Attachment 7 – IDA ICE energy simulation results

Zones

Zone	Group	Zone multiplier, M	Min temp, °C	Max temp, °C	Min op temp, °C	Max op temp, °C	Max heat supplied, W/m2	Room unit heat, W/m2	Max heat removed, W/m2	Room unit cool, W/m2	Dry vent cool, W/m2	Max sup airflow, L/(s m2)	Max rtn airflow, L/(s m2)	Max solar gain, W/m2	Min rel hum, %	Max rel hum, %	Max CO2, ppm (vol)	Max PPD, %	Max age of air, h	In use, h	h of T_op>25, h	h of T_op>27, h	Occ. hours, h	PDH, h	Unmet hours (cooling)	Unmet hours (heating)	Zone
Garage/workshop 1		1	20.91	23.28	21.09	23.64	16.84	26.27	19.81	0	15.36	2.025	1.998	0	4.817	73.5	493.7	16.49	0.6001	3128.1	0	0	10595	1220	0	0	Garage/workshop 1
Garage/workshop 2		1	20.91	23.08	21.15	23.41	11.56	21.35	19.74	0	14.87	2.025	1.998	0	4.817	73.43	493.7	16.18	0.6	3128.1	0	0	10841	1161	0	0	Garage/workshop 2
Technical room		1	20.91	22.97	21.06	23.18	16.15	34.91	18.96	0	14.6	2.025	1.998	0	4.817	73.24	493.7	16.71	0.6001	3128.1	0	0	2202	257.4	0	0	Technical room
Washroom		1	20.91	23.89	20.97	24.25	25.79	35.69	20	0	16.85	2.025	1.998	0	4.817	74.71	493.7	17.27	0.6	3128.1	0	0	4375	514.4	0	0	Washroom
Stairs		1	20.85	25.06	20.77	26.39	53.78	63.85	61.03	39.48	19.74	2.025	1.998	61.72	4.817	73.87	493.7	18.44	0.6001	3128.1	737.4	0	3537	386.7	0	0	Stairs
Display		1	20.88	25.13	21.12	27.67	16.53	26.43	74.82	53.37	19.92	2.025	1.998	79.52	4.808	73.58	493.7	16.36	0.6	3128.1	1149.5	258.3	65020	6043	0	0	Display
Toilet/wardrobe		1	20.92	22.99	21.21	23.23	6.107	20.26	19.63	0	14.65	2.025	1.997	0	4.817	73.19	493.6	15.88	0.6001	3128.1	0	0	2809	281.6	0	0	Toilet/wardrobe
Office 1.1		1	20.91	25.01	21.03	25.46	20.11	37.8	24.62	3.42	19.6	2.026	1.997	35.49	4.817	73.23	493.7	16.93	0.5999	3128.1	107	0	1652	174.9	0	0	Office 1.1
Office 1.2		1	20.89	25.15	20.88	26.22	42.89	53.67	62.62	41.18	19.96	2.025	1.997	116.1	4.817	74.17	493.7	17.83	0.6001	3128.1	734.7	0	1475	155.3	0	0	Office 1.2
Office 2.6		1	20.92	24.39	21.12	25.04	20.82	31.26	21.01	0	18.08	2.025	1.998	28.96	4.793	73.1	493.7	16.33	0.5441	3128.1	1.8	0	13150	1380	0	0	Office 2.6
Office 2.5		1	20.93	25.01	21.17	25.8	15.54	24.86	24.22	2.709	19.59	2.025	1.997	45.61	4.793	71.97	493.7	16.07	0.544	3128.1	94.8	0	13721	1342	0	0	Office 2.5
Office 2.4		1	20.93	25	21.17	25.69	15.35	24.66	21.96	0.1449	19.58	2.026	1.998	43.23	4.793	71.98	493.6	16.11	0.544	3128.1	56.2	0	8565	846.6	0	0	Office 2.4
Office 2.3		1	20.92	25.02	21.14	25.87	18.45	27.9	26.6	5.469	19.61	2.024	1.997	46.55	4.793	71.66	493.7	16.29	0.5444	3128.1	121.5	0	9683	967.5	0	0	Office 2.3
Office 2.2		1	20.93	25.06	21.11	26.8	20.74	30.52	54.45	33.22	19.75	2.025	1.997	80.52	4.793	69.97	493.7	16.42	0.5442	3128.1	502.8	0	13587	1315	0	0	Office 2.2
Office 2.8		1	20.94	22.34	21.21	22.56	6.81	16.03	17.69	0	13.06	2.025	1.998	0	4.793	73.47	493.7	15.87	0.5441	3128.1	0	0	1985	215.4	0	0	Office 2.8
Office 2.1		1	20.93	23.91	21.13	24.43	18.14	28.29	19.25	0	16.9	2.025	1.997	30.91	4.793	71.86	493.7	16.33	0.5443	3128.1	0	0	9817	1040	0	0	Office 2.1
Meeting room		1	20.93	23.97	21.03	24.35	24.53	37.59	19.24	0	17.05	2.025	1.997	21.81	4.793	71.47	493.7	16.88	0.5442	3128.1	0	0	1978	221.3	0	0	Meeting room
Stairs, kitchen, corridor		1	20.93	23.12	21.16	23.5	14.73	25.47	18.4	0	14.97	2.025	1.997	10.53	4.793	73.1	493.7	16.14	0.5441	3128.1	0	0	17805	1943	0	0	Stairs, kitchen, corridor
Office 2.7		1	20.93	23.19	21.12	23.58	17.73	30.03	18.5	0	15.14	2.025	1.998	12.11	4.793	73.1	493.7	16.38	0.5443	3128.1	0	0	5271	585.6	0	0	Office 2.7
Women toilet		1	20.94	22.1	21.21	22.27	6.749	15.98	17.42	0	12.48	2.025	1.998	0	4.793	73.73	493.7	15.97	0.5442	3128.1	0	0	1438	159.5	0	0	Women toilet
Men toilet		1	20.94	22.1	21.21	22.27	6.688	15.95	17.42	0	12.47	2.026	1.998	0	4.793	73.74	493.7	16	0.5444	3128.1	0	0	1303	144.8	0	0	Men toilet
HCWC		1	20.94	22.03	21.17	22.16	6.583	15.87	17.26	0	12.31	2.025	1.996	0	4.793	73.78	493.7	16.22	0.5444	3128.1	0	0	671.2	76.37	0	0	HCWC
Broom cupboard		1	20.95	22.17	21.15	22.29	6.463	15.75	17.24	0	12.63	2.025	1.998	0	4.793	73.69	493.7	16.35	0.5442	3128.1	0	0	454.5	52.12	0	0	Broom cupboard
Silent room		1	20.94	22.19	21.2	22.37	6.778	16	17.44	0	12.7	2.025	1.998	0	4.793	73.69	493.7	16.01	0.5441	3128.1	0	0	1302	144.3	0	0	Silent room
Total																							203236.7	20627.8			

