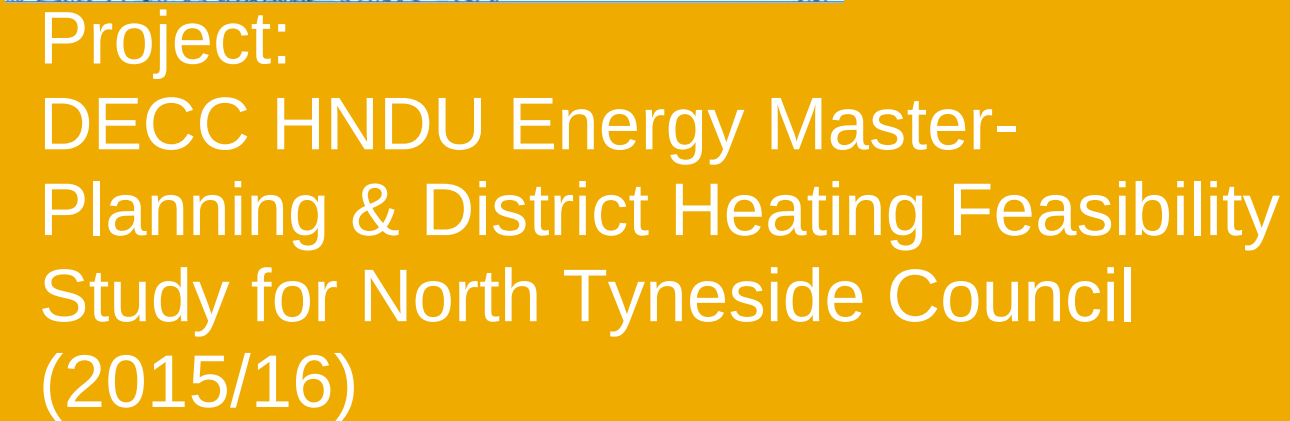




CAPITA



Energy Master-Planning Report Supplement



Quality Management

Job No	N/A		
Project	DECCHNDU Energy Master-Planning & District Heating Feasibility Study		
Location	North Tyneside		
Title	Energy Master-Planning Report - Final Draft for End Stage Review		
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V1.0	20/06/16	Final draft for Client review	NR	MT	BD

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Note: This report supplement document provides technical and financial detail with supporting graphics to accompany the proposal analysis sections of the main Energy Master-Planning Report document (Doc re: EMDH-EM:V2.2.

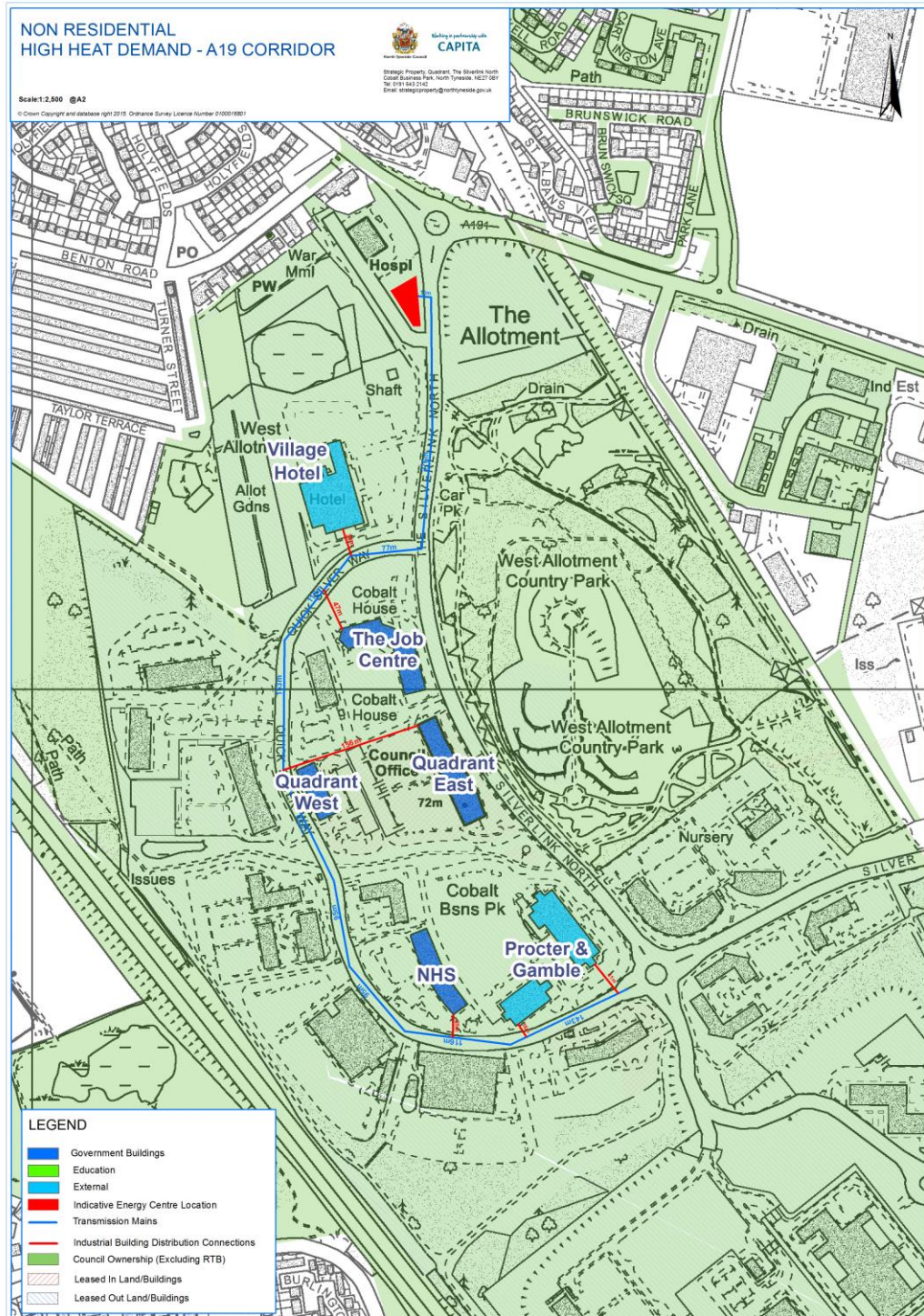
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1. A19 North System Technical Overview and Financial Performance Summary

