713	29.6%	
420-410 Internal Gains	-0.200	-0.184	-0.178	-0.185	-0.183	-0.185	-0.200	-0.178	-0.186	11.8%	
430-420 Ext Solar Abs.	0.162	-0.002	-0.005	-0.003	-0.005	-0.003	-0.005	0.162	0.024	695.2%	
600-430 South Windows	-0.045	-0.234	-0.325	-0.112	-0.057	-0.050	-0.325	-0.045	-0.137	204.3%	
440-600 Cavity Albedo		0.007	0.025	0.014	0.009	0.015	0.007	0.025	0.014	127.7%	
450-600 Const Int&Ext Surf Coefs	-0.266	-0.042	-0.282	-0.105	-0.186	-0.322	-0.322	-0.042	-0.200	139.6%	
460-600 Const Int Surf Coefs	-0.200	-0.049	-0.055	-0.113	-0.127	-0.199	-0.200	-0.049	-0.124	122.0%	
460-450 Auto Ext Surf Heat Transf	0.066	-0.007	0.227	-0.009	0.059	0.122	-0.009	0.227	0.076	308.4%	
470-600 Const Ext Surf Coefs	-0.137	-0.020	-0.228	0.002	-0.059	-0.127	-0.228	0.002	-0.095	243.0%	
470-450 Auto Int Surf Heat Transf	0.129	0.022	0.054	0.107	0.127	0.194	0.022	0.194	0.106	162.7%	
PEAK SENSIBLE COOLING [kW]							Statistics for Example Results				VibeArch
CASES	BSIMAC	CSE	DeST	EnergyPlus	ESP-r	TRNSYS	Min	Max	Mean	(Max-Min)/ Mean** (%)	
400-395 Surf. Conv. & IR	0.251	0.136	0.149	0.229	0.162	0.107	0.107	0.251	0.172	83.7%	
410-400 Infiltration	0.213	0.206	0.252	0.221	0.168	0.232	0.168	0.252	0.215	39.0%	
420-410 Internal Gains	0.197	0.209	0.208	0.205	0.212	0.210	0.197	0.212	0.207	7.3%	
430-420 Ext Solar Abs.	0.959	0.931	0.923	0.897	1.038	0.890	0.890	1.038	0.940	15.7%	
600-430 South Windows	3.483	4.641	3.582	4.422	4.319	4.342	3.483	4.641	4.132	28.0%	
440-600 Cavity Albedo		-1.815	-1.656	-1.666	-1.514	-1.738	-1.815	-1.514	-1.678	18.0%	
450-600 Const Int&Ext Surf Coefs	0.162	-0.301	0.641	0.115	0.308	0.268	-0.301	0.641	0.199	474.2%	
460-600 Const Int Surf Coefs	0.154	-0.238	0.480	0.023	0.111	0.023	-0.238	0.480	0.092	779.6%	
460-450 Auto Ext Surf Heat Transf	-0.008	0.063	-0.161	-0.092	-0.197	-0.244	-0.244	0.063	-0.107	288.5%	
470-600 Const Ext Surf Coefs	0.045	-0.093	0.148	0.092	0.214	0.274	-0.093	0.274	0.113	324.3%	
470-450 Auto Int Surf Heat Transf	-0.117	0.208	-0.493	-0.023	-0.094	0.007	-0.493	0.208	-0.085	821.0%	

** ABS[(Max-Min) / (Mean of Example Simulation Results)]

ASHRAE Standard 140-2023, Test Results Comparison for Section 7 - Building Thermal Envelope and Fabric Load Cases 195-995 & 600FF-980FF

(VibeArch) vs. Annex B8, Section B8.1 Example Results

By Chang Heon Cheong (Individual), 22-Sep-2026

Note: The statistics in the tables below are based on the listed example results.

These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B8-10. High Mass Basic and In-Depth Sensitivity Tests

ANNUAL HEATING [MWh]							Statistics for Example Results				VibeArch
CASES	BSIMAC	CSE	DeST	EnergyPlus	ESP-r	TRNSYS	Min	Max	Mean	(Max-Min)/ Mean** (%)	
800-430 Mass, w/ High Cond. Wall	-0.030	-0.548	-0.551	-0.505	-0.565	-0.481	-0.565	-0.030	-0.447	119.8%	-2.441 -1.123 -0.791 -1.486 -1.767 -2.459 -1.746
900-800 Himass, S. Win.	-3.415	-3.527	-3.812	-3.452	-3.395	-3.555	-3.812	-3.395	-3.526	11.8%	
900-810 Himass, Int. Sol. Abs.		-0.659	-0.863	-0.678	-0.600	-0.796	-0.863	-0.600	-0.719	36.5%	
910-610 Mass, w/ S. Shade	-2.000	-2.419	-2.284	-2.419	-2.460	-2.460	-2.460	-2.000	-2.340	19.7%	
920-620 Mass, w/ E&W Win.	-0.870	-1.138	-1.038	-1.149	-1.215	-1.112	-1.215	-0.870	-1.087	31.7%	
930-630 Mass w/ E&W Shade	-0.653	-0.832	-0.744	-0.790	-0.773	-0.754	-0.832	-0.653	-0.758	23.7%	
940-640 Mass, w/ Htg. Setback	-1.293	-1.540	-1.470	-1.594	-1.640	-1.484	-1.640	-1.293	-1.503	23.1%	
980-680 Mass, w/ Insulation 20/27	-1.499	-1.540	-1.466	-1.769	-1.781	-1.836	-1.836	-1.466	-1.648	22.4%	
985-685 Mass, w/ 20/20 Tstat	-1.731	-2.454	-2.367	-2.508	-2.620	-2.506	-2.620	-1.731	-2.364	37.6%	
995-695 Mass, w/ Insulation 20/20	-1.379	-1.660	-1.615	-1.795	-1.827	-1.815	-1.827	-1.379	-1.682	26.7%	
ANNUAL SENSIBLE COOLING [MWh]							Statistics for Example Results				VibeArch
CASES	BSIMAC	CSE	DeST	EnergyPlus	ESP-r	TRNSYS	Min	Max	Mean	(Max-Min)/ Mean** (%)	
800-430 Mass, w/ High Cond. Wall	-0.611	-0.526	-0.582	-0.482	-0.561	-0.457	-0.611	-0.457	-0.537	28.7%	-2.959 -1.296 -0.926 -3.274 -4.005 -2.695 -2.681 -1.902
900-800 Himass, S. Win.	2.241	2.084	2.021	2.115	2.096	1.985	1.985	2.241	2.090	12.2%	
900-810 Himass, Int. Sol. Abs.		0.983	1.026	0.981	0.882	0.973	0.882	1.026	0.969	14.9%	
910-610 Mass, w/ S. Shade	-2.815	-2.967	-2.683	-2.949	-2.950	-2.926	-2.967	-2.683	-2.882	9.9%	
920-620 Mass, w/ E&W Win.	-1.276	-1.290	-1.203	-1.329	-1.431	-1.292	-1.431	-1.203	-1.303	17.5%	
930-630 Mass w/ E&W Shade	-0.913	-0.945	-0.879	-0.917	-0.942	-0.901	-0.945	-0.879	-0.916	7.2%	
940-640 Mass, w/ Htg. Setback	-3.191	-3.247	-2.894	-3.339	-3.465	-3.274	-3.465	-2.894	-3.235	17.7%	
950-650 Mass, w/ Night Vent	-4.043	-4.056	-3.568	-4.110	-4.289	-3.991	-4.289	-3.568	-4.009	18.0%	
980-680 Mass, w/ Insulation 20/27	-2.437	-2.435	-2.174	-2.732	-2.755	-2.791	-2.791	-2.174	-2.554	24.2%	
985-685 Mass, w/ 20/20 Tstat	-1.857	-2.626	-2.358	-2.760	-2.872	-2.738	-2.872	-1.857	-2.535	40.0%	
995-695 Mass, w/ Insulation 20/20	-1.273	-1.772	-1.615	-1.969	-2.000	-1.975	-2.000	-1.273	-1.767	41.1%	
PEAK HEATING [kW]							Statistics for Example Results				VibeArch
CASES	BSIMAC	CSE	DeST	EnergyPlus	ESP-r	TRNSYS	Min	Max	Mean	(Max-Min)/ Mean** (%)	
800-430 Mass, w/ High Cond. Wall	-0.343	-0.476	-0.496	-0.393	-0.445	-0.442	-0.496	-0.343	-0.432	35.4%	-0.508 -0.494 -0.460 -1.131 -0.519 -0.562 -0.460
900-800 Himass, S. Win.	-0.406	-0.334	-0.411	-0.236	-0.207	-0.188	-0.411	-0.188	-0.297	74.9%	
900-810 Himass, Int. Sol. Abs.		-0.057	-0.059	-0.062	-0.062	-0.066	-0.066	-0.057	-0.061	15.4%	
910-610 Mass, w/ S. Shade	-0.405	-0.552	-0.565	-0.493	-0.549	-0.560	-0.565	-0.405	-0.521	30.7%	
920-620 Mass, w/ E&W Win.	-0.250	-0.525	-0.555	-0.459	-0.547	-0.520	-0.555	-0.250	-0.476	64.1%	
930-630 Mass w/ E&W Shade	-0.284	-0.502	-0.523	-0.422	-0.494	-0.487	-0.523	-0.284	-0.452	52.9%	
940-640 Mass, w/ Htg. Setback	-0.751	-1.171	-0.999	-1.416	-0.979	-0.634	-1.416	-0.634	-0.992	78.9%	
980-680 Mass, w/ Insulation 20/27	-0.433	-0.524	-0.429	-0.515	-0.549	-0.523	-0.549	-0.429	-0.495	24.2%	
985-685 Mass, w/ 20/20 Tstat	-0.415	-0.580	-0.596	-0.528	-0.605	-0.589	-0.605	-0.415	-0.552	34.4%	
995-695 Mass, w/ Insulation 20/20	-0.427	-0.426	-0.393	-0.450	-0.465	-0.456	-0.465	-0.393	-0.436	16.5%	
PEAK SENSIBLE COOLING [kW]							Statistics for Example Results				VibeArch
CASES	BSIMAC	CSE	DeST	EnergyPlus	ESP-r	TRNSYS	Min	Max	Mean	(Max-Min)/ Mean** (%)	
800-430 Mass, w/ High Cond. Wall	-0.881	-0.738	-0.683	-0.884	-0.822	-0.768	-0.884	-0.683	-0.796	25.2%	-3.920 -1.456 -1.341 -3.279 -3.897 -3.291 -3.234 -3.139
900-800 Himass, S. Win.	1.753	2.275	1.399	1.995	1.844	2.004	1.399	2.275	1.878	46.6%	
900-810 Himass, Int. Sol. Abs.		0.966	0.616	0.770	0.717	0.827	0.616	0.966	0.779	44.9%	
910-610 Mass, w/ S. Shade	-2.973	-3.710	-3.228	-3.912	-3.722	-3.787	-3.912	-2.973	-3.555	26.4%	
920-620 Mass, w/ E&W Win.	-1.223	-1.436	-1.245	-1.537	-1.523	-1.434	-1.537	-1.223	-1.400	22.4%	
930-630 Mass w/ E&W Shade	-1.069	-1.336	-1.191	-1.431	-1.477	-1.336	-1.477	-1.069	-1.307	31.2%	
940-640 Mass, w/ Htg. Setback	-2.492	-3.053	-2.809	-3.257	-3.236	-3.029	-3.257	-2.492	-2.979	25.7%	
950-650 Mass, w/ Night Vent	-3.282	-3.926	-2.991	-3.751	-3.759	-3.561	-3.926	-2.991	-3.545	26.4%	
980-680 Mass, w/ Insulation 20/27	-2.377	-3.383	-2.931	-3.320	-3.335	-3.244	-3.383	-2.377	-3.098	32.5%	
985-685 Mass, w/ 20/20 Tstat	-2.341	-2.934	-2.863	-3.192	-3.198	-2.983	-3.198	-2.341	-2.918	29.4%	
995-695 Mass, w/ Insulation 20/20	-2.103	-3.317	-3.040	-3.157	-3.285	-3.060	-3.317	-2.103	-2.994	40.6%	

** ABS[(Max-Min) / (Mean of Example Simulation Results)]

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By Chang Heon Cheong (Individual), 22-Sep-2026

Note: The statistics in the tables below are based on the listed example results.
 These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B8-11. Annual Transmissivity Coefficient of Windows

(ANNUAL UNSHADED TRANSMITTED SOLAR RADIATION)/(ANNUAL UNSHADED INCIDENT SOLAR RADIATION)

Simulation Model:	BSIMAC	CSE	DeST	EnergyPlus	ESP-r	TRNSYS	Statistics for Example Results				VibeArch
Case							Min	Max	Mean	(Max-Min)/ Mean* (%)	
600 South	0.591	0.627	0.624	0.587	0.597	0.594	0.587	0.627	0.603	6.7%	0.594
620 West	0.600		0.629	0.601	0.616	0.640	0.600	0.640	0.617	6.5%	0.644
660 South, Low-E	0.322	0.381	0.392	0.318	0.325	0.324	0.318	0.392	0.344	21.6%	0.295
670 South, Single-Pane	0.748	0.750	0.770	0.747	0.754	0.751	0.747	0.770	0.753	3.1%	0.739

* ABS[(Max-Min) / (Mean of Example Simulation Results)]

Table B8-12. Annual Shading Coefficient of Window Shading Devices: Overhangs & Fins

(1-(ANNUAL SHADED TRANSMITTED SOLAR RADIATION)/(ANNUAL UNSHADED TRANSMITTED SOLAR RADIATION))

Simulation Model:	BSIMAC	CSE	DeST	EnergyPlus	ESP-r	TRNSYS	Statistics for Example Results				VibeArch
Case							Min	Max	Mean	(Max-Min)/ Mean* (%)	
610/600 South	0.218	0.194	0.176	0.196	0.224	0.195	0.176	0.224	0.201	24.0%	0.187
630/620 West	0.268		0.299	0.278	0.342	0.286	0.268	0.342	0.294	25.2%	0.279

* ABS[(Max-Min) / (Mean of Example Simulation Results)]

Table B8-13. Case 600 Annual Incident Solar Radiation (kWh/m²)

Simulation Model:	BSIMAC	CSE	DeST	EnergyPlus	ESP-r	TRNSYS	Statistics for Example Results				VibeArch
Case							Min	Max	Mean	(Max-Min)/ Mean* (%)	
Horizontal	1670	1663	1667	1664	1665	1669	1663	1670	1666	0.4%	1670
North	453	399	477	438	432	440	399	477	440	17.8%	431
East	1061	1027	1017	1062	1054	1068	1017	1068	1048	4.9%	1057
South	1387	1317	1291	1370	1363	1384	1291	1387	1352	7.1%	1368
West	997	903	906	967	961	974	903	997	951	9.9%	964

* ABS[(Max-Min) / (Mean of Example Simulation Results)]

Table B8-14. Annual Transmitted Solar Radiation - Unshaded (kWh/m²)

Simulation Model:	BSIMAC	CSE	DeST	EnergyPlus	ESP-r	TRNSYS	Statistics for Example Results				VibeArch
Case							Min	Max	Mean	(Max-Min)/ Mean* (%)	
600 South	820	826	805	804	814	823	804	826	815	2.6%	813
620 West	598		569	581	592	624	569	624	593	9.2%	621
660 South	447	501	506	436	443	448	436	506	464	15.2%	404
670 South	1037	988	994	1024	1028	1039	988	1039	1018	5.0%	1010

* ABS[(Max-Min) / (Mean of Example Simulation Results)]

Table B8-15. Annual Transmitted Solar Radiation - Shaded (kWh/m²)

Simulation Model:	BSIMAC	CSE	DeST	EnergyPlus	ESP-r	TRNSYS	Statistics for Example Results				VibeArch
Case							Min	Max	Mean	(Max-Min)/ Mean* (%)	
610 South	641	665	663	646	631	662	631	665	651	5.2%	661
630 West	438		399	419	390	446	390	446	418	13.4%	447

* ABS[(Max-Min) / (Mean of Example Simulation Results)]

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Note: The statistics in the tables below are based on the listed example results.
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Table B8-16. Sky Temperature Output, Case 600

MAXIMUM ANNUAL HOURLY INTEGRATED SKY TEMPERATURE																				Example Result Statistics				VibeArch									
Simulation Model:		BSIMAC				CSE				DeST				EnergyPlus				ESP-r										TRNSYS				TestSpec-Alt Alternative Values	
Case	T (°C)	Mo.	Day	Hr	T (°C)	Mo.	Day	Hr	T (°C)	Mo.	Day	Hr	T (°C)	Mo.	Day	Hr	T (°C)	Mo.	Day	Hr	T (°C)	Mo.	Day	Hr	T (°C)	Min	Max	Mean	(Max-Min)/ Mean** (%)	T (°C)	Mo.	Day	Hr
Average Annual Hourly Integrated					-3.9				-5.9				-2.0				-5.2				-5.1				-5.9	-5.9	-2.0	-4.7	83.2%	-2.0			
Minimum Annual Hourly Integrated					-46.2	Dec	31	24	-46.9	Dec	31	23	-38.0	Dec	31	24	-46.9	Dec	31	23	-46.2	Dec	31	24	-46.9	-46.9	-38.0	-45.2	19.8%	-38.1	Dec	31	24
Maximum Annual Hourly Integrated					30.1	Jun	13	15	24.6	Aug	4	15	24.7	Aug	4	16	26.7	Aug	4	15	26.0	Jun	13	18	24.6	24.6	30.1	26.1	20.9%	26.0	Aug	4	15

** ABS[(Max-Min) / (Mean of Example Simulation Results)]

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Note: The statistics in the tables below are based on the listed example results.
 These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B8-M1. Monthly Heating Loads (kWh)

Simulation Model:	BSIMAC	CSE	DeST	EnergyPlus	ESP-r	TRNSYS	Statistics for Example Results				VibeArch
							Min	Max	Mean	(Max-Min)/ Mean** (%)	
Case 600											
Jan	664.0	655.6	672.7	711.9	732.0	734.9	655.6	734.9	695.2	11.4%	708.3
Feb	653.3	626.3	635.3	682.6	682.0	702.1	626.3	702.1	663.6	11.4%	691.0
Mar	433.5	435.7	450.5	472.2	481.0	495.0	433.5	495.0	461.3	13.3%	483.7
Apr	511.0	457.0	448.0	510.1	479.0	517.3	448.0	517.3	487.1	14.2%	523.3
May	112.8	127.8	128.0	136.8	139.0	150.7	112.8	150.7	132.5	28.6%	143.4
Jun	2.7	11.7	11.2	10.1	14.0	16.0	2.7	16.0	10.9	120.7%	12.4
Jul	4.8	11.5	10.1	12.0	14.0	16.7	4.8	16.7	11.5	103.0%	12.9
Aug	1.4	6.9	8.4	6.6	9.0	9.6	1.4	9.6	7.0	118.1%	7.9
Sep	51.8	74.3	76.7	73.3	81.0	84.8	51.8	84.8	73.7	44.9%	77.7
Oct	317.0	328.4	324.1	347.7	354.0	367.1	317.0	367.1	339.7	14.7%	354.4
Nov	598.7	575.6	585.8	625.3	629.0	645.8	575.6	645.8	610.0	11.5%	629.7
Dec	698.7	682.0	697.8	735.7	750.0	763.5	682.0	763.5	721.3	11.3%	741.7
Case 900											
Jan	277.8	206.1	275.3	255.8	266.0	291.9	206.1	291.9	262.2	32.7%	250.3
Feb	307.4	243.2	292.9	294.2	283.0	322.1	243.2	322.1	290.5	27.2%	307.5
Mar	134.4	102.4	120.0	125.5	115.0	143.8	102.4	143.8	123.5	33.5%	139.7
Apr	275.7	222.4	214.2	268.7	228.0	275.5	214.2	275.7	247.4	24.9%	290.1
May	20.1	33.3	26.8	33.4	29.0	37.5	20.1	37.5	30.0	58.0%	39.4
Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	#DIV/0!	0.0
Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	#DIV/0!	0.0
Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	#DIV/0!	0.0
Sep	2.1	0.0	0.0	0.1	0.0	0.5	0.0	2.1	0.5	458.3%	0.4
Oct	80.5	65.1	63.6	81.1	70.0	85.0	63.6	85.0	74.2	28.9%	84.9
Nov	298.2	251.6	283.9	297.0	286.0	318.2	251.6	318.2	289.2	23.0%	307.1
Dec	329.8	254.7	314.3	307.9	308.0	339.4	254.7	339.4	309.0	27.4%	320.7

** ABS[(Max-Min) / (Mean of Example Simulation Results)]

Table B8-M2. Monthly Sensible Cooling Loads (kWh)

Simulation Model:	BSIMAC	CSE	DeST	EnergyPlus	ESP-r	TRNSYS	Statistics for Example Results				VibeArch
							Min	Max	Mean	(Max-Min)/ Mean** (%)	
Case 600											
Jan	475.4	554.0	417.9	521.8	523.0	495.0	417.9	554.0	497.9	27.3%	533.4
Feb	349.2	394.3	315.4	387.5	398.0	367.4	315.4	398.0	368.6	22.4%	393.0
Mar	450.3	474.4	410.7	484.4	489.0	457.4	410.7	489.0	461.0	17.0%	473.2
Apr	218.7	220.1	230.2	240.5	263.0	235.4	218.7	263.0	234.6	18.9%	221.8
May	342.7	321.2	338.6	339.9	364.0	325.2	321.2	364.0	338.6	12.7%	293.8
Jun	578.3	497.4	526.4	539.6	550.0	516.1	497.4	578.3	534.6	15.1%	488.4
Jul	568.4	505.9	525.1	536.4	556.0	514.4	505.9	568.4	534.4	11.7%	482.6
Aug	658.2	606.5	621.1	648.5	674.0	634.1	606.5	674.0	640.4	10.5%	600.2
Sep	724.8	705.2	672.1	733.7	743.0	710.5	672.1	743.0	714.9	9.9%	703.3
Oct	628.4	676.1	611.1	675.3	681.0	649.5	611.1	681.0	653.6	10.7%	679.0
Nov	394.3	454.7	377.1	437.7	444.0	418.6	377.1	454.7	421.1	18.4%	444.7
Dec	433.3	503.3	386.2	481.9	476.0	456.1	386.2	503.3	456.1	25.7%	486.7
Case 900											
Jan	73.3	67.8	33.5	53.3	42.0	44.6	33.5	73.3	52.4	76.0%	68.2
Feb	24.0	15.1	4.7	12.3	11.0	9.2	4.7	24.0	12.7	151.4%	20.2
Mar	86.4	68.5	40.9	65.4	56.0	50.6	40.9	86.4	61.3	74.2%	66.3
Apr	29.3	12.3	18.3	18.5	22.0	16.1	12.3	29.3	19.4	87.8%	15.5
May	131.1	117.8	128.6	114.5	125.0	98.4	98.4	131.1	119.2	27.5%	86.3
Jun	447.5	372.3	408.5	401.3	404.0	365.8	365.8	447.5	399.9	20.4%	348.2
Jul	440.9	380.4	408.1	398.7	410.0	365.5	365.5	440.9	400.6	18.8%	345.6
Aug	532.6	485.7	510.2	510.3	531.0	487.6	485.7	532.6	509.6	9.2%	461.0
Sep	517.9	484.0	466.1	492.8	492.0	458.9	458.9	517.9	485.3	12.2%	462.5
Oct	296.2	305.6	269.6	292.7	281.0	260.9	260.9	305.6	284.3	15.7%	298.4
Nov	72.7	80.5	56.2	68.0	63.0	60.2	56.2	80.5	66.8	36.4%	79.6
Dec	62.1	73.7	38.1	60.9	48.0	49.5	38.1	73.7	55.4	64.4%	73.6

** ABS[(Max-Min) / (Mean of Example Simulation Results)]

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Table B8-M3. Monthly Hourly Integrated Peak Heating Loads

Simulation Model:	BSIMAC			CSE			DeST			EnergyPlus			ESP-r			TRNSYS			Example Result Statistics				VibeArch		
																			Min	Max	Mean	(Max-Min)/ Mean** (%)			
Case 600	kW	Day	Hr	kW	Day	Hr	kW	Day	Hr	kW	Day	Hr	kW	Day	Hr	kW	Day	Hr	kW	kW	kW		kW	Day	Hr
Jan	3.100	29	7	3.020	1	1	3.036	1	0	2.978	1	3	3.230	1	1	3.359	1	1	2.978	3.359	3.120	12.2%	2.984	4	4
Feb	3.041	9	7	2.900	9	6	2.922	9	5	3.067	9	6	3.140	9	6	3.225	9	6	2.900	3.225	3.049	10.7%	3.136	9	6
Mar	2.275	2	7	2.034	17	6	2.065	17	5	2.115	17	6	2.230	17	6	2.287	17	6	2.034	2.287	2.168	11.7%	2.215	17	6
Apr	2.446	3	6	2.207	11	6	2.238	11	5	2.322	11	5	2.380	11	6	2.457	11	6	2.207	2.457	2.342	10.7%	2.384	11	5
May	1.645	3	5	1.592	1	5	1.569	1	4	1.624	1	5	1.750	1	5	1.778	1	5	1.569	1.778	1.660	12.6%	1.671	1	4
Jun	0.805	9	5	0.778	9	5	0.748	9	4	0.732	9	5	0.760	10	5	0.853	9	5	0.732	0.853	0.779	15.4%	0.826	9	5
Jul	0.599	25	6	0.540	26	5	0.512	26	4	0.514	26	5	0.570	26	5	0.619	26	5	0.512	0.619	0.559	19.1%	0.549	26	5
Aug	0.572	10	7	0.553	17	6	0.532	17	5	0.479	17	6	0.560	17	6	0.591	17	6	0.479	0.591	0.548	20.5%	0.515	17	6
Sep	1.229	28	24	1.120	29	1	1.114	29	2	1.130	28	24	1.190	29	1	1.212	28	24	1.114	1.229	1.166	9.9%	1.137	28	24
Oct	1.702	6	7	1.624	15	6	1.619	9	5	1.682	15	5	1.770	9	6	1.813	15	6	1.619	1.813	1.702	11.4%	1.711	15	5
Nov	3.255	26	8	2.850	26	8	2.931	26	7	3.106	26	7	3.110	26	7	3.207	26	8	2.850	3.255	3.076	13.2%	3.170	26	7
Dec	3.171	31	24	2.941	31	24	2.972	31	23	3.204	31	24	3.170	31	24	3.278	31	24	2.941	3.278	3.123	10.8%	3.218	31	24
Case 900																									
Jan	2.322	7	7	2.077	1	5	2.178	1	4	1.903	29	7	2.200	1	5	2.379	1	5	1.903	2.379	2.176	21.9%	1.975	29	7
Feb	2.551	8	24	2.443	9	6	2.453	9	5	2.687	9	6	2.630	9	7	2.778	9	7	2.443	2.778	2.591	12.9%	2.682	9	6
Mar	1.774	16	7	1.613	17	6	1.646	17	5	1.744	17	6	1.760	17	7	1.858	17	6	1.613	1.858	1.733	14.2%	1.805	17	6
Apr	1.997	2	7	1.771	3	4	1.725	3	3	2.004	3	4	1.930	3	4	2.036	3	4	1.725	2.036	1.910	16.3%	2.018	3	3
May	1.295	4	6	1.142	1	5	1.124	1	5	1.268	1	5	1.230	1	5	1.324	1	5	1.124	1.324	1.231	16.3%	1.262	1	5
Jun	0.000			0.000	1	1				0.000	1	1	0.000	1	1	0.000	31	0	0.000	0.000	0.000	----			
Jul	0.000			0.000	1	1				0.000	1	1	0.000	1	1	0.000	31	0	0.000	0.000	0.000	----			
Aug	0.000			0.000	1	1				0.000	1	1	0.000	1	1	0.000	31	0	0.000	0.000	0.000	----			
Sep	0.113	28	6	0.000	1	1				0.064	29	7	0.000	1	1	0.194	29	7	0.000	0.194	0.074	261.6%	0.146	29	7
Oct	1.201	6	7	1.188	7	7	1.158	7	6	1.326	7	7	1.210	7	7	1.331	7	7	1.158	1.331	1.236	14.0%	1.327	7	7
Nov	2.427	1	7	2.086	26	8	2.201	26	7	2.316	26	7	2.280	26	8	2.463	26	8	2.086	2.463	2.296	16.4%	2.402	26	8
Dec	2.120	31	8	1.927	31	8	1.981	29	6	2.175	31	7	2.040	9	7	2.180	9	7	1.927	2.180	2.070	12.2%	2.224	31	8

** ABS[(Max-Min) / (Mean of Example Simulation Results)]

Table B8-M4. Monthly Hourly Integrated Peak Sensible Cooling Loads

Simulation Model:	BSIMAC			CSE			DeST			EnergyPlus			ESP-r			TRNSYS			Example Result Statistics				VibeArch		
																			Min	Max	Mean	(Max-Min)/ Mean** (%)			
Case 600	kW	Day	Hr	kW	Day	Hr	kW	Day	Hr	kW	Day	Hr	kW	Day	Hr	kW	Day	Hr	kW	kW	kW		kW	Day	Hr
Jan	5.650	22	15	6.481	22	14	5.422	22	14	6.352	22	14	6.190	22	14	6.046	22	14	5.422	6.481	6.023	17.6%	6.424	22	14
Feb	4.921	15	15	5.393	15	14	4.444	15	14	5.537	2	14	5.420	2	14	5.155	2	14	4.444	5.537	5.145	21.2%	5.523	15	14
Mar	4.458	24	14	5.148	24	13	4.252	9	14	5.009	9	14	5.040	9	14	4.740	9	14	4.252	5.148	4.774	18.8%	5.043	9	14
Apr	3.473	12	14	4.015	27	14	3.600	7	14	3.931	12	14	4.040	12	14	3.803	12	14	3.473	4.040	3.810	14.9%	3.840	7	14
May	2.774	10	14	3.080	21	14	2.894	10	14	3.086	10	13	3.100	10	14	3.040	21	14	2.774	3.100	2.996	10.9%	2.883	10	14
Jun	3.253	26	15	3.249	13	13	3.067	14	14	3.449	13	13	3.430	13	14	3.379	13	13	3.067	3.449	3.304	11.6%	3.219	26	14
Jul	3.319	17	14	3.290	17	14	3.155	29	13	3.628	17	14	3.640	17	14	3.497	17	14	3.155	3.640	3.422	14.2%	3.390	29	14
Aug	4.192	26	14	4.120	8	14	4.038	29	13	4.672	26	14	4.700	29	14	4.651	27	13	4.038	4.700	4.395	15.1%	4.581	27	13
Sep	5.086	30	14	5.450	2	14	4.911	30	13	5.715	30	13	5.580	30	14	5.420	30	14	4.911	5.715	5.360	15.0%	5.638	30	14
Oct	5.577	18	14	6.270	1	13	5.278	10	13	6.222	18	14	6.070	18	14	5.923	18	14	5.278	6.270	5.890	16.8%	6.304	18	14
Nov	5.476	28	14	6.149	28	13	5.229	29	13	6.194	28	13	6.030	28	14	5.824	28	14	5.229	6.194	5.817	16.6%	6.236	28	13
Dec	5.537	1	14	6.450	1	14	5.294	1	13	6.251	1	14	6.120	1	14	5.942	1	14	5.294	6.450	5.932	19.5%	6.219	1	14
Case 900																									
Jan	1.982	22	16	2.242	22	15	1.637	22	15	2.078	22	15	1.810	22	16	1.878	22	15	1.637	2.242	1.938	31.2%	2.305	22	15
Feb	1.096	15	16	0.996	15	15	0.588	15	15	0.979	15	15	0.850	15	16	0.829	15	15	0.588	1.096	0.890	57.1%	1.170	15	15
Mar	1.508	10	15	1.434	24	15	1.143	10	14	1.493	11	14	1.270	10	15	1.426	11	14	1.143	1.508	1.379	26.5%	1.546	11	14
Apr	1.093	7	15	0.631	19	14	1.032	8	14	0.953	7	15	0.950	8	15	0.837	8	15	0.631	1.093	0.916	50.4%	0.950	7	15
May	1.555	11	15	1.427	21	14	1.446	11	14	1.534	11	14	1.460	11	15	1.465	11	14	1.427	1.555	1.481	8.6%	1.396	11	14
Jun	2.101	26	15	1.897	14	14	1.873	14	14	1.966	14	14	1.890	14	15	1.974	14	14	1.873	2.101	1.950	11.7%	1.841	26	16
Jul	2.140	17	15	1.943	17	14	1.830	17	14	2.068	17	15	1.970	17	15	1.975	17	15	1.830	2.140	1.988	15.6%	1.912	17	15
Aug	2.632	26	15	2.485	5	14	2.212	29	14	2.526	29	15	2.510	29	15	2.534	29	15	2.212	2.632	2.483	16.9%	2.434	29	14
Sep	2.961	30	15	3.137	4	14	2.556	11	14	2.989	11	15	2.810	11	15	2.871	11	15	2.556	3.137	2.887	20.1%	2.905	11	15
Oct	3.039	1	15	3.376	1	14	2.549	12	14	3.040	1	14	2.900	12	15	2.940	1	14	2.549	3.376	2.974	27.8%	3.070	1	14
Nov	1.982	6	15	2.233	20	15	1.683	20	14	2.002	20	15	1.940	20	15	1.941	22	14	1.683	2.233	1.963	28.0%	2.250	22	14
Dec	2.069	1	15	2.105	1	15	1.595	2	14	1.968	2	15	1.670	2	15	1.690	2	15	1.595	2.105	1.850	27.6%	2.085	2	15

** ABS[(Max-Min) / (Mean of Example Simulation Results)]

**RAE Standard 140-2023, Test Results Comparison for Section 7 - Building Thermal Envelope and Fabric Load Cases 195-995 & 600FF-9f
(VibeArch) vs. Annex B8, Section B8.1 Example Results
By Chang Heon Cheong (Individual), 22-Sep-2026**

Note: The statistics in the tables below are based on the listed example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B8-M5. Monthly Load 600-900 Sensitivity Tests

ANNUAL HEATING [MWh]							Statistics for Example Results				VibeArch
Month	BSIMAC	CSE	DeST	EnergyPlus	ESP-r	TRNSYS	Min	Max	Mean	(Max-Min)/ Mean** (%)	
Jan	386.2	449.5	397.4	456.0	466.0	443.0	386.2	466.0	433.0	18.4%	458.0
Feb	345.9	383.0	342.4	388.5	399.0	379.9	342.4	399.0	373.1	15.2%	383.4
Mar	299.1	333.3	330.5	346.7	366.0	351.2	299.1	366.0	337.8	19.8%	343.9
Apr	235.3	234.6	233.8	241.5	251.0	241.8	233.8	251.0	239.7	7.2%	233.2
May	92.7	94.4	101.2	103.4	110.0	113.2	92.7	113.2	102.5	20.1%	104.0
Jun	2.7	11.7	11.2	10.1	14.0	16.0	2.7	16.0	10.9	120.7%	12.4
Jul	4.8	11.5	10.1	12.0	14.0	16.7	4.8	16.7	11.5	103.0%	12.9
Aug	1.4	6.9	8.4	6.6	9.0	9.6	1.4	9.6	7.0	118.1%	7.9
Sep	49.7	74.3	76.7	73.2	81.0	84.3	49.7	84.3	73.2	47.3%	77.3
Oct	236.5	263.3	260.6	266.6	284.0	282.0	236.5	284.0	265.5	17.9%	269.5
Nov	300.5	324.0	301.9	328.3	343.0	327.6	300.5	343.0	320.9	13.3%	322.7
Dec	368.9	427.3	383.5	427.9	442.0	424.2	368.9	442.0	412.3	17.7%	421.0
ANNUAL SENSIBLE COOLING [MWh]							Statistics for Example Results				VibeArch
Month	BSIMAC	CSE	DeST	EnergyPlus	ESP-r	TRNSYS	Min	Max	Mean	(Max-Min)/ Mean** (%)	
Jan	402.1	486.2	384.4	468.5	481.0	450.4	384.4	486.2	445.4	22.8%	465.3
Feb	325.2	379.2	310.7	375.2	387.0	358.2	310.7	387.0	355.9	21.4%	372.8
Mar	363.9	405.8	369.8	419.0	433.0	406.8	363.9	433.0	399.7	17.3%	407.0
Apr	189.4	207.8	211.9	222.0	241.0	219.3	189.4	241.0	215.2	24.0%	206.3
May	211.6	203.3	210.0	225.4	239.0	226.8	203.3	239.0	219.4	16.3%	207.5
Jun	130.8	125.2	118.0	138.3	146.0	150.2	118.0	150.2	134.7	24.0%	140.2
Jul	127.5	125.4	117.0	137.7	146.0	148.9	117.0	148.9	133.7	23.8%	137.0
Aug	125.6	120.8	110.9	138.2	143.0	146.6	110.9	146.6	130.8	27.2%	139.2
Sep	206.9	221.2	206.0	240.9	251.0	251.6	206.0	251.6	229.6	19.9%	240.8
Oct	332.2	370.6	341.6	382.6	400.0	388.6	332.2	400.0	369.3	18.4%	380.5
Nov	321.6	374.3	320.9	369.7	381.0	358.4	320.9	381.0	354.3	17.0%	365.1
Dec	371.2	429.5	348.2	420.9	428.0	406.6	348.2	429.5	400.7	20.3%	413.1
PEAK HEATING [kW]							Statistics for Example Results				VibeArch
Month	BSIMAC	CSE	DeST	EnergyPlus	ESP-r	TRNSYS	Min	Max	Mean	(Max-Min)/ Mean** (%)	
Jan	0.778	0.943	0.858	1.075	1.030	0.980	0.778	1.075	0.944	31.4%	1.009
Feb	0.490	0.456	0.469	0.379	0.510	0.447	0.379	0.510	0.459	28.5%	0.454
Mar	0.501	0.422	0.419	0.370	0.470	0.429	0.370	0.501	0.435	30.1%	0.409
Apr	0.449	0.437	0.513	0.319	0.450	0.421	0.319	0.513	0.431	45.0%	0.367
May	0.350	0.450	0.445	0.356	0.520	0.454	0.350	0.520	0.429	39.6%	0.410
Jun	0.805	0.778	0.748	0.732	0.760	0.853	0.732	0.853	0.779	15.4%	0.826
Jul	0.599	0.540	0.512	0.514	0.570	0.619	0.512	0.619	0.559	19.1%	0.549
Aug	0.572	0.553	0.532	0.479	0.560	0.591	0.479	0.591	0.548	20.5%	0.515
Sep	1.116	1.120	1.114	1.065	1.190	1.017	1.017	1.190	1.104	15.7%	0.991
Oct	0.501	0.435	0.461	0.356	0.560	0.482	0.356	0.560	0.466	43.7%	0.384
Nov	0.828	0.764	0.730	0.790	0.830	0.744	0.730	0.830	0.781	12.8%	0.768
Dec	1.051	1.014	0.991	1.030	1.130	1.098	0.991	1.130	1.052	13.2%	0.994
PEAK SENSIBLE COOLING [kW]							Statistics for Example Results				VibeArch
Month	BSIMAC	CSE	DeST	EnergyPlus	ESP-r	TRNSYS	Min	Max	Mean	(Max-Min)/ Mean** (%)	
Jan	3.668	4.239	3.785	4.274	4.380	4.168	3.668	4.380	4.086	17.4%	4.119
Feb	3.825	4.397	3.856	4.558	4.570	4.326	3.825	4.570	4.255	17.5%	4.353
Mar	2.950	3.714	3.109	3.515	3.770	3.314	2.950	3.770	3.395	24.2%	3.497
Apr	2.380	3.384	2.568	2.978	3.090	2.966	2.380	3.384	2.894	34.7%	2.890
May	1.219	1.652	1.448	1.553	1.640	1.576	1.219	1.652	1.515	28.6%	1.486
Jun	1.152	1.352	1.194	1.483	1.540	1.405	1.152	1.540	1.354	28.7%	1.378
Jul	1.179	1.347	1.325	1.560	1.670	1.522	1.179	1.670	1.434	34.3%	1.479
Aug	1.560	1.634	1.826	2.146	2.190	2.117	1.560	2.190	1.912	32.9%	2.147
Sep	2.125	2.313	2.355	2.726	2.770	2.549	2.125	2.770	2.473	26.1%	2.733
Oct	2.538	2.894	2.729	3.182	3.170	2.983	2.538	3.182	2.916	22.1%	3.234
Nov	3.494	3.916	3.546	4.192	4.090	3.883	3.494	4.192	3.854	18.1%	3.985
Dec	3.468	4.345	3.699	4.283	4.450	4.252	3.468	4.450	4.083	24.1%	4.133