Air handling units

AHU	Heating, kWh	Cooling, kWh	AHU heat recovery, kWh	AHU cold recovery, kWh	Humidi-fication, kWh	Fans, kWh
Air Handling Unit	66694.7	23193.8	284627	343.6	0	47626
Total	66694.7	23193.8	284627	343.6	0	47626

Systems energy

	kWh
Zone heating	125909
Zone cooling	14797.5
AHU heating	66694.7
AHU cooling	23193.8
Dom. hot water	52064
Cooling	37991.3
Heating	244667.7

Energy balance (sensible only)

	Envelope & Thermal bridges, kWh	Internal Walls and Masses, kWh	Window & Solar, kWh	Mech. supply air, kWh	Infiltra-tion & Openings, kWh	Occu-pants, kWh	Equip-ment, kWh	Lighting, kWh	Local heating units, kWh	Local cooling units, kWh	Net losses, kWh
Total	-65370.2	-51.9	28885.7	-163167	-1216.4	14393.1	30484.5	44919.3	125910.4	-14795.5	0
During heating	-47127.6	6558.6	-19846.7	-121222	-1096.8	8988.2	19256.7	28374.2	125898.1	0	0
During cooling	-9985.3	-3845.9	35094.6	-20872.8	-51.6	2369.4	4943.3	7284.2	0	-14794.2	0
Rest of time	-8257.3	-2764.6	13637.8	-21072.3	-68	3035.5	6284.5	9260.9	12.3	-1.3	0

Delivered Energy

Meter	Total, kWh	Per m2, kWh/m2	Peak demand, kW	Cost	CO2 Emission, kg	Primary energy, kWh
Lighting, facility	44918	26.86	14.78			
Electric cooling	12664.2	7.573	27.23			
HVAC aux	47740	28.55	5.753			
Electric heating	113656	67.97	51.17			
Equipment, tenant	30484	18.23	10.03			
Total	249462.2	149.2	109	0	0	0

Zones

Zone	Group	Zone multiplier, M	Min temp, °C	Max temp, °C	Min op temp, °C	Max op temp, °C	Max heat supplied, W/m2	Room unit heat, W/m2	Max heat removed, W/m2	Room unit cool, W/m2	Dry vent cool, W/m2	Max sup airflow, L/(s m2)	Max rtn airflow, L/(s m2)	Max solar gain, W/m2	Min rel hum, %	Max rel hum, %	Max CO2, ppm (vol)	Max PPD, %	Max age of air, h	In use, h	h of T_op>25, h	h of T_op>27, h	Occ. hours, h	PDH, h	Unmet hours (cooling)	Unmet hours (heating)	Zone
Garage/workshop 1		1	20.91	23.27	21.09	23.63	16.82	26.23	19.45	0	15.34	2.025	1.998	0	4.816	73.5	493.7	16.47	0.6001	3123.2	0	0	10594	1221	0	0	Garage/workshop 1
Garage/workshop 2		1	20.91	23.05	21.15	23.37	11.54	21.35	19.44	0	14.79	2.025	1.998	0	4.816	73.45	493.7	16.16	0.6	3123.2	0	0	10840	1163	0	0	Garage/workshop 2
Technical room		1	20.91	22.9	21.06	23.1	16.1	34.91	18.52	0	14.44	2.025	1.998	0	4.816	73.23	493.7	16.71	0.6001	3123.2	0	0	2202	258.4	0	0	Technical room
Washroom		1	20.91	23.78	20.97	24.13	25.7	35.64	19.58	0	16.58	2.025	1.998	0	4.816	74.71	493.7	17.26	0.6	3123.2	0	0	4375	516.8	0	0	Washroom
Stairs		1	20.9	25.02	20.91	25.67	32.49	48.69	30.25	9.014	19.62	2.025	1.998	36.6	4.816	73.22	493.7	17.55	0.6001	3123.2	211.7	0	3536	393.6	0	0	Stairs
Display		1	20.89	25.07	21.16	27.04	13.93	23.5	56.94	34.7	19.79	2.025	1.998	64.84	4.816	73.57	493.7	16.17	0.6	3123.2	1004.8	5.1	65017	5707	0	0	Display
Toilet/wardrobe		1	20.93	22.84	21.22	23.07	6.016	20.42	19.07	0	14.29	2.025	1.997	0	4.816	73.21	493.6	15.86	0.6001	3123.2	0	0	2809	283.5	0	0	Toilet/wardrobe
Office 1.1		1	20.91	24.58	21.04	24.9	17.46	35.78	21.39	0	18.55	2.025	1.997	27.87	4.816	73.2	493.7	16.83	0.5999	3123.2	0	0	1652	177.7	0	0	Office 1.1
Office 1.2		1	20.9	25.07	20.93	25.97	33.61	47.25	49	27.52	19.75	2.025	1.997	92.34	4.816	73.15	493.7	17.52	0.6001	3123.2	561.5	0	1475	154.7	0	0	Office 1.2
Office 2.6		1	20.92	23.56	21.14	24.1	19.06	29.89	19.3	0	16.05	2.025	1.998	21.49	4.801	73.1	493.6	16.2	0.5441	3123.2	0	0	13149	1420	0	0	Office 2.6
Office 2.5		1	20.93	24.03	21.19	24.62	14.04	23.22	19.87	0	17.19	2.025	1.997	33.17	4.801	73.11	493.7	15.97	0.544	3123.2	0	0	13720	1387	0	0	Office 2.5
Office 2.4		1	20.93	24	21.18	24.57	14.07	23.25	19.85	0	17.13	2.026	1.998	32.55	4.801	73.1	493.6	16.03	0.544	3123.2	0	0	8565	872.7	0	0	Office 2.4
Office 2.3		1	20.93	24.18	21.15	24.78	16.87	26.16	20.05	0	17.56	2.024	1.997	33.63	4.801	72.85	493.7	16.2	0.5444	3123.2	0	0	9683	1003	0	0	Office 2.3
Office 2.2		1	20.93	25.03	21.14	26.15	18.03	27.57	34.33	13.15	19.65	2.025	1.997	61.44	4.801	70.27	493.7	16.24	0.5442	3123.2	258.7	0	13587	1331	0	0	Office 2.2
Office 2.8		1	20.94	22.25	21.23	22.46	6.767	16	17.62	0	12.85	2.025	1.998	0	4.801	73.47	493.7	15.87	0.5441	3123.2	0	0	1985	216.4	0	0	Office 2.8
Office 2.1		1	20.93	23.37	21.15	23.81	15.75	26.35	18.9	0	15.58	2.025	1.997	23.35	4.801	72.89	493.7	16.17	0.5443	3123.2	0	0	9816	1055	0	0	Office 2.1
Meeting room		1	20.93	23.3	21.06	23.62	20.95	34.82	18.61	0	15.42	2.025	1.997	16.64	4.801	72.7	493.7	16.72	0.5442	3123.2	0	0	1978	225.7	0	0	Meeting room
Stairs, kitchen, corridc		1	20.94	22.54	21.18	22.84	11.88	23.08	18.04	0	13.56	2.025	1.997	5.851	4.801	73.5	493.7	15.98	0.5441	3123.2	0	0	17804	1969	0	0	Stairs, kitchen, corridor
Office 2.7		1	20.93	22.79	21.14	23.13	15.73	28.37	18.29	0	14.16	2.025	1.998	9.071	4.801	73.11	493.7	16.25	0.5443	3123.2	0	0	5271	592	0	0	Office 2.7
Women toilet		1	20.94	22.04	21.21	22.21	6.711	15.97	17.39	0	12.32	2.025	1.998	0	4.801	73.73	493.7	15.97	0.5442	3123.2	0	0	1438	159.8	0	0	Women toilet
Men toilet		1	20.94	22.05	21.21	22.21	6.659	15.94	17.38	0	12.34	2.025	1.998	0	4.801	73.74	493.7	16	0.5444	3123.2	0	0	1303	145.1	0	0	Men toilet
HCWC		1	20.94	21.97	21.17	22.09	6.545	15.85	17.22	0	12.15	2.025	1.996	0	4.801	73.78	493.7	16.21	0.5444	3123.2	0	0	671.1	76.51	0	0	HCWC
Broom cupboard		1	20.95	22.04	21.15	22.15	6.374	15.7	17.19	0	12.32	2.025	1.998	0	4.801	73.82	493.7	16.34	0.5442	3123.2	0	0	454.5	52.29	0	0	Broom cupboard
Silent room		1	20.94	22.12	21.21	22.3	6.742	15.99	17.41	0	12.53	2.025	1.998	0	4.801	73.69	493.7	16	0.5441	3123.2	0	0	1302	144.7	0	0	Silent room
Total																							203226.6	20525.9			