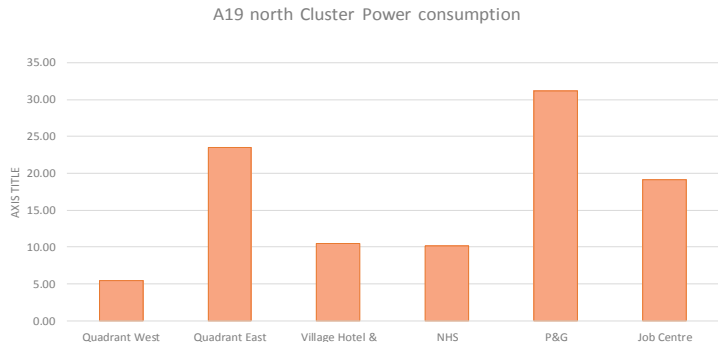
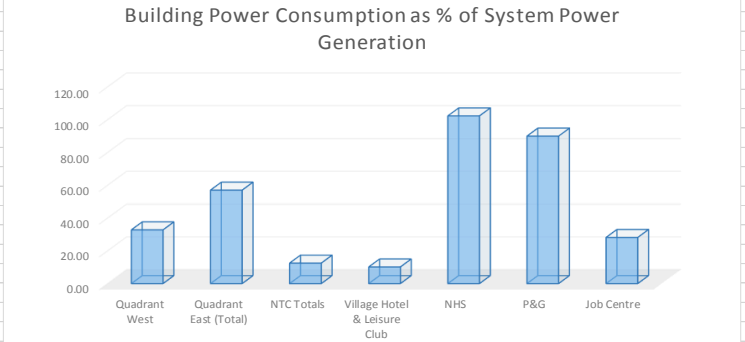
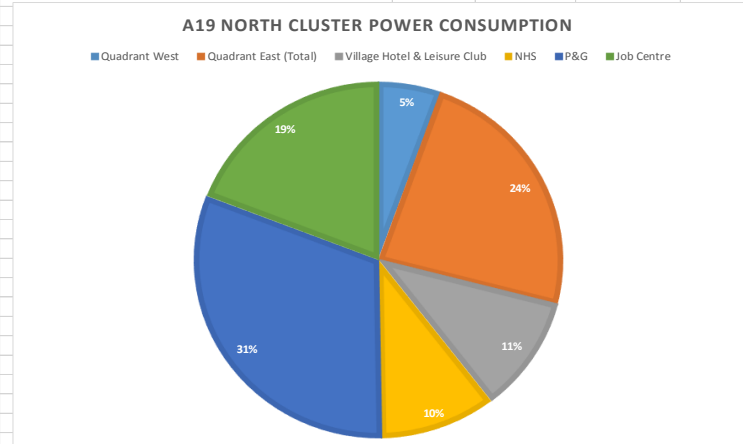
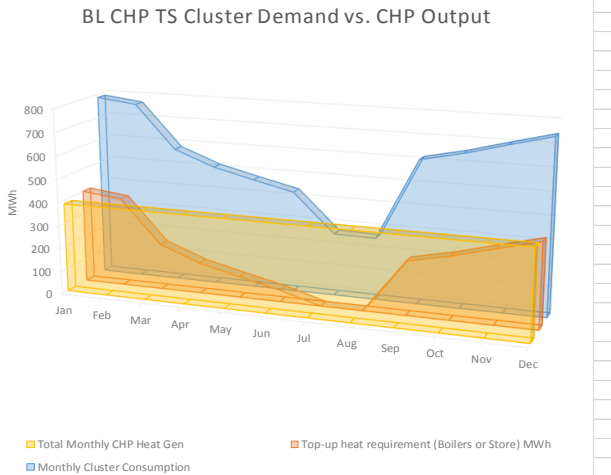