** ABS[(Max-Min) / (Mean of Example Simulation Results)]

Figure B8-1.
Annual Incident Solar Radiation

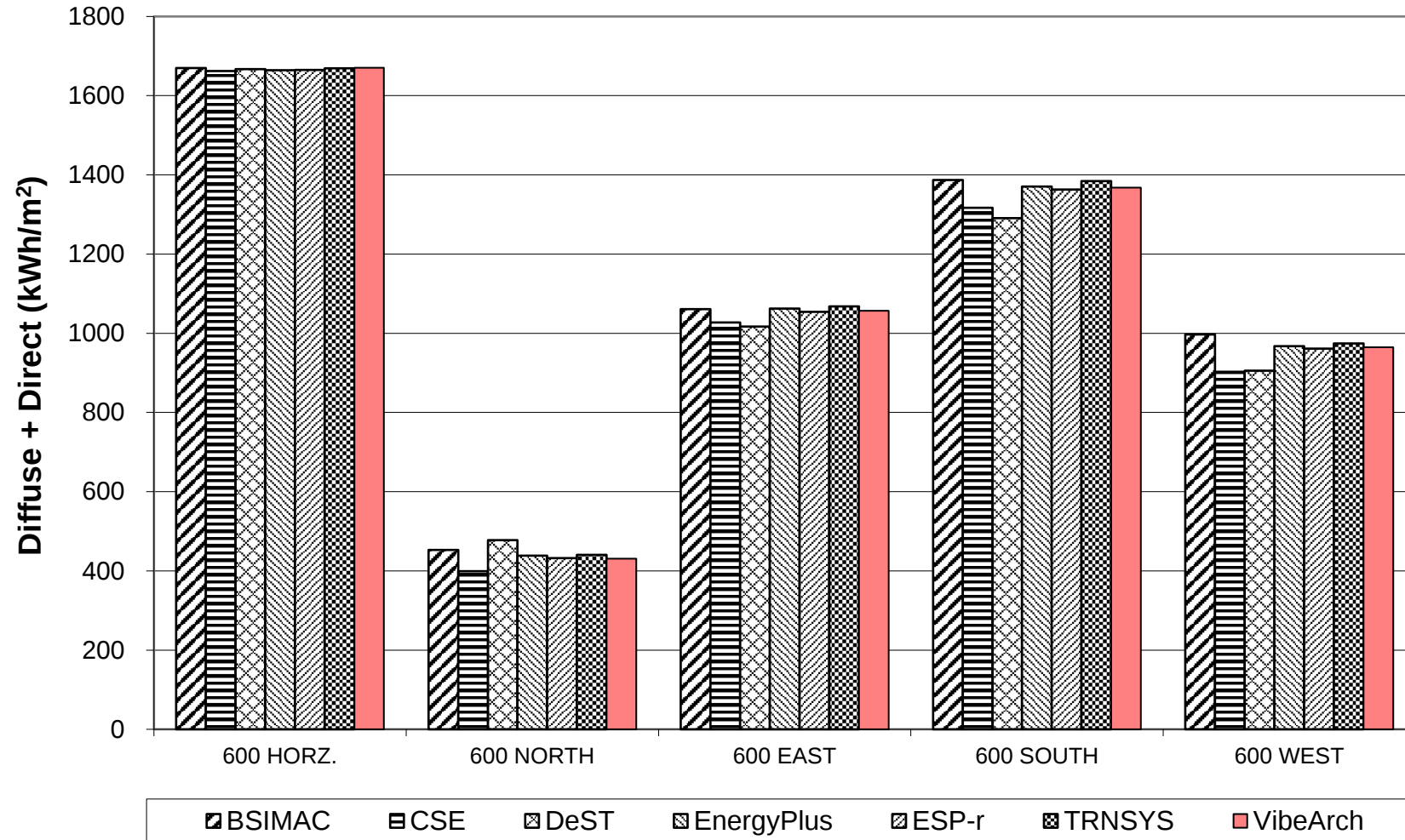


Figure B8-2.
Annual Transmitted Solar Radiation - Unshaded

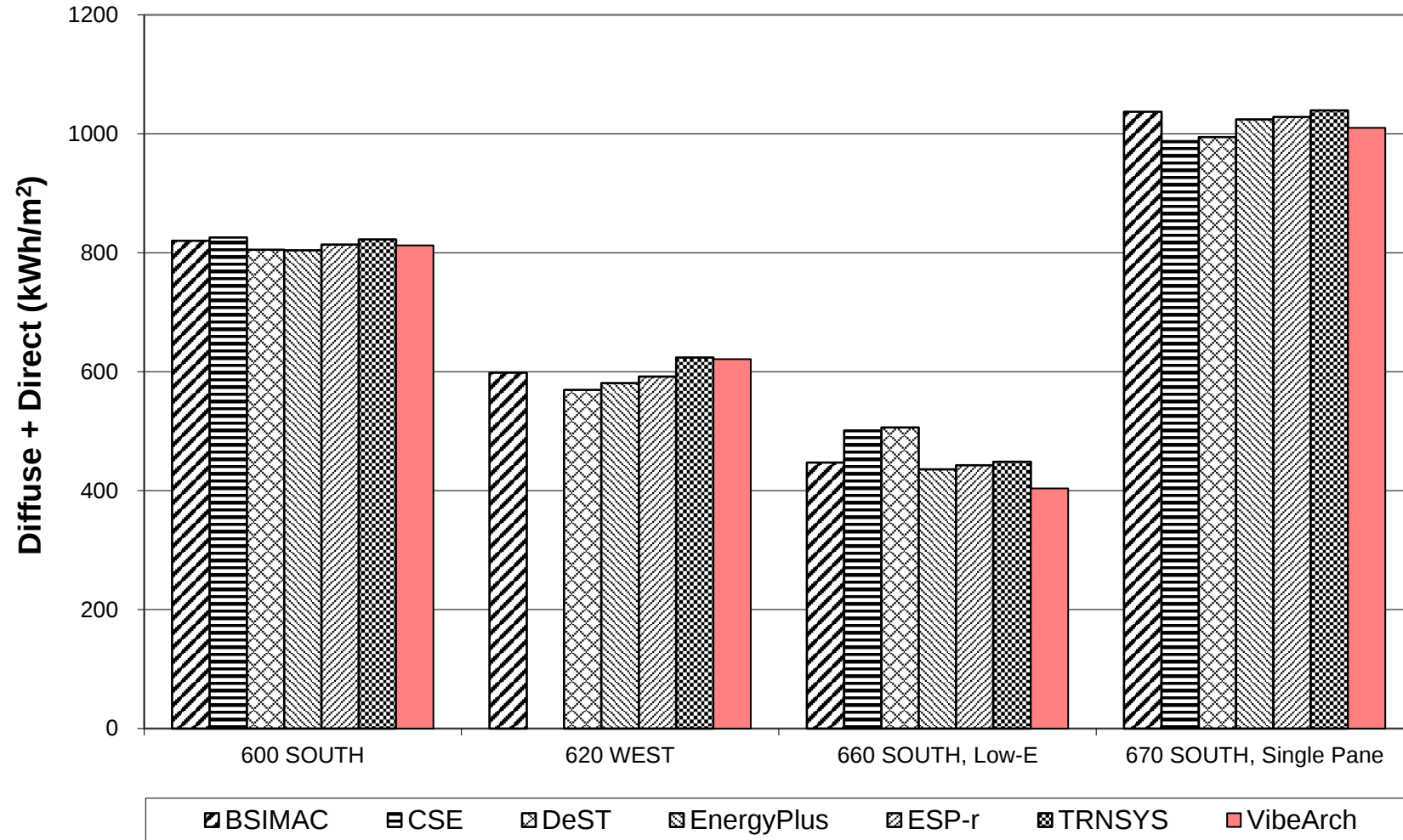


Figure B8-3.
Annual Transmitted Solar Radiation - Shaded

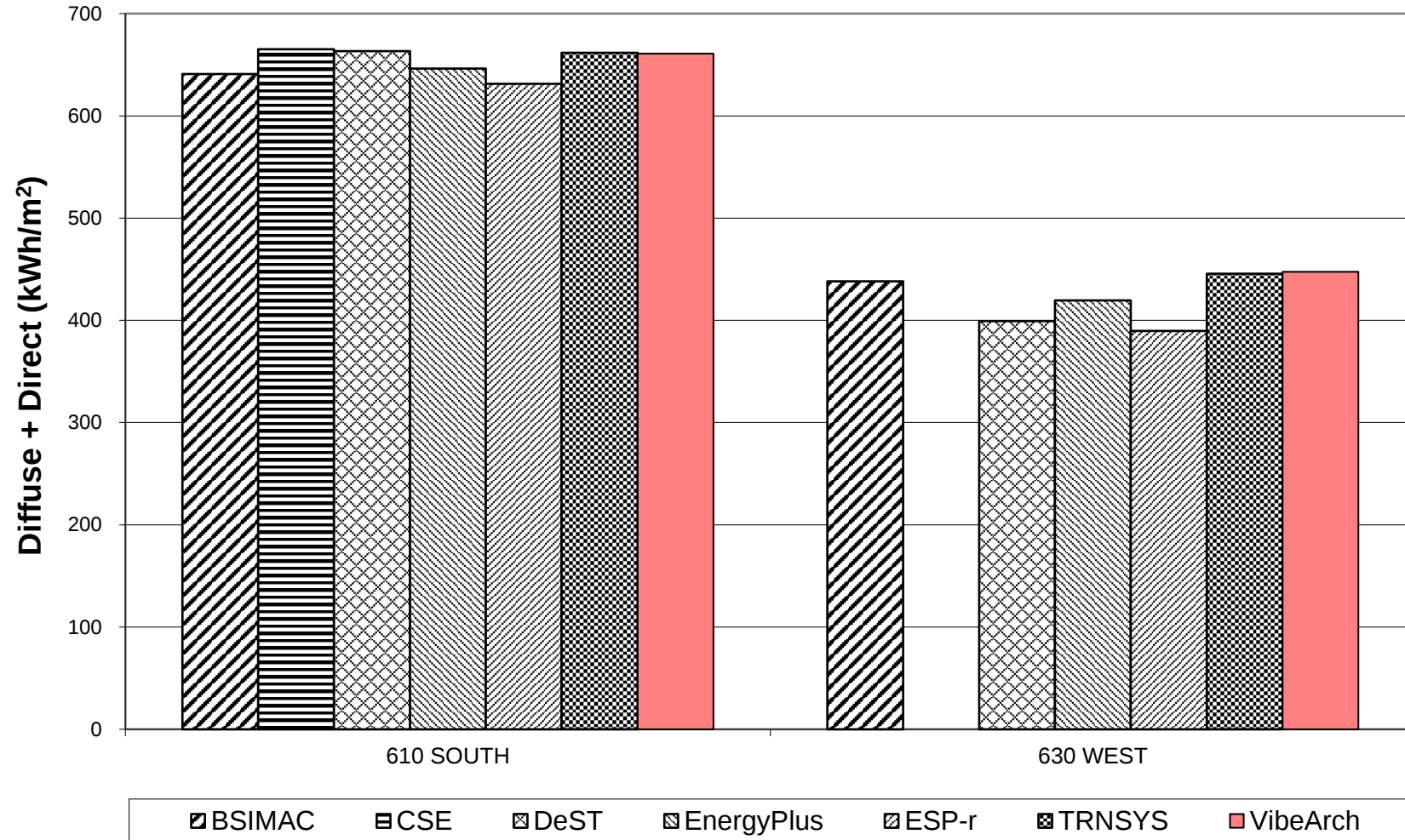


Figure B8-4.
Annual Transmissivity Coefficient of Windows
(Unshaded Transmitted)/(Incident Solar Radiation)

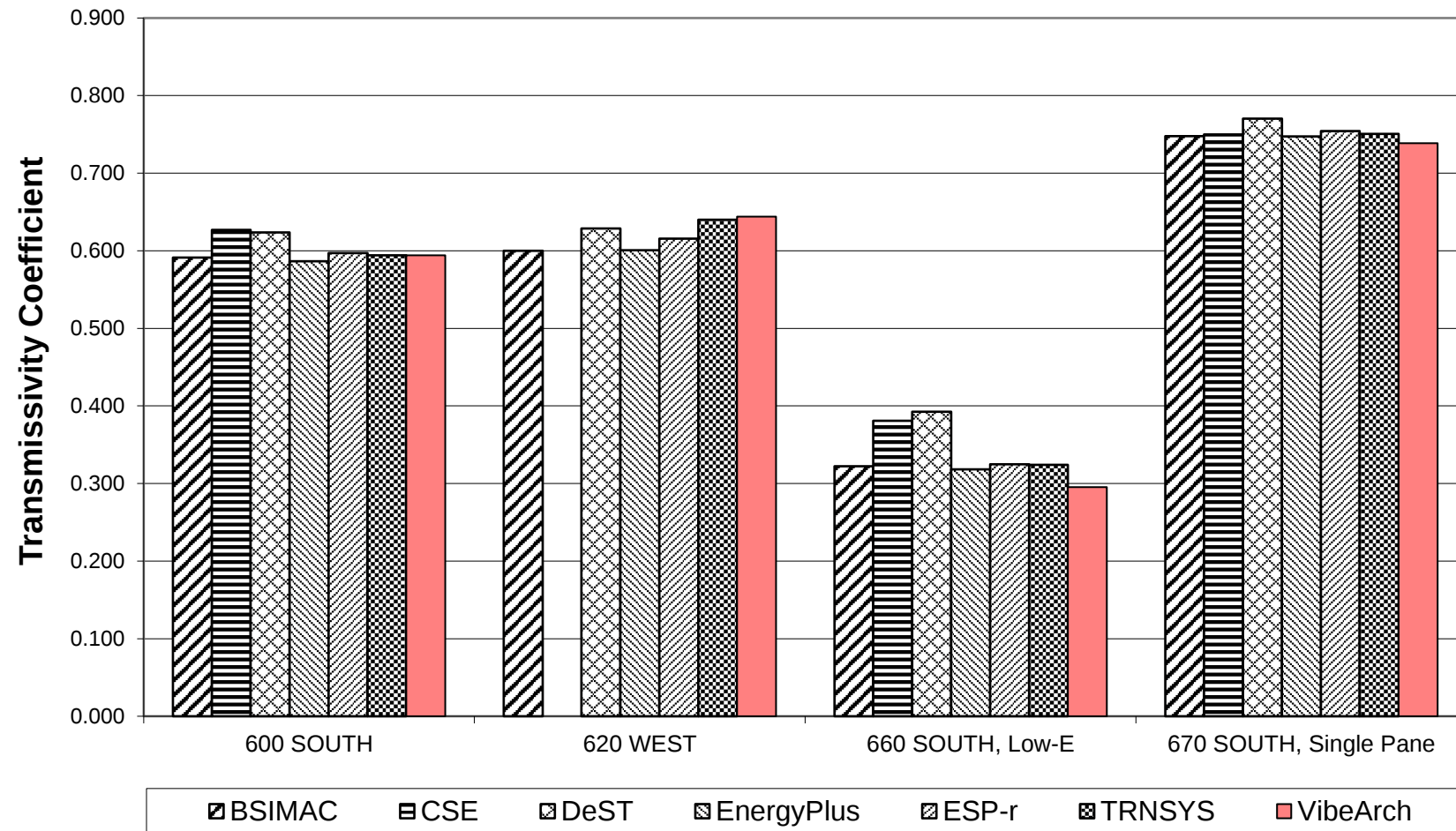


Figure B8-5.
Annual Overhang and Fin Shading Coefficients
(1-(Shaded)/(Unshaded)) Transmitted Solar Radiation

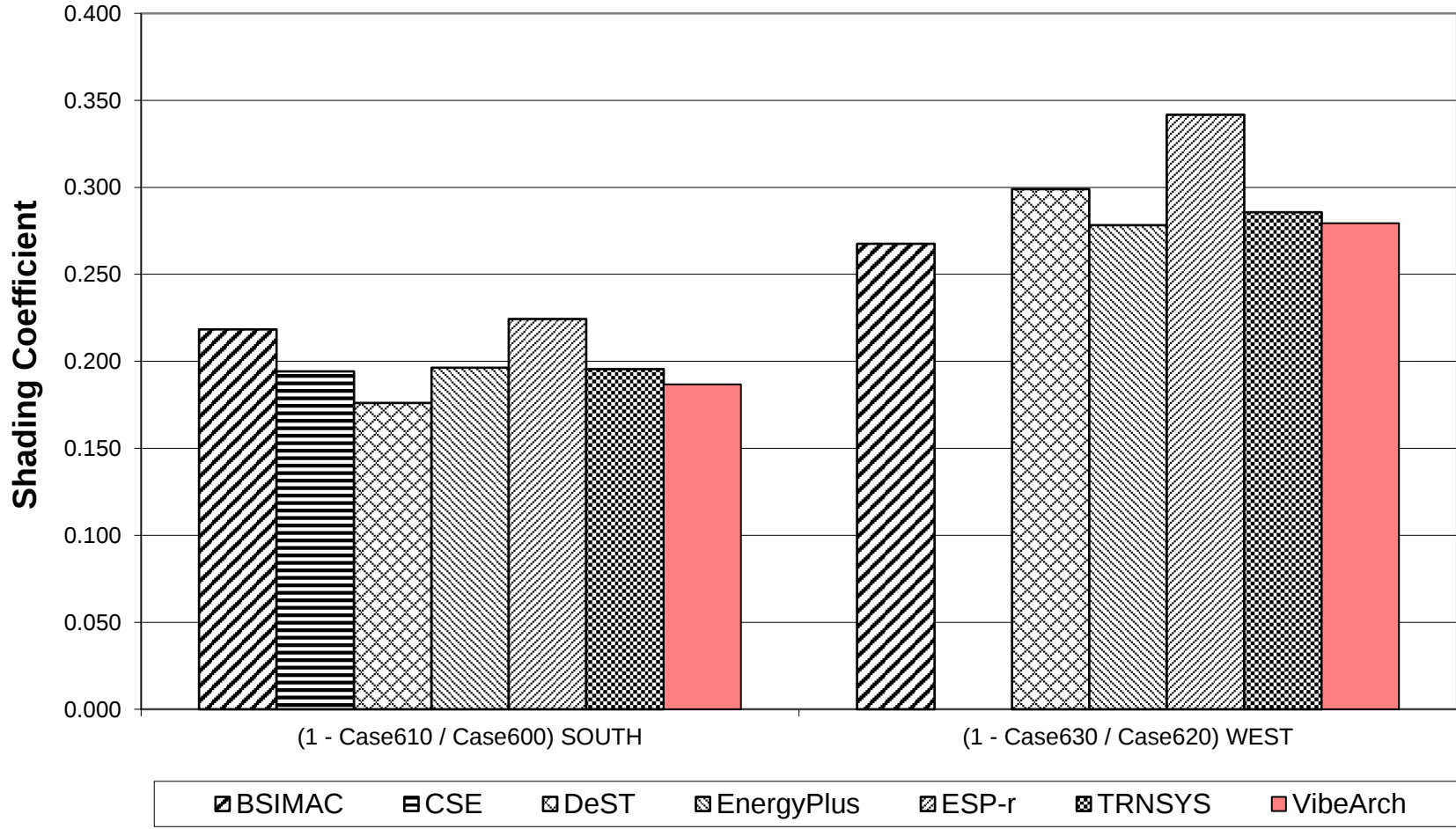
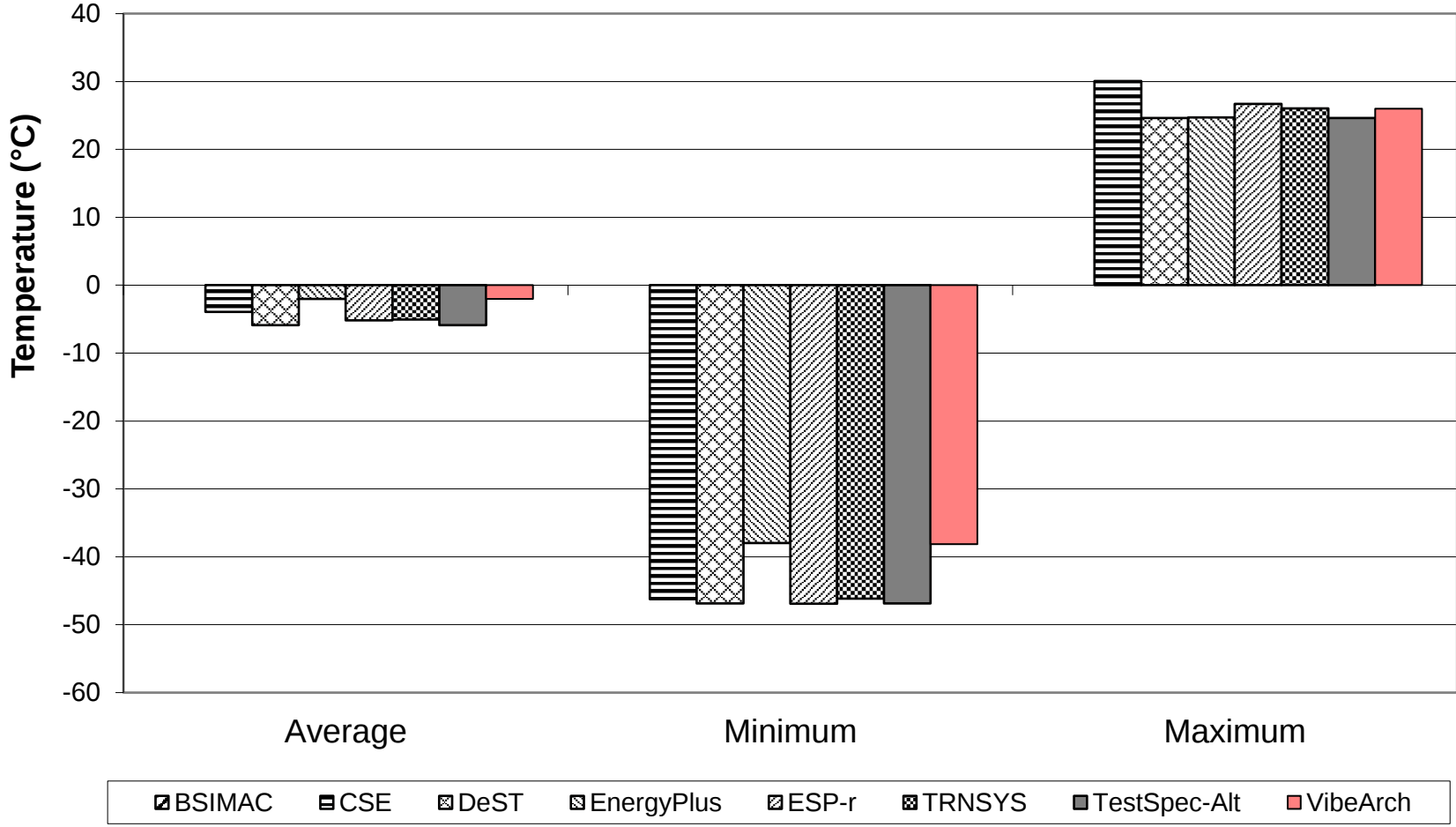
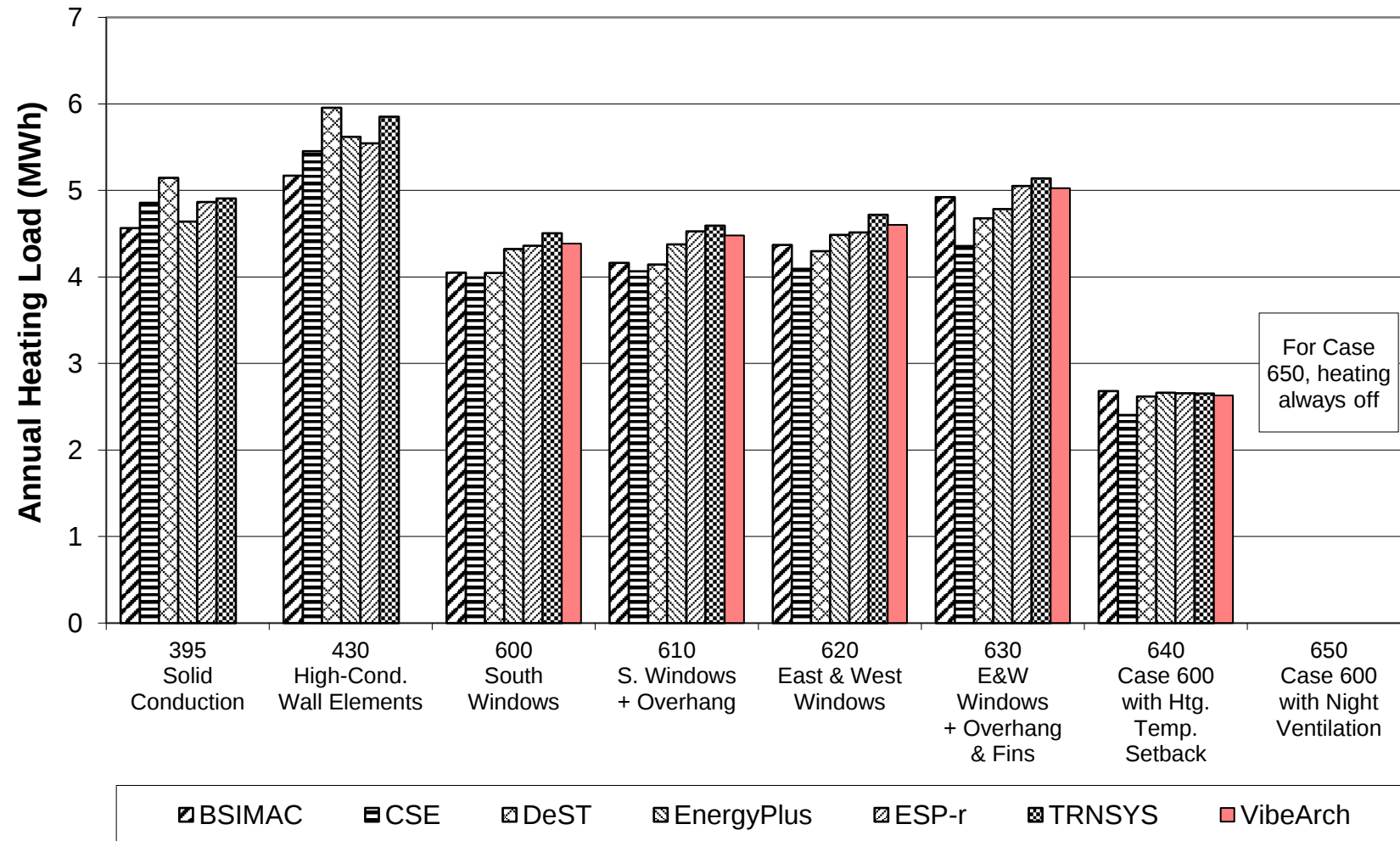


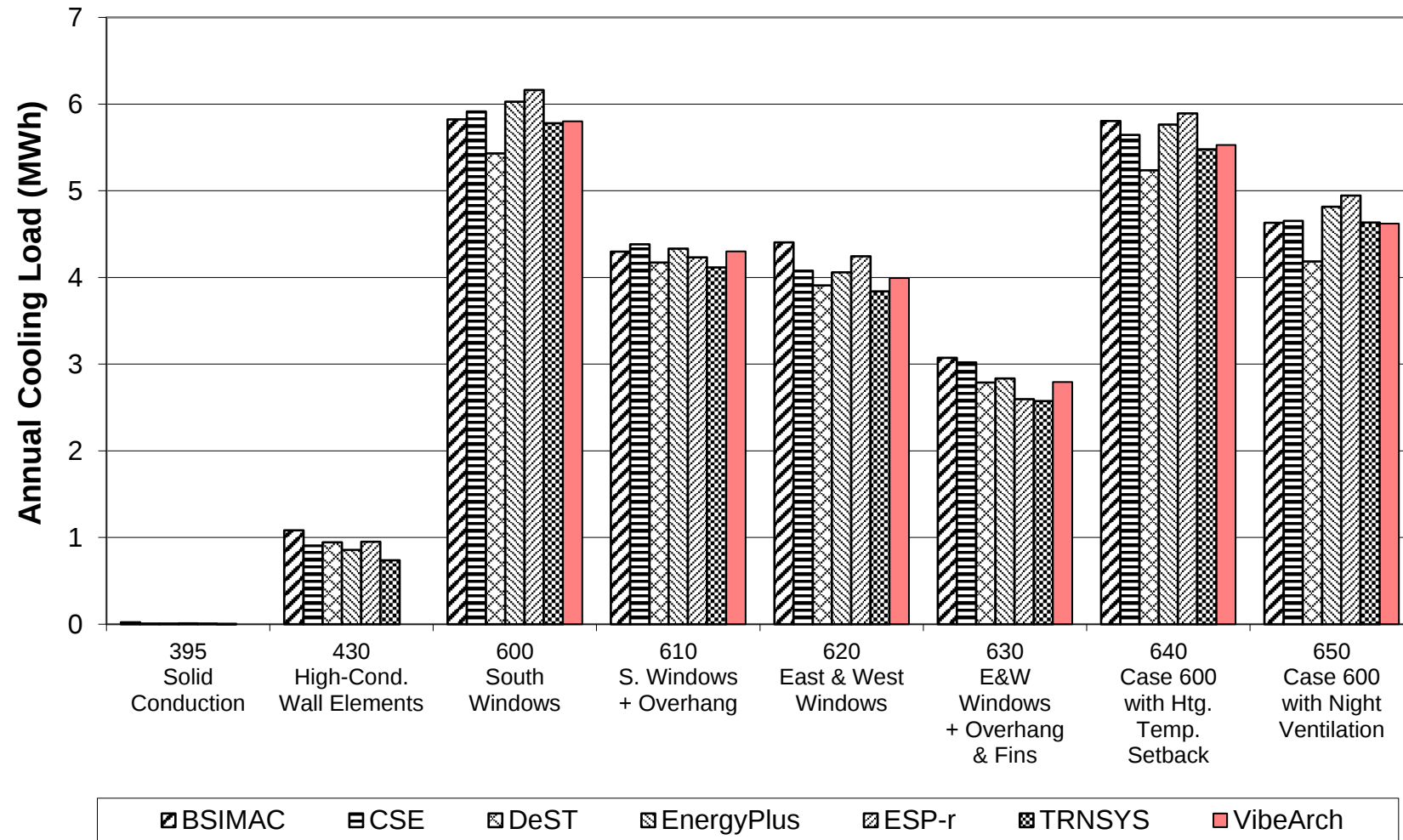
Figure B8-6.
Average, Minimum and Maximum Sky Temperature
Case 600



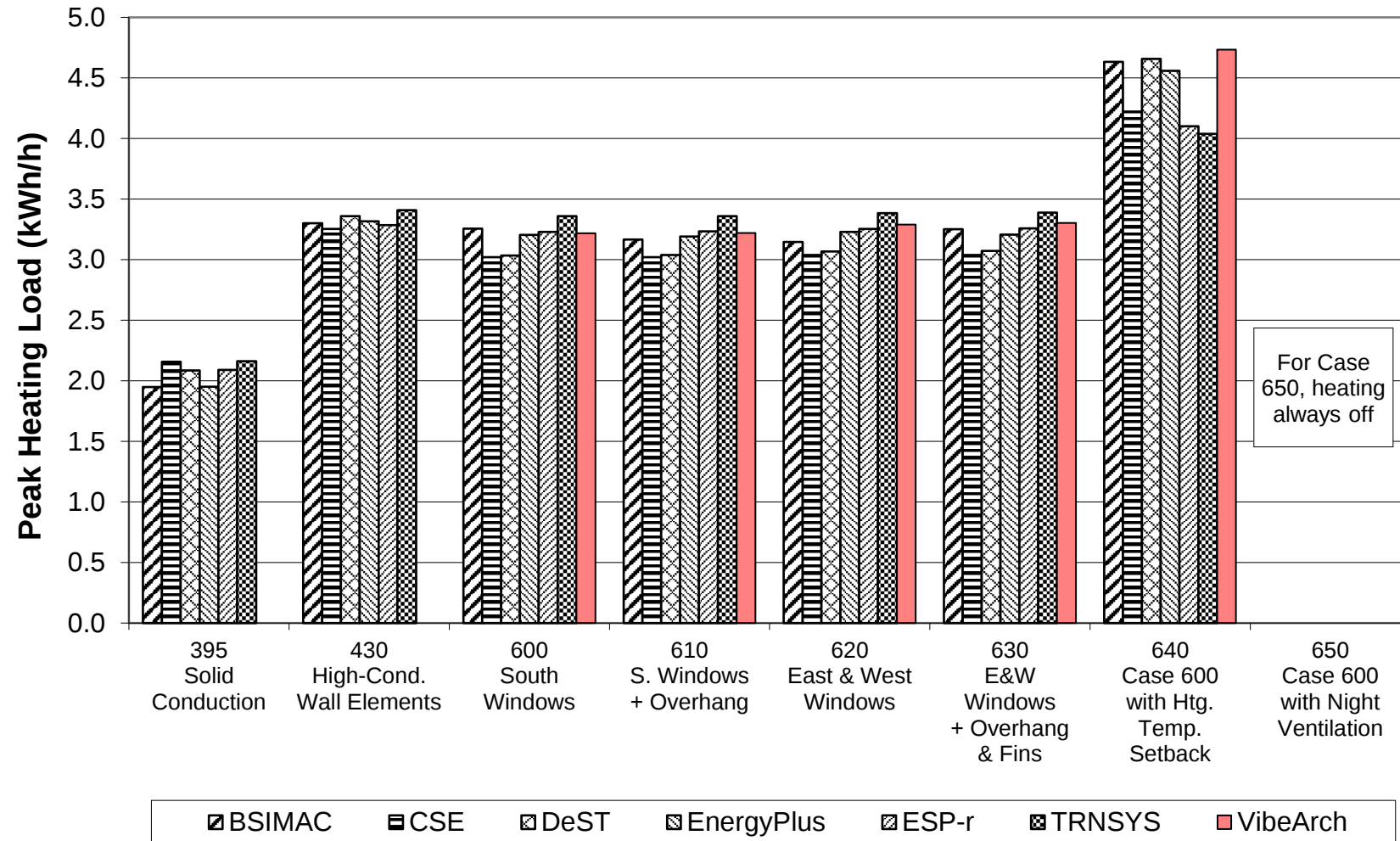
**Figure B8-7. Basic:
Low Mass Annual Heating**



**Figure B8-8. Basic:
Low Mass Annual Sensible Cooling**

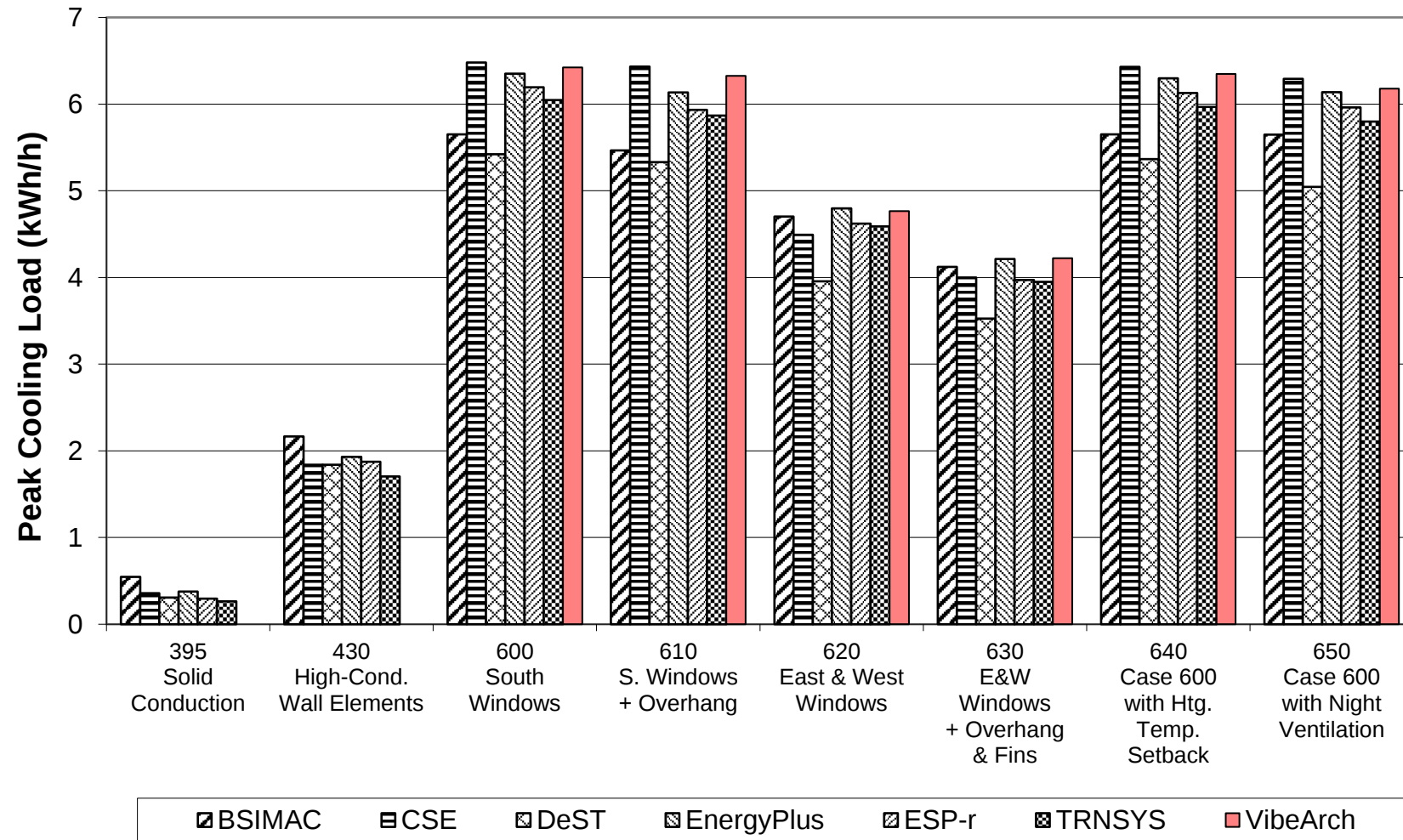


**Figure B8-9. Basic:
Low Mass Peak Heating**

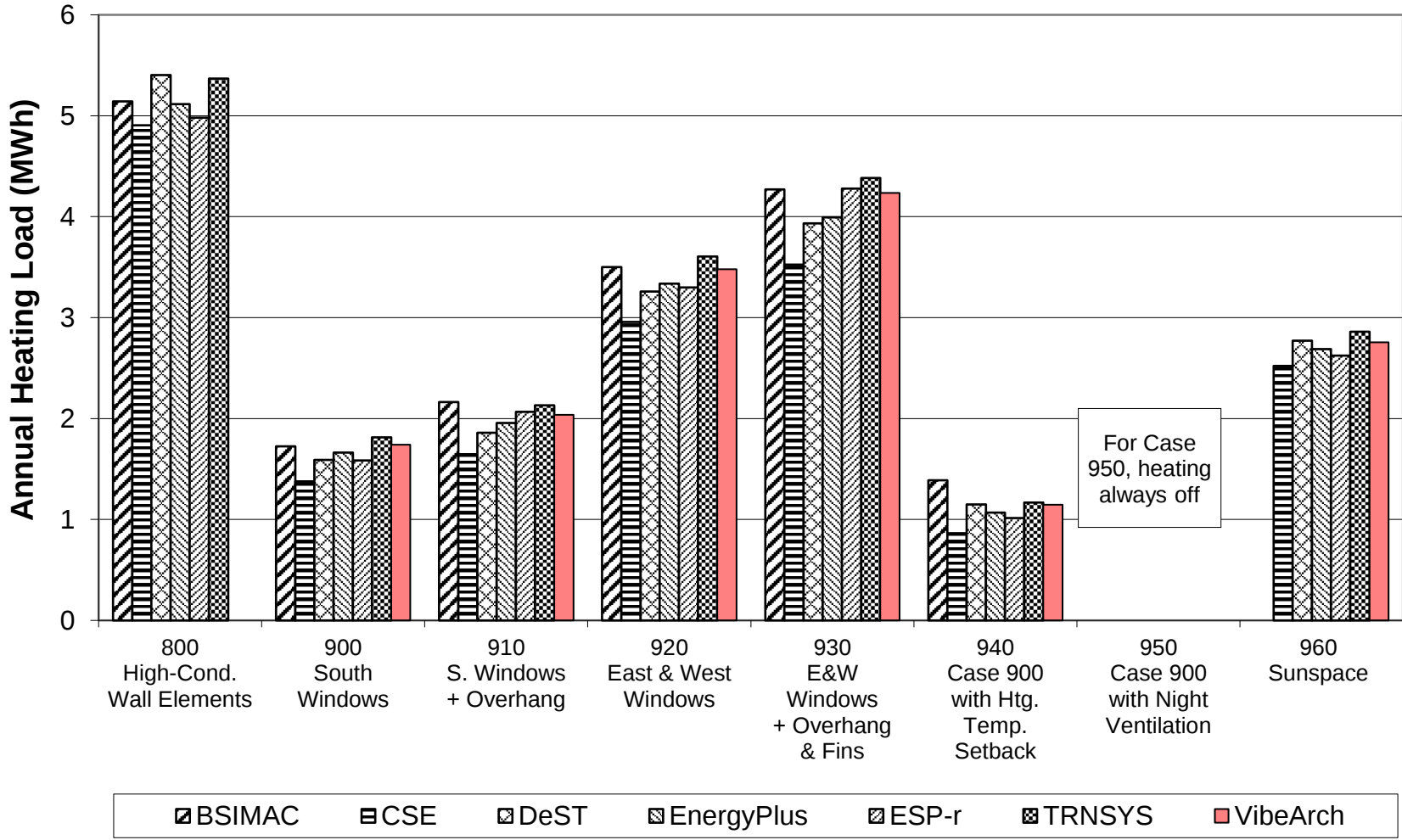


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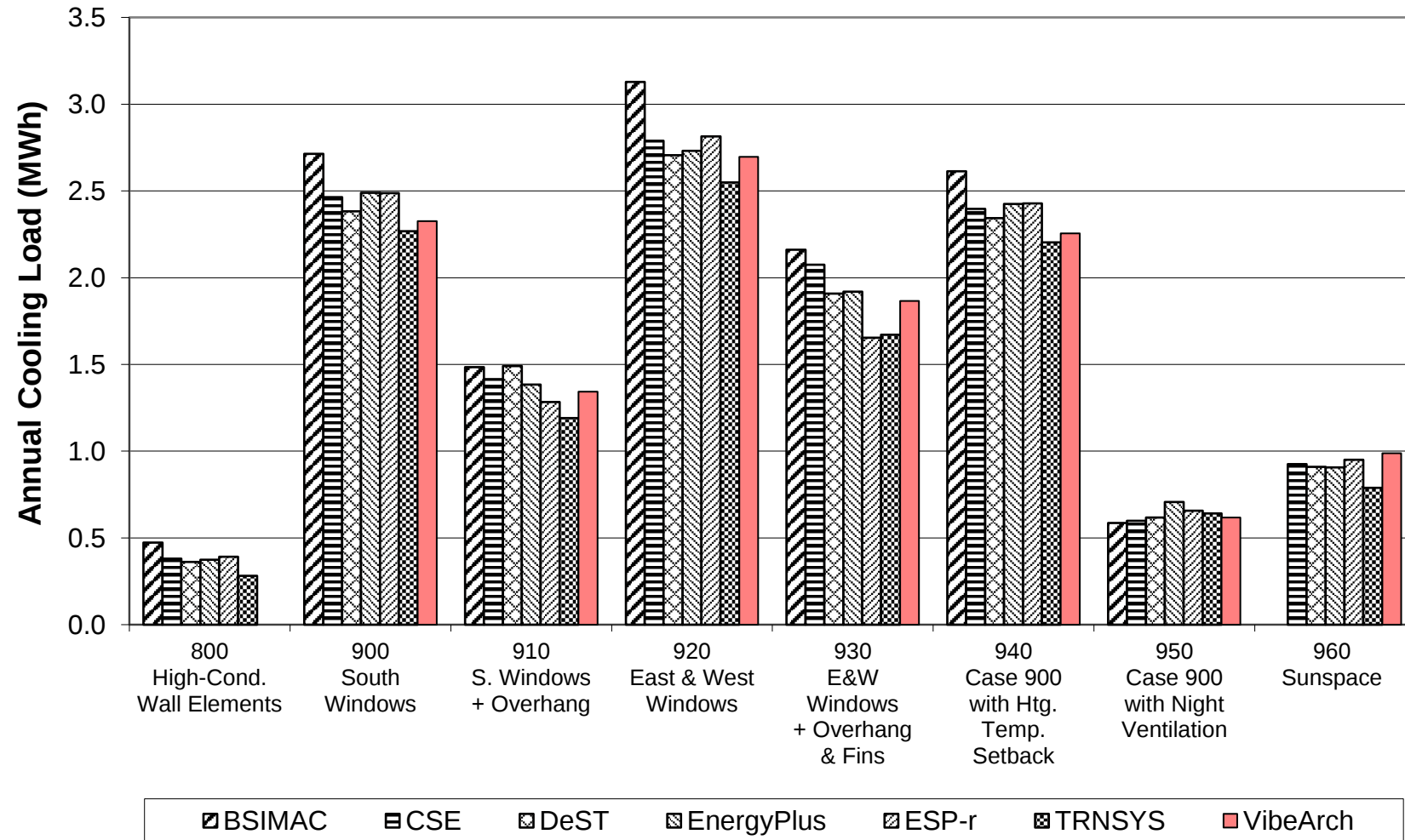
**Figure B8-10. Basic:
Low Mass Peak Sensible Cooling**