Air handling units

AHU	Heating, kWh	Cooling, kWh	AHU heat recovery, kWh	AHU cold recovery, kWh	Humidi-fication, kWh	Fans, kWh
Air Handlir	66920.8	23106.7	284388	404.7	0	47626
Total	66920.8	23106.7	284388	404.7	0	47626

Systems energy

	kWh
Zone heati	117796
Zone coolii	7302.3
AHU heatir	66920.8
AHU coolir	23106.7
Dom. hot v	52064
Cooling	30409
Heating	236780.8

Energy balance (sensible only)

	Envelope & Thermal bridges, kWh	Internal Walls and Masses, kWh	Window & Solar, kWh	Mech. supply air, kWh	Infiltra-tion & Openings, kWh	Occu-pants, kWh	Equip-ment, kWh	Lighting, kWh	Local heating units, kWh	Local cooling units, kWh	Net losses, kWh
Total	-64771.3	-7.6	26114.8	-160403	-1221.9	14392.4	30483.2	44920.2	117797.4	-7302.6	0
During hea	-50954.6	4783.2	-5092	-125025	-1124.3	9446.5	20219.6	29793	117807.2	0	0
During coo	-6582.6	-2354	20505.8	-16123.8	-37.4	1952.2	4069.6	5997.1	0	-7301.4	0
Rest of tim	-7234.1	-2436.8	10701	-19253.6	-60.2	2993.7	6194	9130.1	-9.8	-1.2	0

Delivered Energy

Meter	Total, kWh	Per m2, kWh/m2	Peak demand, kW	Cost	CO2 Emission, kg	Primary energy, kWh
Lighting, fa	44918	26.86	14.78			
Electric coo	10136.4	6.062	23.6			
HVAC aux	47742	28.55	5.751			
Electric hea	109713	65.61	48.89			
Equipment	30483	18.23	10.03			
Total	242992.4	145.3	103.1	0	0	0

Zones

Zone	Group	Zone multiplier, M	Min temp, °C	Max temp, °C	Min op temp, °C	Max op temp, °C	Max heat supplied, W/m2	Room unit heat, W/m2	Max heat removed, W/m2	Room unit cool, W/m2	Dry vent cool, W/m2	Max sup airflow, L/(s m2)	Max rtn airflow, L/(s m2)	Max solar gain, W/m2	Min rel hum, %	Max rel hum, %	Max CO2, ppm (vol)	Max PPD, %	Max age of air, h	In use, h	h of T_op>25, h	h of T_op>27, h	Occ. hours, h	PDH, h	Unmet hours (cooling)	Unmet hours (heating)	Zone
Garage/workshop 1		1	20.91	23.15	21.09	23.51	16.9	26.3	19.48	0	15.04	2.025	1.998	0	4.818	73.49	493.6	16.44	0.6001	3127.3	0	0	10595	1221	0	0	Garage/workshop 1
Garage/workshop 2		1	20.91	22.95	21.15	23.27	11.58	21.57	19.35	0	14.56	2.025	1.998	0	4.817	73.43	493.6	16.15	0.6	3127.3	0	0	10842	1167	0	0	Garage/workshop 2
Technical room		1	20.91	22.8	21.06	23	16.14	35.73	18.32	0	14.19	2.025	1.998	0	4.818	73.21	493.7	16.69	0.6001	3127.3	0	0	2202	260.4	0	0	Technical room
Washroom		1	20.92	23.5	20.97	23.83	25.67	35.61	19.17	0	15.9	2.025	1.998	0	4.818	74.71	493.7	17.24	0.6	3127.3	0	0	4376	521.7	0	0	Washroom
Stairs		1	20.91	25.02	20.91	25.66	32.46	49.45	29.86	8.454	19.62	2.025	1.998	38.11	4.818	73.21	493.7	17.52	0.6001	3127.3	213.6	0	3537	393.1	0	0	Stairs
Display		1	20.9	25.02	21.2	26.08	10.14	19.09	31.28	10.3	19.66	2.025	1.998	43.56	4.817	73.58	493.7	15.86	0.6	3127.3	502.8	0	65025	5377	0	0	Display
Toilet/wardrobe		1	20.93	22.74	21.21	22.97	6.034	21.03	18.79	0	14.04	2.025	1.997	0	4.817	73.19	493.6	15.85	0.6001	3127.3	0	0	2809	285.9	0	0	Toilet/wardrobe
Office 1.1		1	20.91	23.69	21.07	23.95	14.31	33.91	19.62	0	16.36	2.025	1.997	19.58	4.817	73.18	493.7	16.67	0.5999	3127.3	0	0	1652	182.6	0	0	Office 1.1
Office 1.2		1	20.92	25.01	21	25.59	21.9	39.28	30.39	8.987	19.61	2.025	1.997	66.24	4.818	70.87	493.7	17.06	0.6001	3127.3	180	0	1476	156.3	0	0	Office 1.2
Office 2.6		1	20.93	22.94	21.16	23.38	17.62	29.04	18.26	0	14.53	2.025	1.998	15.63	4.803	73.1	493.6	16.08	0.5441	3127.3	0	0	13151	1459	0	0	Office 2.6
Office 2.5		1	20.94	23.13	21.2	23.59	12.86	21.82	18.4	0	15	2.025	1.997	24.4	4.803	73.1	493.7	15.89	0.544	3127.3	0	0	13722	1435	0	0	Office 2.5
Office 2.4		1	20.94	23.06	21.19	23.49	12.82	21.78	18.32	0	14.83	2.026	1.998	23.1	4.803	73.1	493.6	15.94	0.544	3127.3	0	0	8566	905.5	0	0	Office 2.4
Office 2.3		1	20.93	23.25	21.16	23.71	15.68	24.74	18.5	0	15.29	2.024	1.997	24.9	4.803	73.1	493.7	16.11	0.5444	3127.3	0	0	9684	1040	0	0	Office 2.3
Office 2.2		1	20.93	24.31	21.17	24.89	15.4	24.5	20.47	0	17.89	2.025	1.997	43.43	4.803	70.37	493.7	16.06	0.5442	3127.3	0	0	13588	1389	0	0	Office 2.2
Office 2.8		1	20.94	22.18	21.22	22.38	6.834	16.09	17.41	0	12.66	2.025	1.998	0	4.803	73.47	493.7	15.87	0.5441	3127.3	0	0	1985	217.7	0	0	Office 2.8
Office 2.1		1	20.93	22.88	21.18	23.25	13.45	24.65	18.35	0	14.38	2.025	1.997	17.2	4.803	73.25	493.7	16.01	0.5443	3127.3	0	0	9818	1070	0	0	Office 2.1
Meeting room		1	20.94	22.85	21.08	23.12	18.29	33.03	18.14	0	14.3	2.025	1.997	12.67	4.803	73.1	493.7	16.57	0.5442	3127.3	0	0	1978	229.5	0	0	Meeting room
Stairs, kitchen, corridc		1	20.94	22.51	21.18	22.81	11.92	23.33	17.93	0	13.47	2.025	1.997	6.046	4.803	73.5	493.7	15.95	0.5441	3127.3	0	0	17806	1973	0	0	Stairs, kitchen, corridor
Office 2.7		1	20.93	22.55	21.15	22.86	14.35	27.54	17.98	0	13.57	2.025	1.998	6.983	4.803	73.1	493.7	16.15	0.5443	3127.3	0	0	5272	596.4	0	0	Office 2.7
Women toilet		1	20.94	22.04	21.21	22.2	6.816	15.98	17.26	0	12.32	2.025	1.998	0	4.803	73.74	493.7	15.97	0.5442	3127.3	0	0	1438	160	0	0	Women toilet
Men toilet		1	20.94	22.03	21.21	22.2	6.757	15.94	17.25	0	12.31	2.025	1.998	0	4.803	73.74	493.7	16	0.5444	3127.3	0	0	1303	145.3	0	0	Men toilet
HCWC		1	20.95	21.97	21.17	22.09	6.648	15.86	17.09	0	12.14	2.025	1.996	0	4.803	73.78	493.7	16.21	0.5444	3127.3	0	0	671.2	76.61	0	0	HCWC
Broom cupboard		1	20.95	22	21.15	22.1	6.444	15.68	17.05	0	12.21	2.025	1.998	0	4.803	73.82	493.7	16.34	0.5442	3127.3	0	0	454.6	52.41	0	0	Broom cupboard
Silent room		1	20.94	22.07	21.21	22.24	6.805	15.98	17.26	0	12.4	2.025	1.998	0	4.803	73.7	493.7	16	0.5441	3127.3	0	0	1302	145.1	0	0	Silent room
Total																							203252.8	20459.5			

Air handling units

AHU	Heating, kWh	Cooling, kWh	AHU heat recovery, kWh	AHU cold recovery, kWh	Humidi-fication, kWh	Fans, kWh
Air Handlir	67380.3	22879.9	283944	568.6	0	47628
Total	67380.3	22879.9	283944	568.6	0	47628

Systems energy

	kWh
Zone heati	111878
Zone coolii	766
AHU heatir	67380.3
AHU coolir	22879.9
Dom. hot v	52064
Cooling	23645.9
Heating	231322.3

Energy balance (sensible only)

	Envelope & Thermal bridges, kWh	Internal Walls and Masses, kWh	Window & Solar, kWh	Mech. supply air, kWh	Infiltra-tion & Openings, kWh	Occu-pants, kWh	Equip-ment, kWh	Lighting, kWh	Local heating units, kWh	Local cooling units, kWh	Net losses, kWh
Total	-64036.6	15.5	20628.9	-156263	-1244.6	14394.1	30487	44924.7	111879.3	-766	0
During hea	-55039.4	2884.6	8965.4	-129732	-1172.5	9872.3	21114.6	31112.1	111888.6	0	0
During coo	-2302.5	-789.4	4737.4	-7459.5	-15	1085.3	2245.4	3308.8	0	-766	0
Rest of tim	-6694.7	-2079.7	6926.1	-19071.3	-57.1	3436.5	7127	10503.8	-9.3	0	0

Delivered Energy

Meter	Total, kWh	Per m2, kWh/m2	Peak demand, kW	Cost	CO2 Emission, kg	Primary energy, kWh
Lighting, fa	44923	26.86	14.78			
Electric coo	7882	4.713	20.67			
HVAC aux	47742	28.55	5.742			
Electric hea	106986	63.98	46.91			
Equipment	30488	18.23	10.03			
Total	238021	142.3	98.13	0	0	0