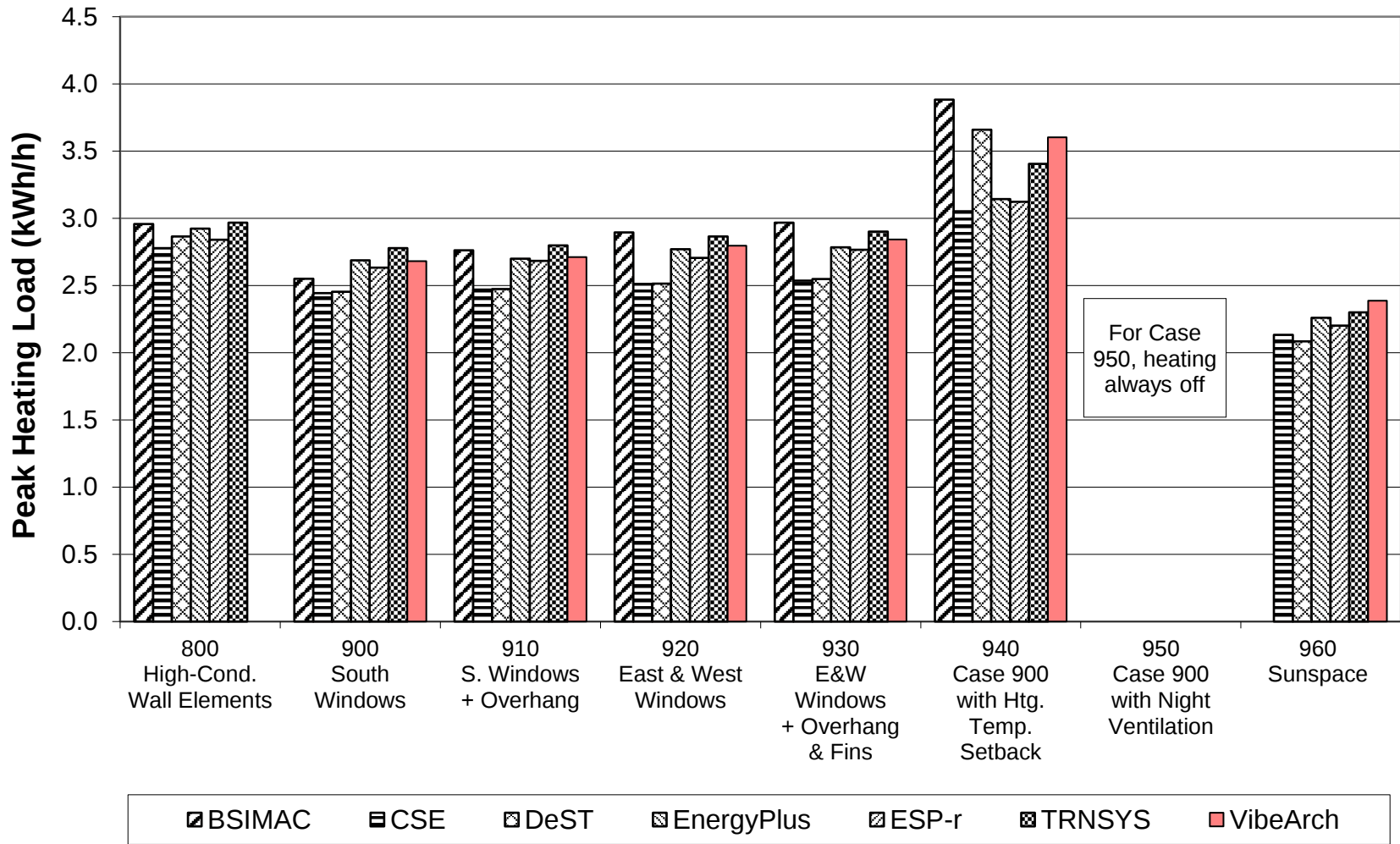
**Figure B8-11. Basic:
High Mass Annual Heating**



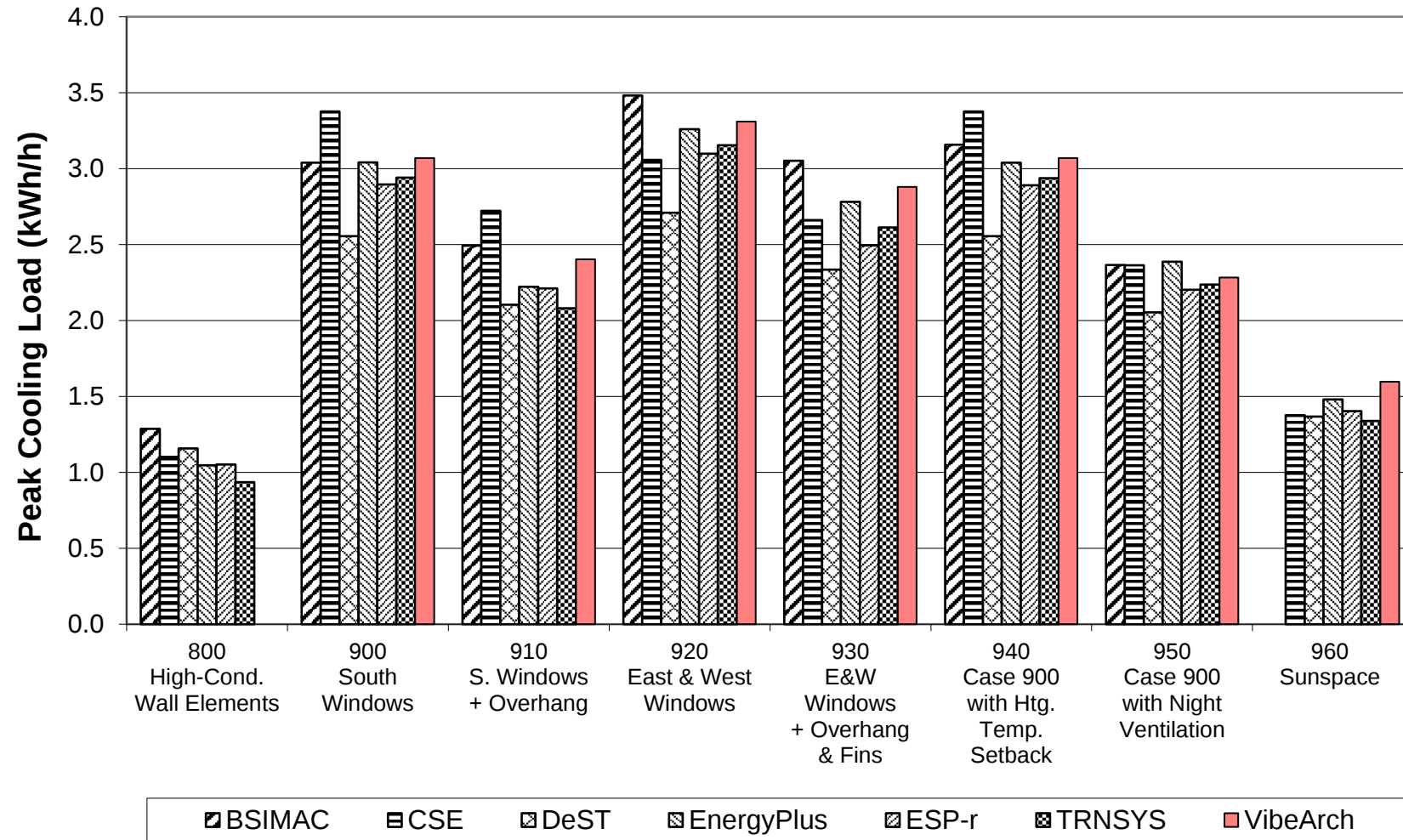
**Figure B8-12. Basic:
High Mass Annual Sensible Cooling**



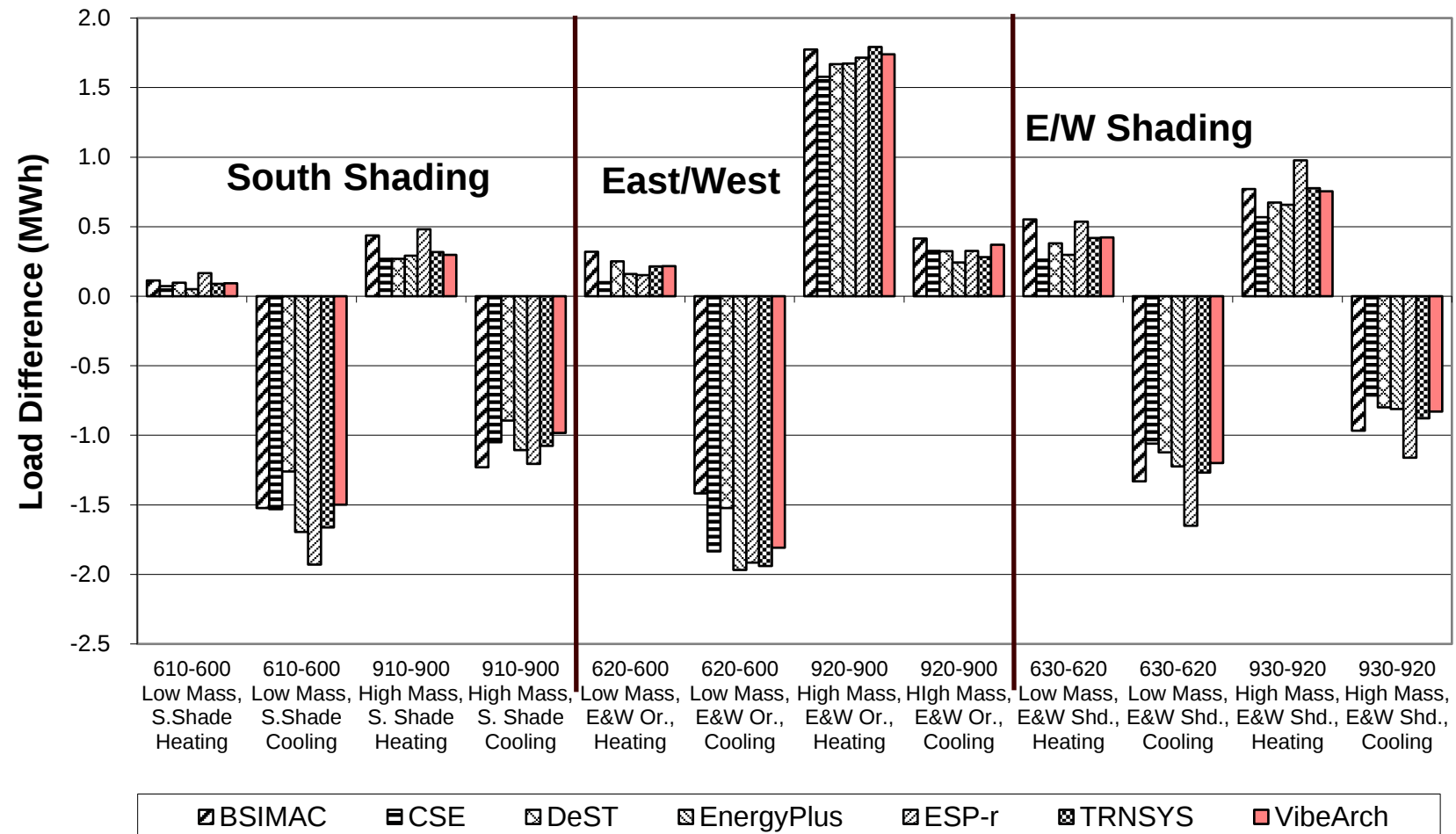
**Figure B8-13. Basic:
High Mass Peak Heating**



**Figure B8-14. Basic:
High Mass Peak Sensible Cooling**

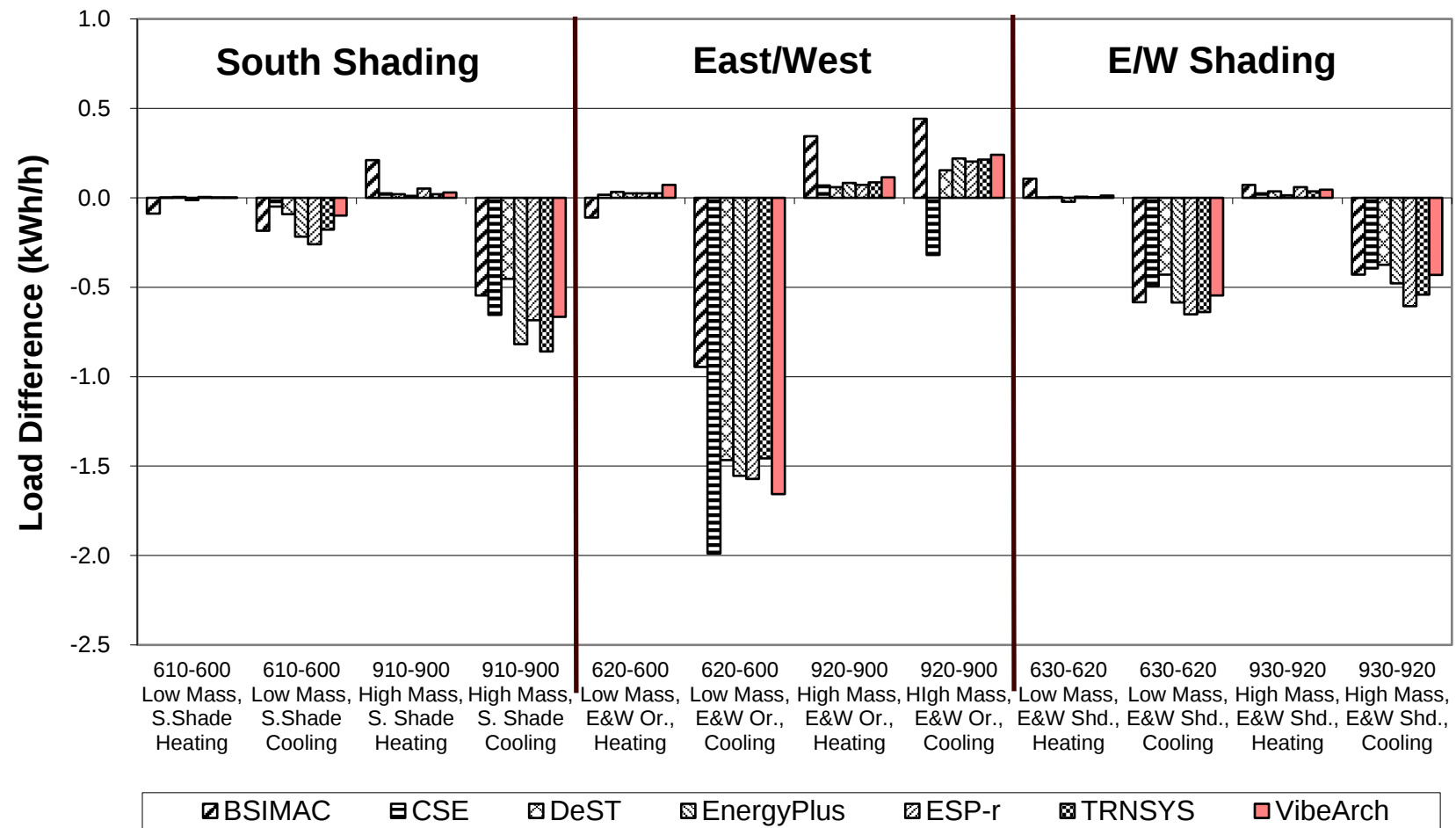


**Figure B8-17. Basic:
Window Shading and Orientation (Delta)
Annual Heating and Sensible Cooling**

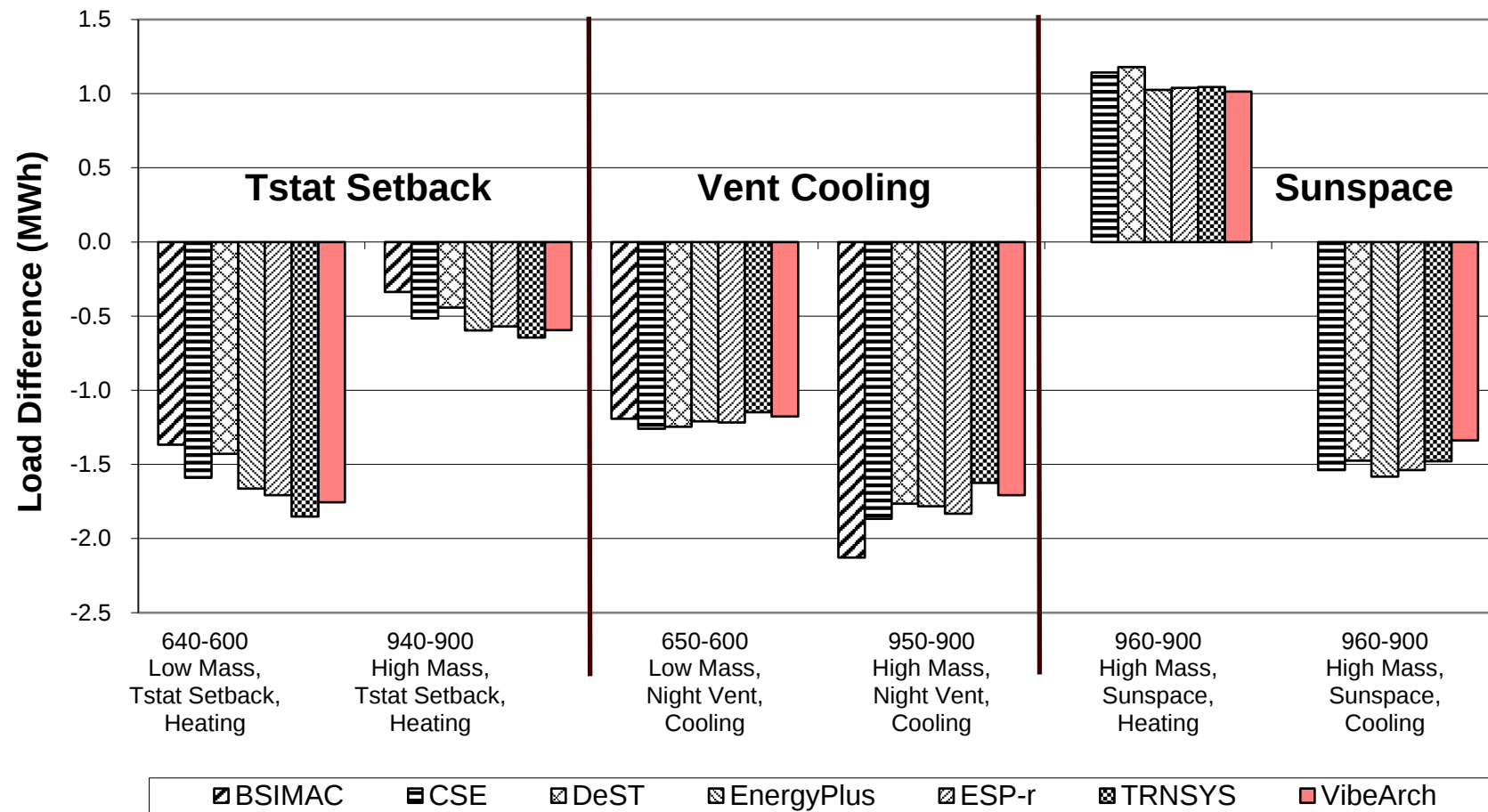


ASHRAE Standard 140-2023, Test Results Comparison for Section 7 - Building Thermal Envelope and Fabric Load Cases 195-995 & 600FF-980FF (VibeArch) vs. Annex B8, Section B8.1 Example Results, by Chang Heon Cheong (Individual), 22-Sep-2026

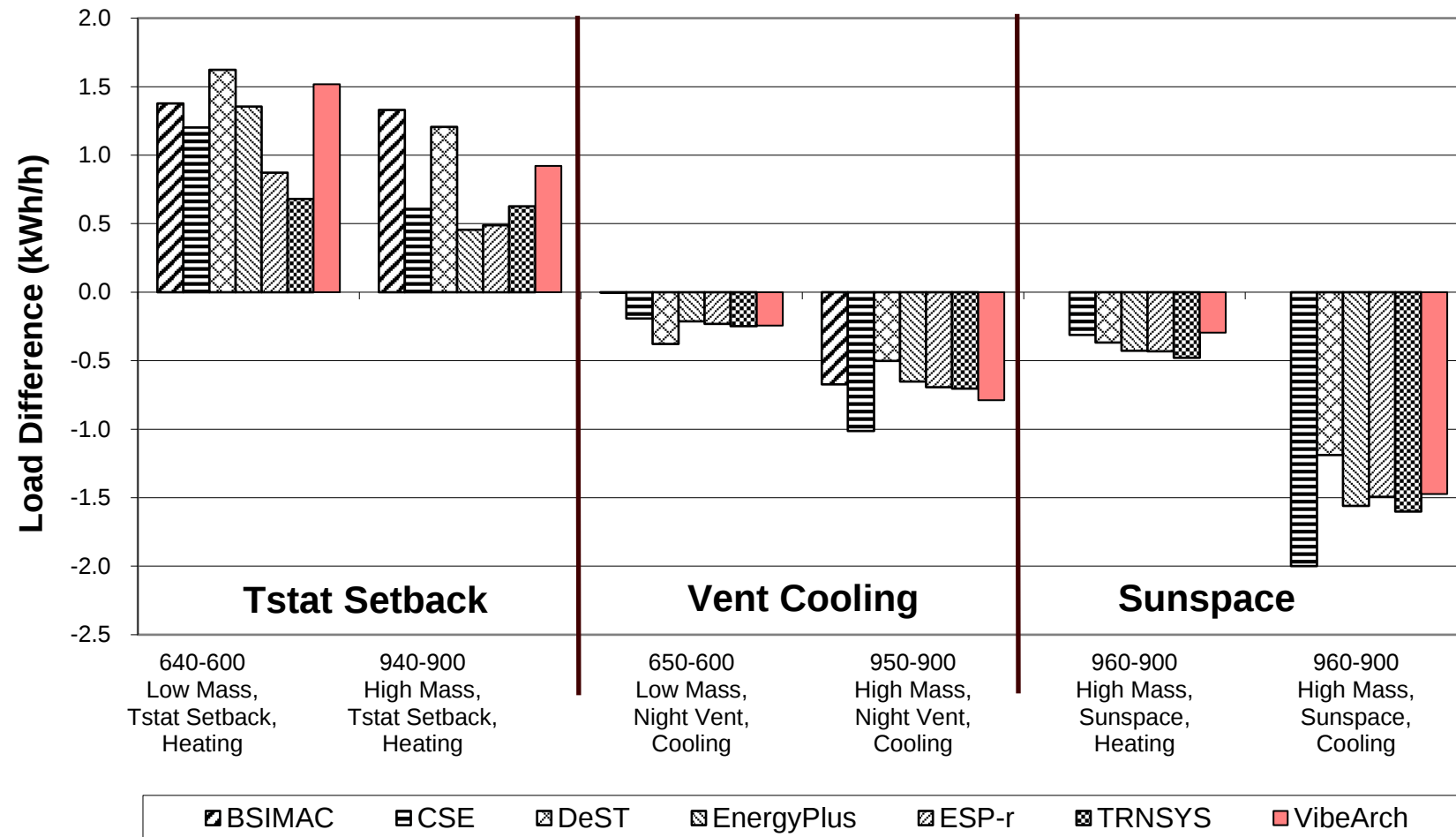
**Figure B8-18. Basic:
Window Shading and Orientation (Delta)
Peak Heating and Sensible Cooling**



**Figure B8-19. Basic:
Thermostat Setback, Vent Cooling, and Sunspace (Delta)
Annual Heating and Sensible Cooling**

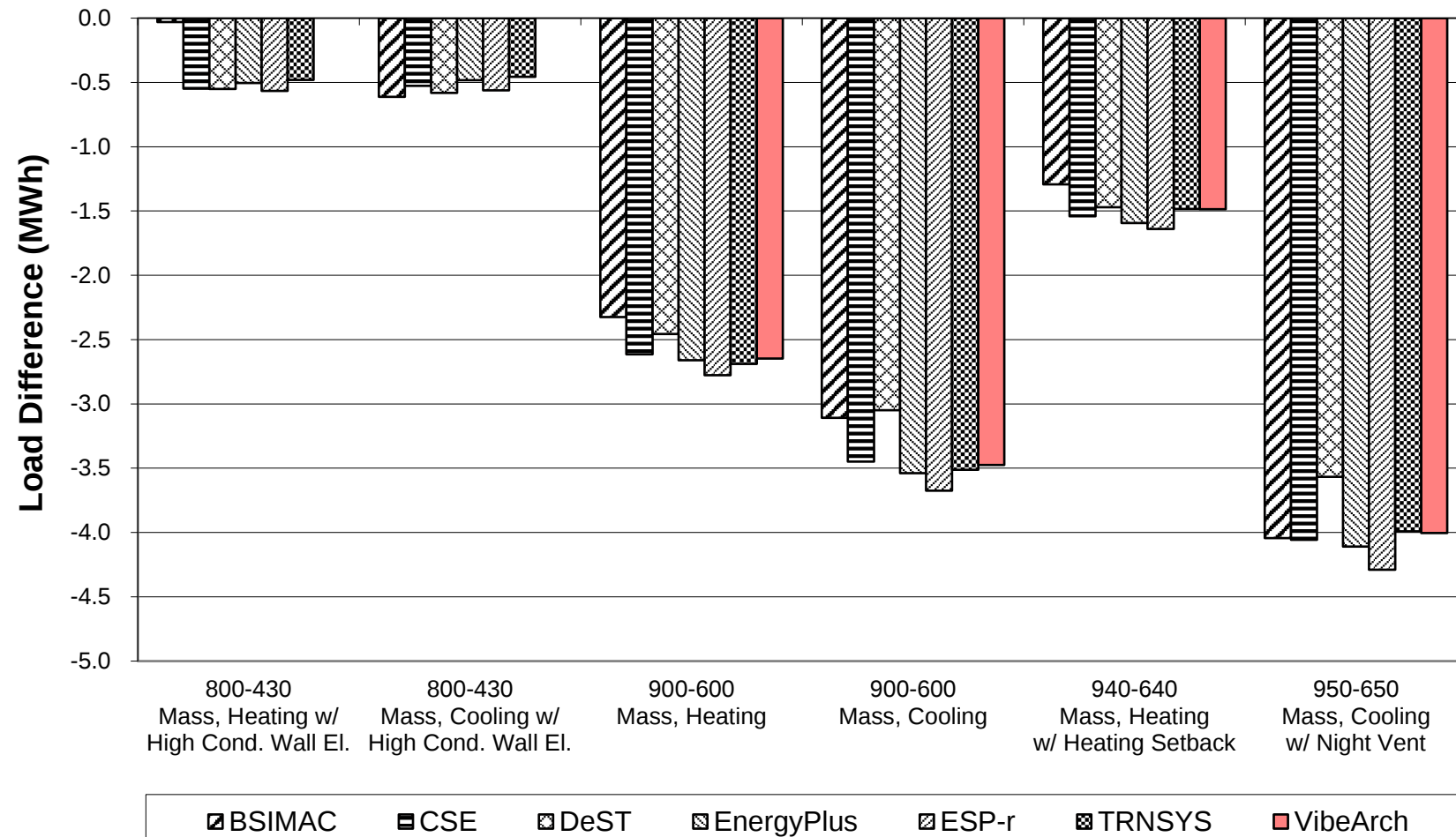


**Figure B8-20. Basic:
Thermostat Setback, Vent Cooling, and Sunspace (Delta)
Peak Heating and Sensible Cooling**

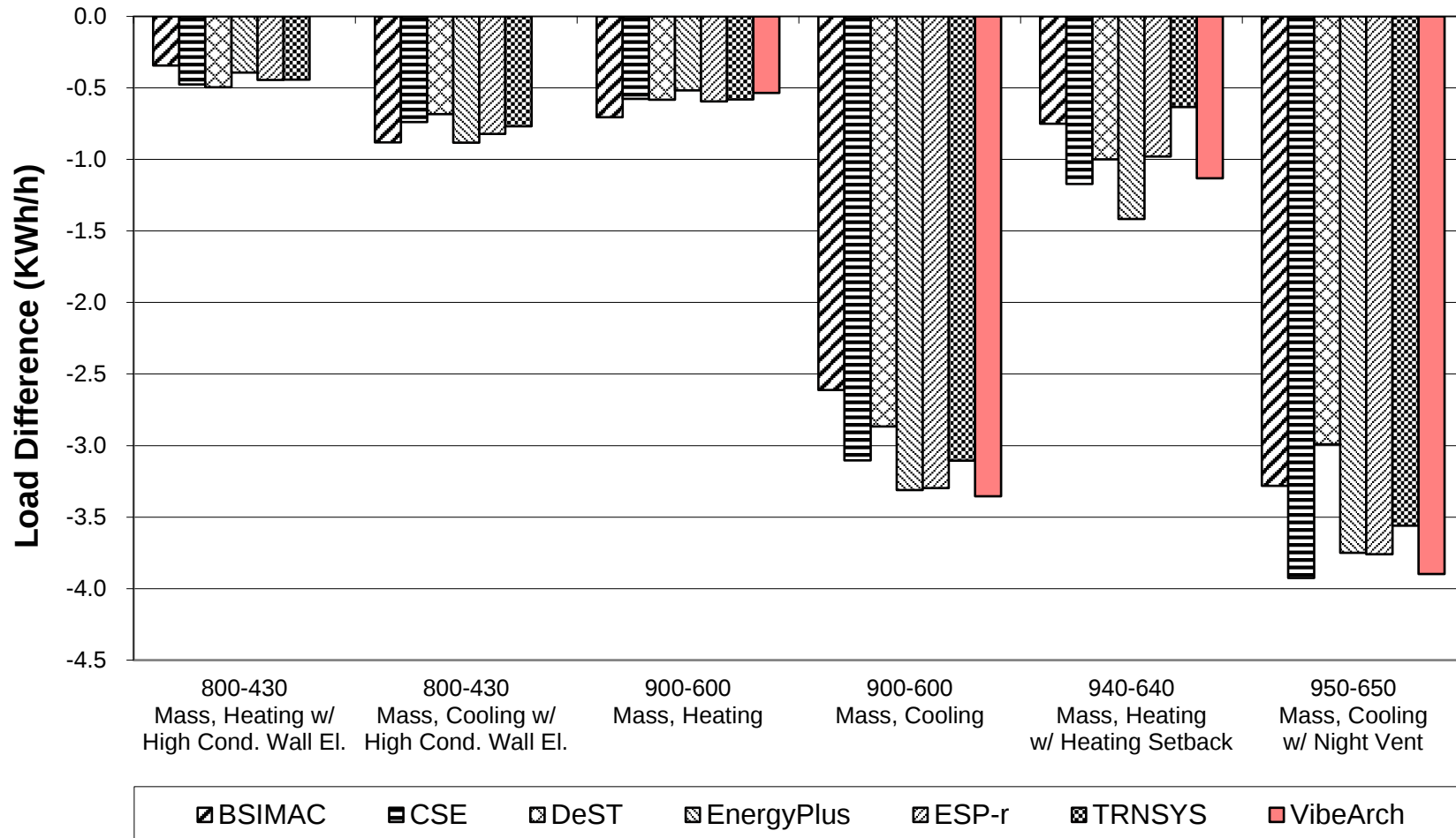


ASHRAE Standard 140-2023, Test Results Comparison for Section 7 - Building Thermal Envelope and Fabric Load Cases 195-995 & 600FF-980FF (VibeArch) vs. Annex B8, Section B8.1 Example Results, by Chang Heon Cheong (Individual), 22-Sep-2026

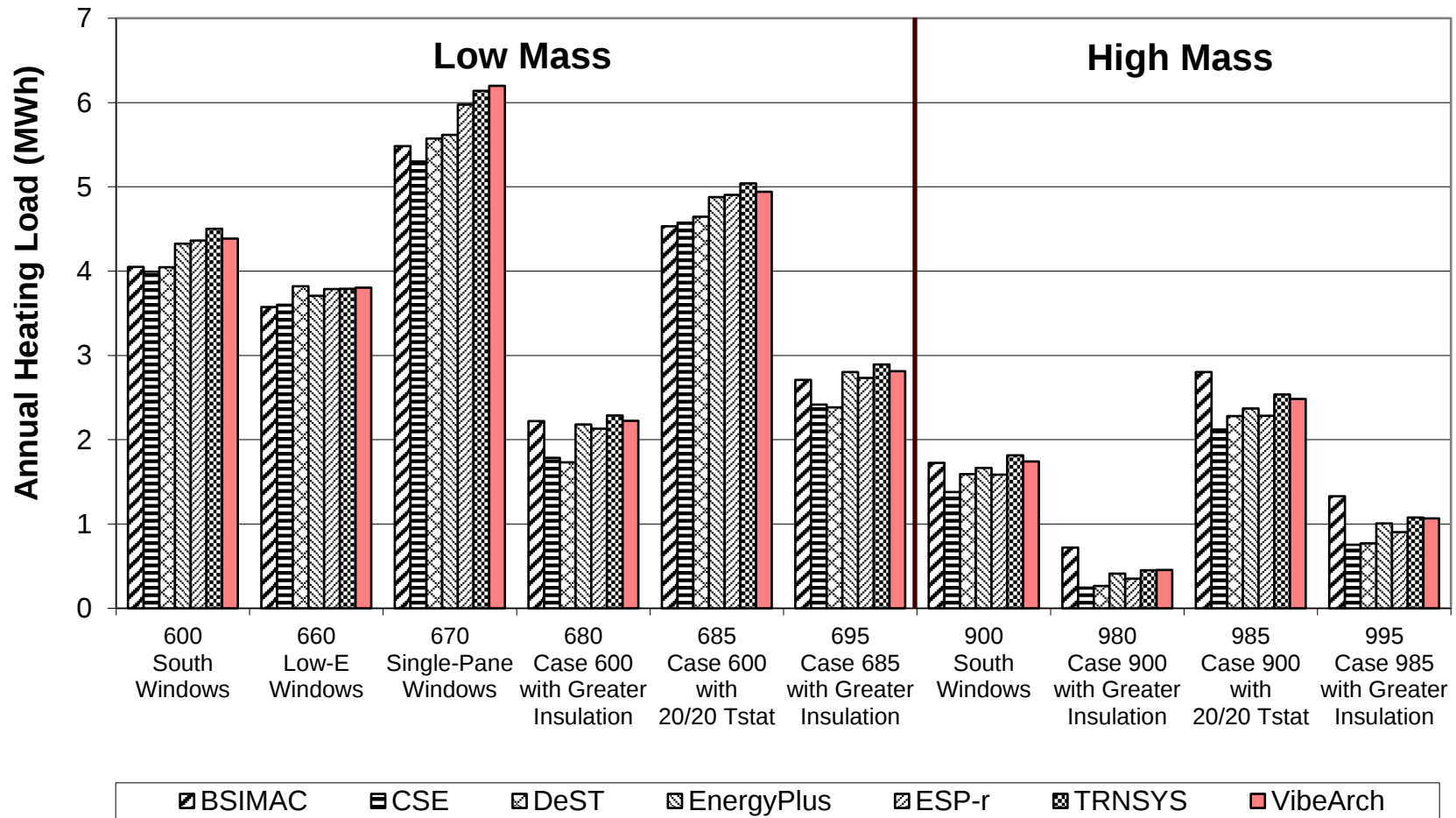
**Figure B8-21. Basic and In-Depth:
Mass Effect (Delta)
Annual Heating and Sensible Cooling**



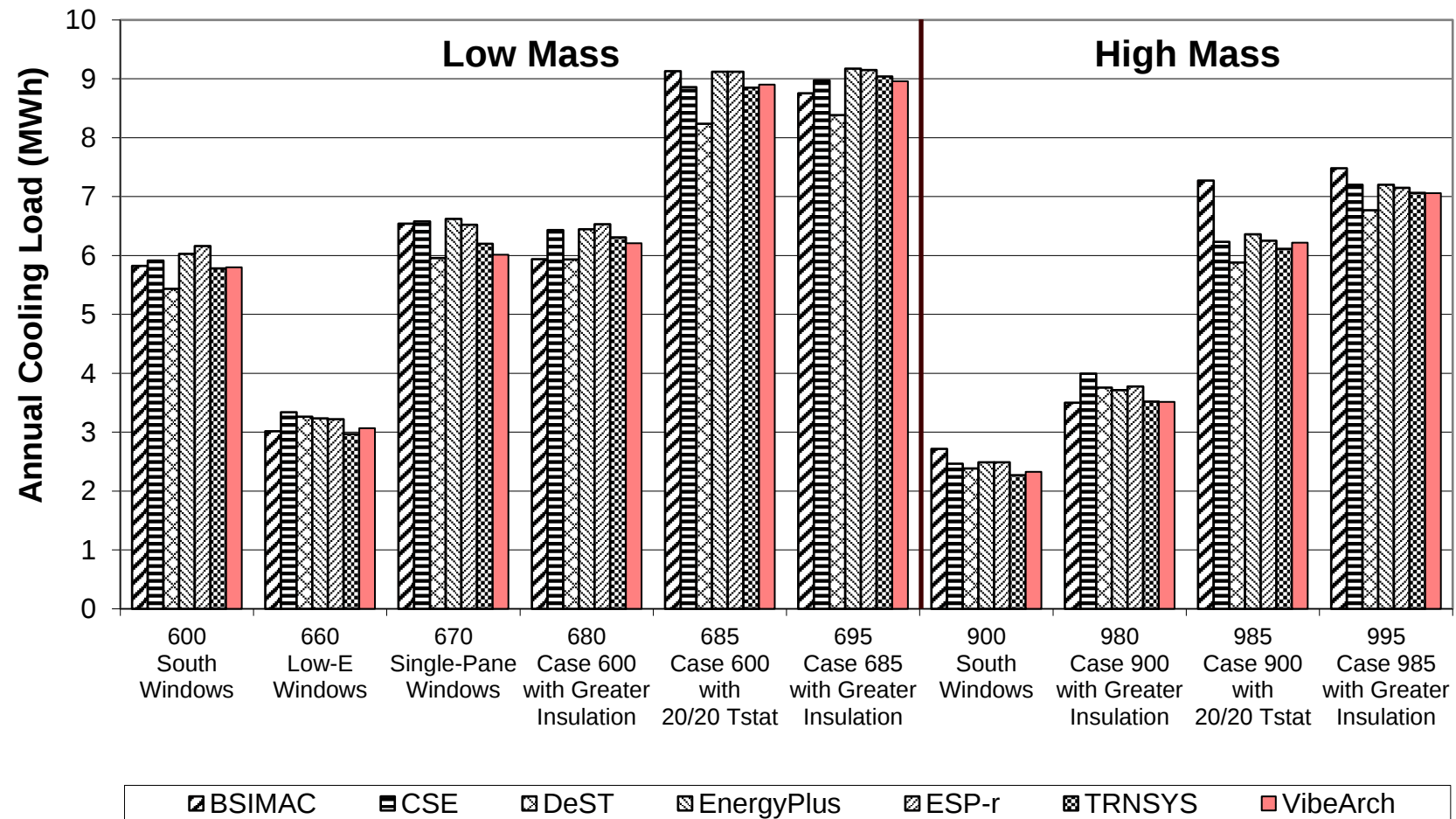
**Figure B8-22. Basic and In-Depth:
Mass Effect (Delta)
Peak Heating and Sensible Cooling**



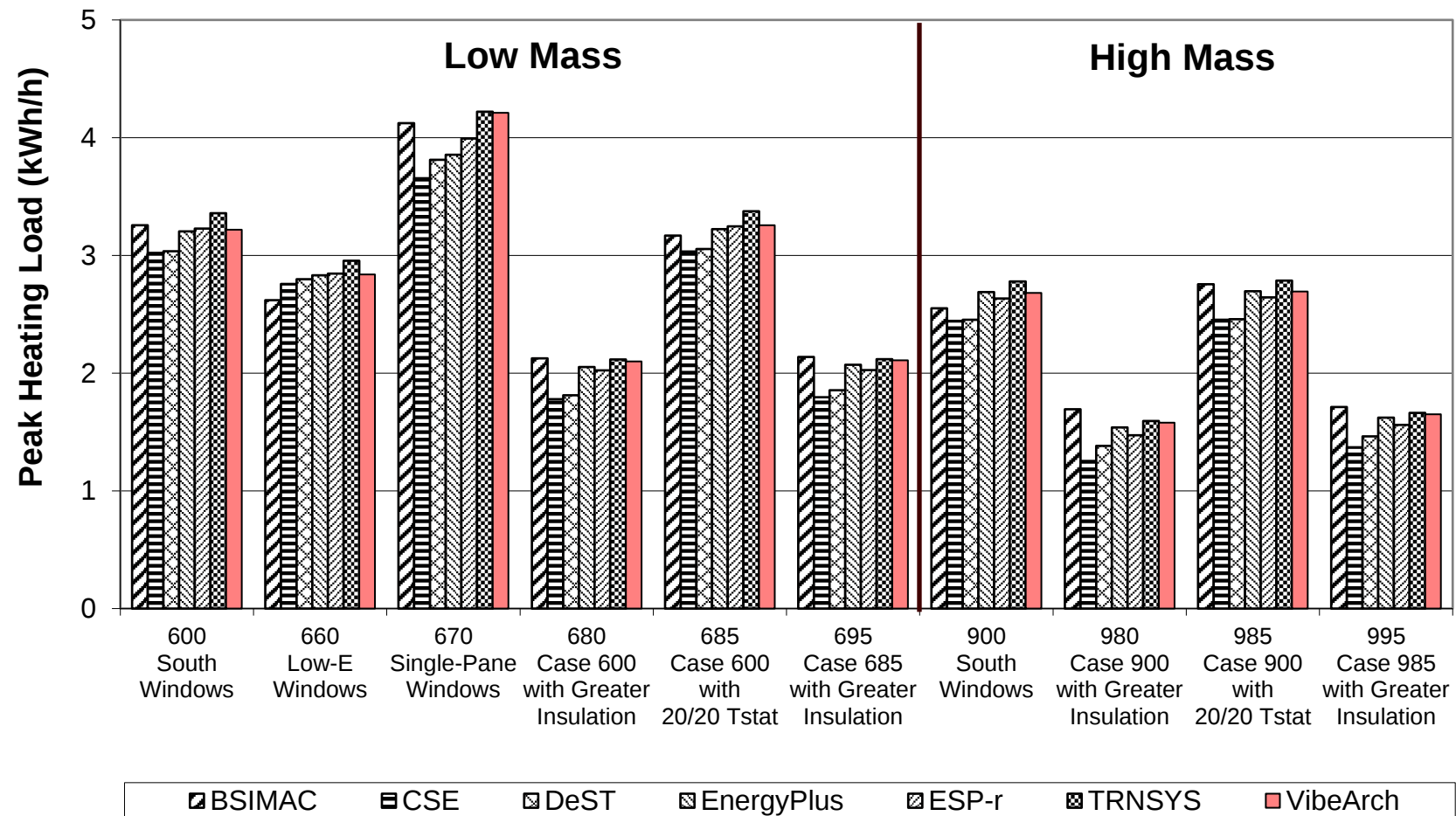
**Figure B8-23. Basic:
Cases 660 to 695 and 980 to 995
Annual Heating**



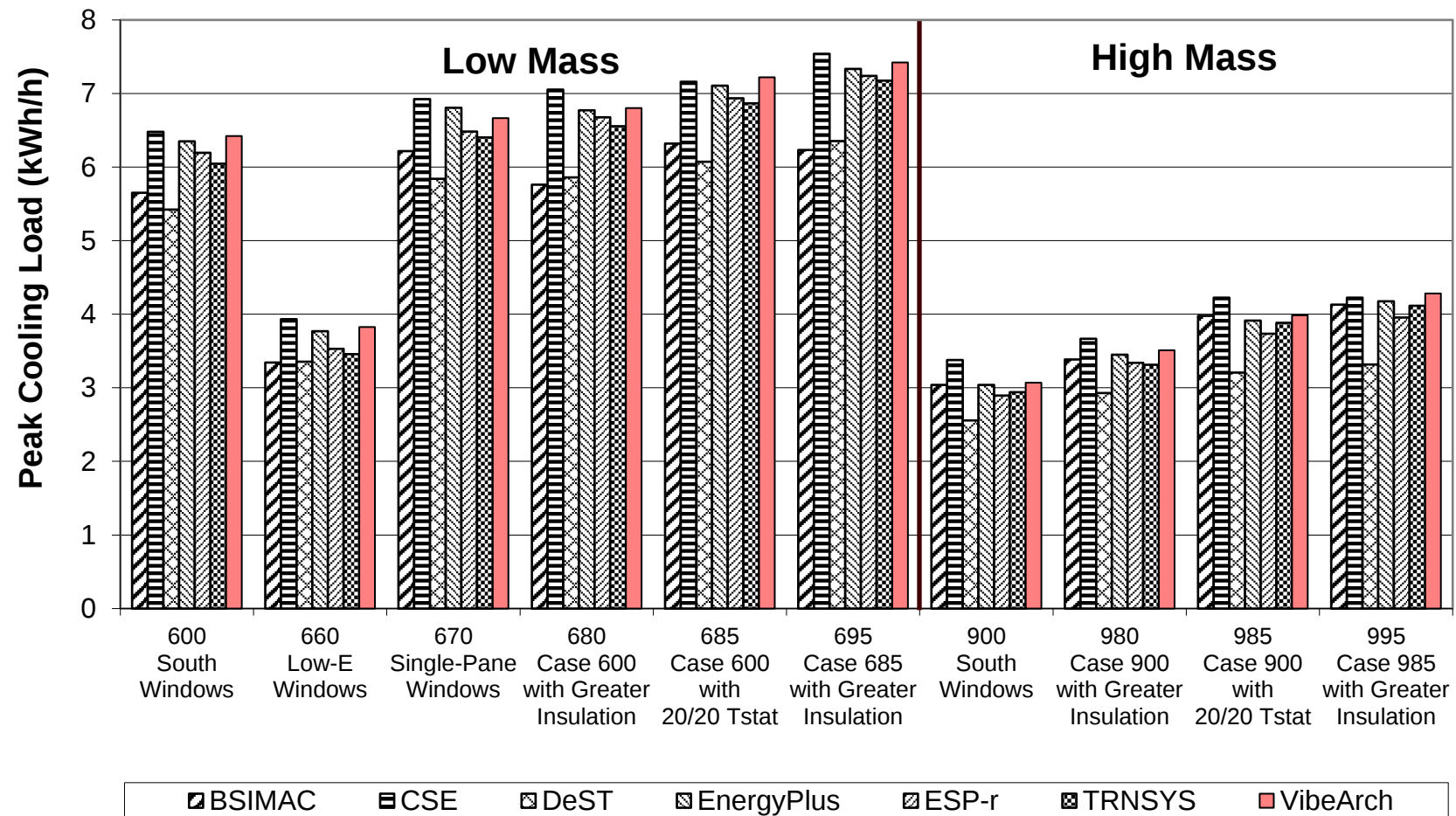
**Figure B8-24. Basic:
Cases 660 to 695 and 980 to 995
Annual Cooling**