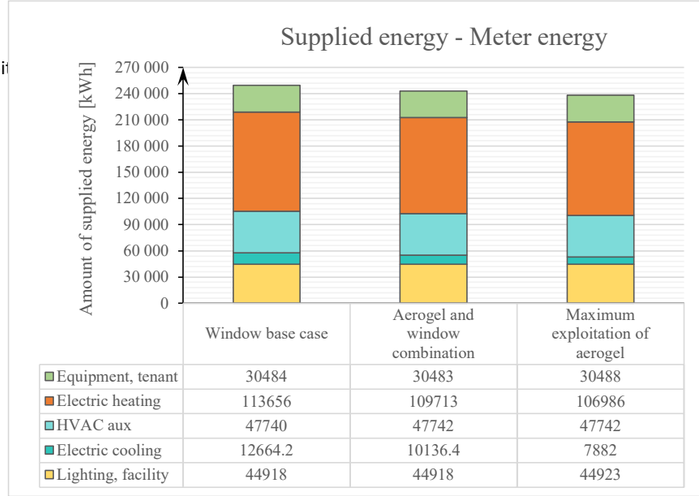
Delivered Energy

	Total, kWh			Per m2, kWh/m2			Peak demand, kW		
	Window base	Aerogel and w	Maximum exp	Window base	Aerogel and winc	Maximum ex	Window base	Aerogel an	Maximum exploit
Lighting, facility	44918	44918	44923	26.86	26.86	26.86	14.78	14.78	14.78
Electric cooling	12664.2	10136.4	7882	7.573	6.062	4.713	27.23	23.6	20.67
HVAC aux	47740	47742	47742	28.55	28.55	28.55	5.753	5.751	5.742
Electric heating	113656	109713	106986	67.97	65.61	63.98	51.17	48.89	46.91
Equipment, tenant	30484	30483	30488	18.23	18.23	18.23	10.03	10.03	10.03
Total	249462.2	242992.4	238021	149.2	145.3	142.3	109	103.1	98.13

Used Energy

	Total, kWh		
	Window base	Aerogel and w	Maximum exploitation of aerogel
Zone heating	125909	117796	111878
Zone cooling	14797.5	7302.3	766
AHU heating	66694.7	66920.8	67380.3
AHU cooling	23193.8	23106.7	22879.9
Dom. hot water	52064	52064	52064
Total	282659	267189.8	254968.2
	192603.7	184716.8	179258.3

0.93071057 0.069289427



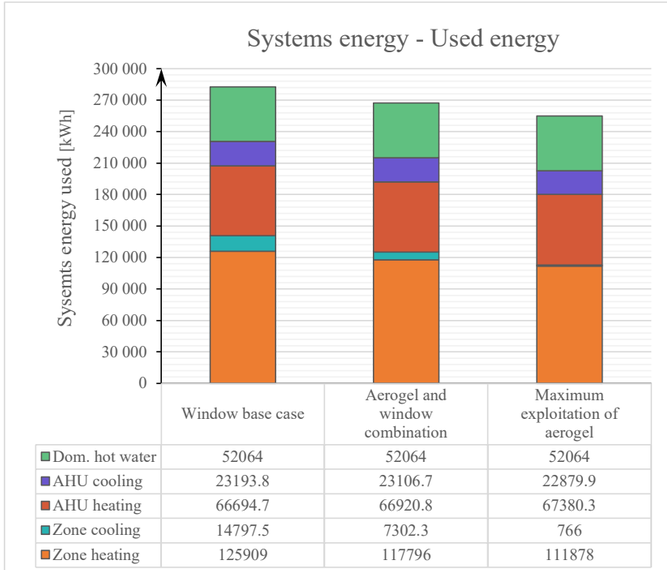
ENERGY FOR ALL ZONES

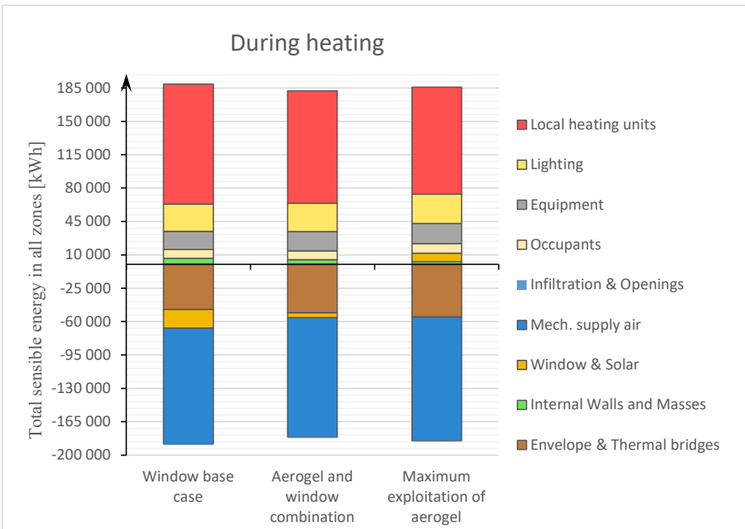
During cooling

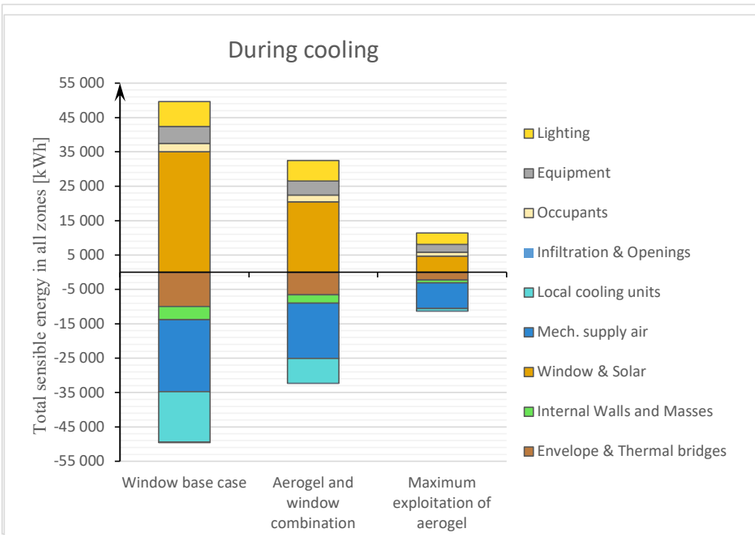
	Envelope & Thermal bridges	Internal Walls and Masses	Window & Solar	Mech. supply air	Infiltration & Openings	Occupants	Equipment	Lighting	Local cooling units
Window base case	-9985.3	-3845.9	35094.6	-20872.8	-51.6	2369.4	4943.3	7284.2	-14794.2
Aerogel and window	-6582.6	-2354	20505.8	-16123.8	-37.4	1952.2	4069.6	5997.1	-7301.4
Maximum exploitatio	-2302.5	-789.4	4737.4	-7459.5	-15	1085.3	2245.4	3308.8	-766
			0.70624956						
			30357.2						

During heating

	Envelope & Thermal bridges	Internal Walls and Masses	Window & Solar	Mech. supply air	Infiltration & Openings	Occupants	Equipment	Lighting	Local heating units
Window base case	-47127.6	6558.6	-19846.7	-121222.2	-1096.8	8988.2	19256.7	28374.2	125898.1
Aerogel and window	-50954.6	4783.2	-5092	-125025.2	-1124.3	9446.5	20219.6	29793	117807.2
Maximum exploitatio	-55039.4	2884.6	8965.4	-129732	-1172.5	9872.3	21114.6	31112.1	111888.6