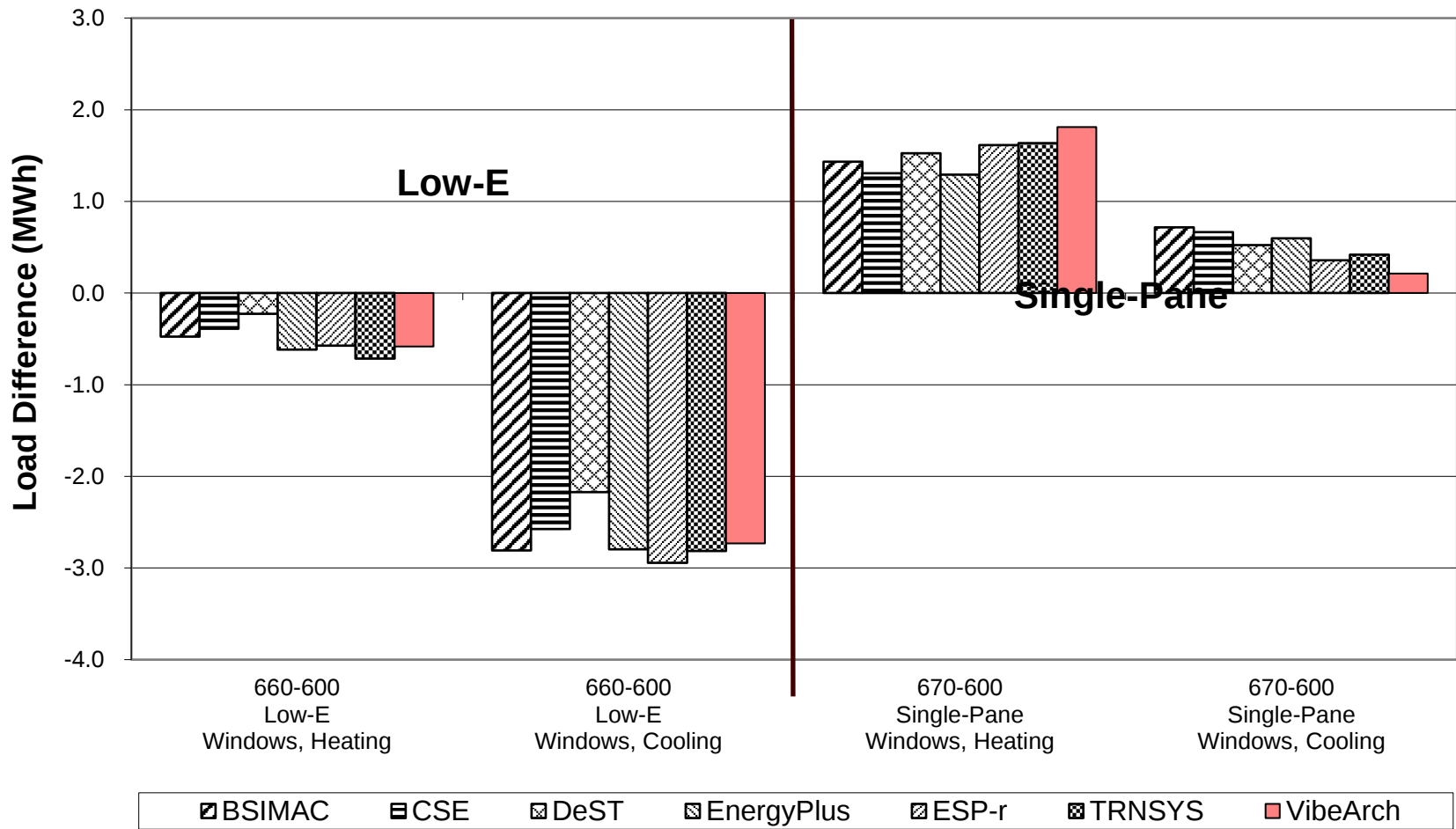
**Figure B8-25. Basic:
Cases 660 to 695 and 980 to 995
Peak Heating**



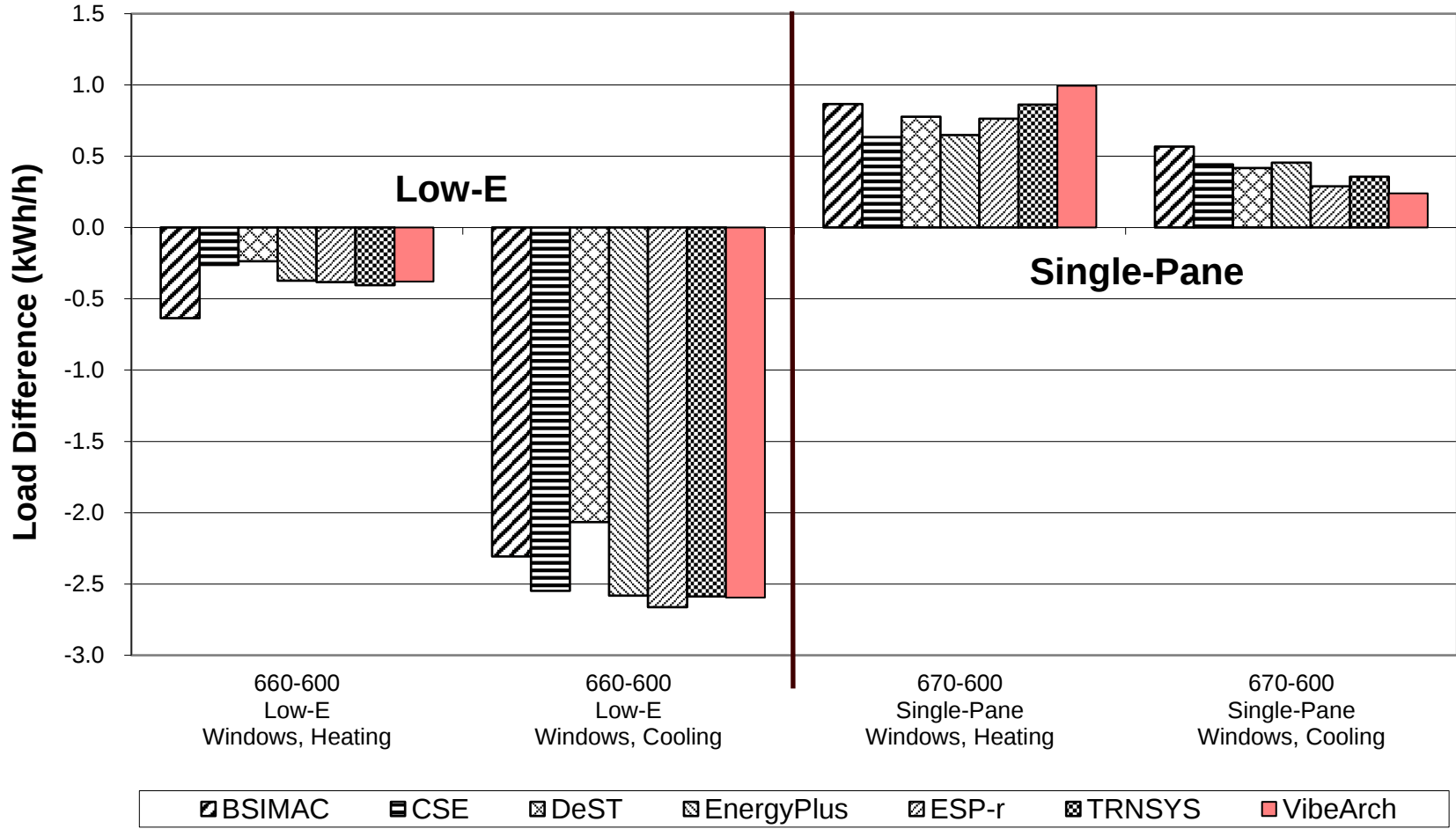
**Figure B8-26. Basic:
Cases 660 to 695 and 980 to 995
Peak Cooling**



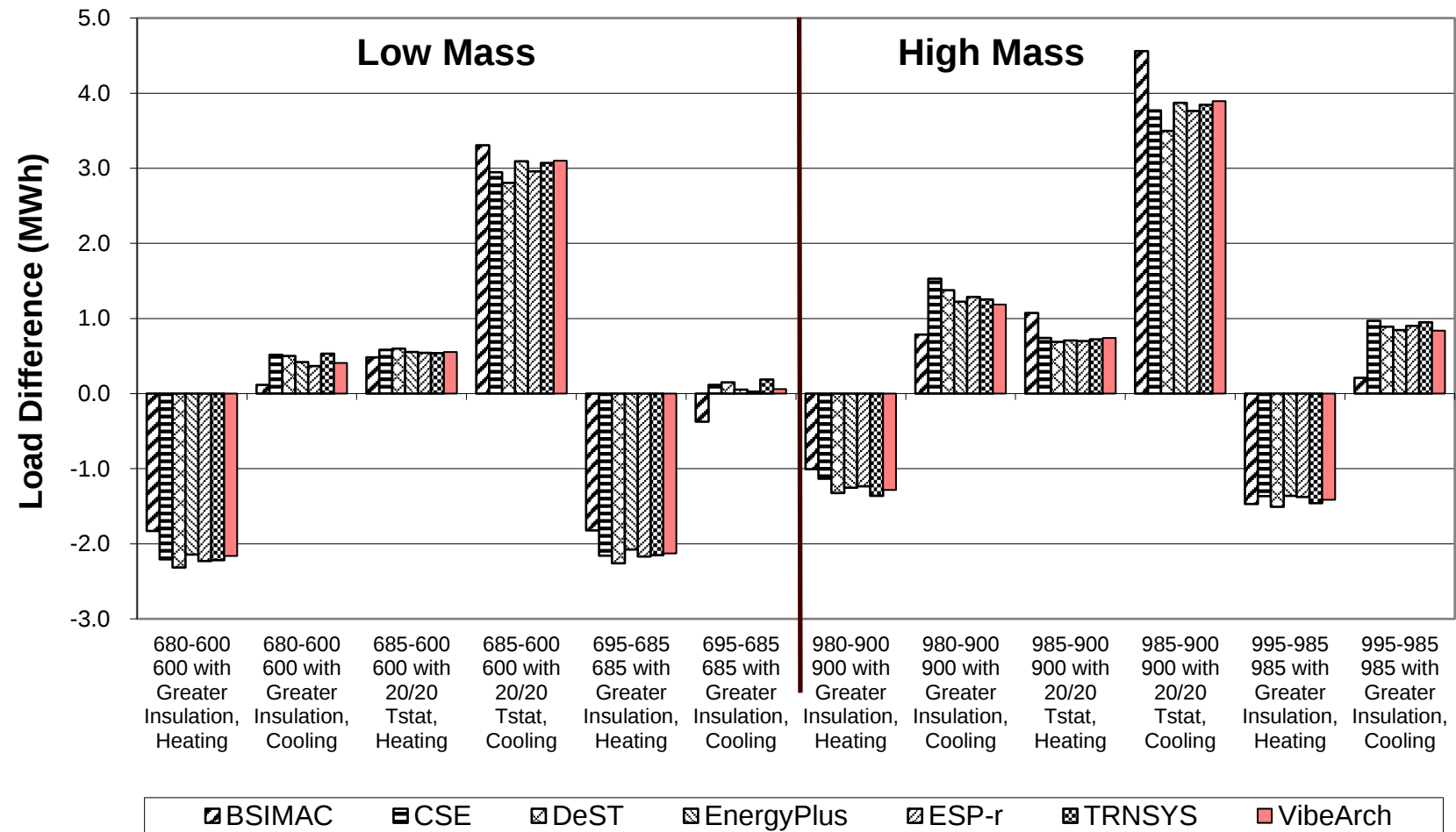
**Figure B8-27. Basic:
Window Types (Delta)
Annual Heating and Sensible Cooling**



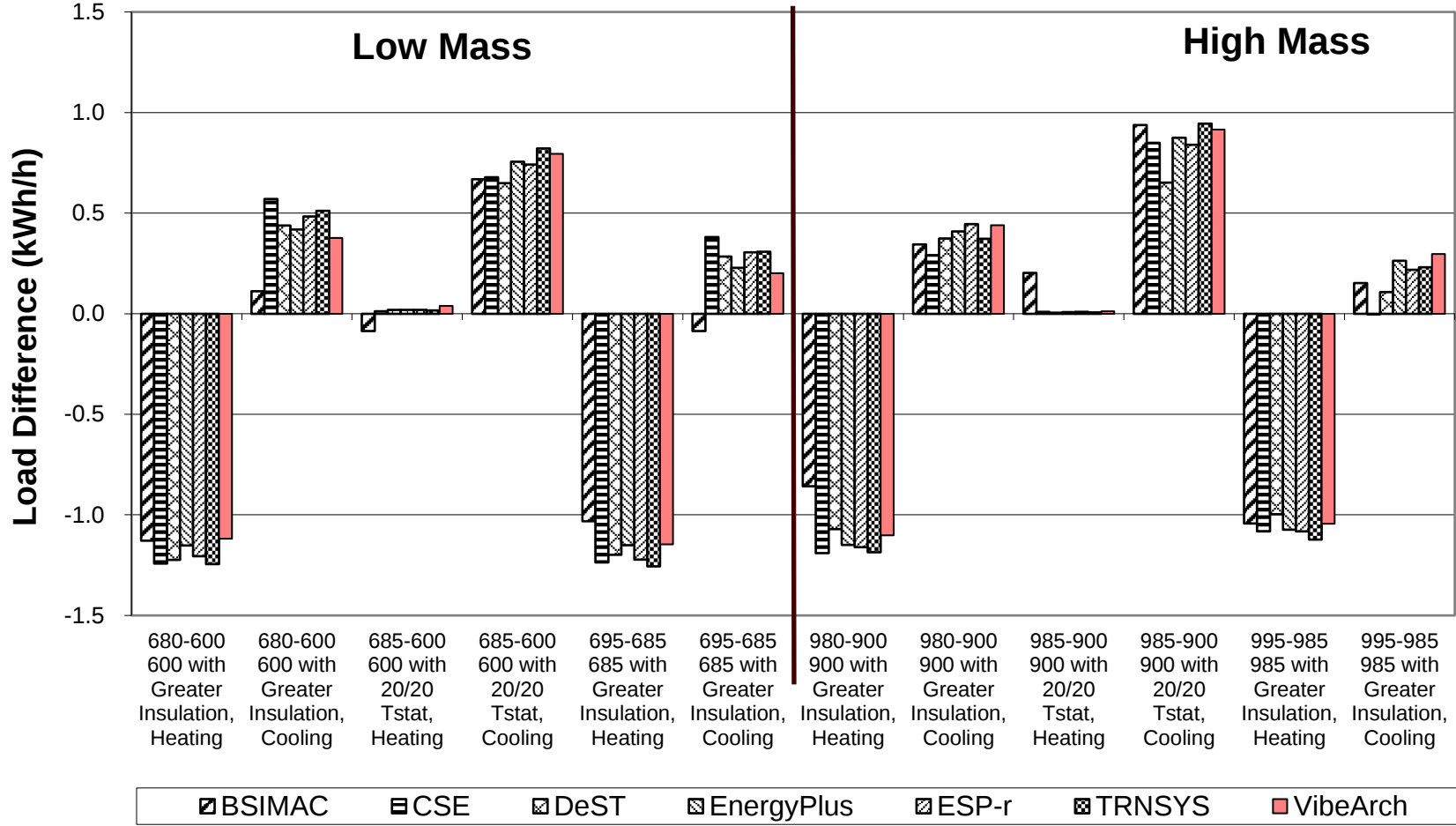
**Figure B8-28. Basic:
Window Types (Delta)
Peak Heating and Sensible Cooling**



**Figure B8-29. Basic:
Insulation (Delta)
Annual Heating and Sensible Cooling**

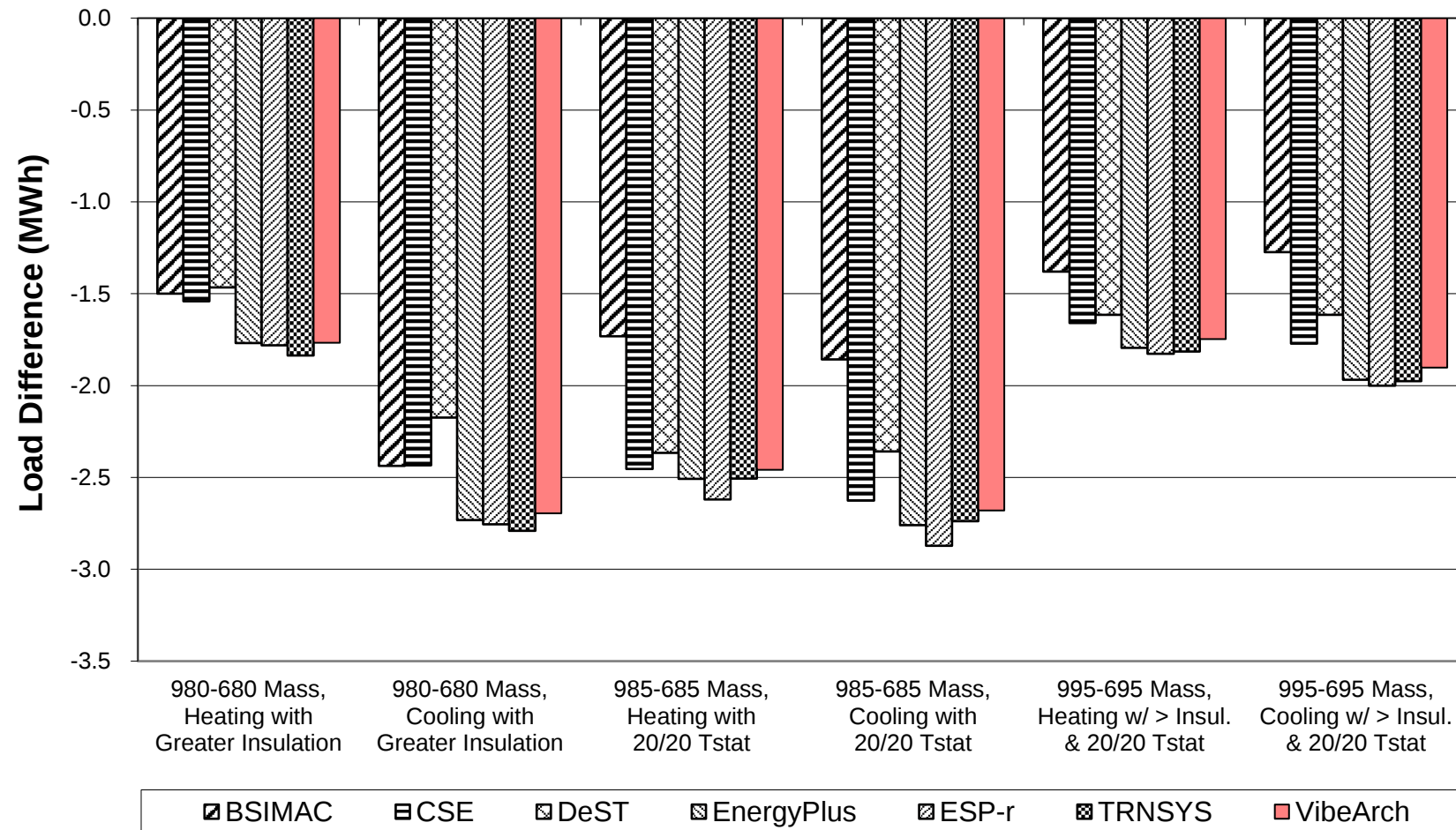


**Figure B8-30. Basic:
Insulation (Delta)
Peak Heating and Sensible Cooling**

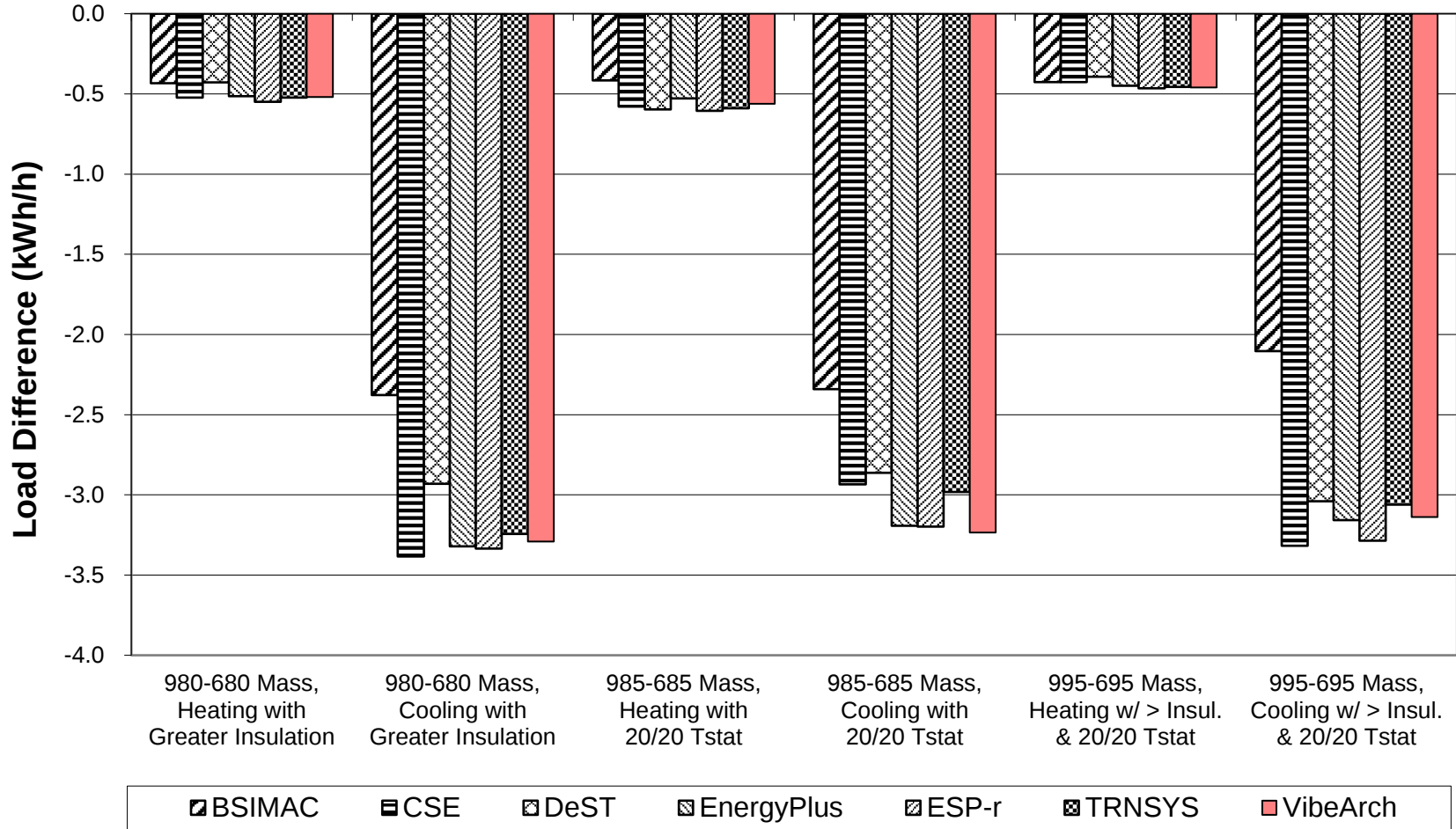


ASHRAE Standard 140-2023, Test Results Comparison for Section 7 - Building Thermal Envelope and Fabric Load Cases 195-995 & 600FF-980FF (VibeArch) vs. Annex B8, Section B8.1 Example Results, by Chang Heon Cheong (Individual), 22-Sep-2026

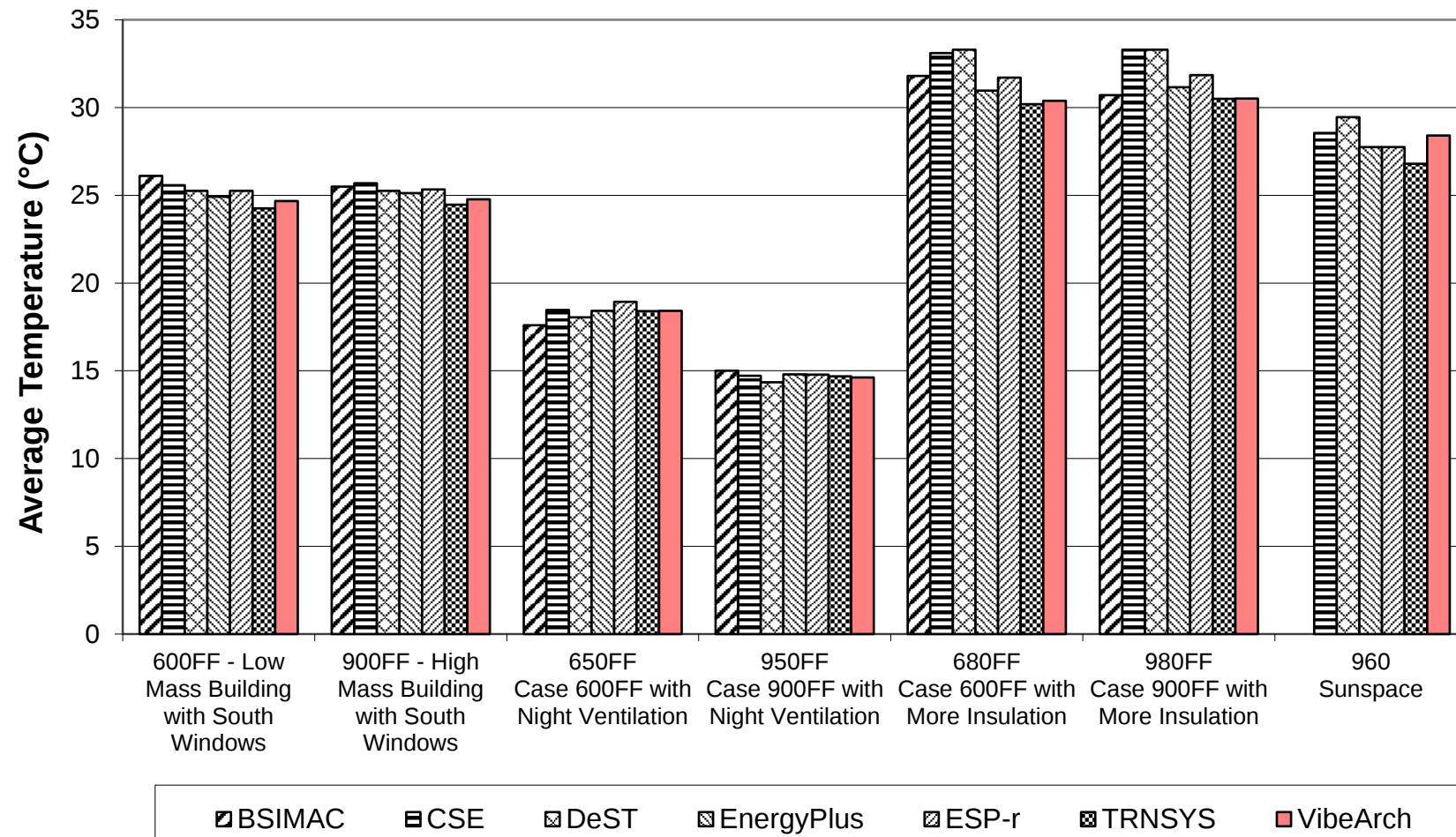
**Figure B8-31. Basic:
Insulation, Mass Effect (Delta)
Annual Heating and Sensible Cooling**



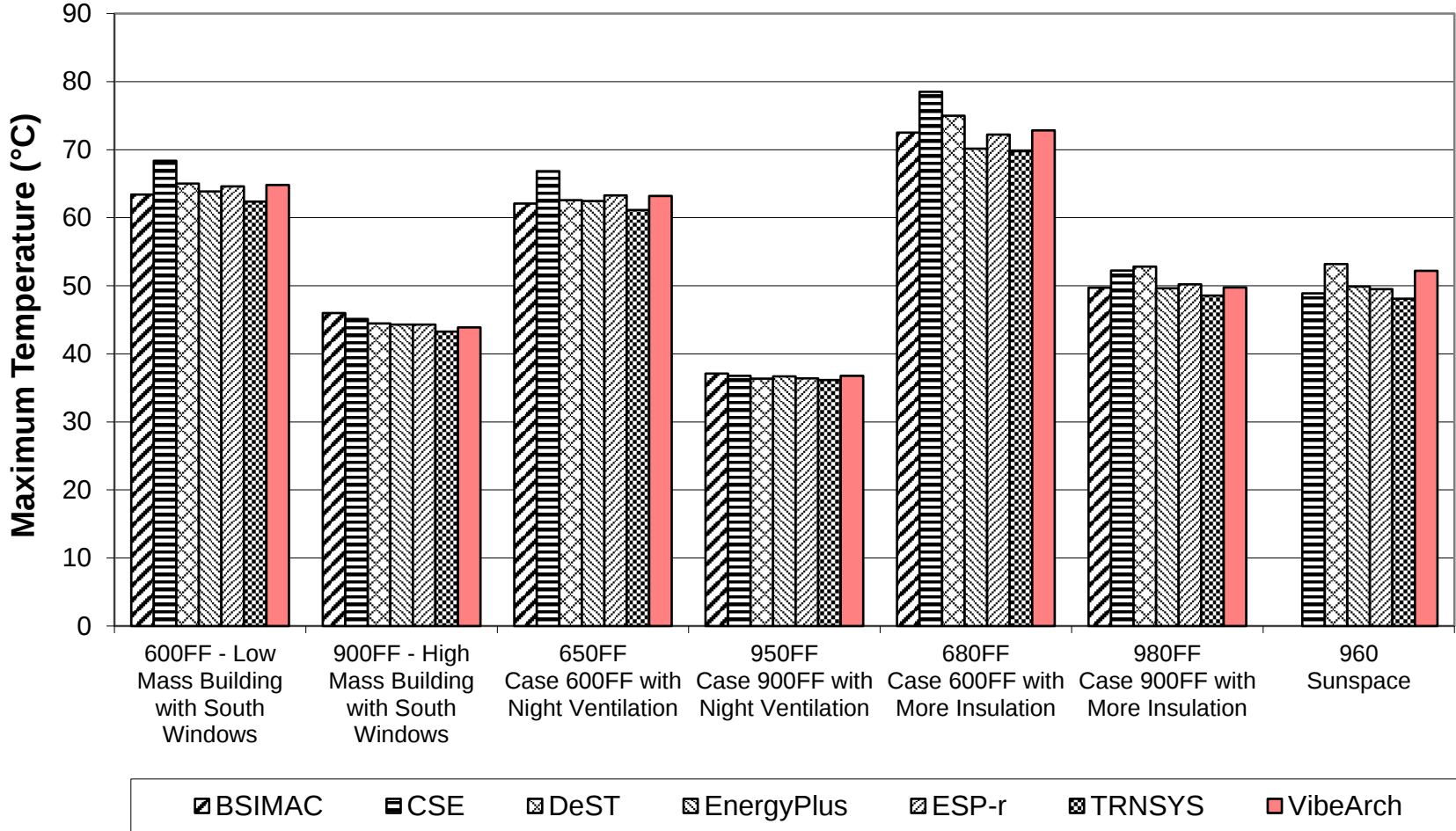
**Figure B8-32. Basic:
Insulation, Mass Effect (Delta)
Peak Heating and Sensible Cooling**



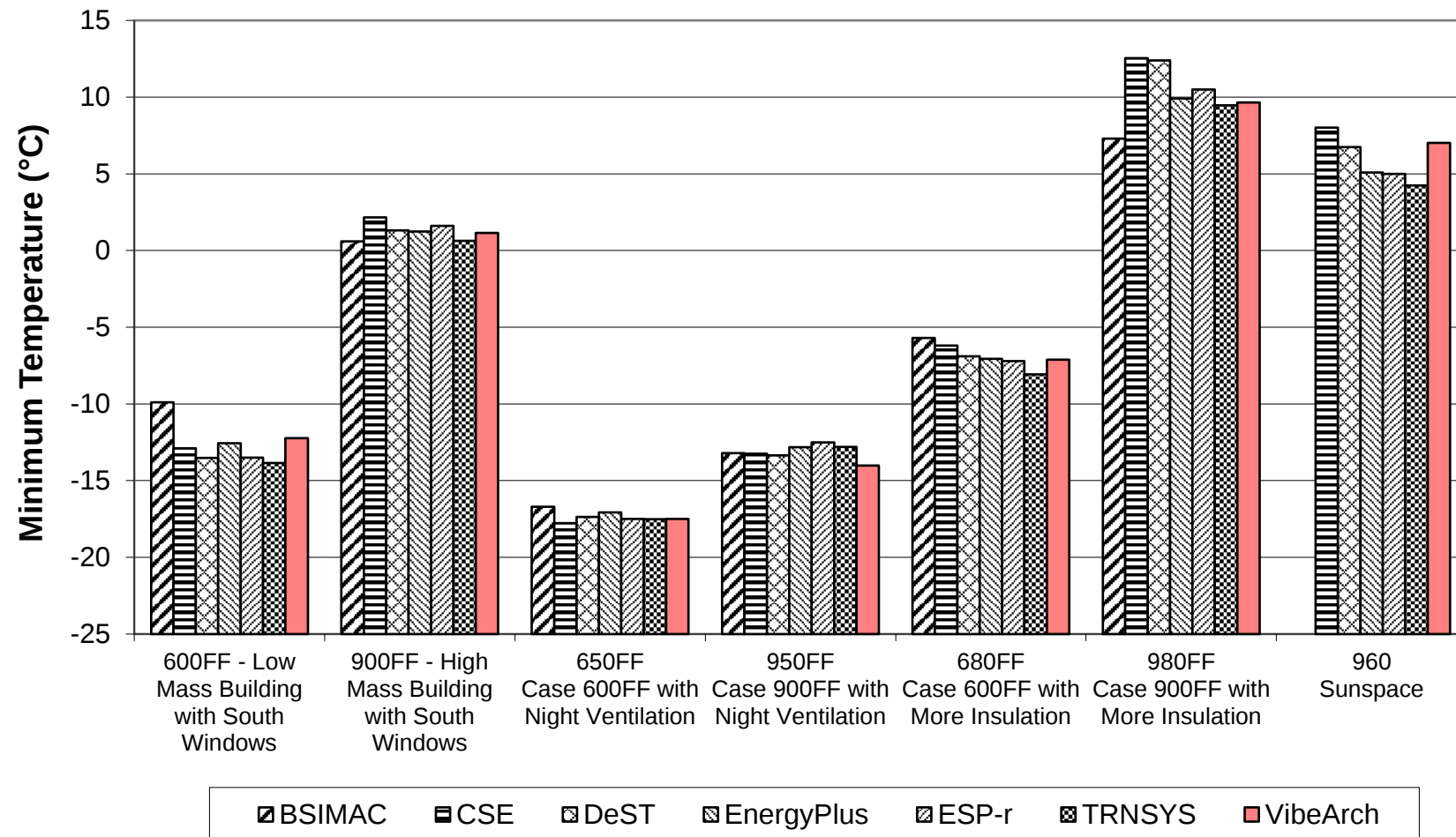
**Figure B8-33. Basic:
Average Hourly Annual Temperature
Free-Float Cases**



**Figure B8-34. Basic:
Maximum Hourly Annual Temperature
Free-Float Cases**

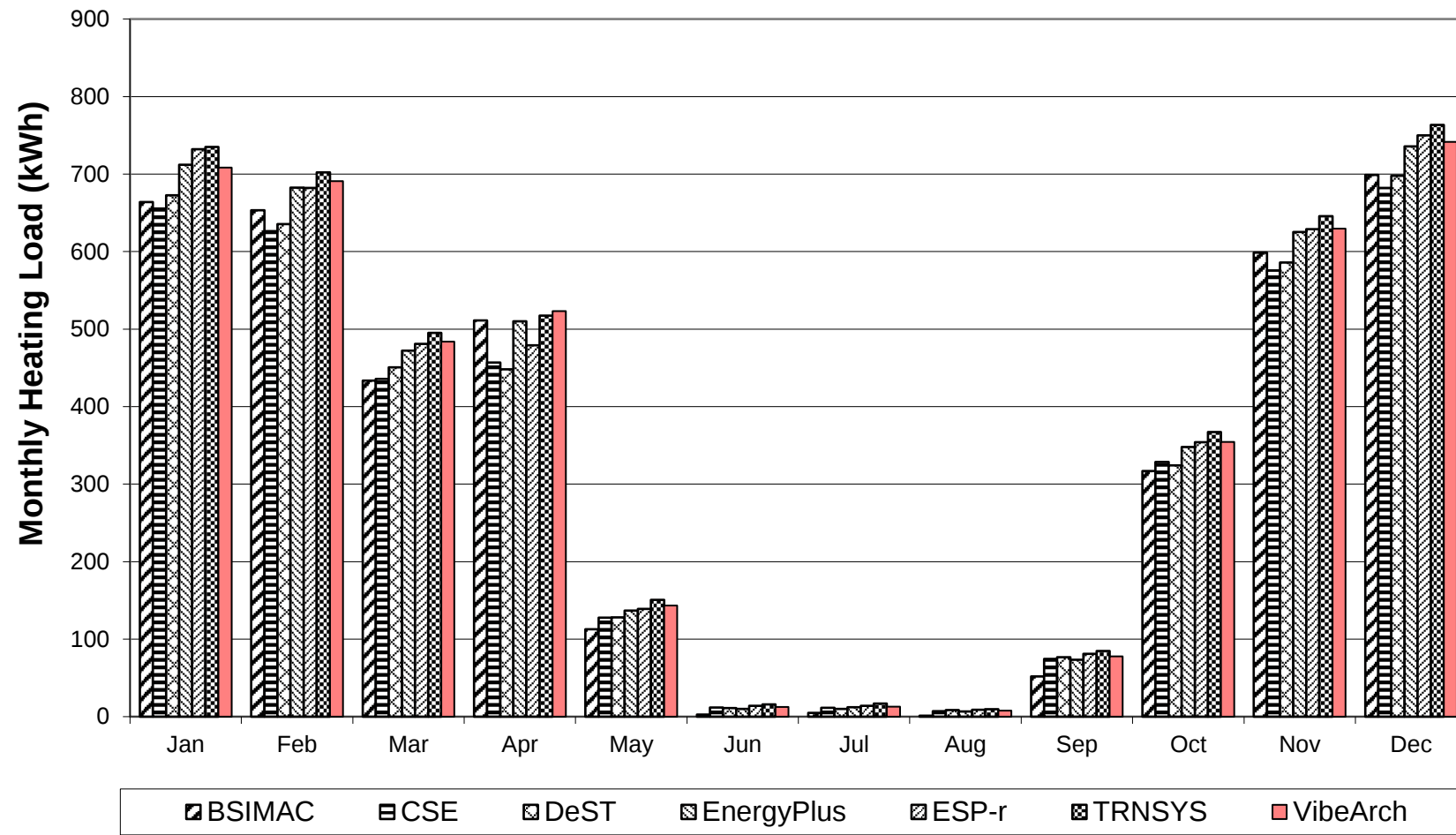


**Figure B8-35. Basic:
Minimum Hourly Annual Temperature
Free-Float Cases**



ASHRAE Standard 140-2023, Test Results Comparison for Section 7 - Building Thermal Envelope and Fabric Load Cases 195-995 & 600FF-980FF (VibeArch) vs. Annex B8, Section B8.1 Example Results, by Chang Heon Cheong (Individual), 22-Sep-2026

**Figure B8-M1.
Monthly Heating
Case 600**



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Figure B8-M2.
Monthly Sensible Cooling
Case 600