EQUA SIMULATION TECHNOLOGY GROUP		Comparative Report	
Project			
Customer	Afry Consult AS	Simulated	31.05.2022 23:43:49

Simulated cases

Base case Base case	
Aerogel M. Aerogel M.1	
Aerogel M1 Aerogel M.2	

Comfort Reference

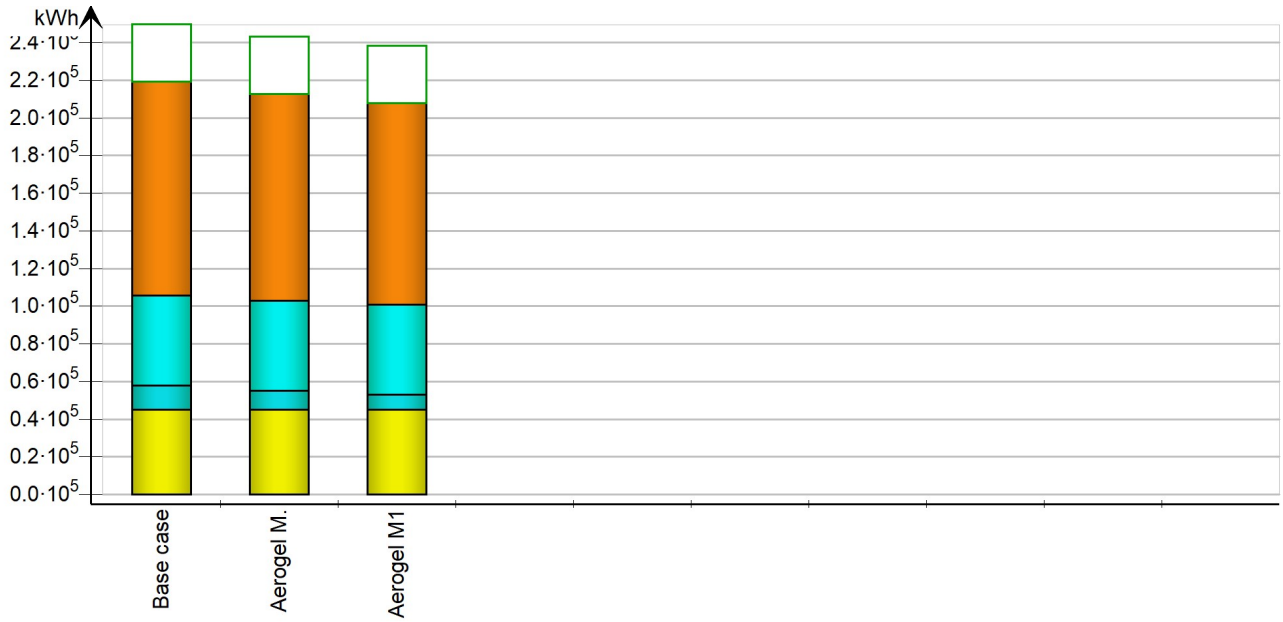
	Base case	Aerogel M.	Aerogel M1
Percentage of hours when operative temperature is above 27°C in worst zone	8	0	0
Percentage of hours when operative temperature is above 27°C in average zone	3	0	0
Percentage of total occupant hours with thermal dissatisfaction	10	10	10

Best comfort per metered energy: Aerogel M1

Supplied Energy

Meter Energy

	Base case		Aerogel M.		Aerogel M1	
	kWh	kWh/m²	kWh	kWh/m²	kWh	kWh/m²
Lighting, facility	44918	26.9	44918	26.9	44923	26.9
Electric cooling	12664	7.6	10136	6.1	7882	4.7
HVAC aux	47740	28.6	47742	28.6	47742	28.6
Electric heating	113656	68.0	109713	65.6	106986	64.0
Total, Facility electric	218978	131.0	212509	127.1	207533	124.1
Total	218978	131.0	212509	127.1	207533	124.1
Equipment, tenant	30484	18.2	30483	18.2	30488	18.2
Total, Tenant electric	30484	18.2	30483	18.2	30488	18.2
Grand total	249462	149.2	242992	145.3	238021	142.3