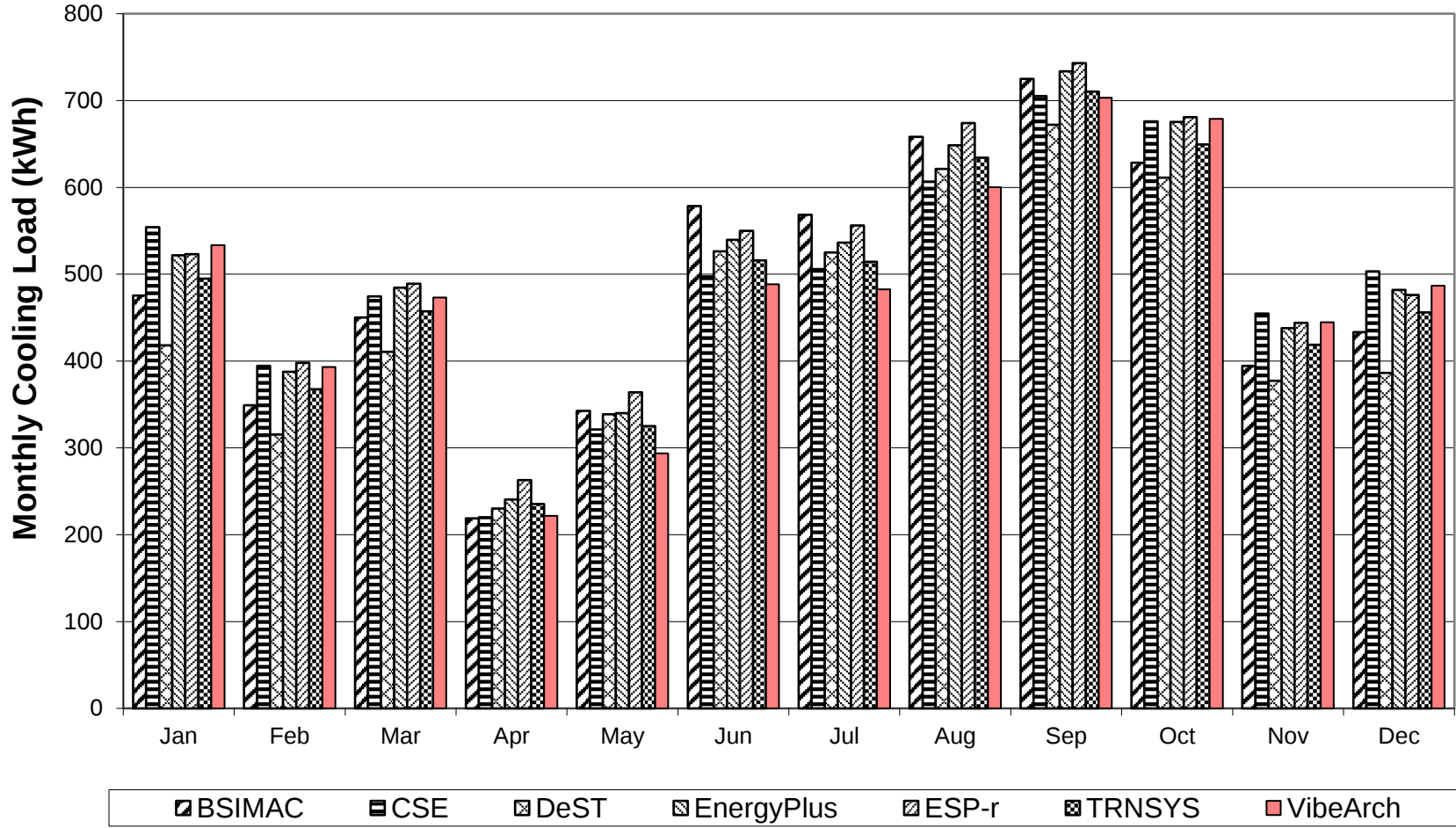


Figure B8-M3.
Monthly Peak Heating
Case 600

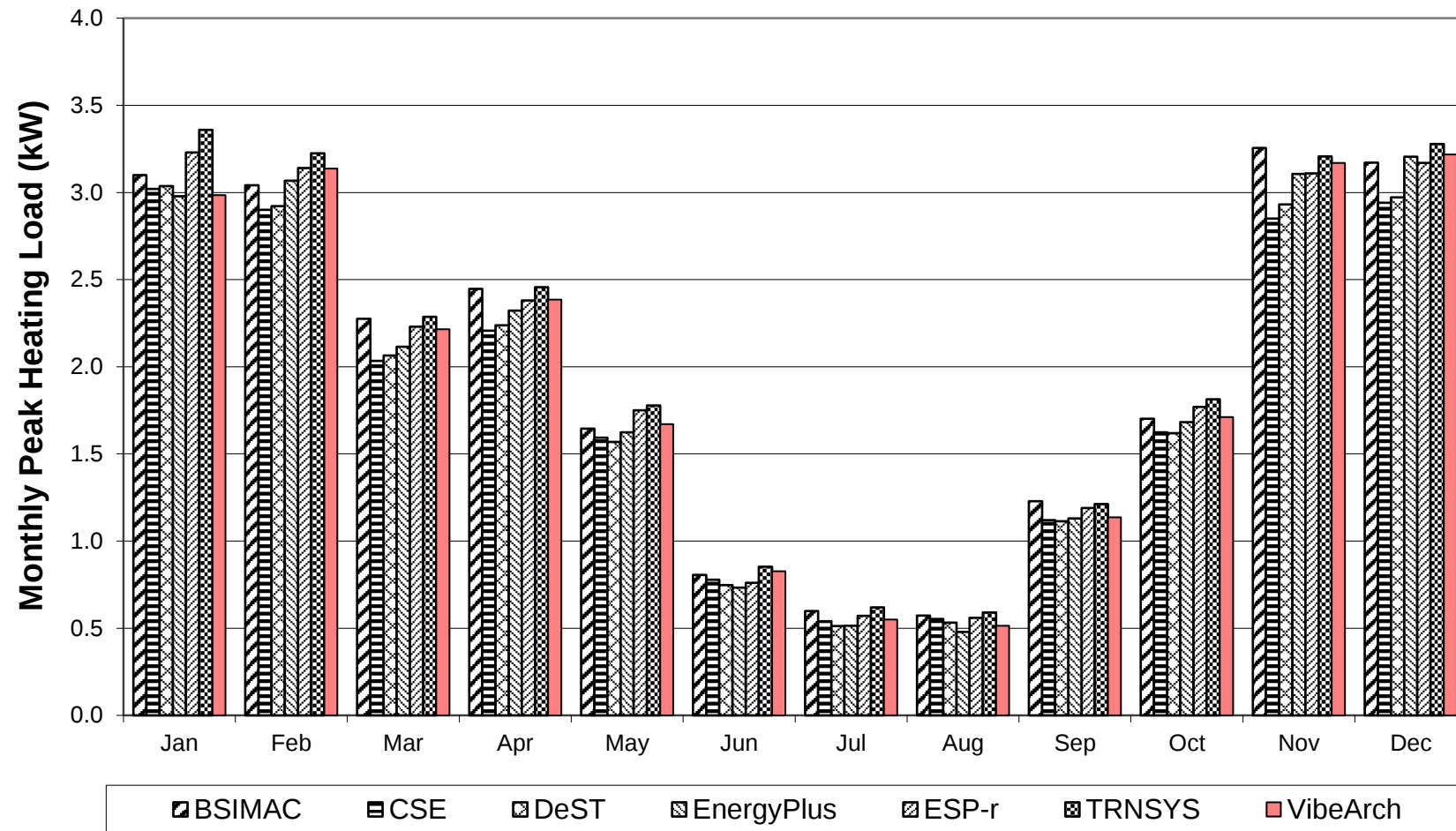


Figure B8-M4.
Monthly Peak Sensible Cooling
Case 600

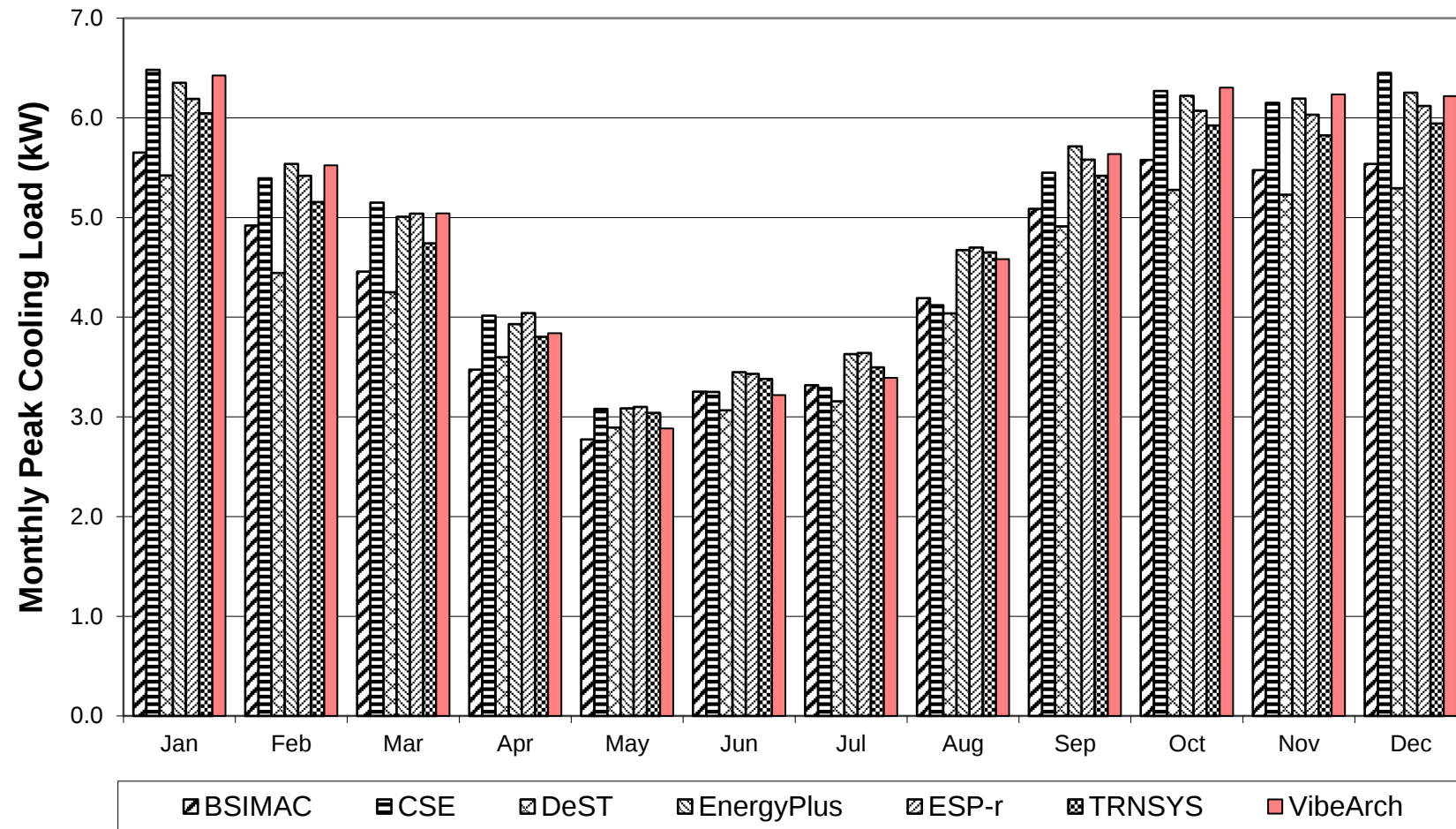


Figure B8-M5.
Monthly Heating
Case 900

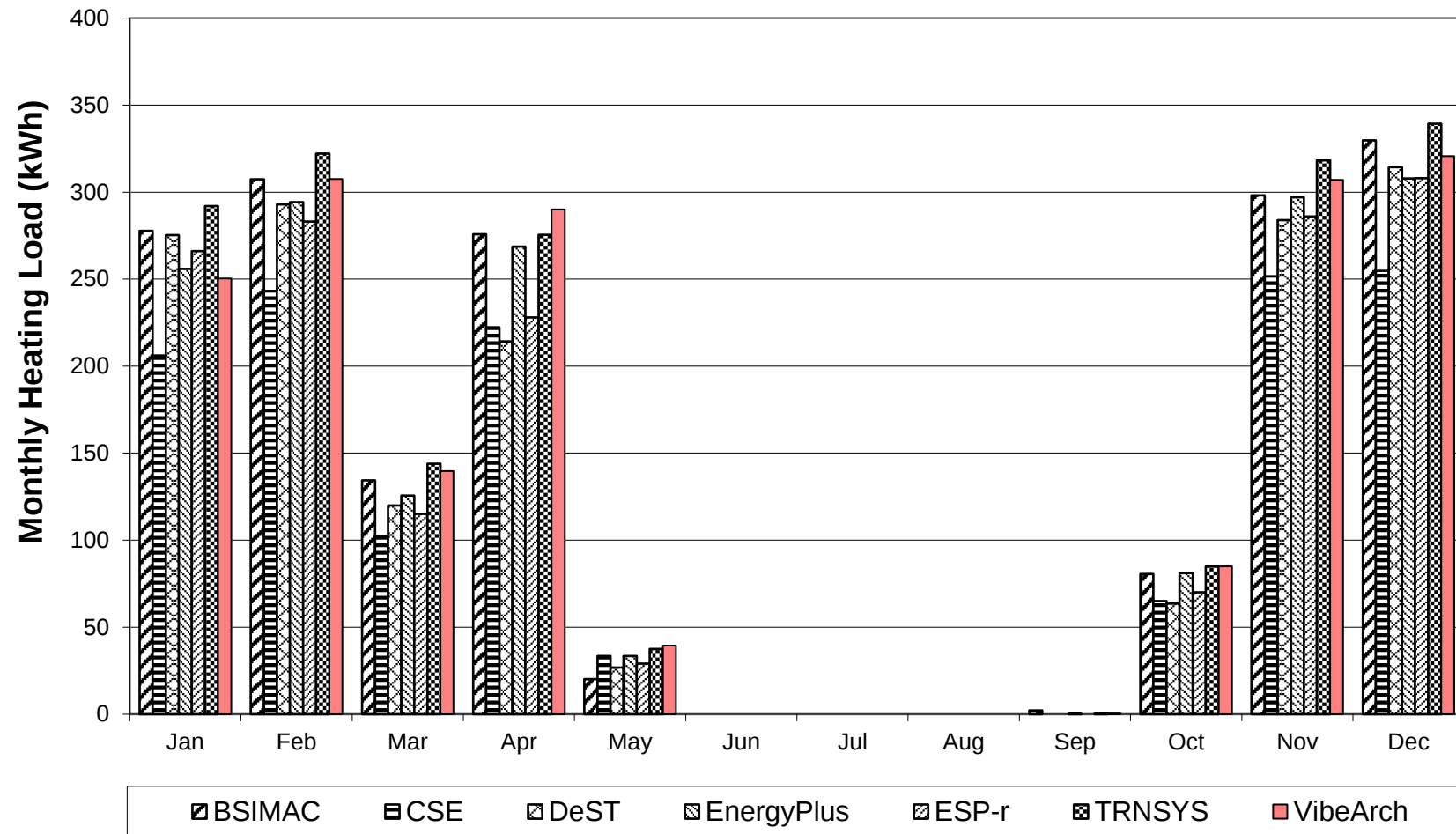


Figure B8-M6.
Monthly Sensible Cooling
Case 900

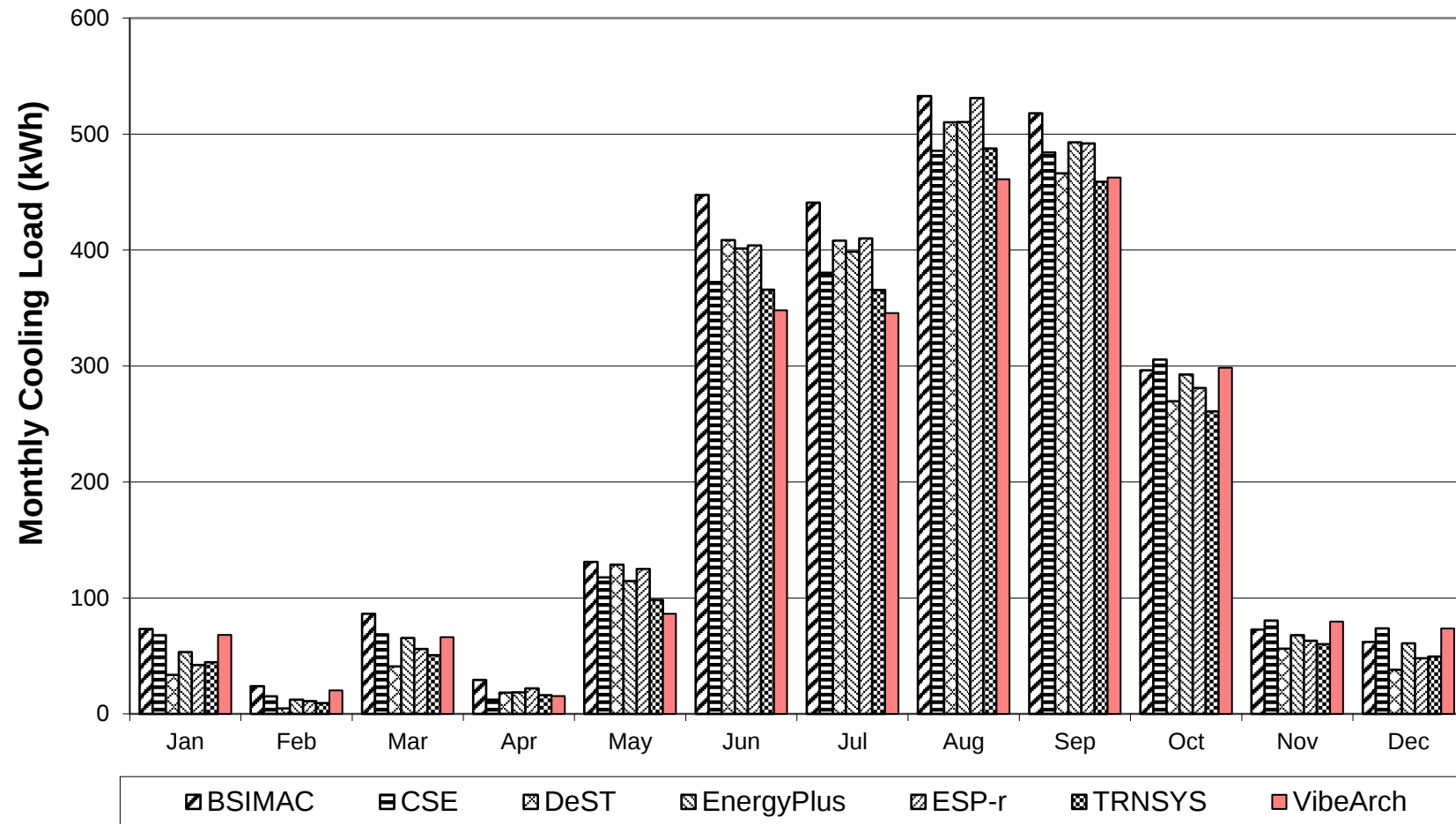


Figure B8-M7.
Monthly Peak Heating
Case 900

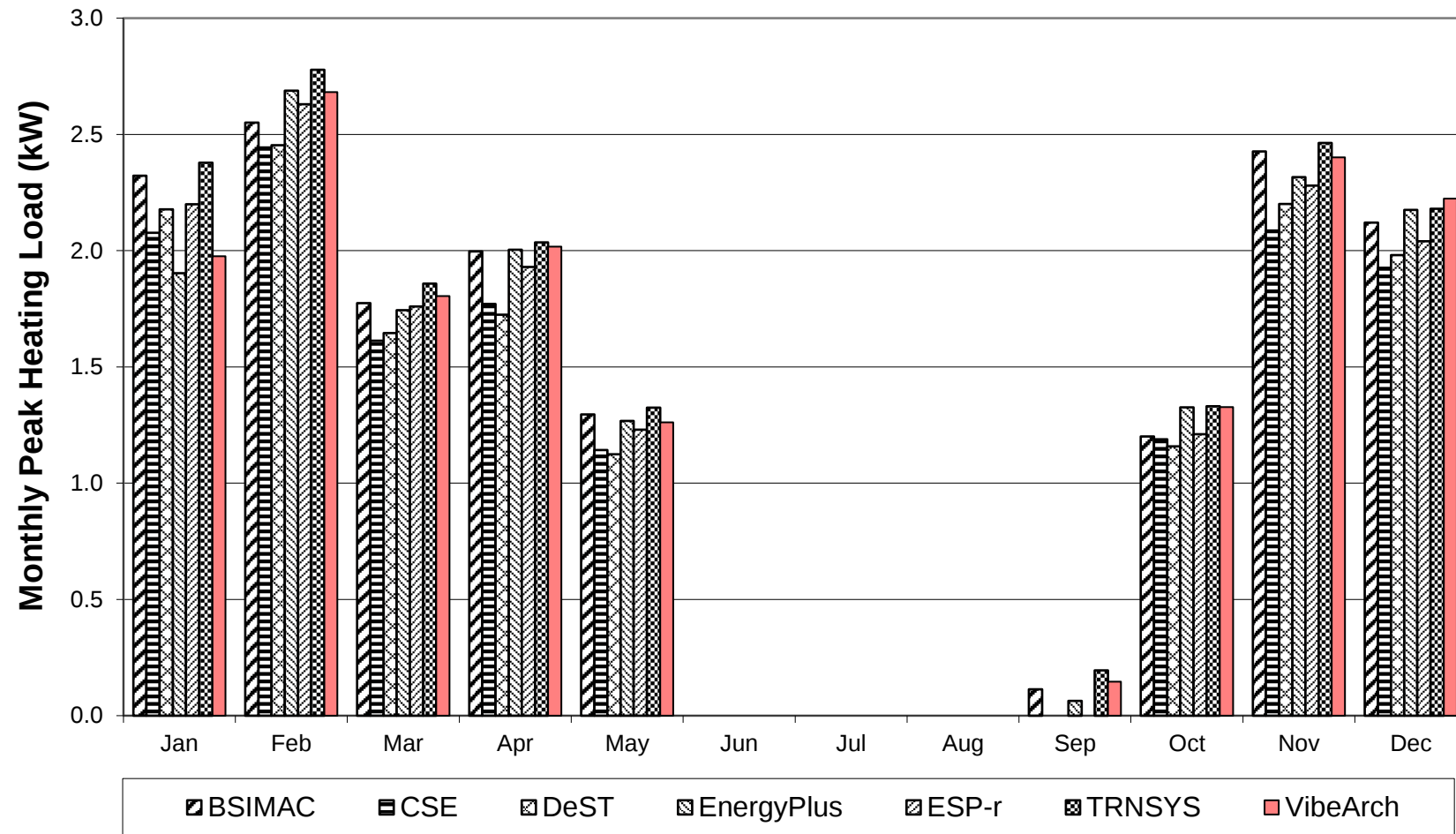


Figure B8-M8.
Monthly Peak Sensible Cooling
Case 900

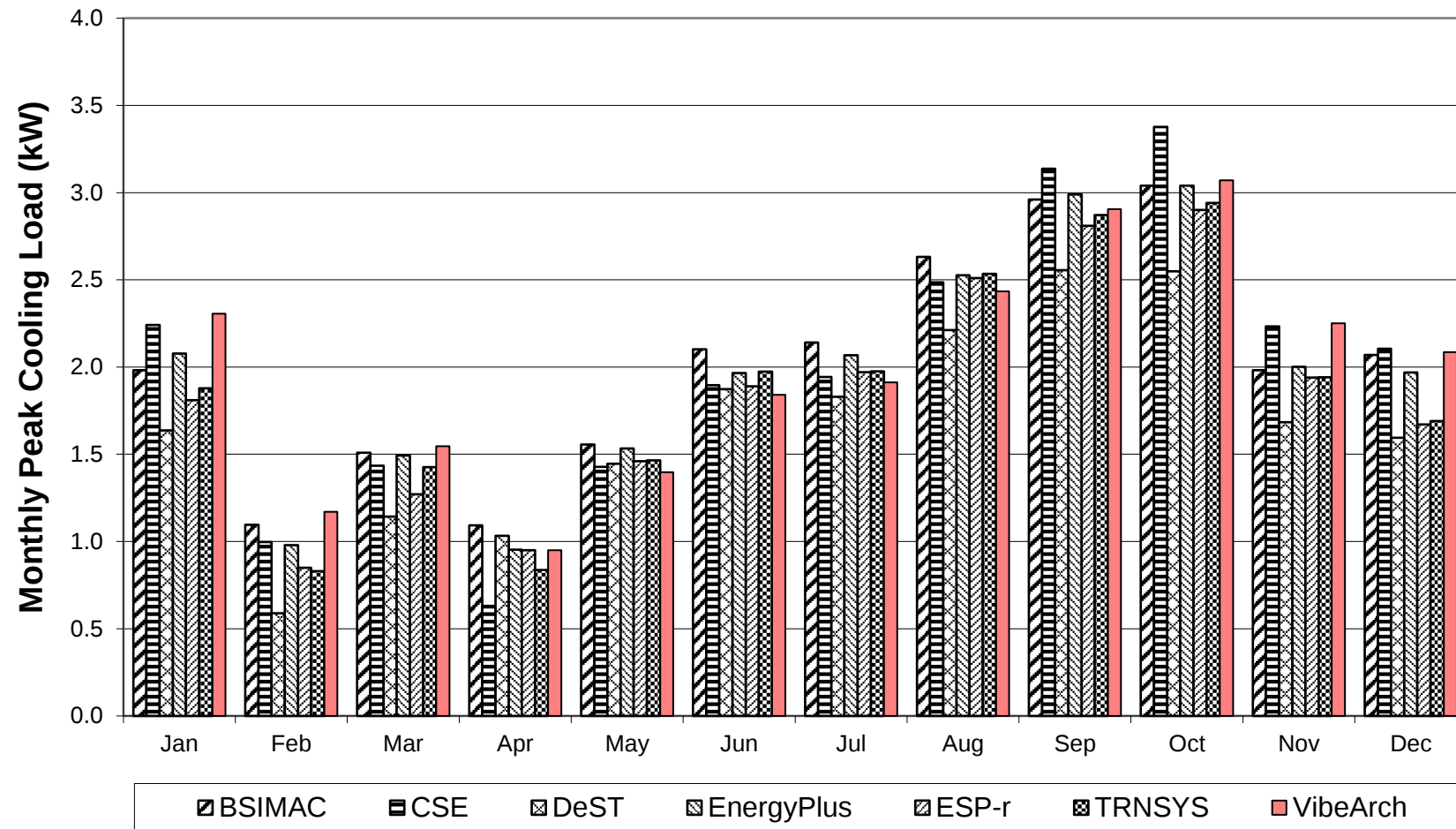


Figure B8-M9.
Monthly Heating Sensitivity (Delta)
Case 600-900

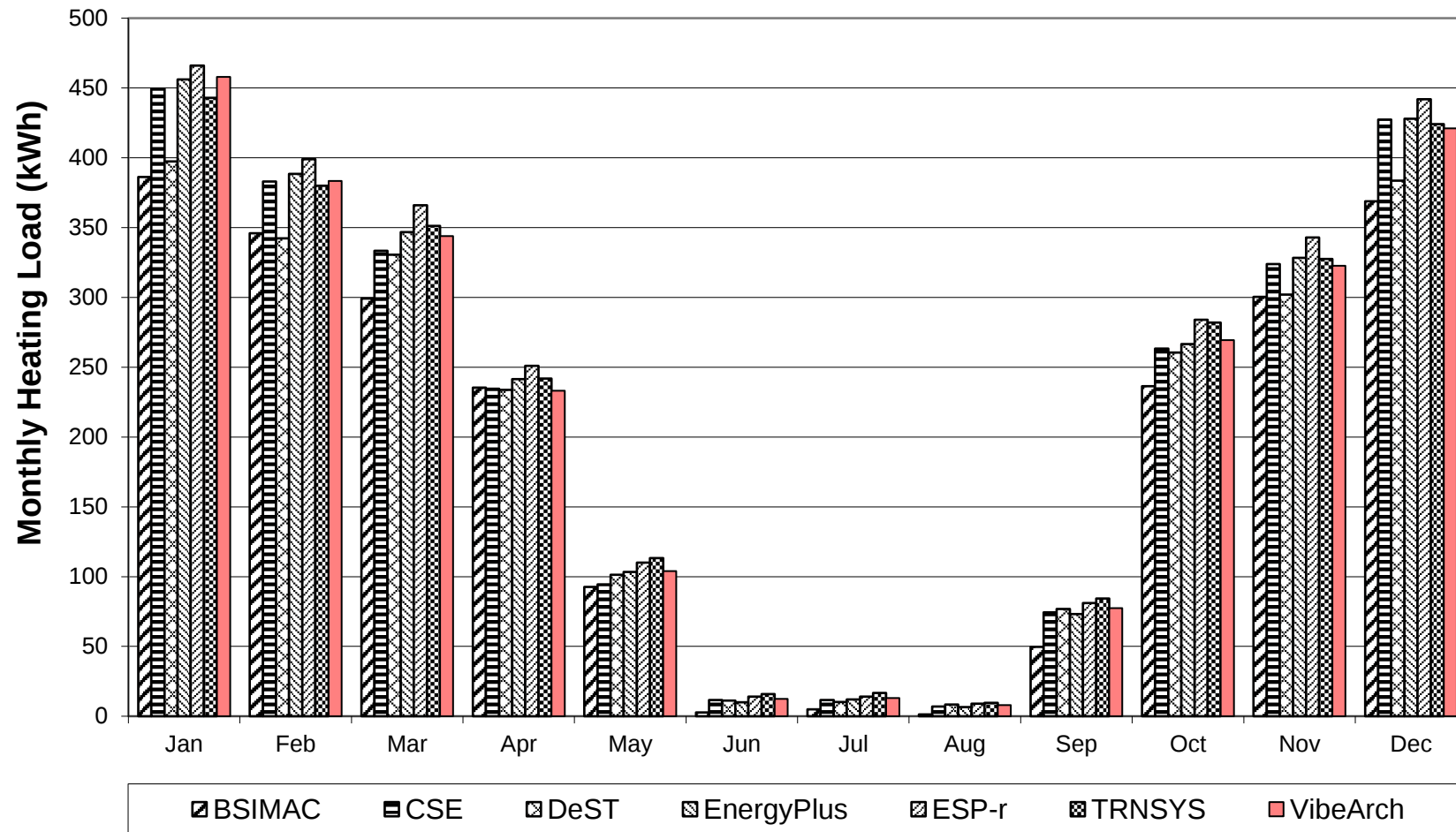


Figure B8-M10.
Monthly Cooling Sensitivity (Delta)
Case 600-900

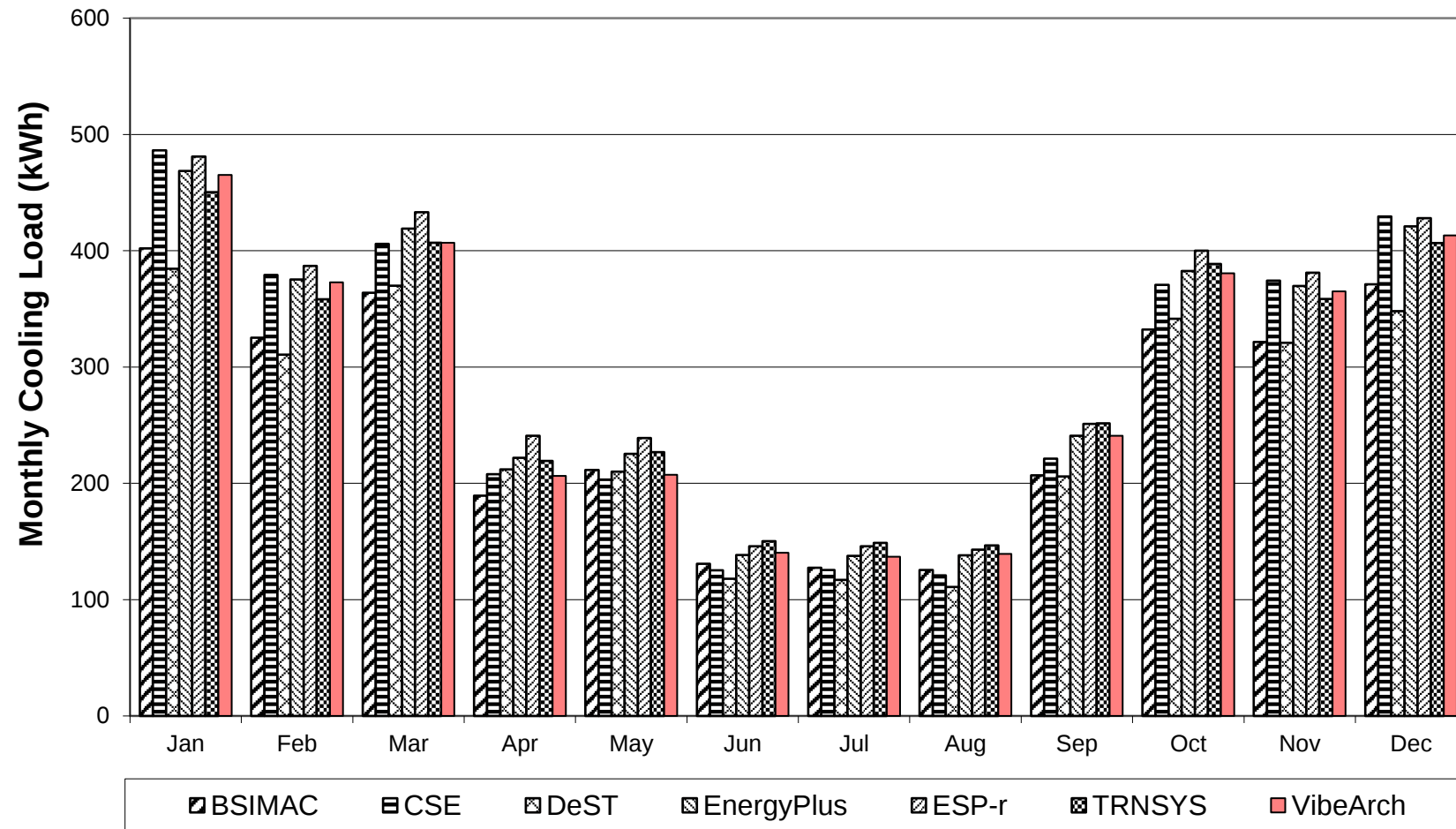


Figure B8-M11.
Monthly Peak Heating Sensitivity (Delta)
Case 600-900

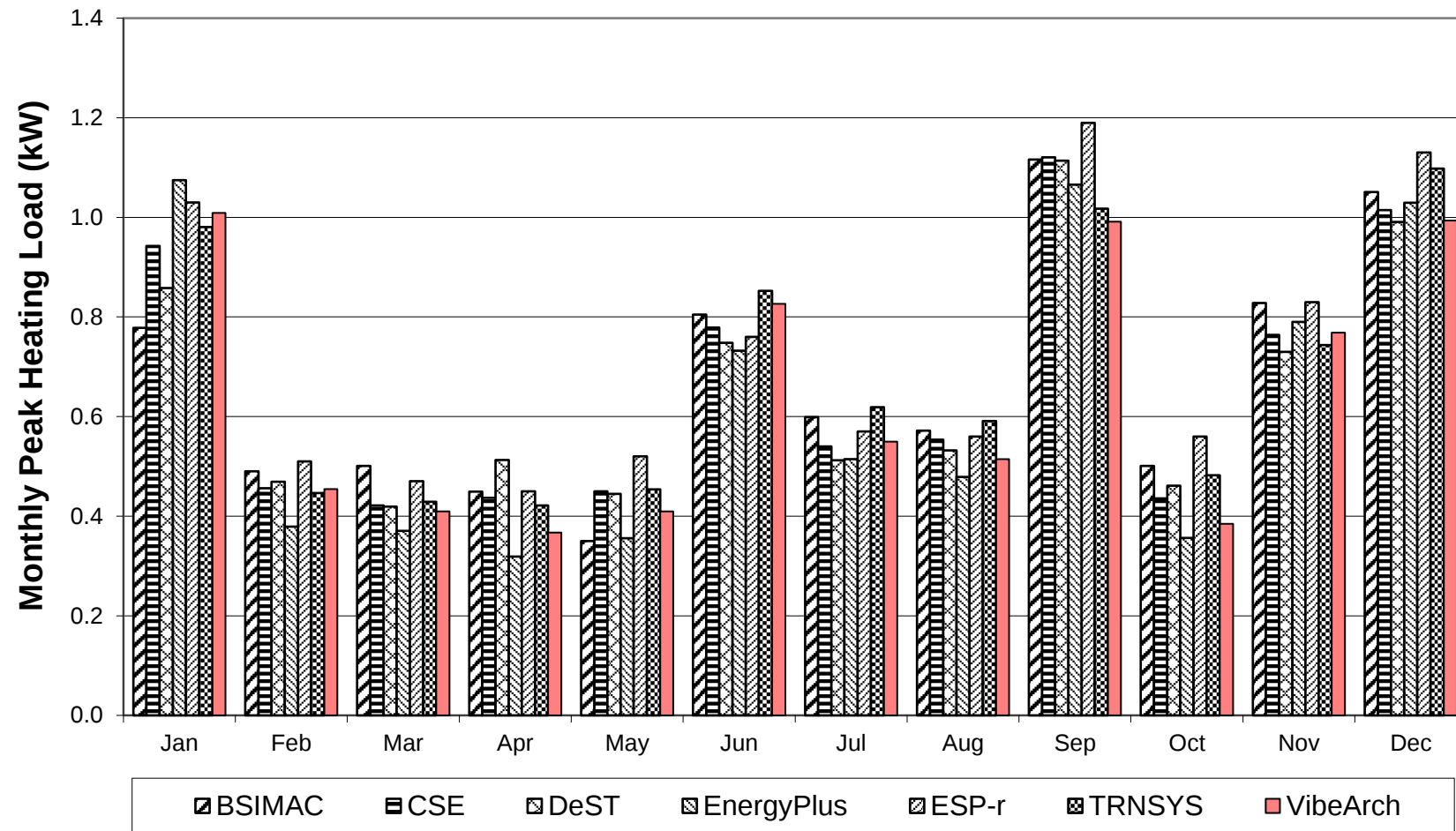


Figure B8-M12.
Monthly Peak Cooling Sensitivity (Delta)
Case 600-900

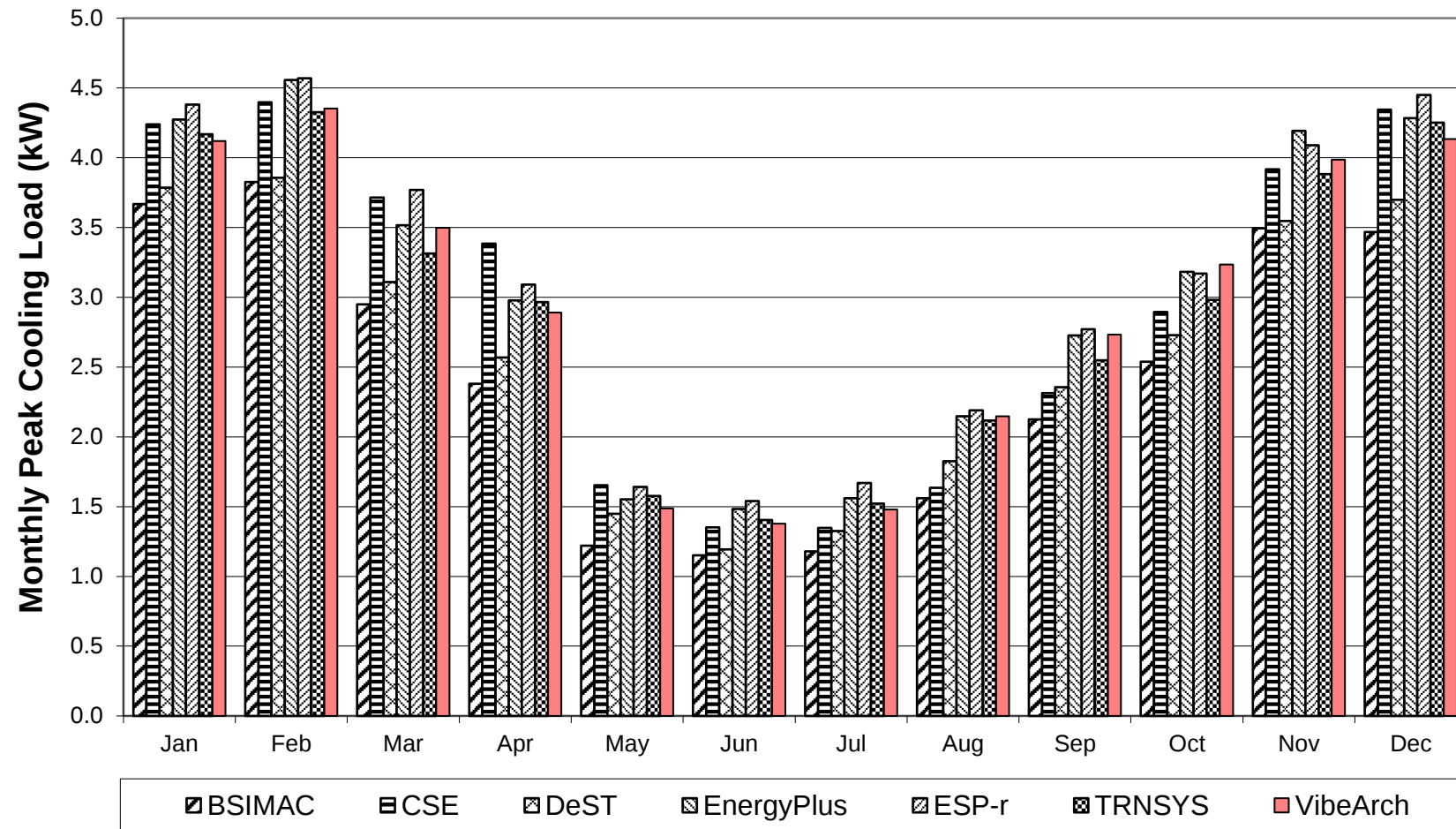


Figure B8-H1. Case 900FF
Annual Hourly Zone Air Temperature Frequency

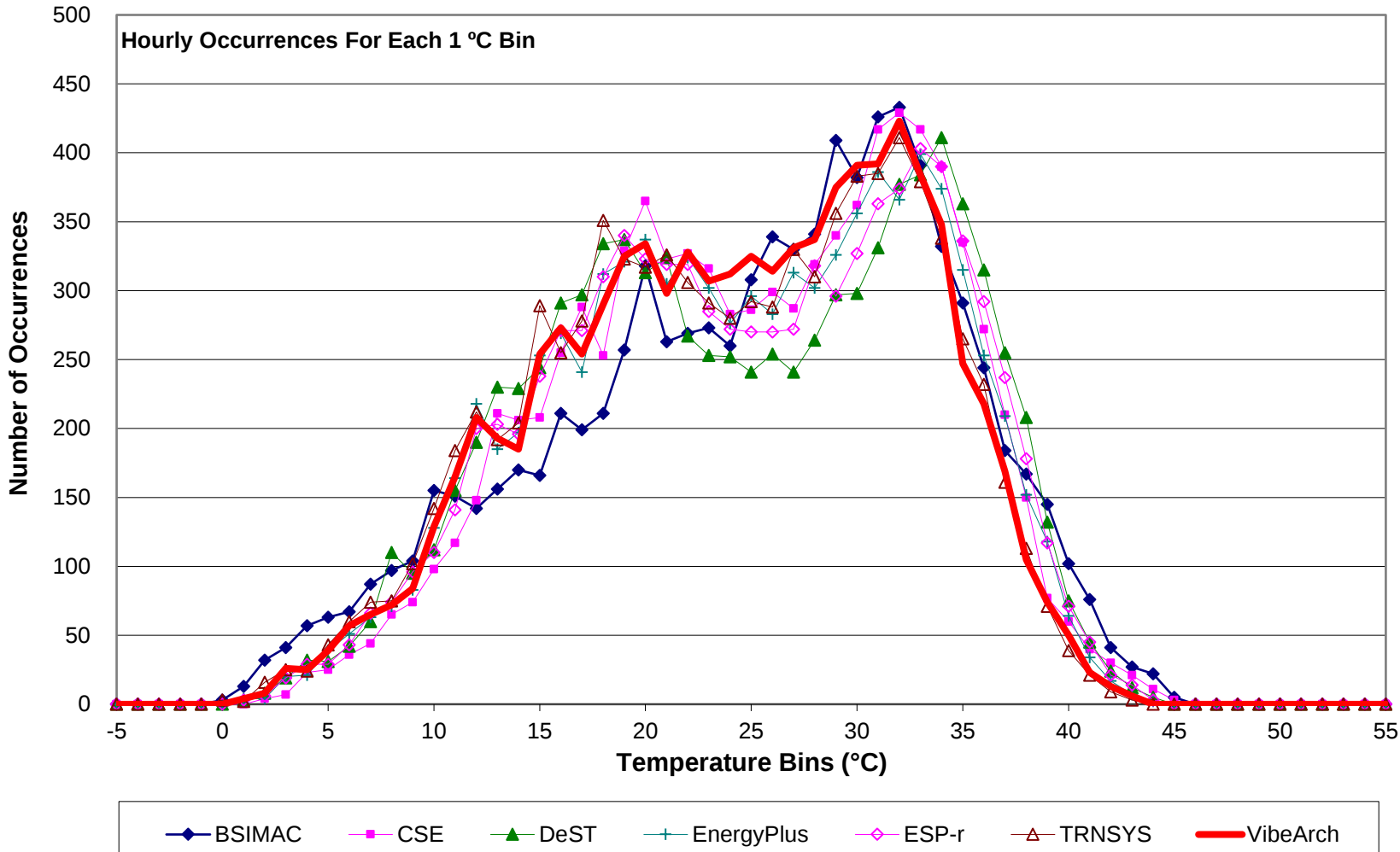


Figure B8-H2. Case 600
Cloudy & Clear Day Hourly Incident Solar
Horizontal (Upward) Facing Surface

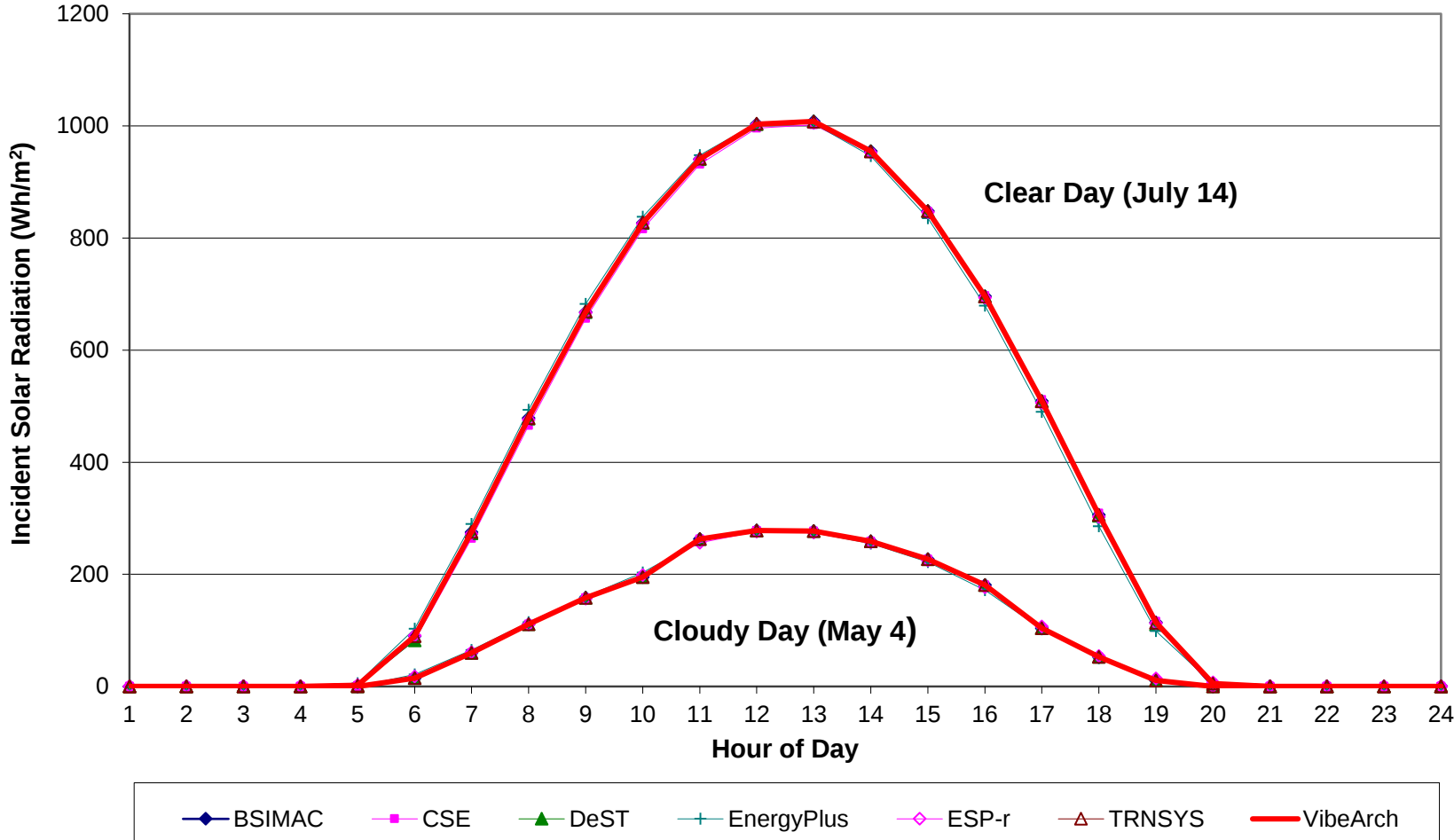


Figure B8-H3. Case 600
Cloudy & Clear Day Hourly Incident Solar
South Facing Surface

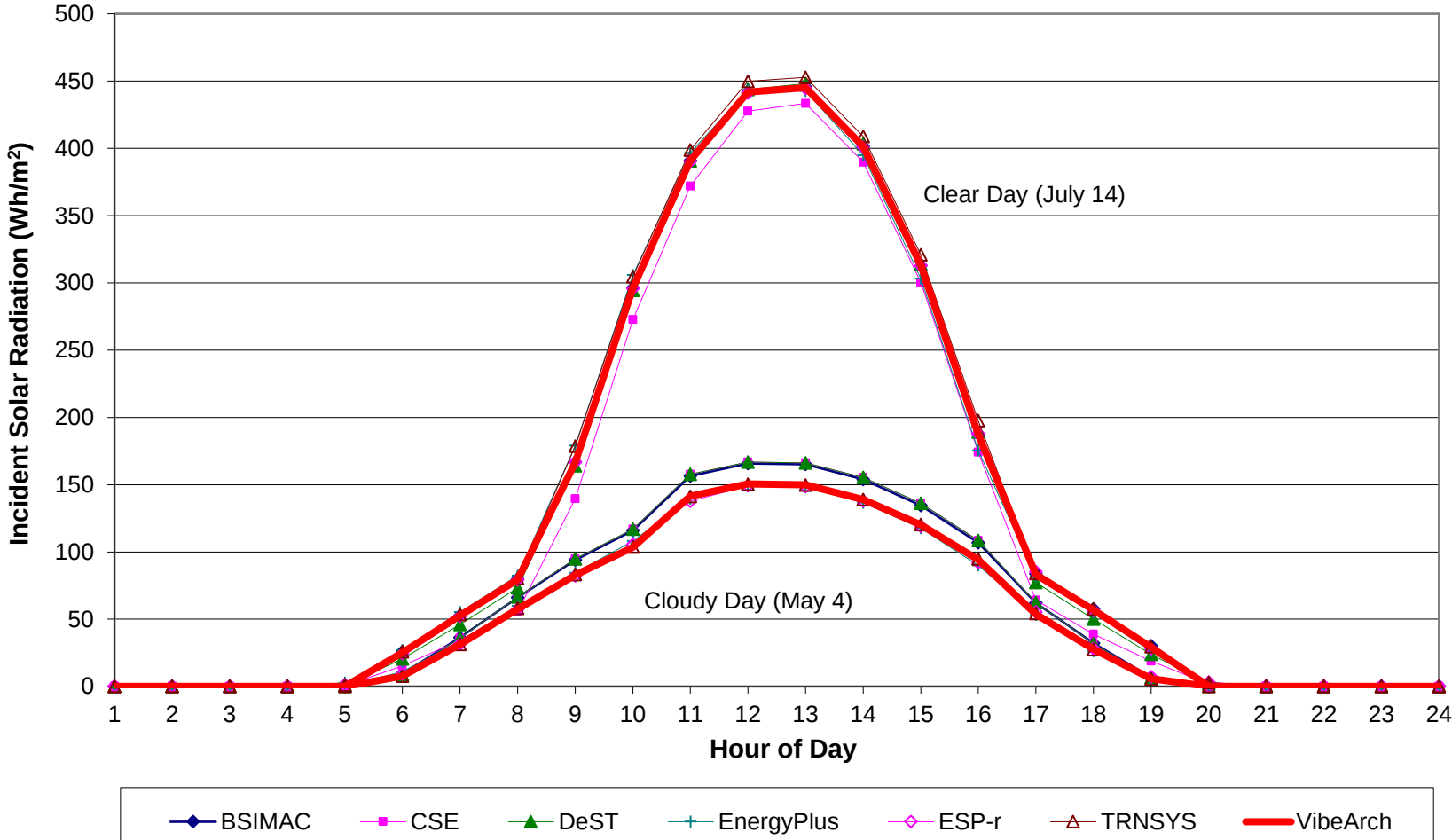


Figure B8-H4. Case 600
Cloudy & Clear Day Hourly Incident Solar
West Facing Surface

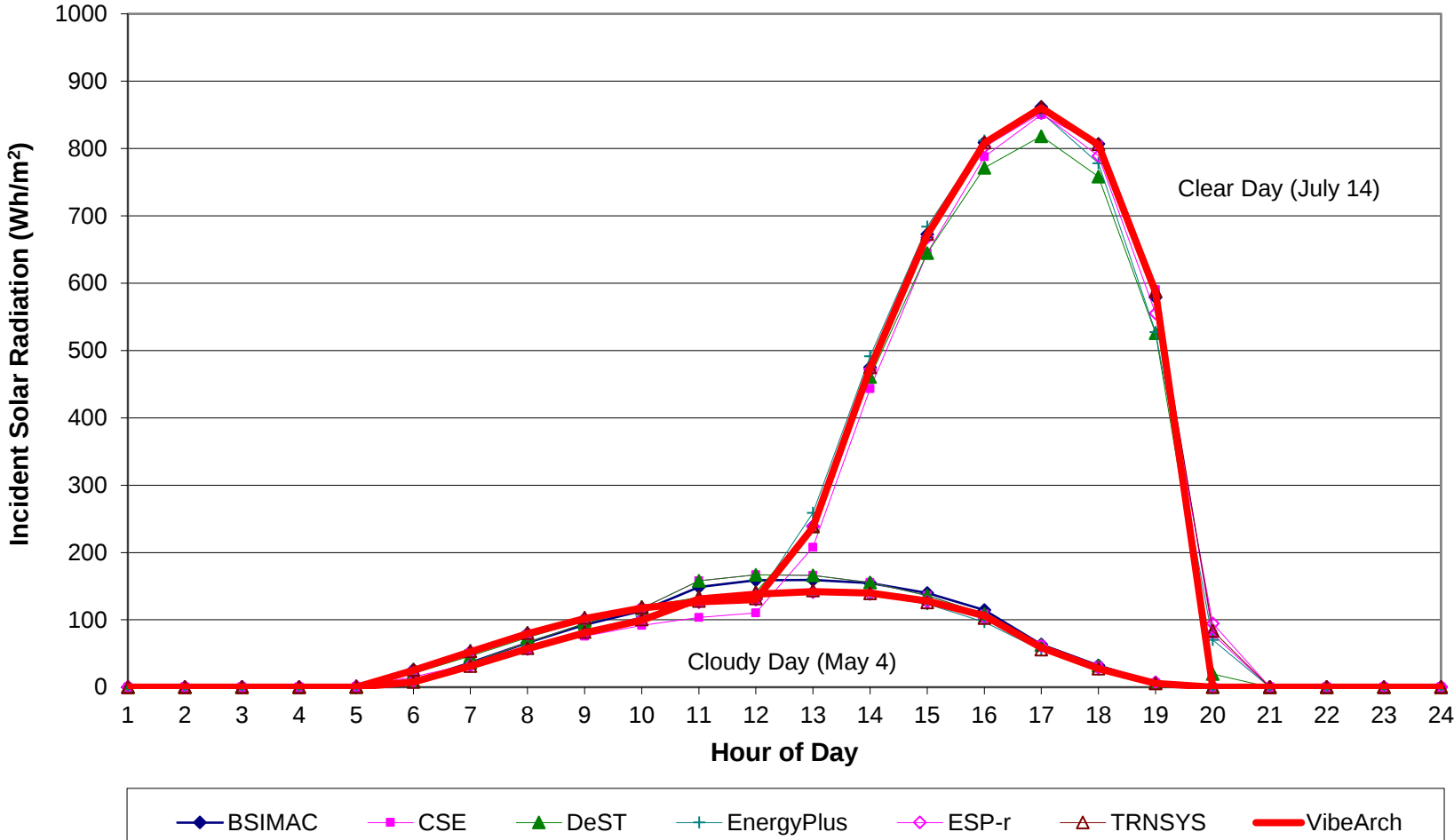


Figure B8-H5. Cases 600, 660, 670
Hourly Transmitted Solar, Clear/Cold Day (Feb 1)
Double-Pane, Low-E, Single-Pane Windows

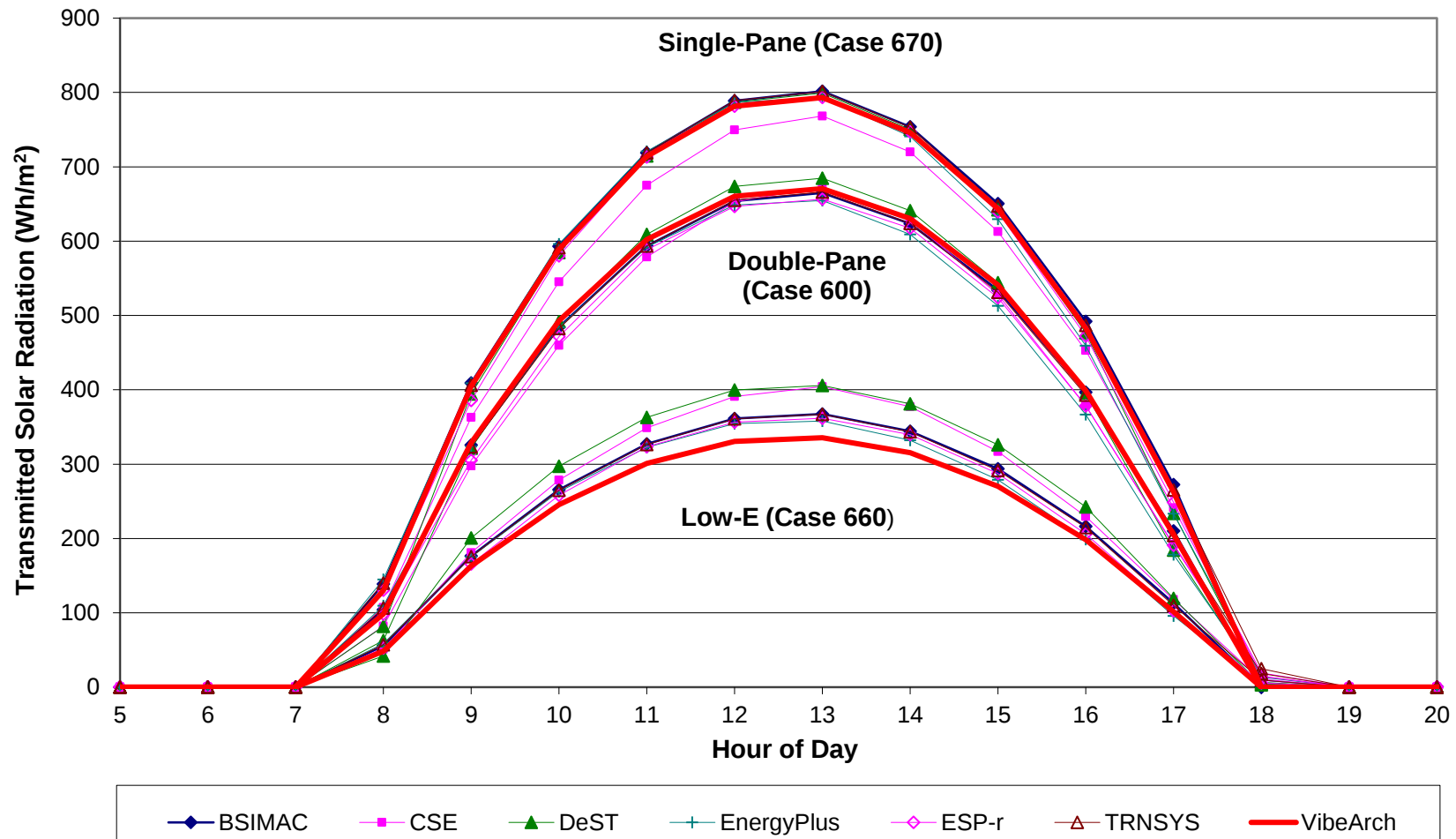
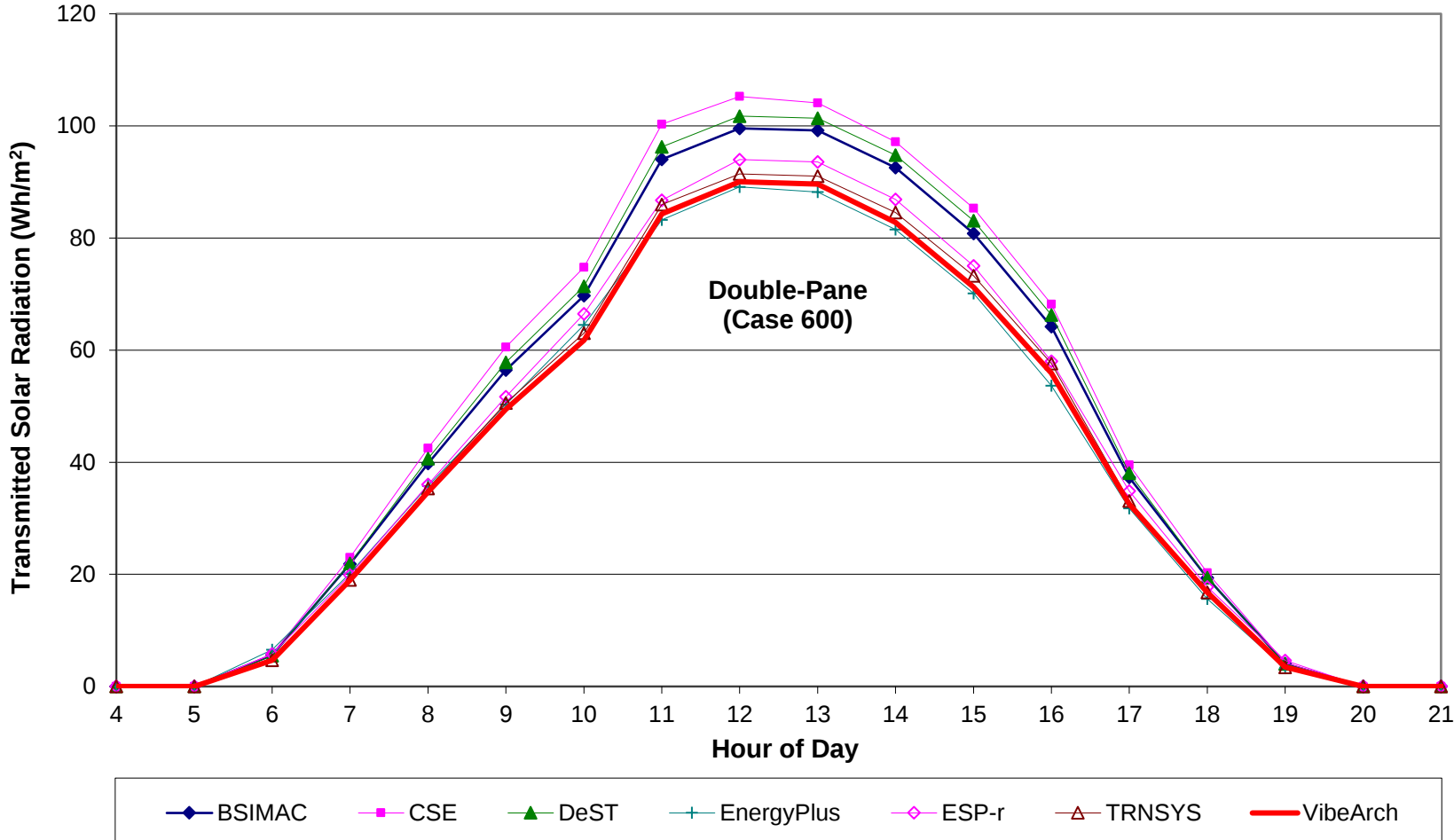


Figure B8-H6. Case 600
Hourly Transmitted Solar, Cloudy Day (May 4)
Double-Pane Windows



**Figure B8-H7. Cases 660, 670
Hourly Transmitted Solar, Cloudy Day (May 4)
Low-E and Single-Pane Windows**

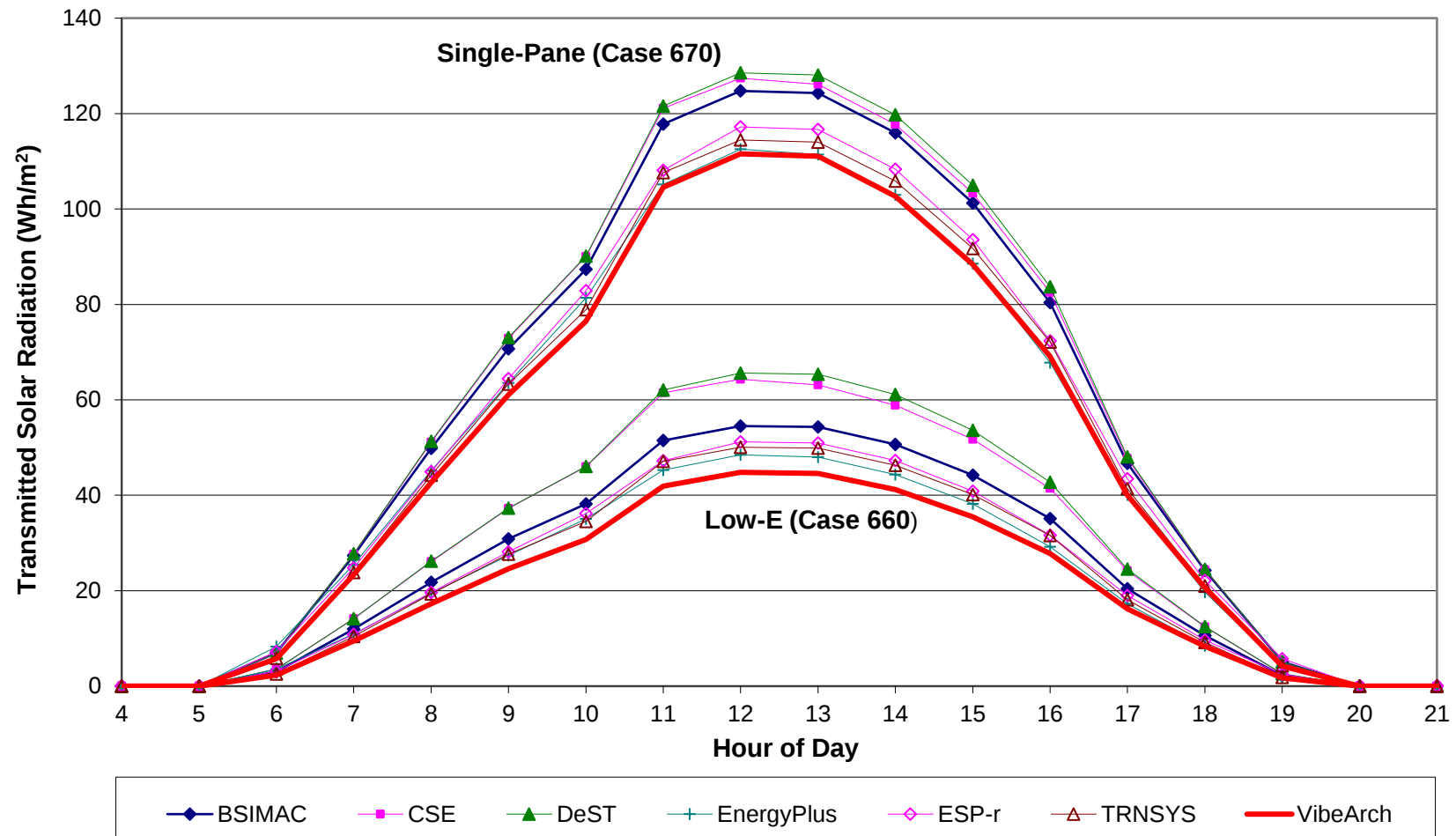


Figure B8-H8. Case 600
Hourly Transmitted Solar, Clear/Hot Day (Jul 14)
Double-Pane Windows

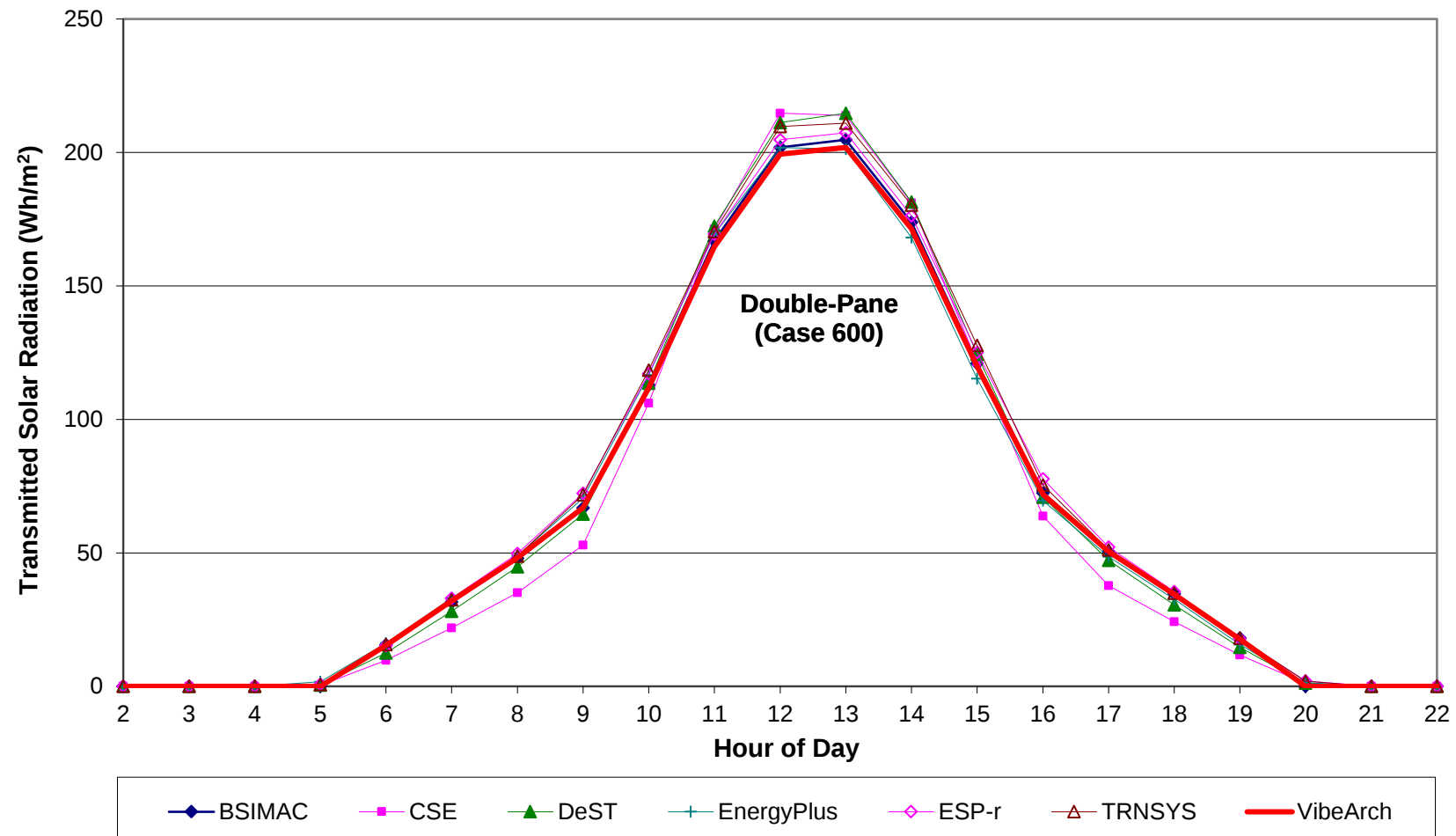
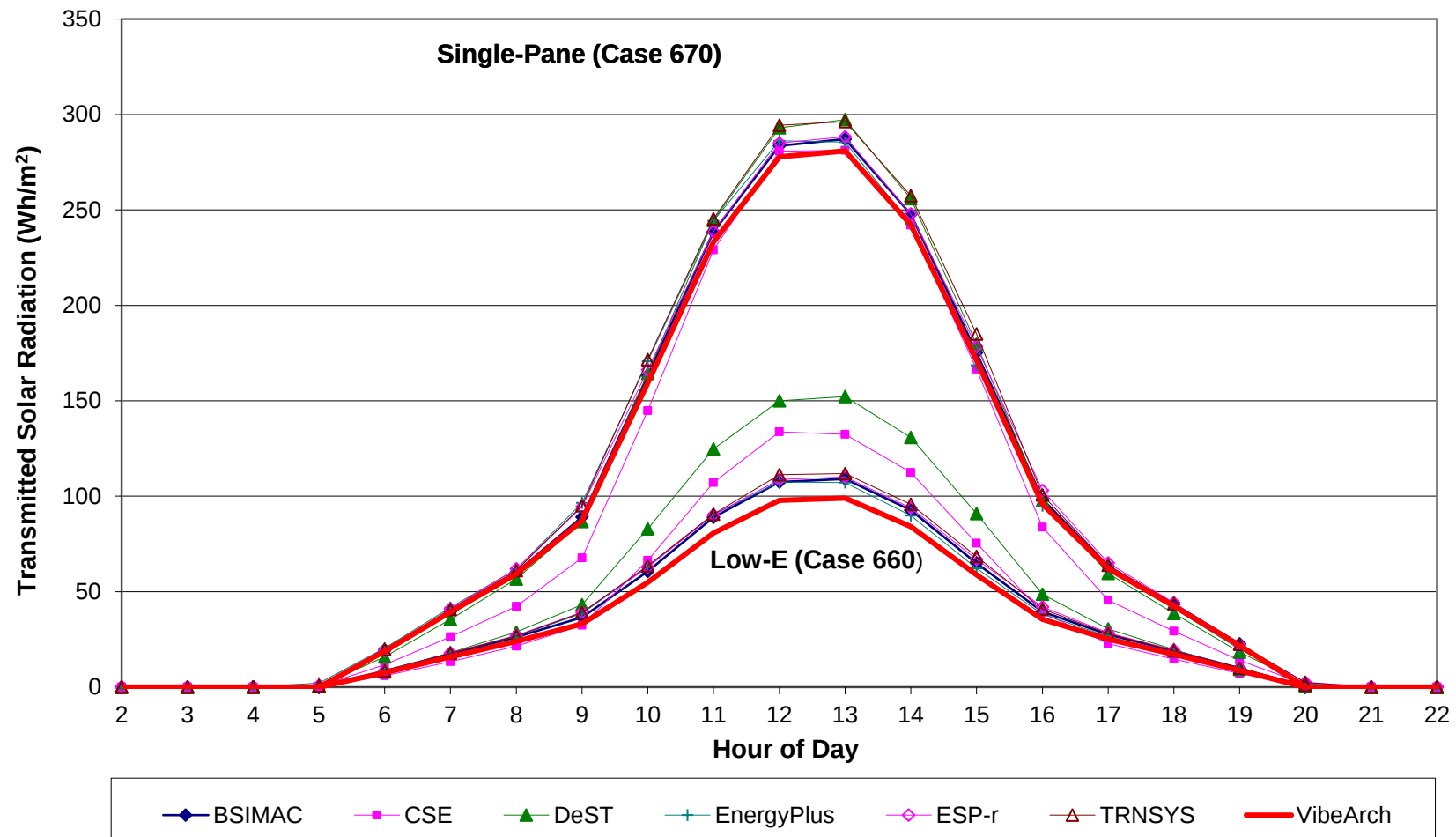
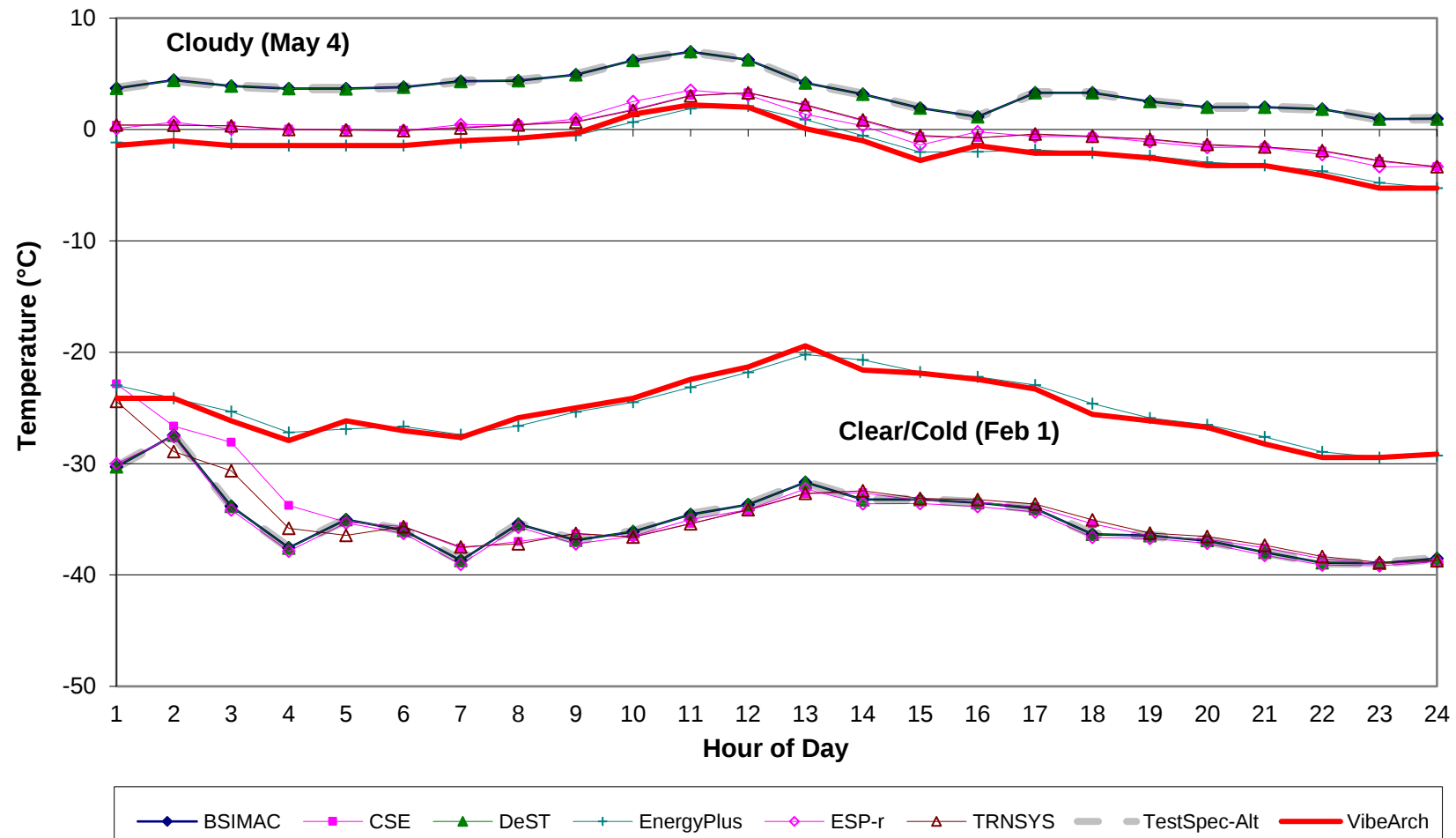


Figure B8-H9. Cases 660, 670
Hourly Transmitted Solar, Clear/Hot Day (Jul 14)
Low-E and Single-Pane Windows



(VibeArch) vs. Annex B8, Section B8.1 Example Results, by Chang Heon Cheong (Individual), 22-Sep-2026

Figure B8-H10.
Hourly Sky Temperatures
Case 600: Clear/Cold, Cloudy Days



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(VibeArch) vs. Annex B8, Section B8.1 Example Results, by Chang Heon Cheong (Individual), 22-Sep-2026

Figure B8-H11.
Hourly Sky Temperatures
Case 600: Clear/Cold, Clear/Hot Days

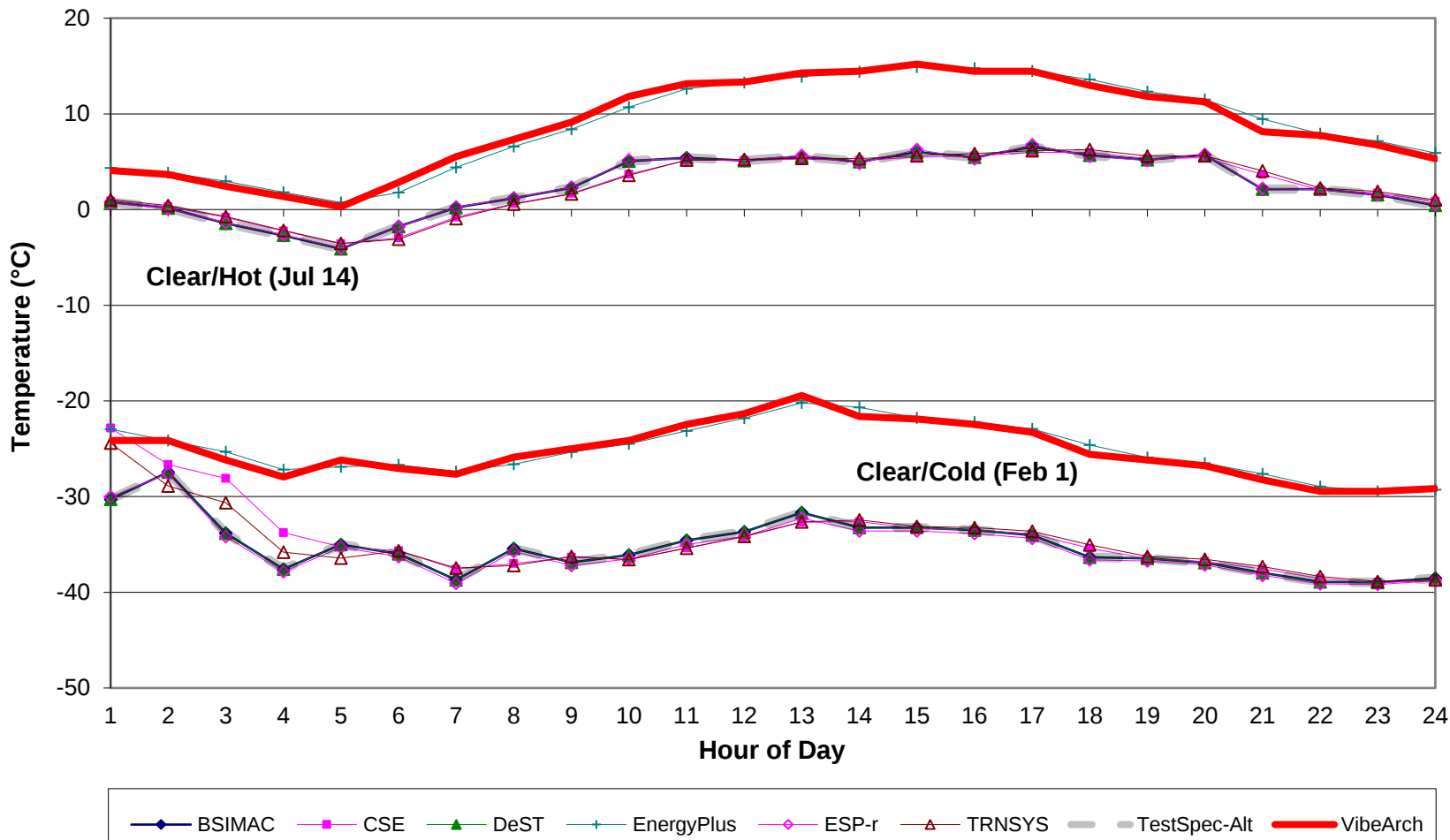


Figure B8-H12.
Hourly Free-Float Temperatures
Clear Cold Day (Feb 1), Cases 600FF and 900FF

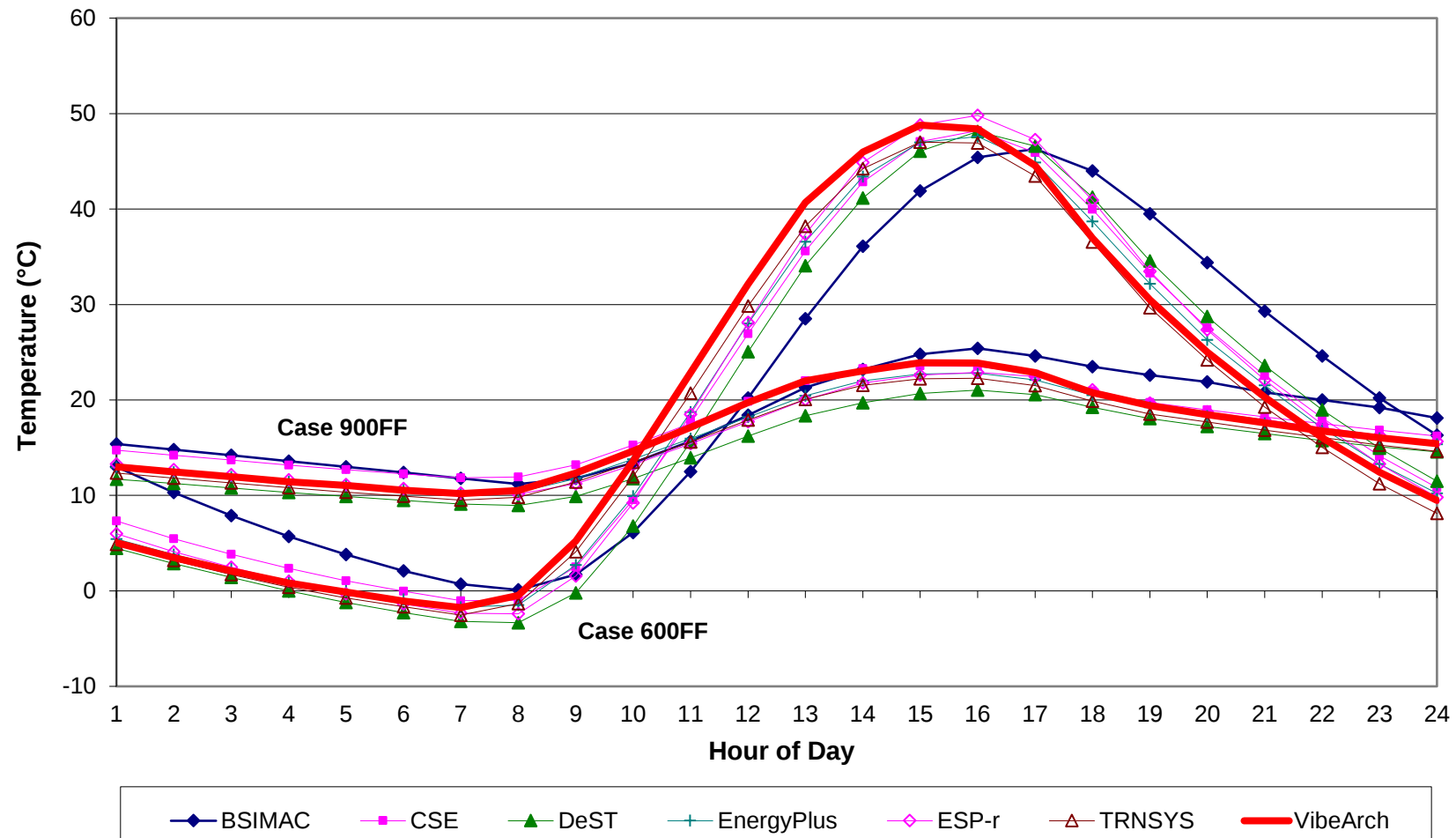


Figure B8-H13.
Hourly Free-Float Temperatures
Clear Hot Day (Jul 14), Cases 650FF and 950FF

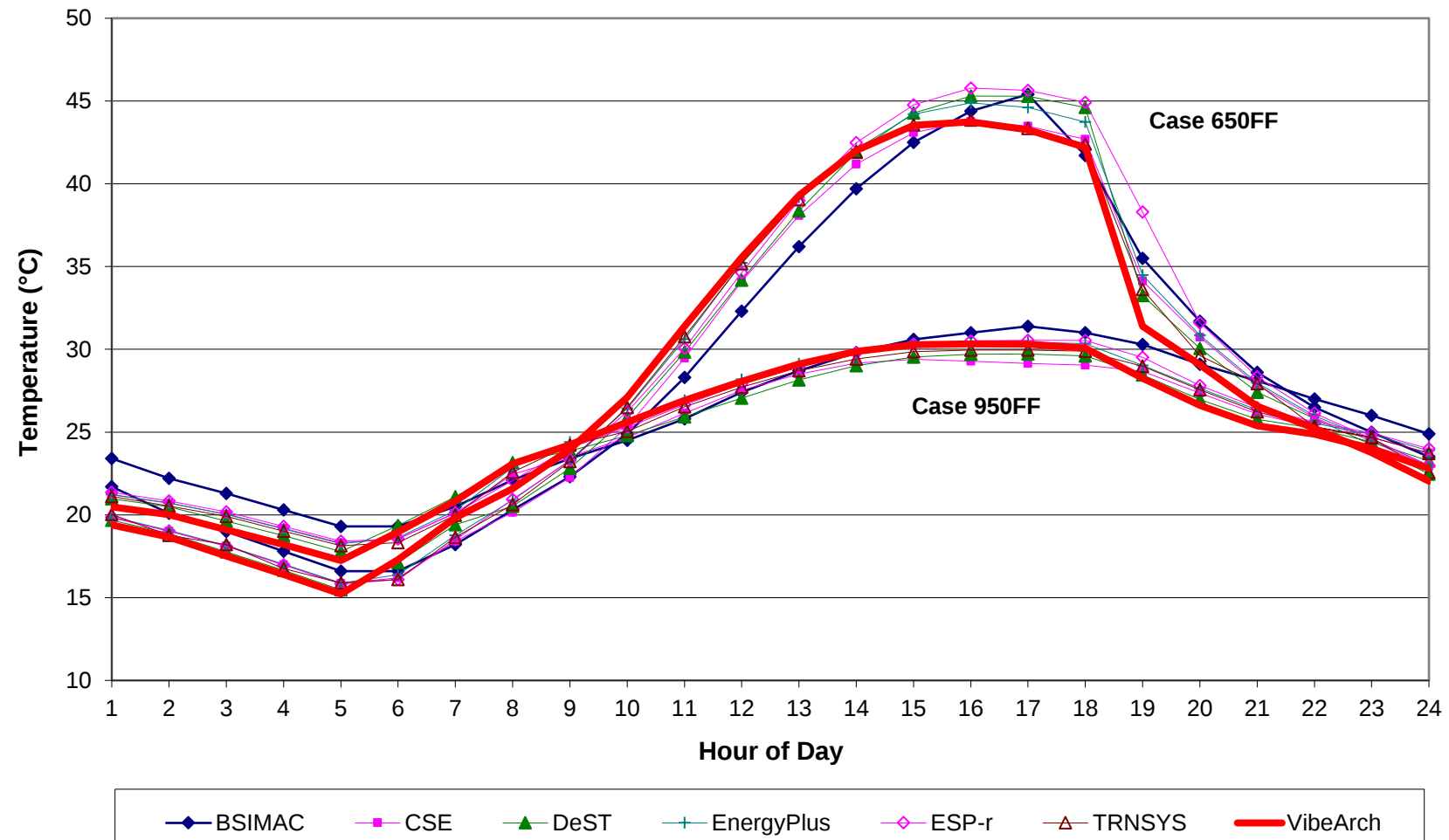


Figure B8-H14.
Hourly Free-Float Temperatures
Clear Cold Day (Feb1), Cases 680FF and 980FF