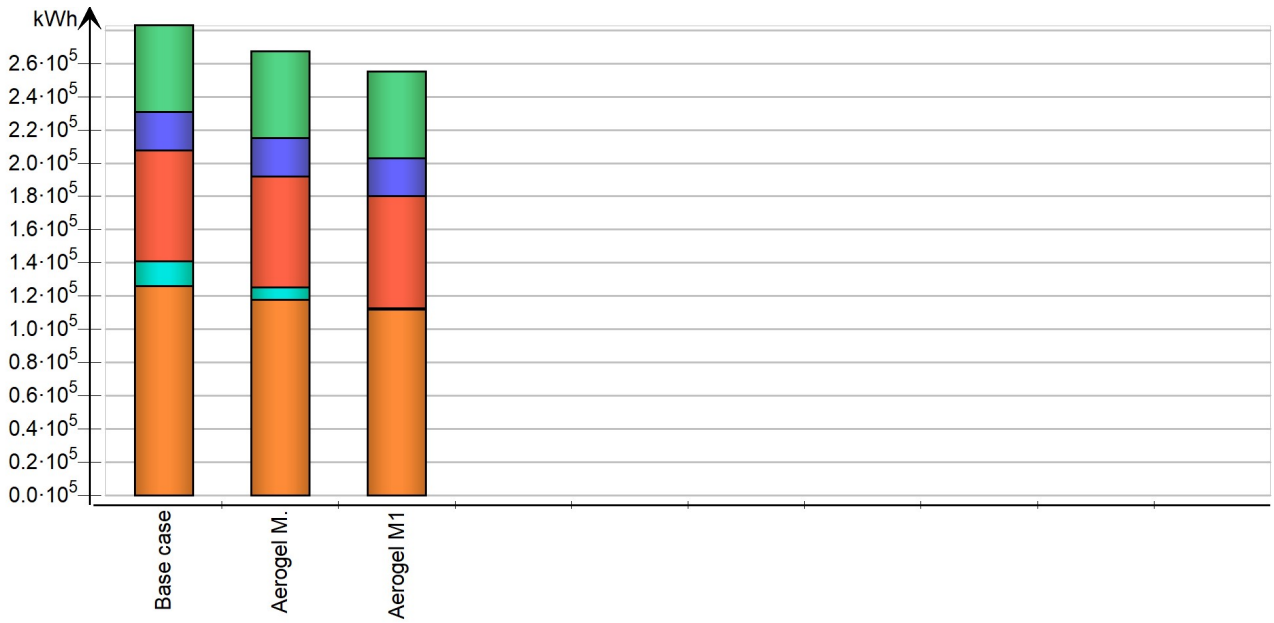


Systems Energy

Used energy

kWh

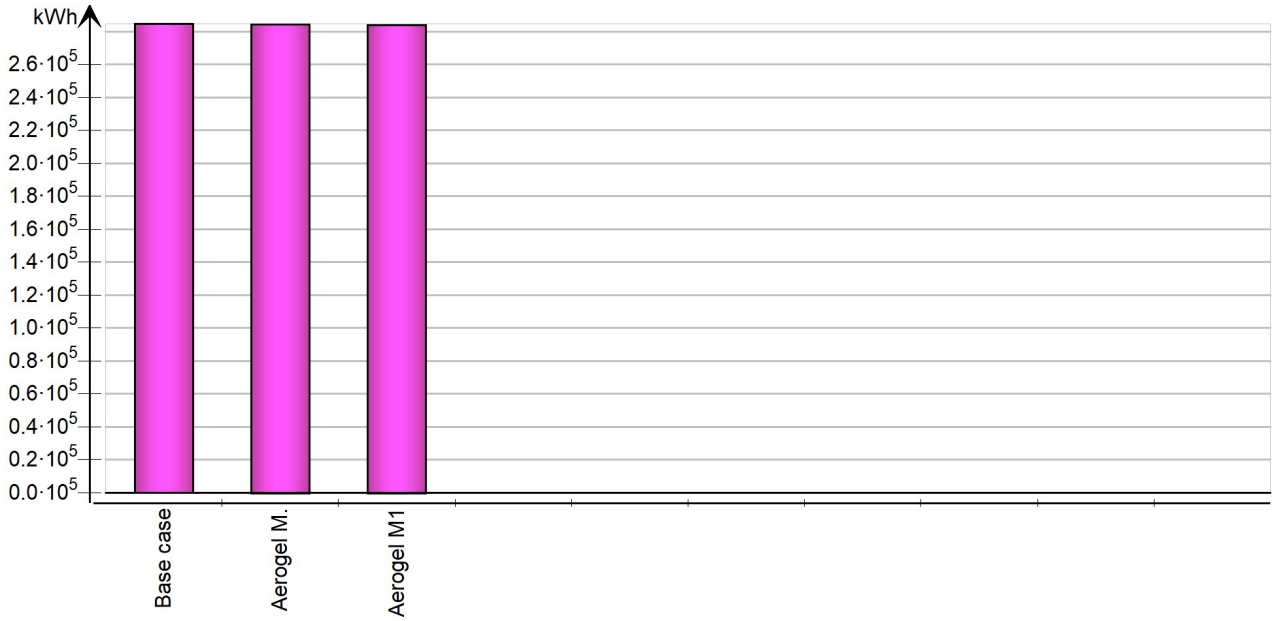
Case	Zone heating	Zone cooling	AHU heating	AHU cooling	Dom. hot water
Base case	125909.0	14797.5	66694.7	23193.8	52064.0
Aerogel M.	117796.0	7302.3	66920.8	23106.7	52064.0
Aerogel M1	111878.0	766.0	67380.3	22879.9	52064.0



Utilized free energy

kWh

Case	AHU heat recovery	AHU cold recovery	Plant heat recovery	Plant cold recovery	Solar heat	Ground heat	Ground cold	Ambient heat	Ambient cold
Base case	284627.0	-343.6							
Aerogel M.	284388.0	-404.7							
Aerogel M1	283944.0	-568.6							



Generated electric energy

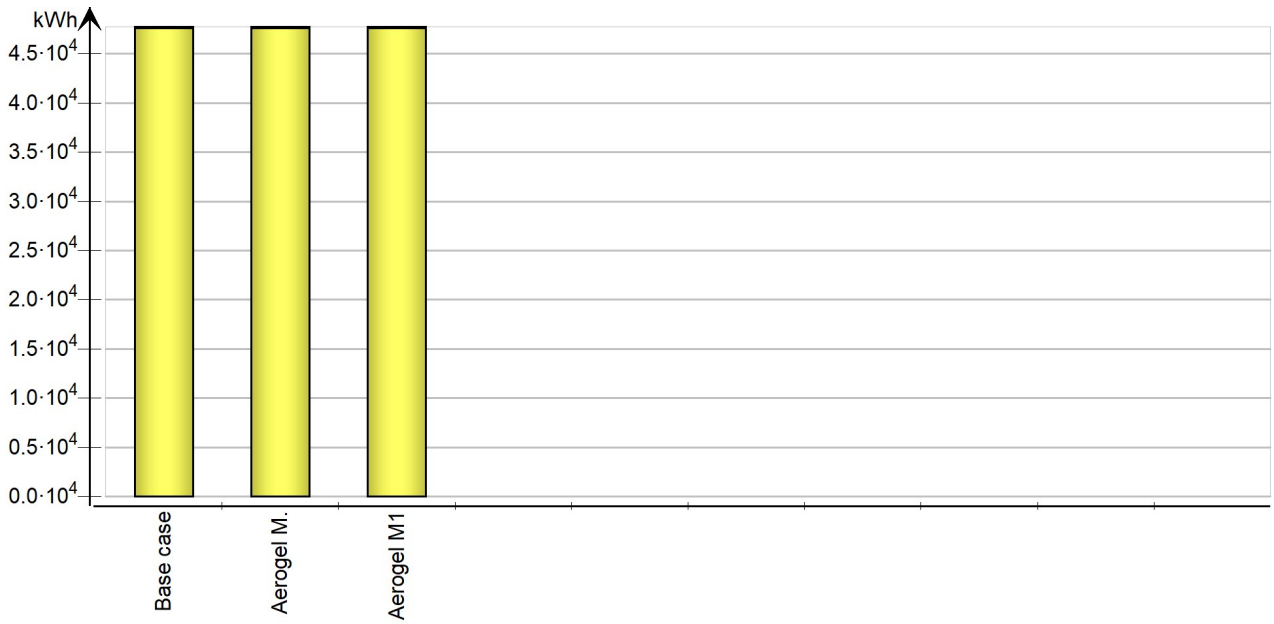
kWh

Case	Solar (PV)	Wind turbine	CHP
Base case			
Aerogel M.			
Aerogel M1			

Auxiliary energy

kWh

Case	Humidi-fication	Fans	Pumps
Base case		47626.0	114.3
Aerogel M.		47626.0	114.2
Aerogel M1		47628.0	113.9