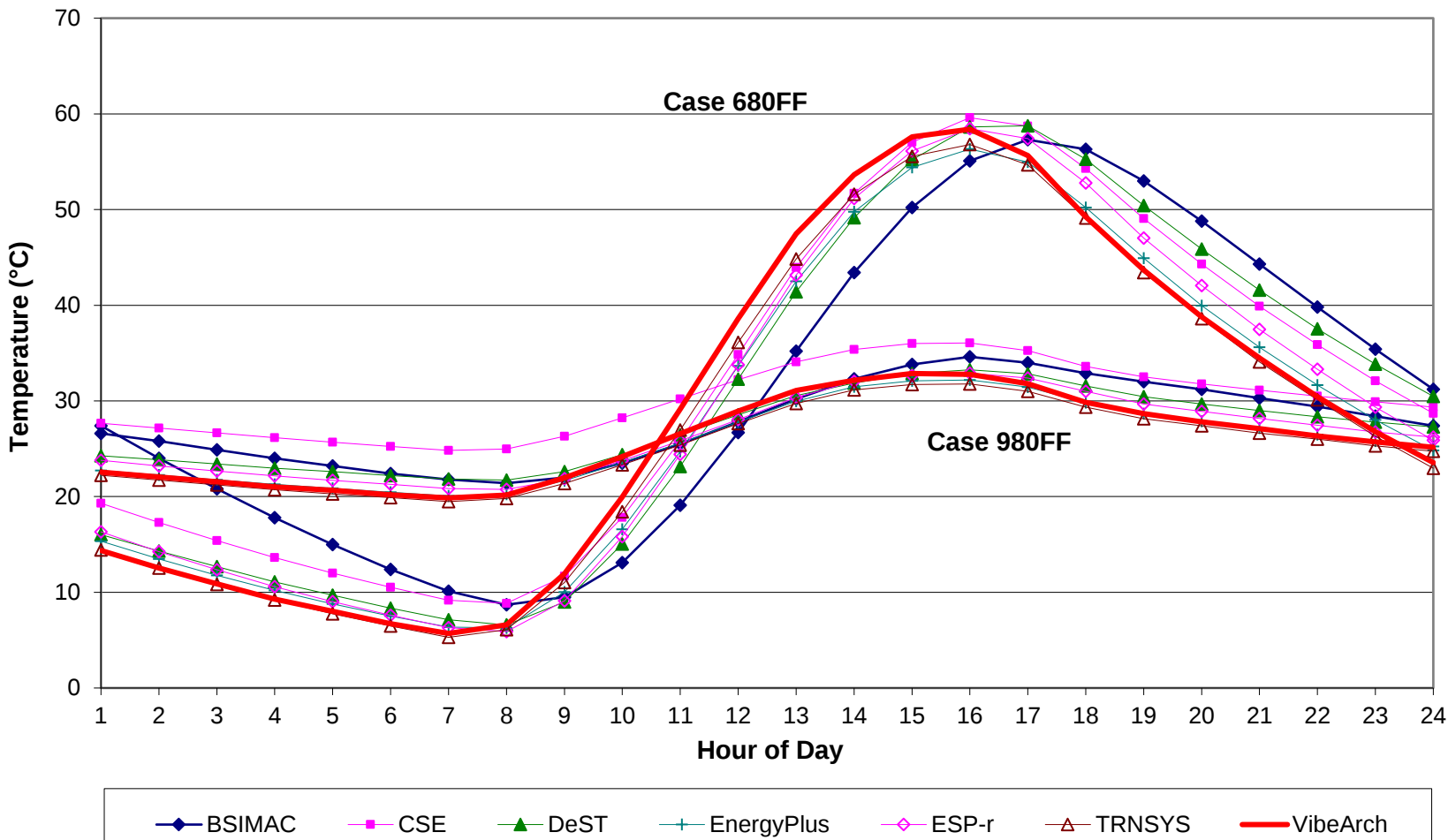


Figure B8-H15. Hourly Loads
Clear Cold Day, Case 600 (Low Mass, Double-Clear Window)
Heating (+), Sensible Cooling (-)

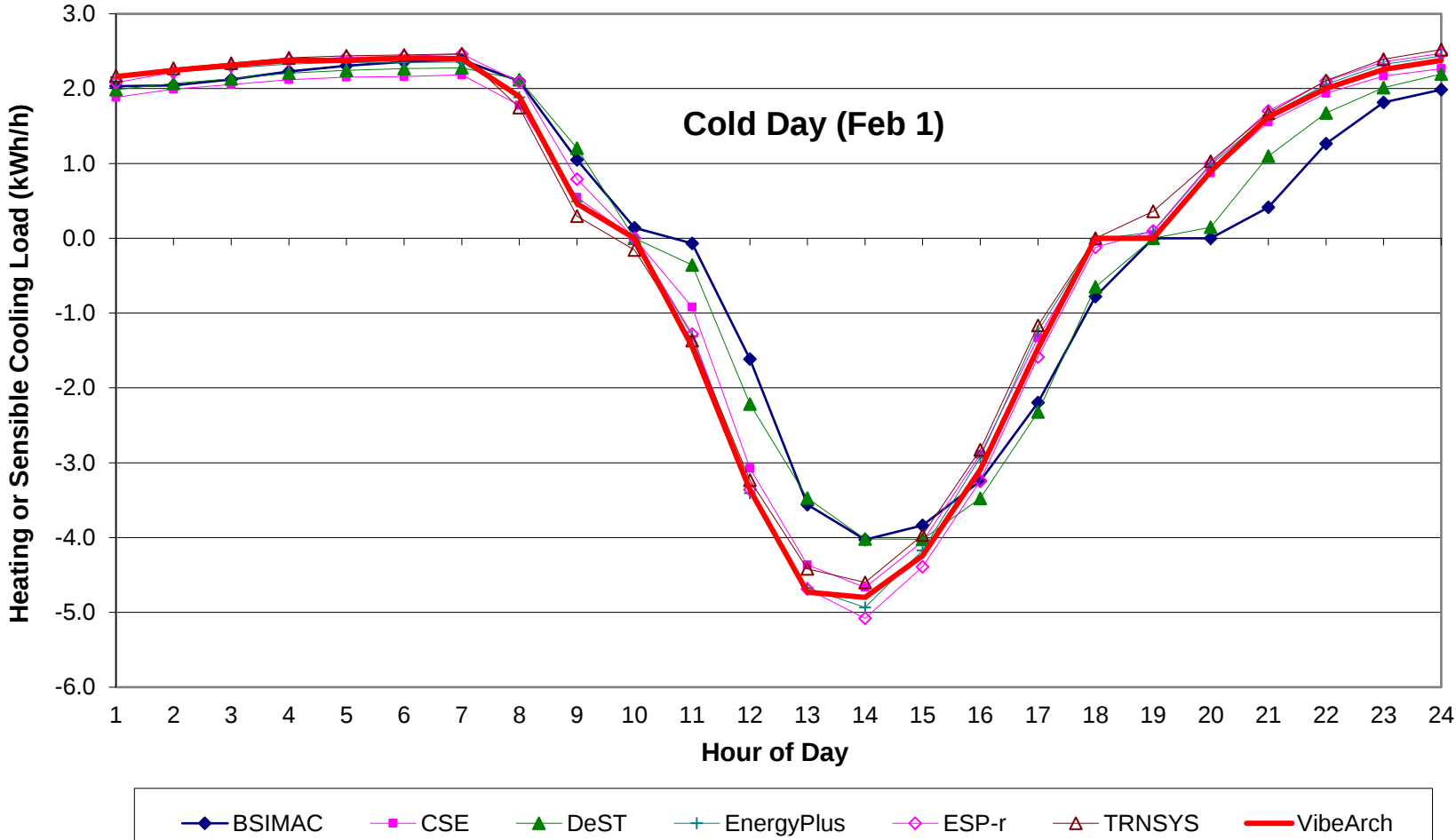


Figure B8-H16. Hourly Loads
Clear Hot Day, Case 600 (Low Mass, Double-Clear Window)
Heating (+), Sensible Cooling (-)

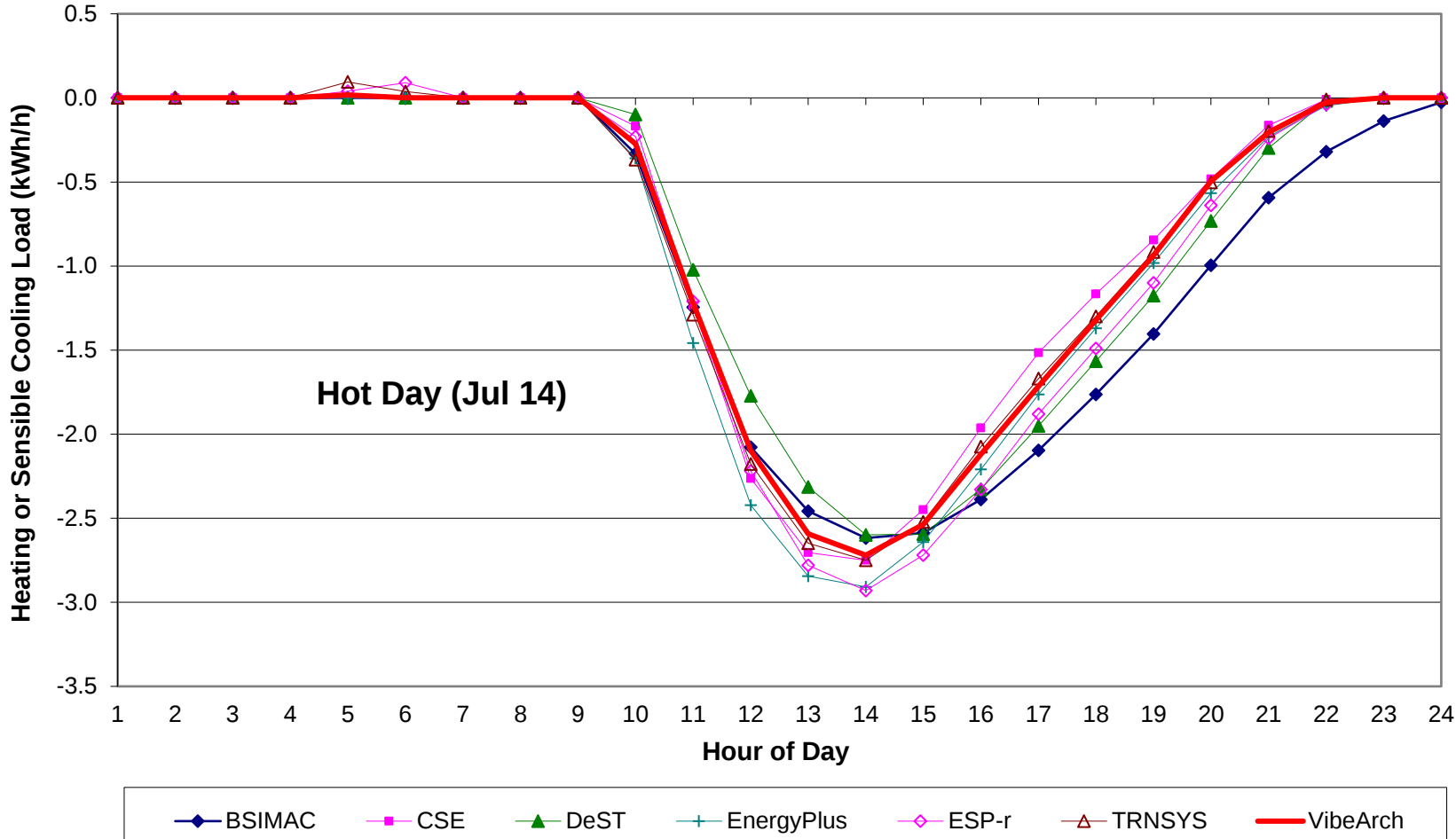


Figure B8-H17. Hourly Loads
Clear Cold Day, Case 640 (Low Mass, Night Setback)
Heating (+), Sensible Cooling (-)

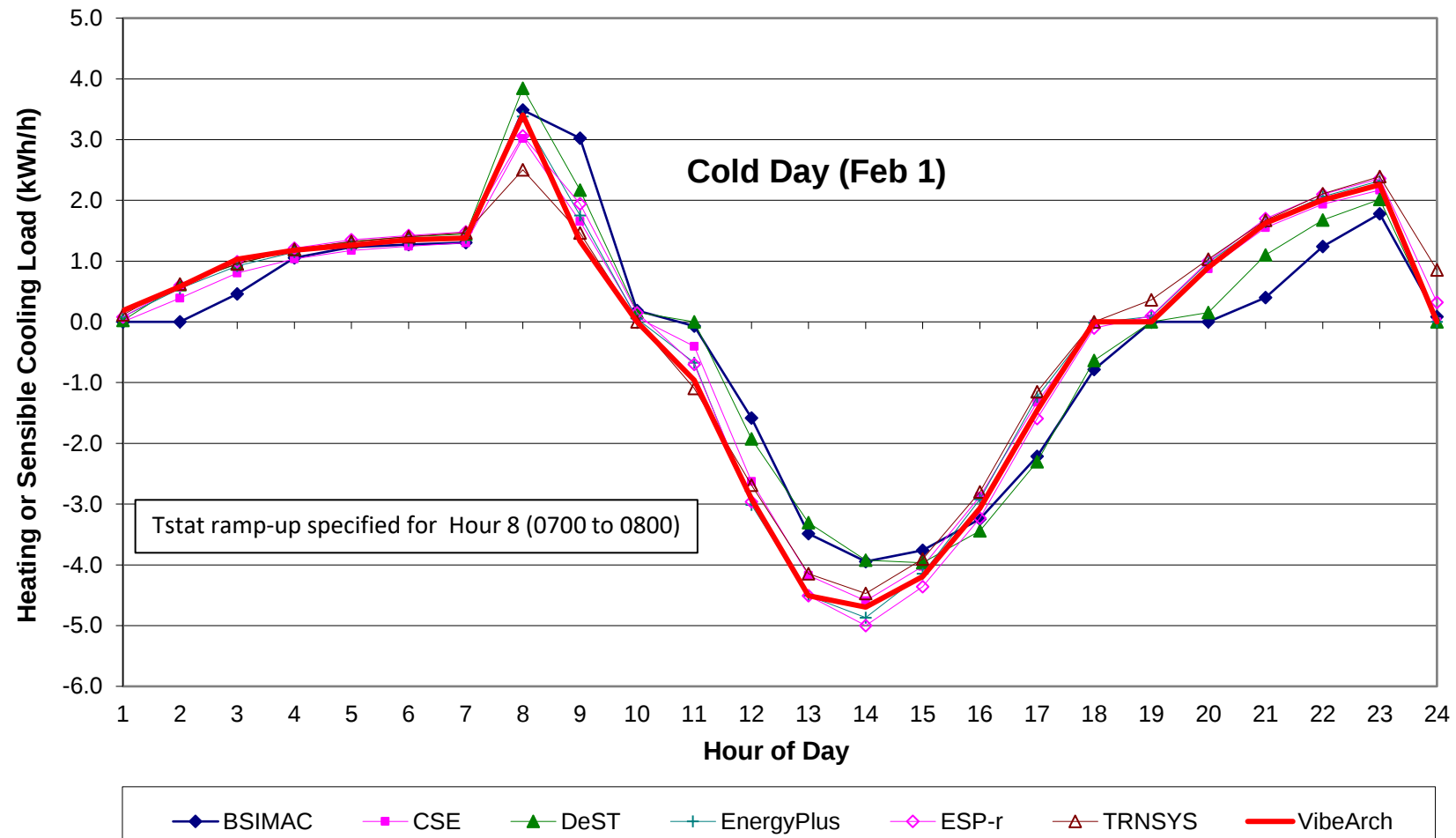


Figure B8-H18.
Hourly Conditioned Zone Temperatures
Clear Cold Day, Case 640

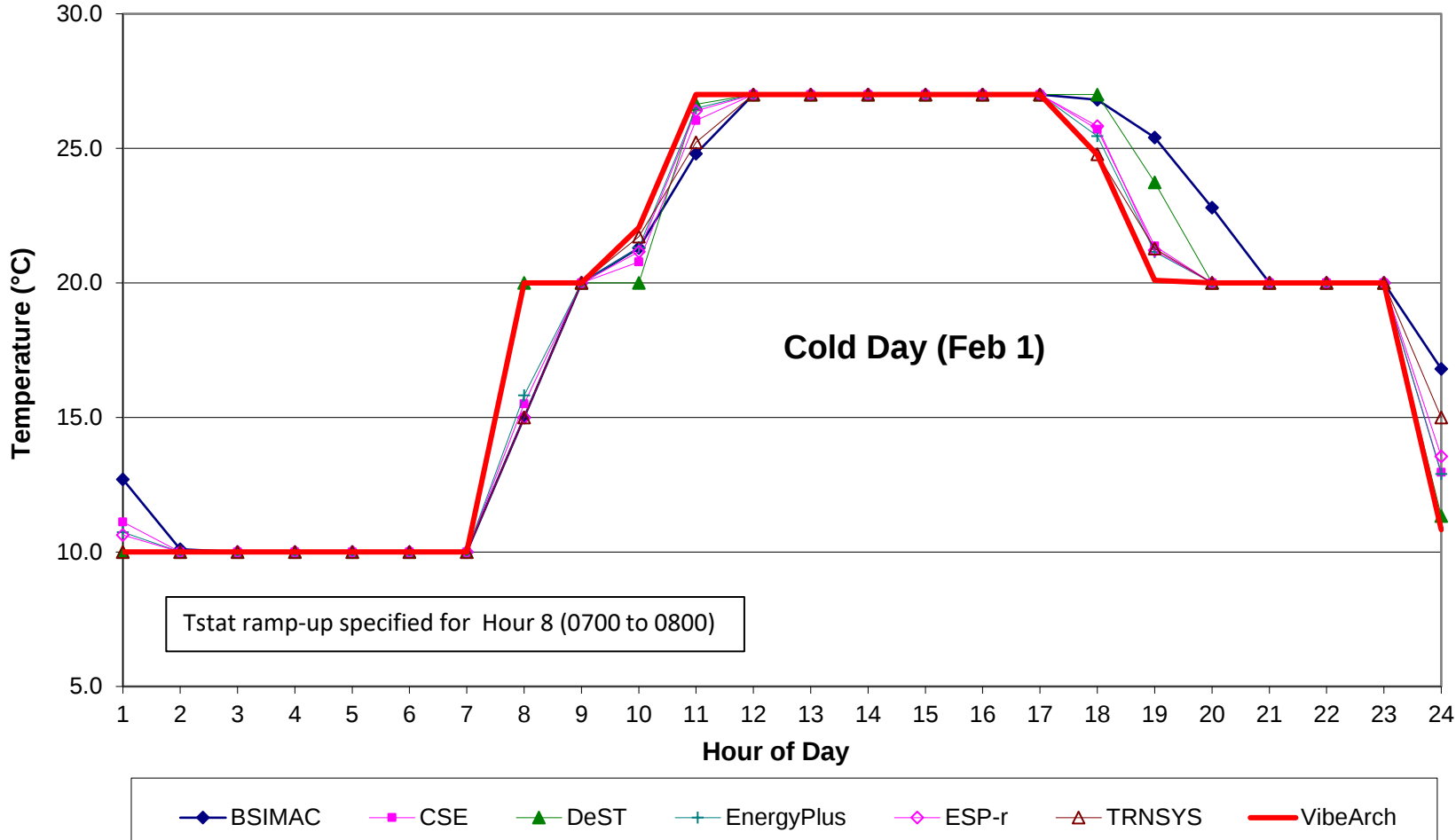


Figure B8-H19. Hourly Loads
Clear Cold Day, Case 940 (High Mass, Night Setback)
Heating (+), Sensible Cooling (-)

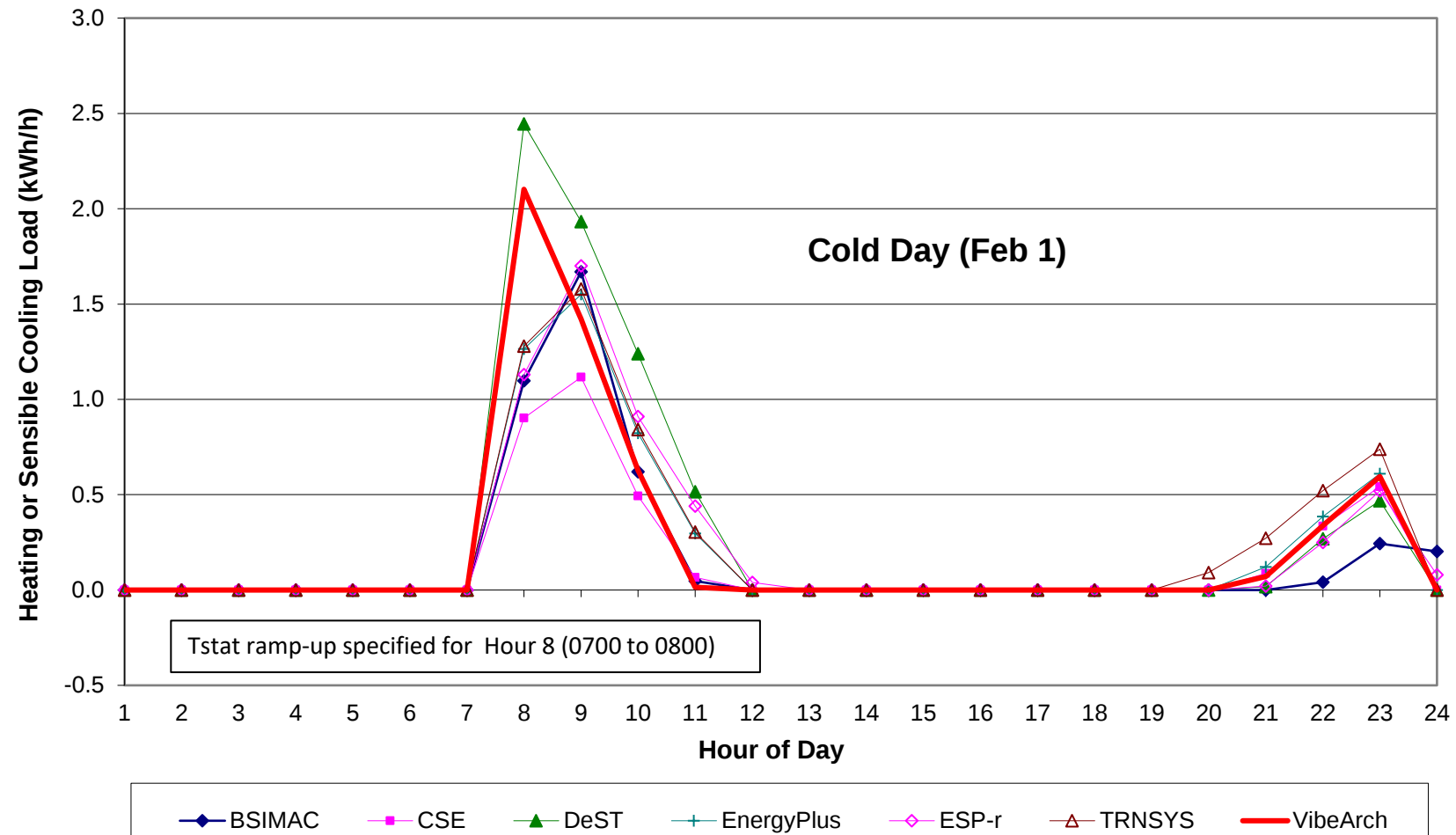


Figure B8-H20.
Hourly Conditioned Zone Temperatures
Clear Cold Day, Case 940

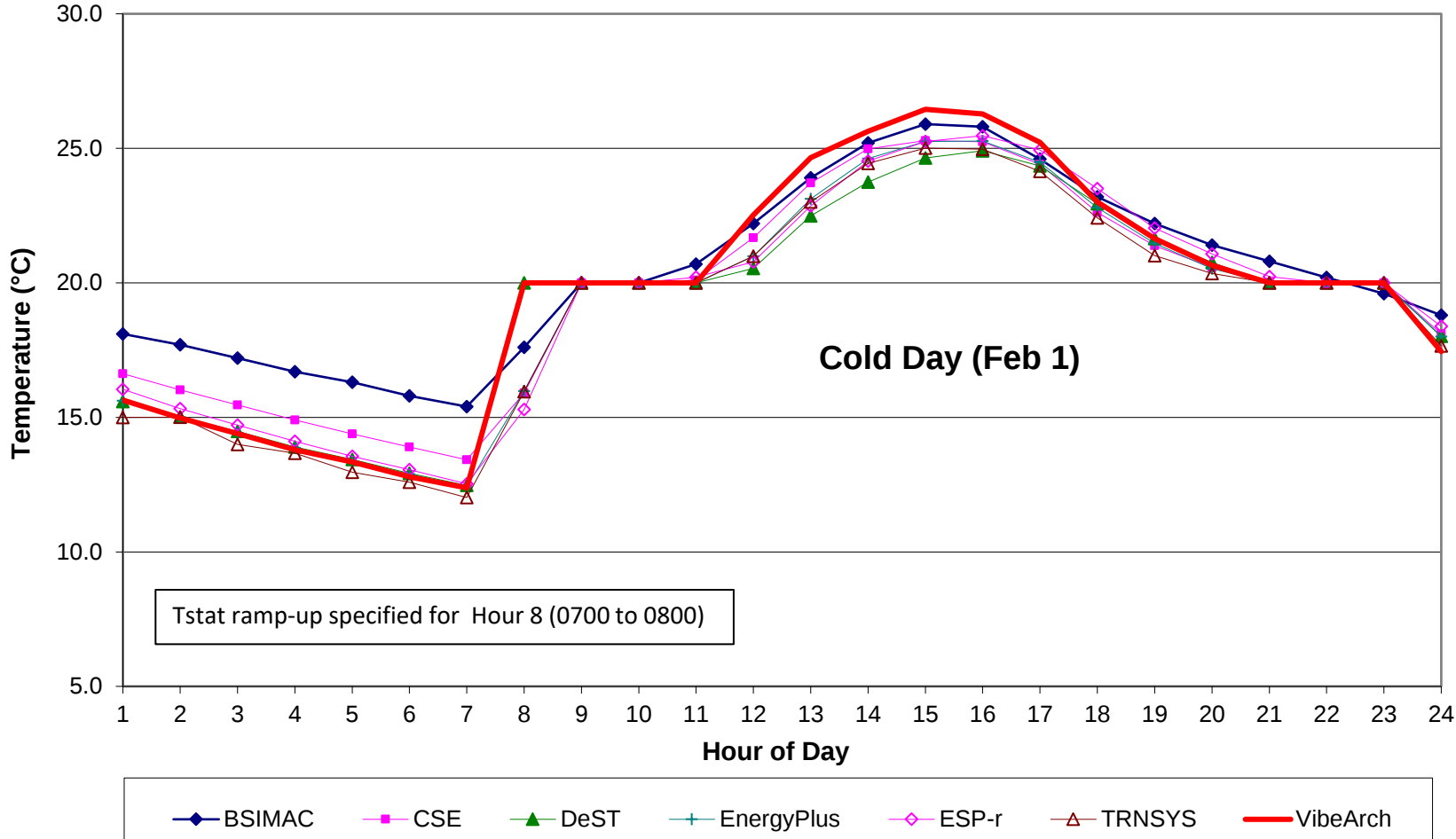


Figure B8-H21. Hourly Loads
Clear Cold Day, Case 660 (Low-E Window)
Heating (+), Sensible Cooling (-)

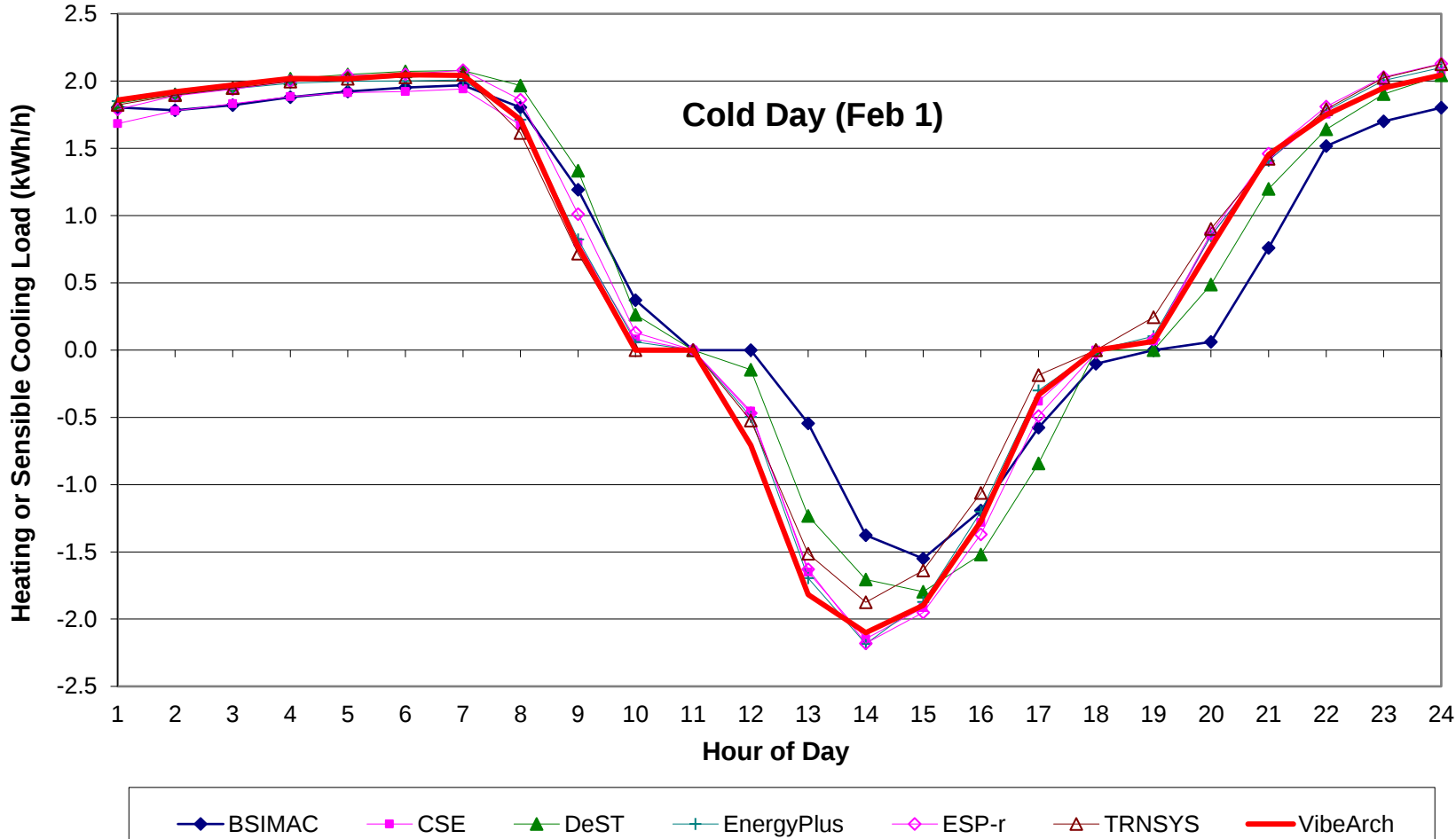


Figure B8-H22. Hourly Loads
Clear Hot Day, Case 660 (Low-E Window)
Heating (+), Sensible Cooling (-)

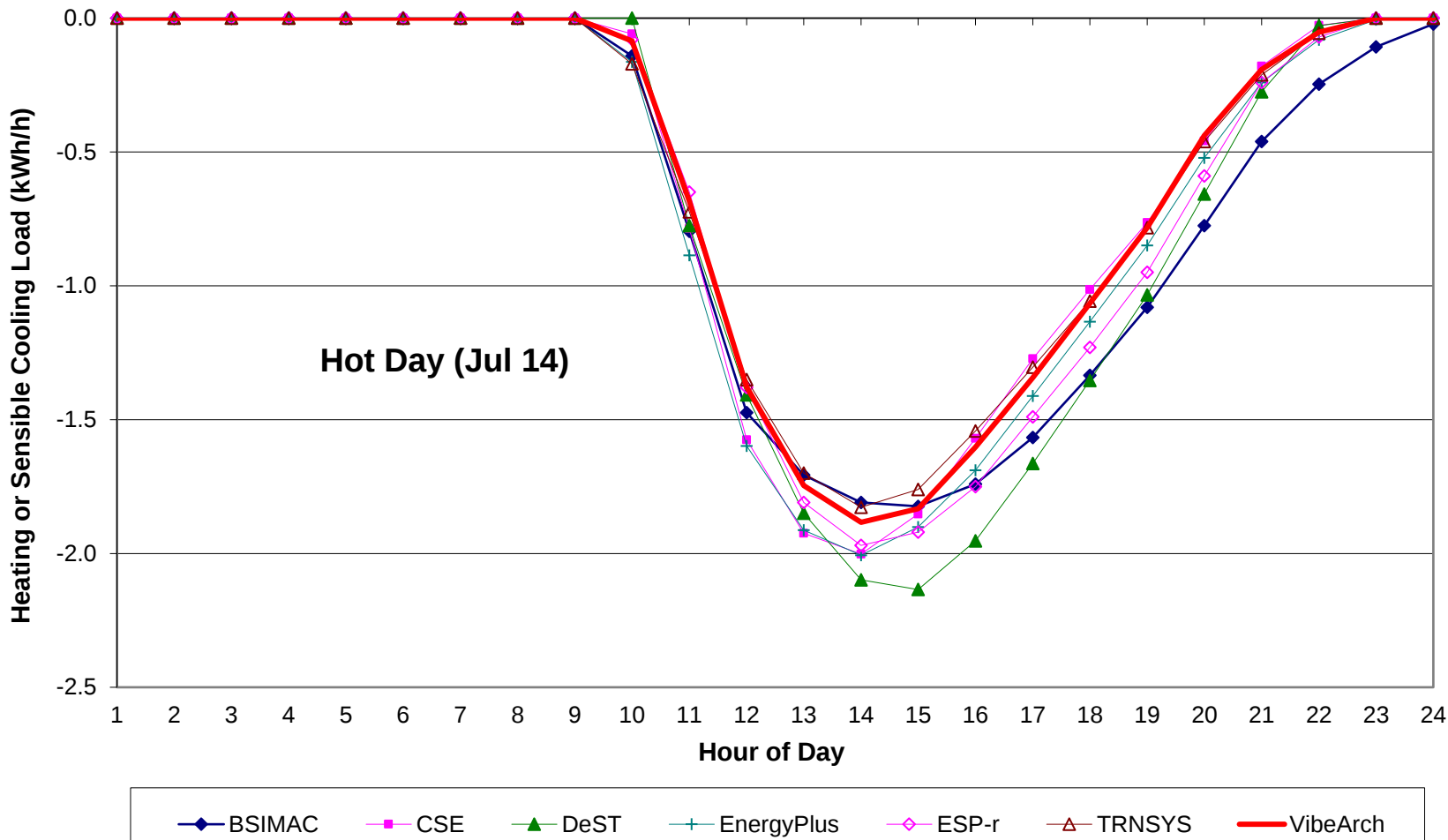


Figure B8-H23. Hourly Loads
Clear Cold Day, Case 670 (Single-Pane Window)
Heating (+), Sensible Cooling (-)

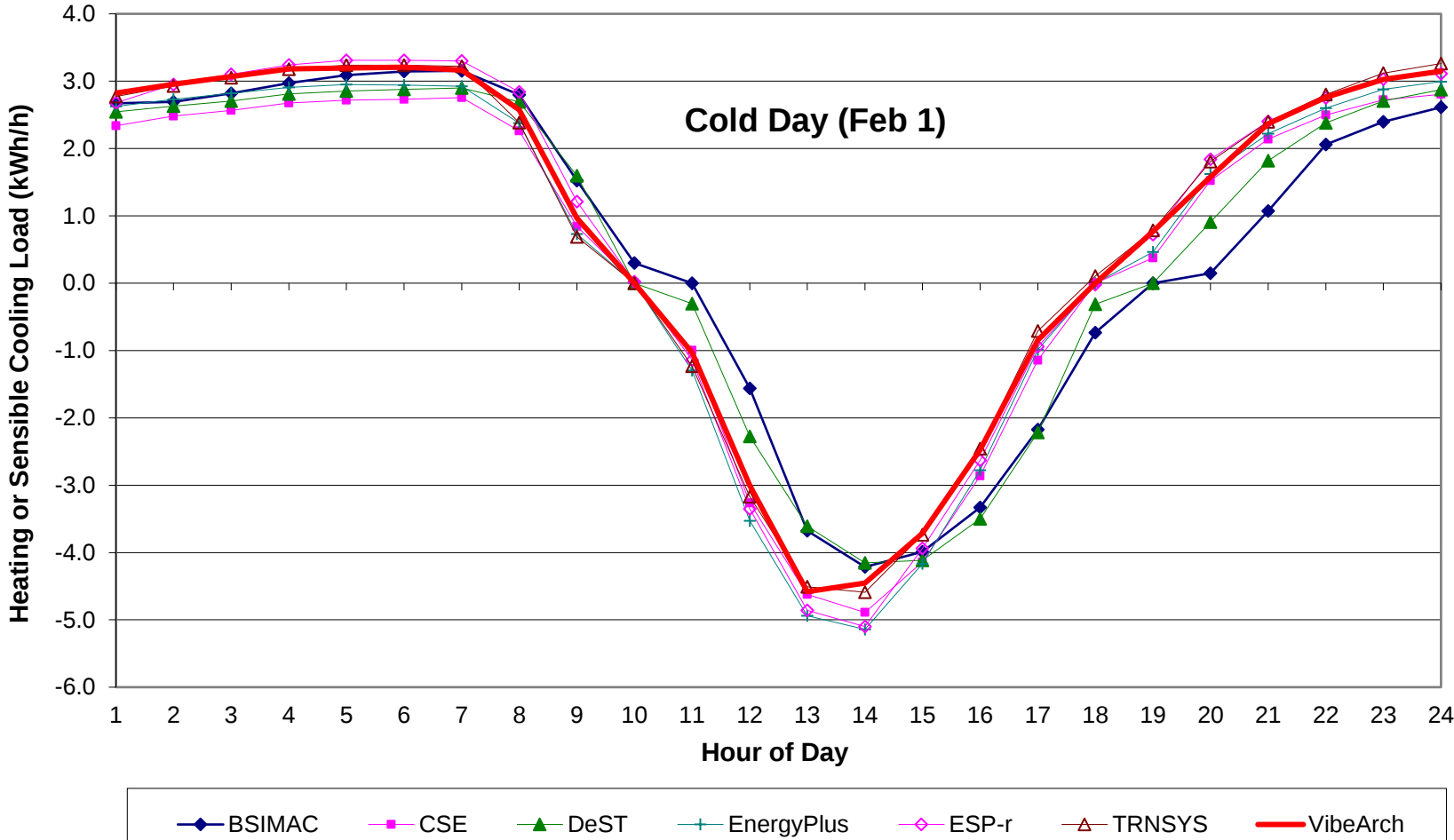


Figure B8-H24. Hourly Loads
Clear Hot Day, Case 670 (Single-Pane Window)
Heating (+), Sensible Cooling (-)

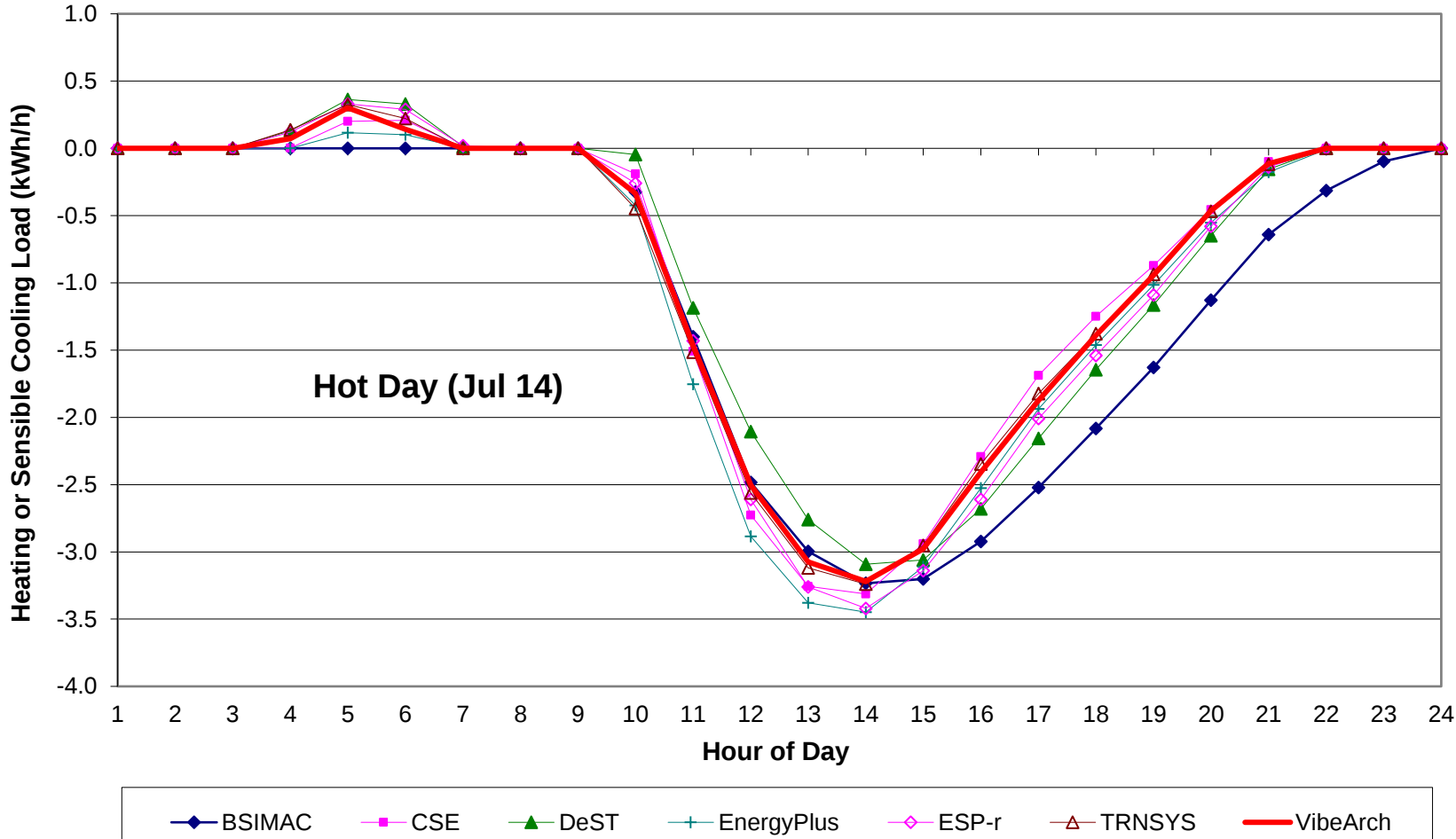


Figure B8-H25. Hourly Loads
Clear Cold Day, Case 680 (Insulation)
Heating (+), Sensible Cooling (-)

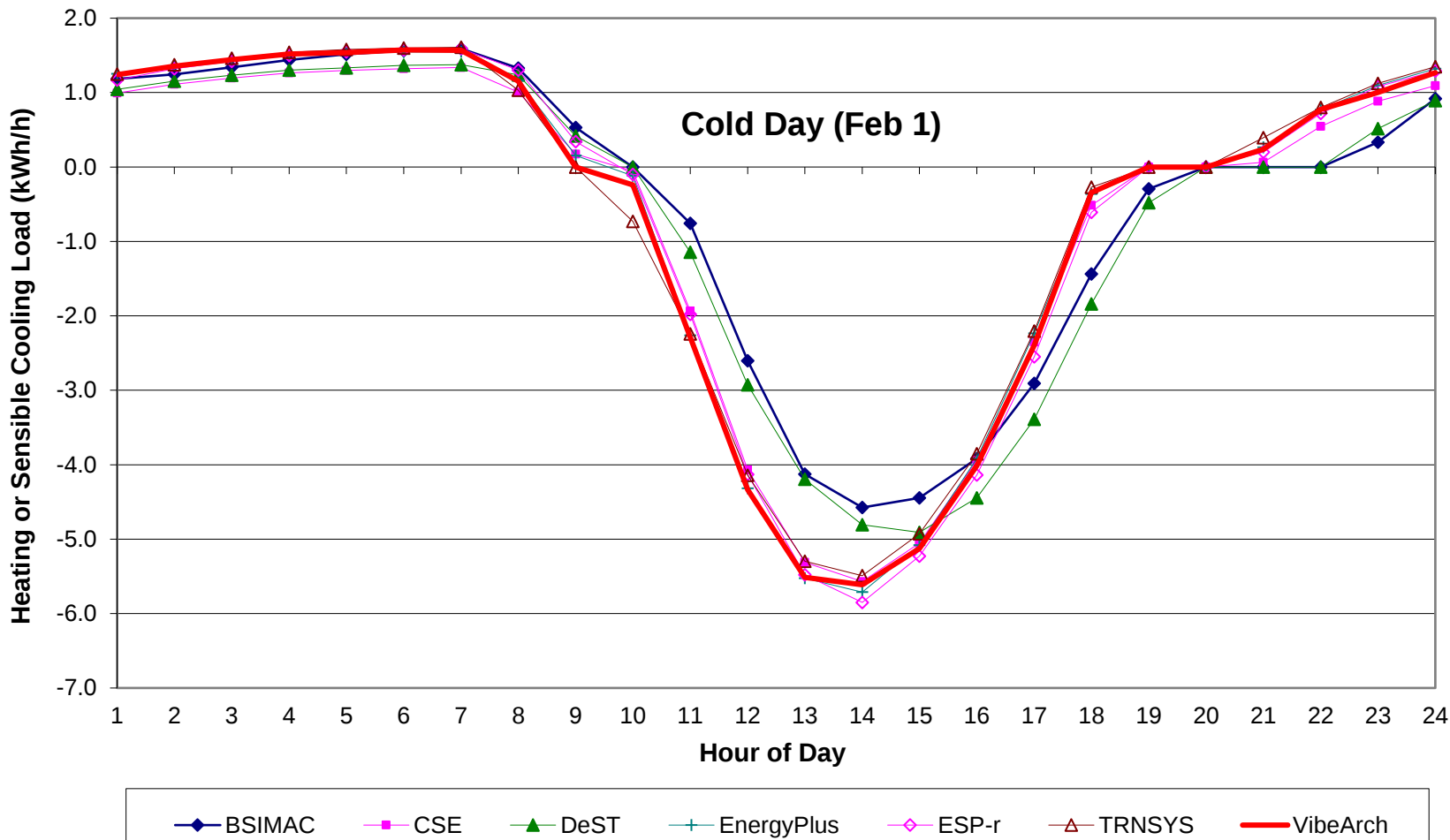


Figure B8-H26. Hourly Loads
Clear Hot Day, Case 680 (Insulation)
Heating (+), Sensible Cooling (-)

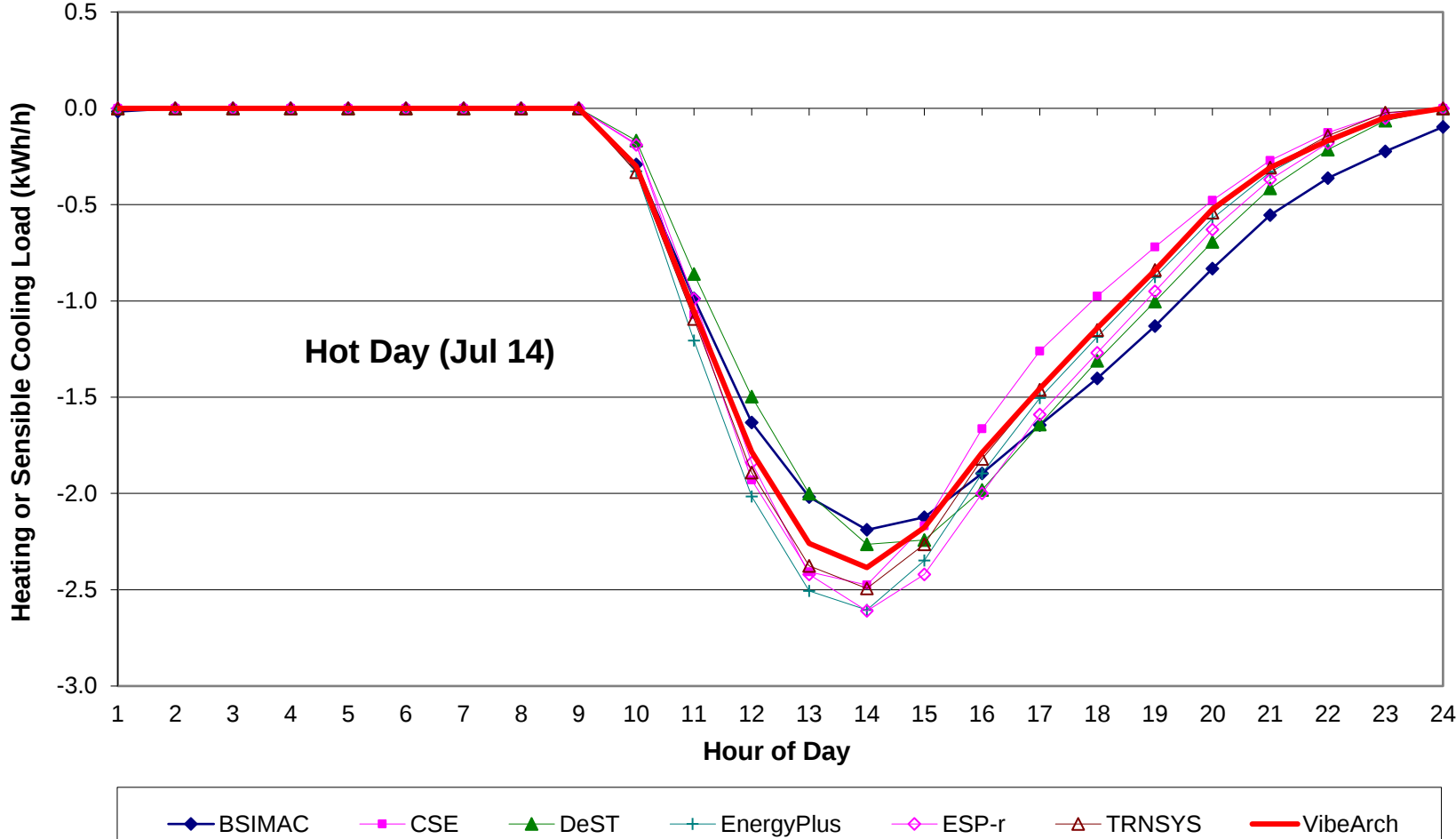


Figure B8-H27. Hourly Loads
Clear Cold Day, Case 685 (20/20 Tstat)
Heating (+), Sensible Cooling (-)

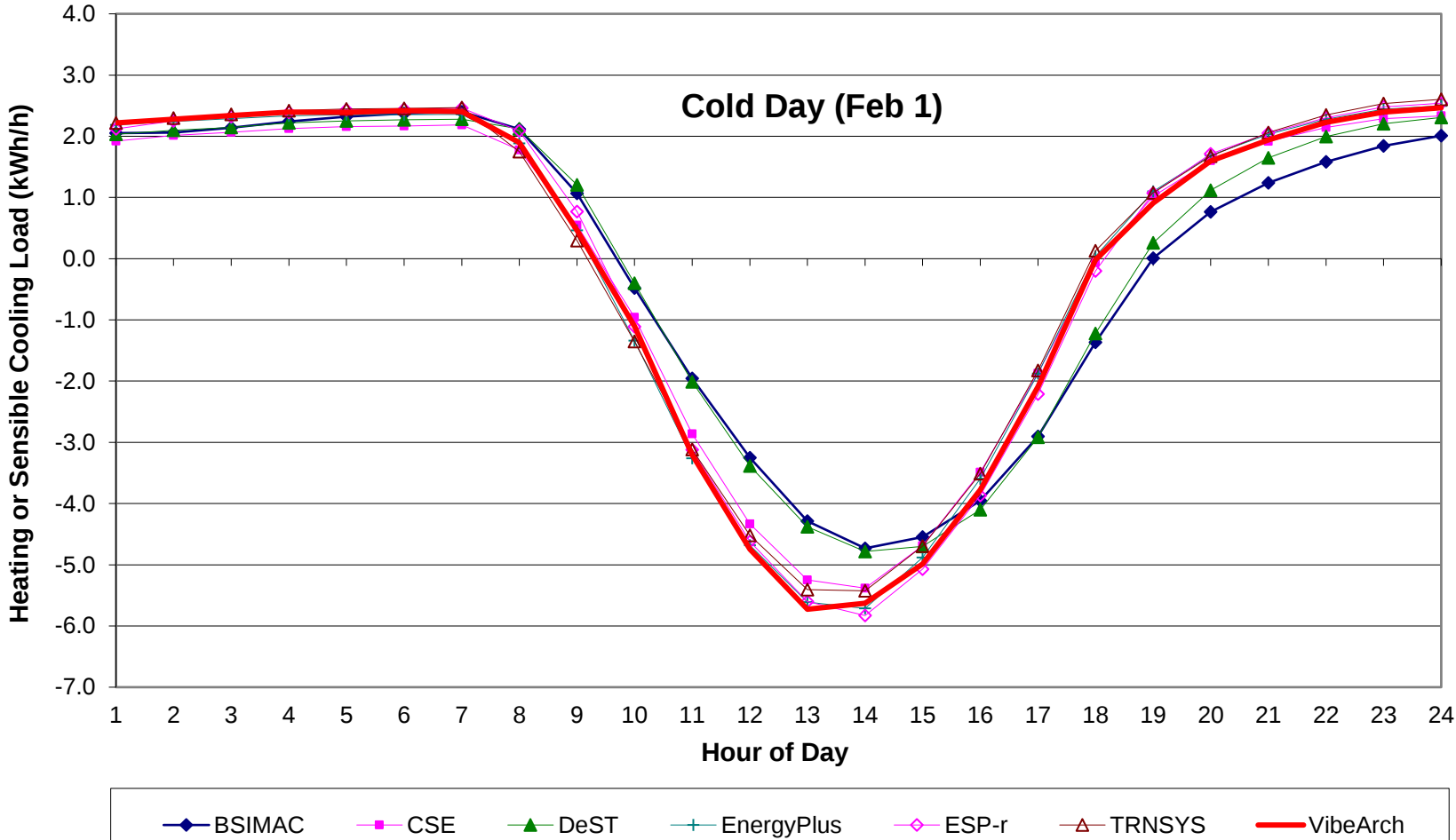


Figure B8-H28. Hourly Loads
Clear Hot Day, Case 685 (20/20 Tstat)
Heating (+), Sensible Cooling (-)

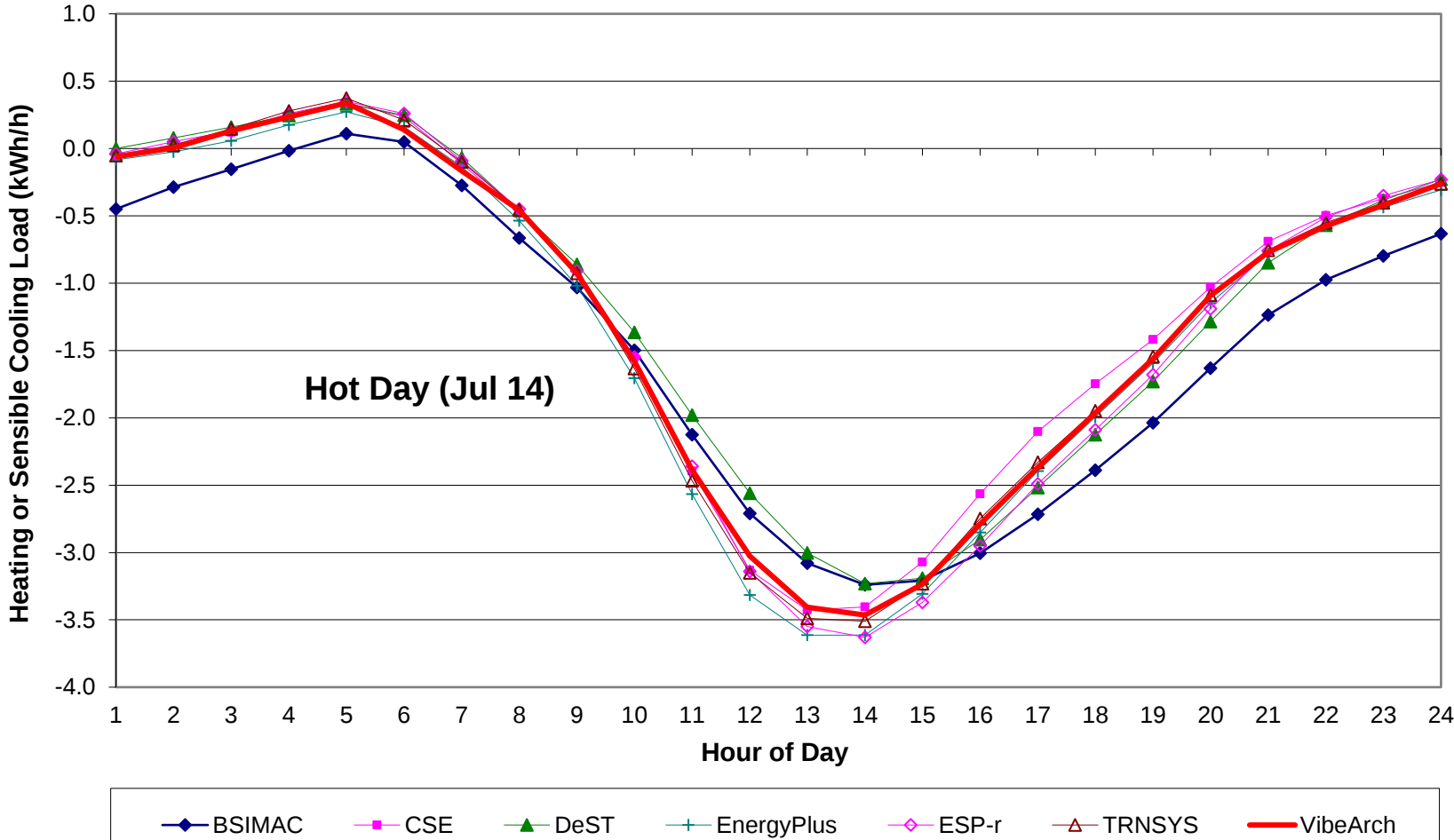


Figure B8-H29. Hourly Loads
Clear Cold Day, Case 695 (20/20, Insulation)
Heating (+), Sensible Cooling (-)

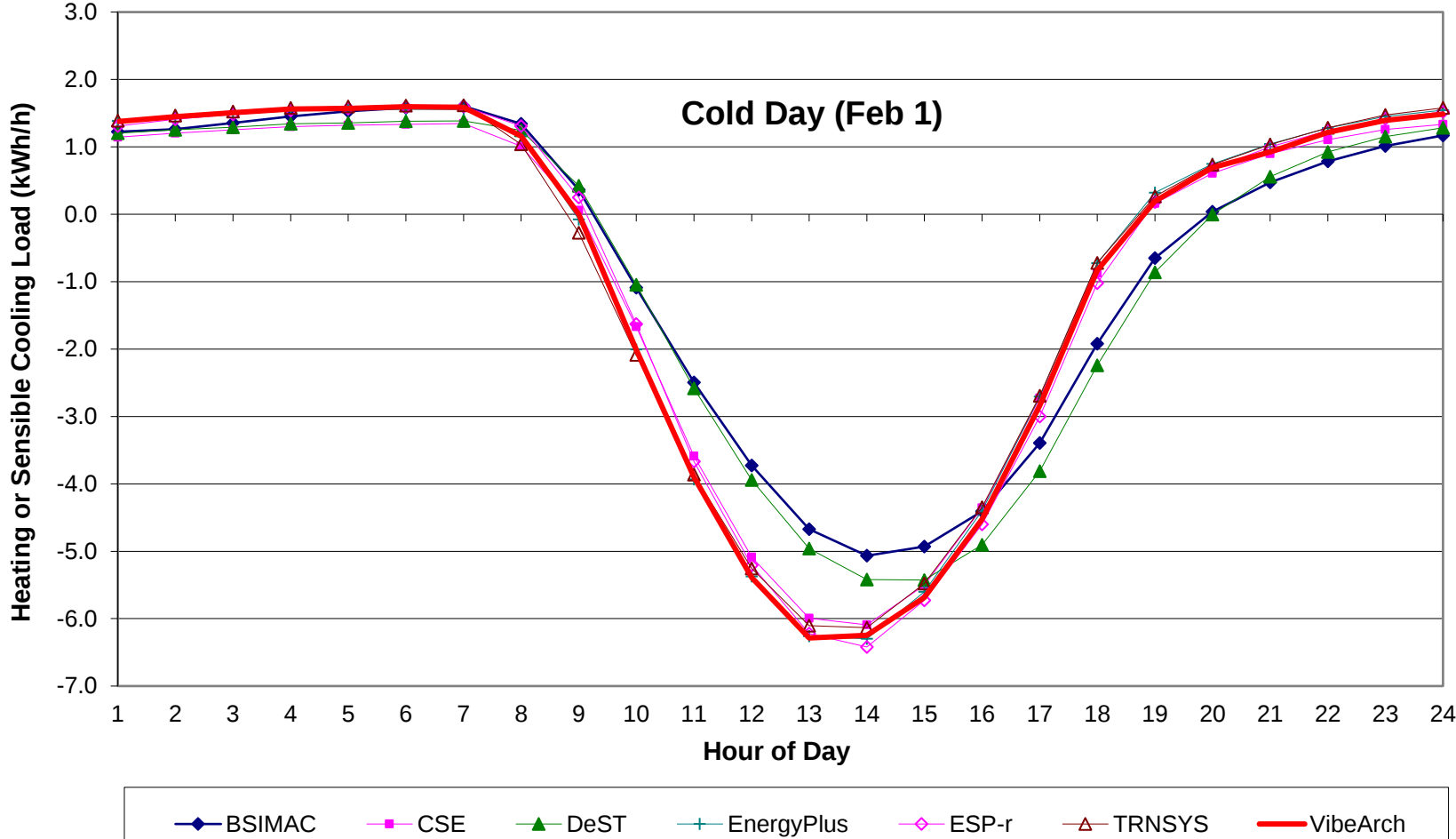


Figure B8-H30. Hourly Loads
Clear Hot Day, Case 695 (20/20, Insulation)
Heating (+), Sensible Cooling (-)

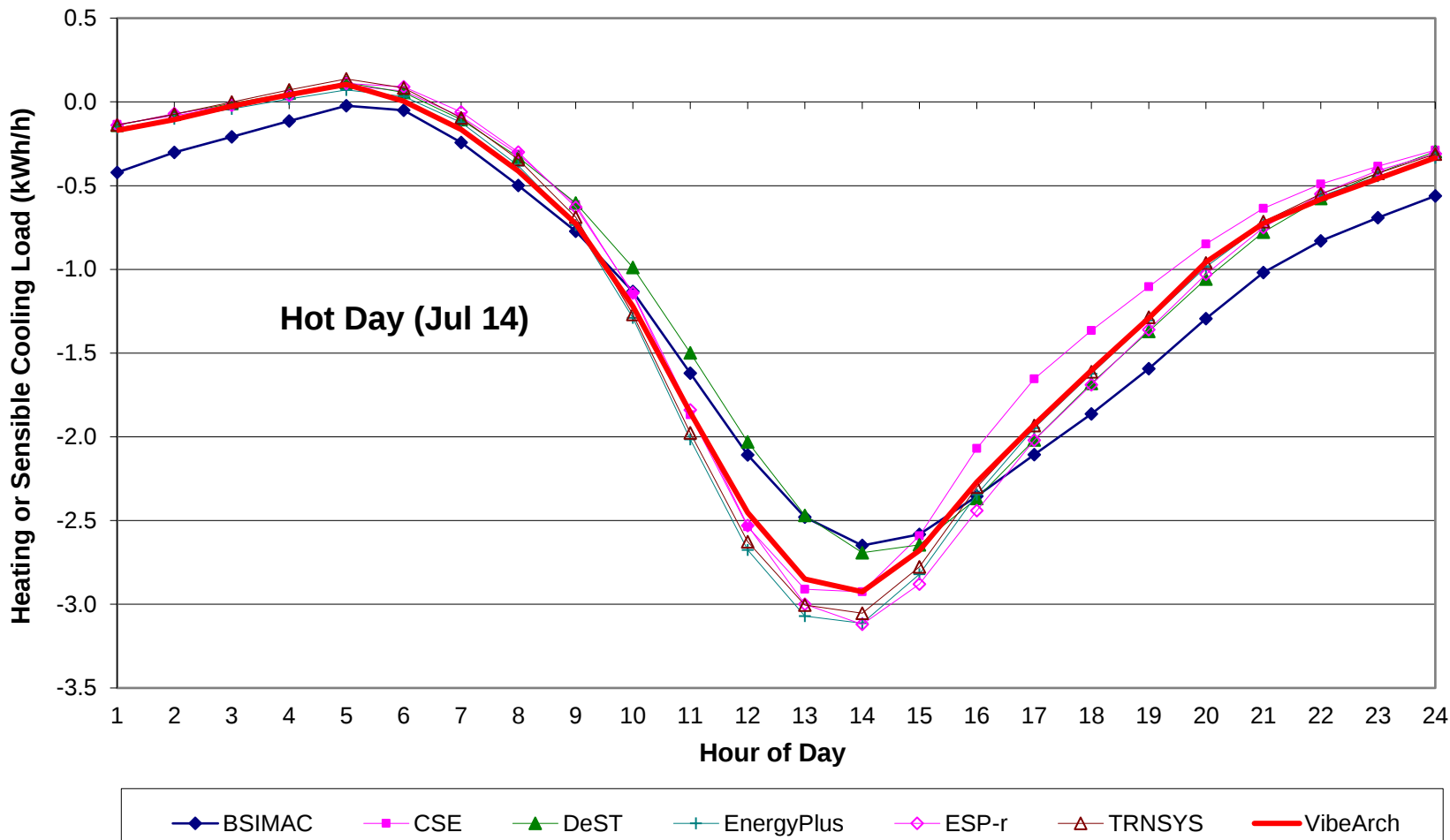


Figure B8-H31. Hourly Loads
Clear Cold Day, Case 900 (High Mass)
Heating (+), Sensible Cooling (-)

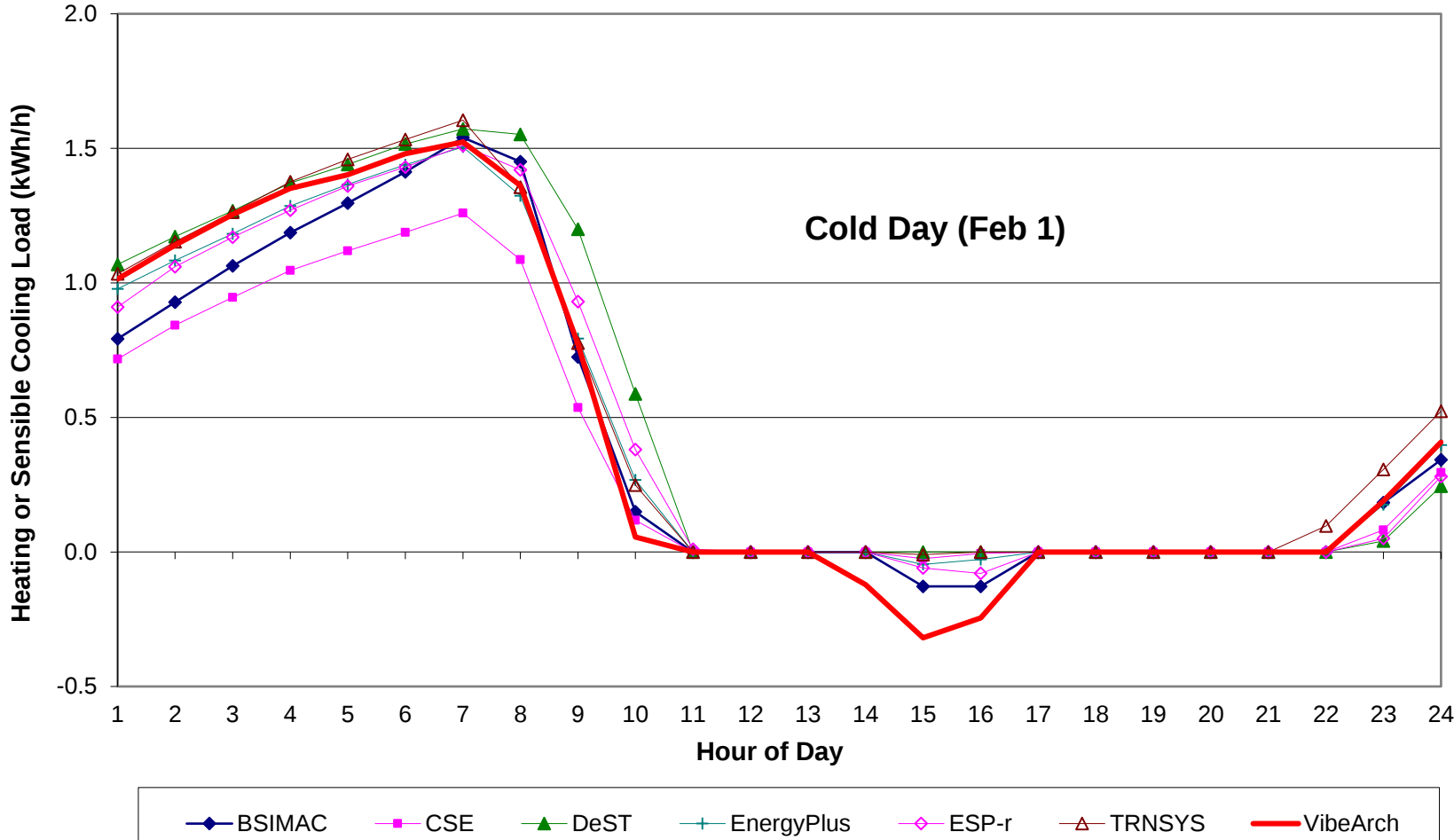
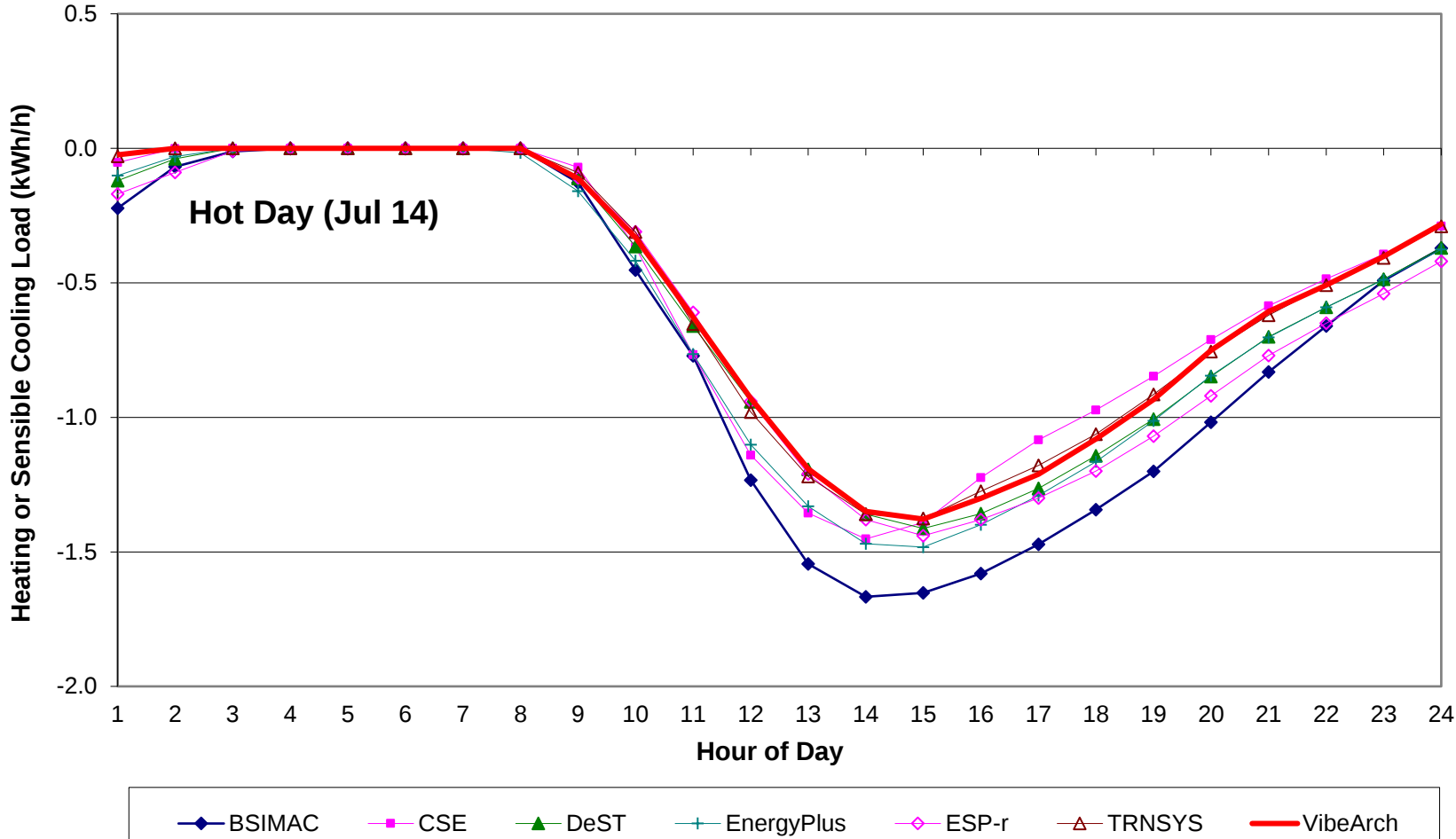


Figure B8-H32. Hourly Loads
Clear Hot Day, Case 900 (High Mass)
Heating (+), Sensible Cooling (-)



**Figure B8-H33. Hourly Loads
Clear Cold Day, Case 980 (High Mass, Insulation)
Heating (+), Sensible Cooling (-)**

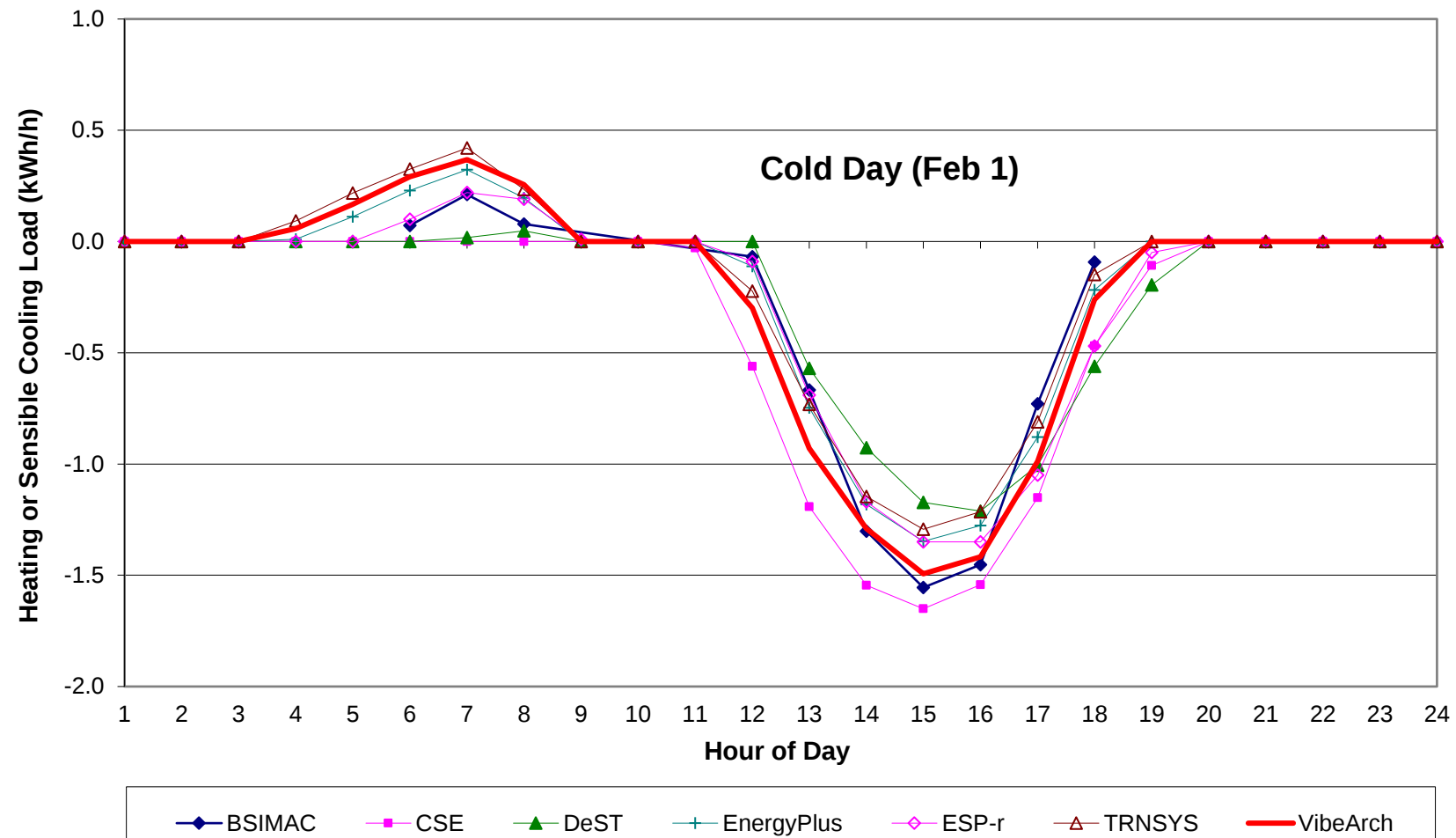


Figure B8-H34. Hourly Loads
Clear Hot Day, Case 980 (High Mass, Insulation)
Heating (+), Sensible Cooling (-)

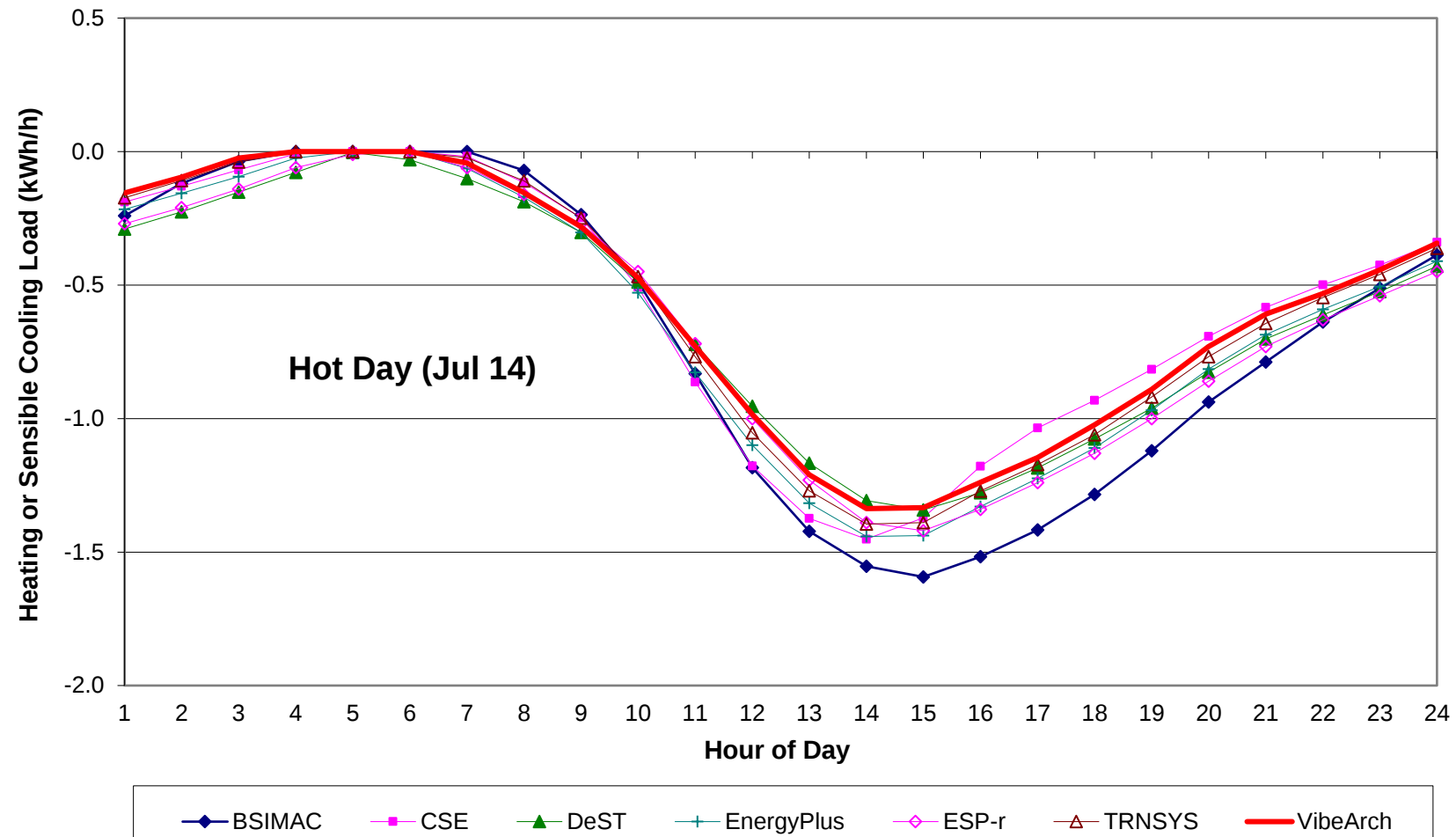


Figure B8-H35. Hourly Loads
Clear Cold Day, Case 985 (High Mass, 20/20 Tstat)
Heating (+), Sensible Cooling (-)

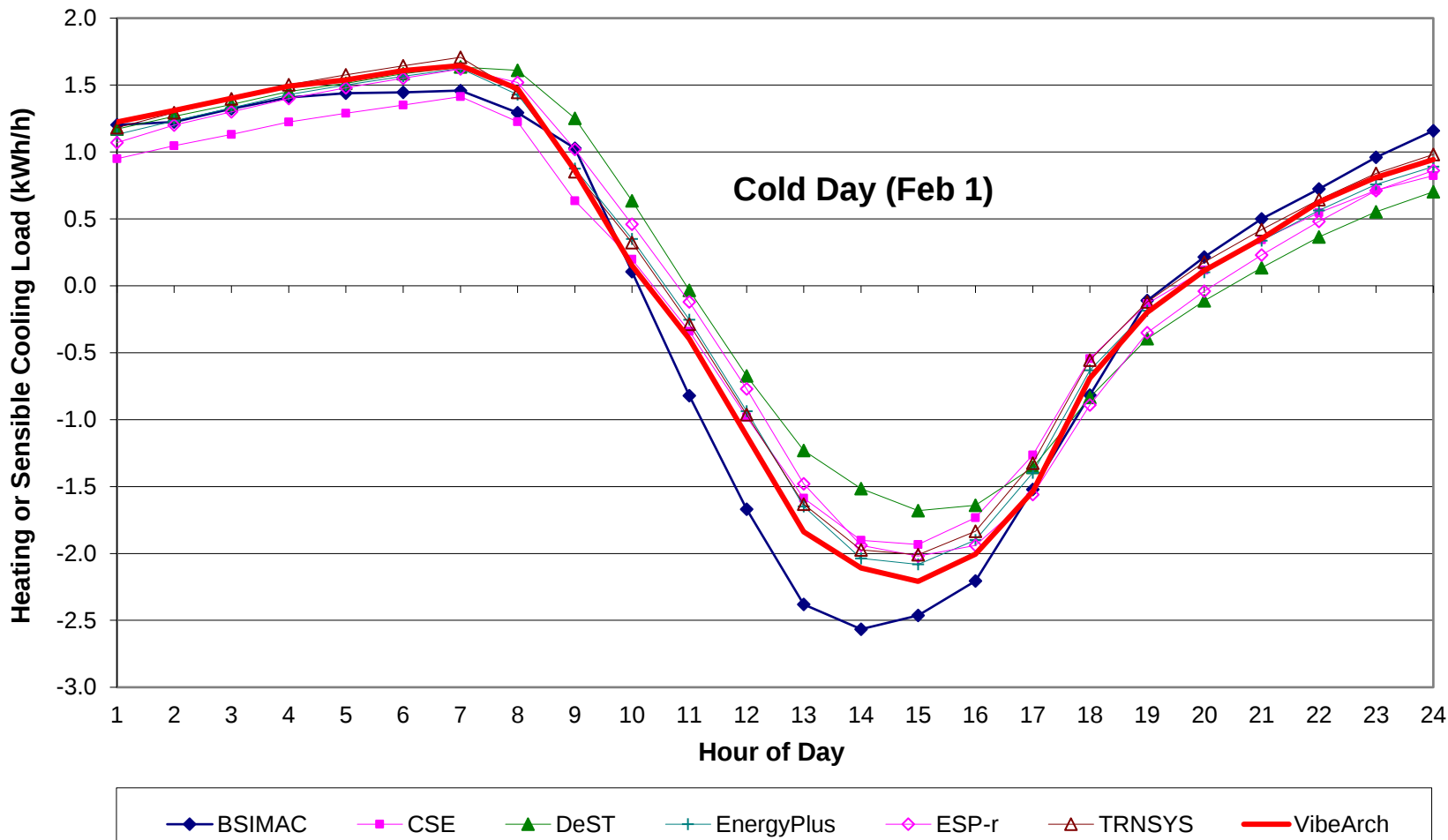


Figure B8-H36. Hourly Loads
Clear Hot Day, Case 985 (High Mass, 20/20 Tstat)
Heating (+), Sensible Cooling (-)