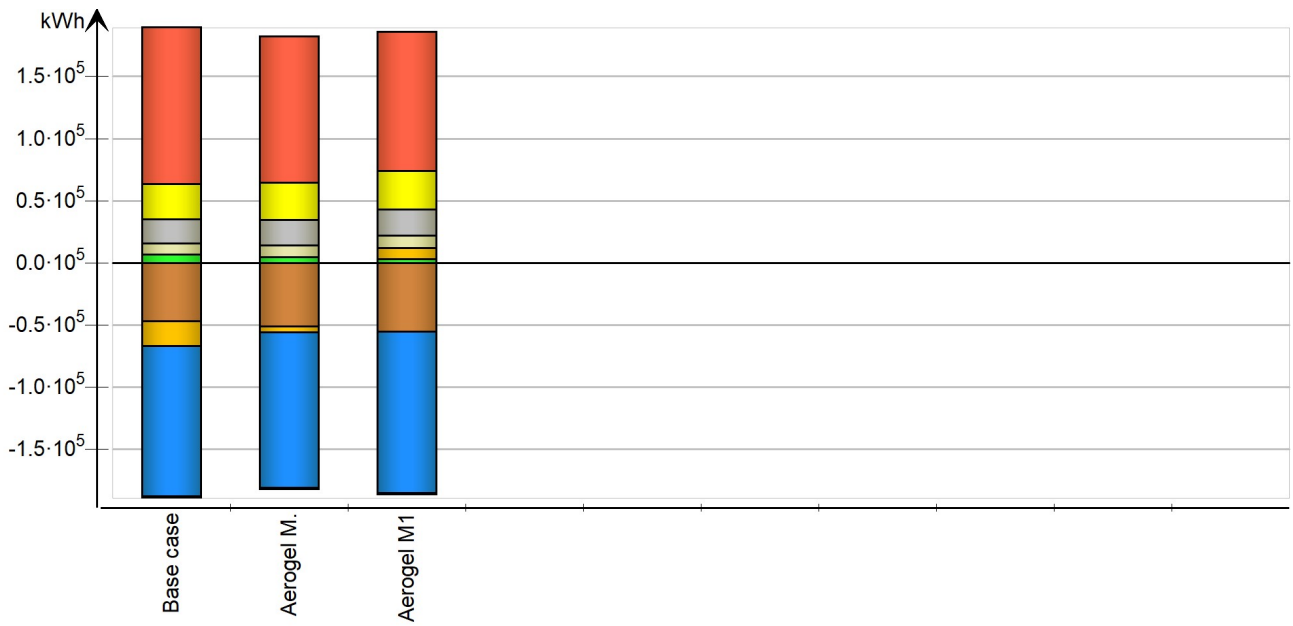


Energy for all zones (sensible only)

During heating

kWh

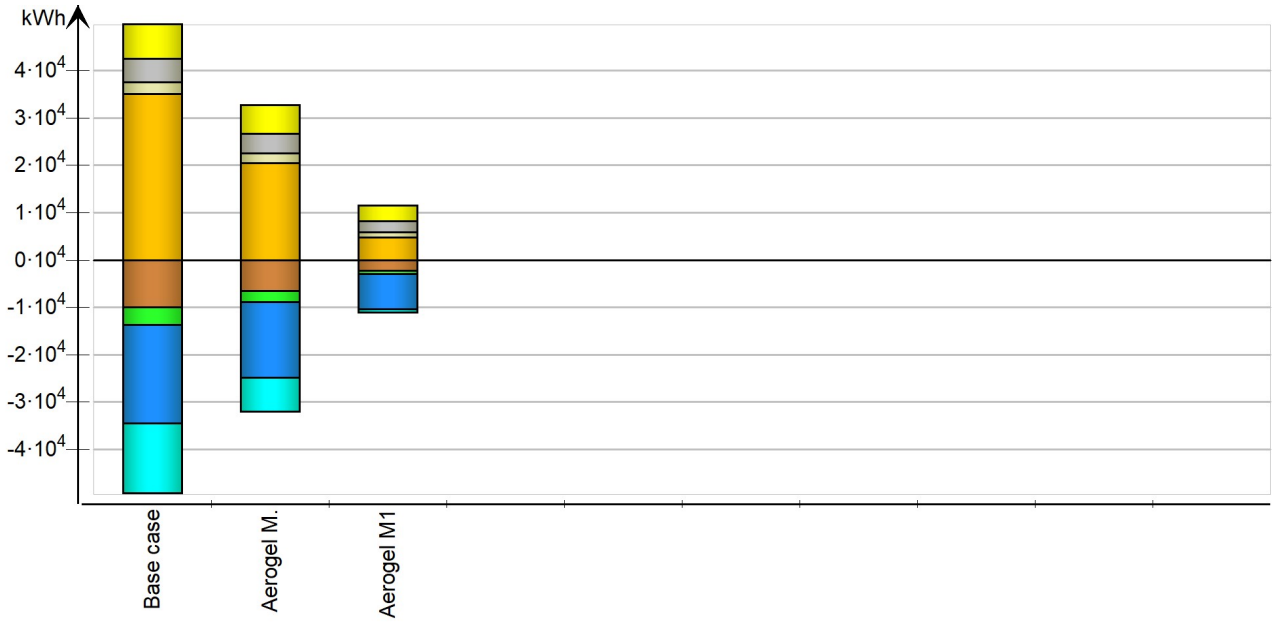
Case	Envelope & Thermal bridges	Internal Walls and Masses	Window & Solar	Mech. supply air	Infiltra-tion & Openings	Occu-pants	Equip-ment	Lighting	Local heating units	Local cooling units	Net losses
Base case	-47127.6	6558.6	-19846.7	-121222.2	-1096.8	8988.2	19256.7	28374.2	125898.1	0.0	0.0
Aerogel M.	-50954.6	4783.2	-5092.0	-125025.2	-1124.3	9446.5	20219.6	29793.0	117807.2	0.0	0.0
Aerogel M1	-55039.4	2884.6	8965.4	-129732.0	-1172.5	9872.3	21114.6	31112.1	111888.6	0.0	0.0



During cooling

kWh

Case	Envelope & Thermal bridges	Internal Walls and Masses	Window & Solar	Mech. supply air	Infiltra-tion & Openings	Occu-pants	Equip-ment	Lighting	Local heating units	Local cooling units	Net losses
Base case	-9985.3	-3845.9	35094.6	-20872.8	-51.6	2369.4	4943.3	7284.2	0.0	-14794.2	0.0
Aerogel M.	-6582.6	-2354.0	20505.8	-16123.8	-37.4	1952.2	4069.6	5997.1	0.0	-7301.4	0.0
Aerogel M1	-2302.5	-789.4	4737.4	-7459.5	-15.0	1085.3	2245.4	3308.8	0.0	-766.0	0.0



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