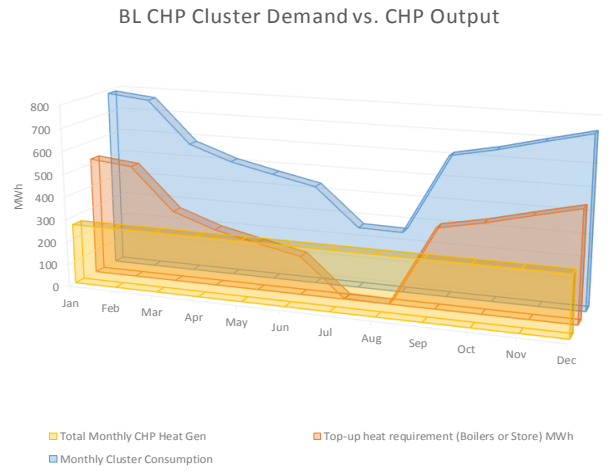
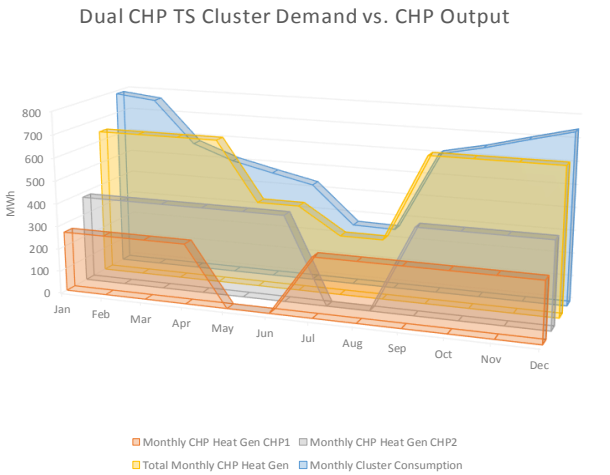
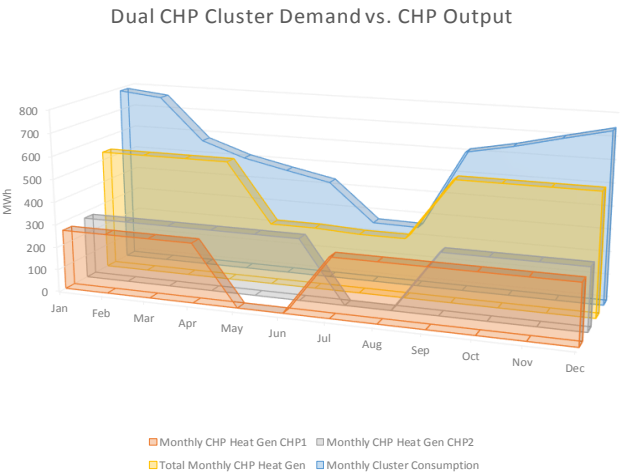
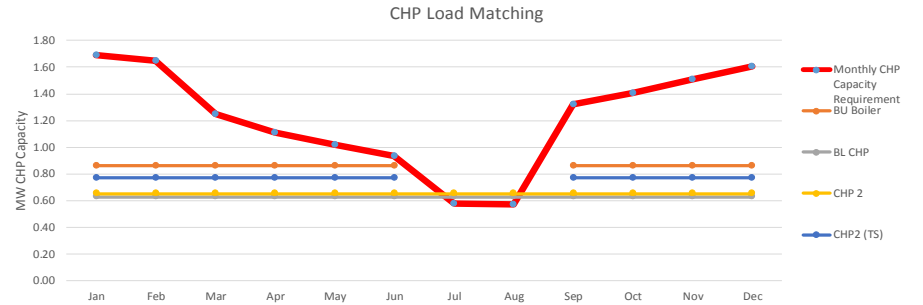
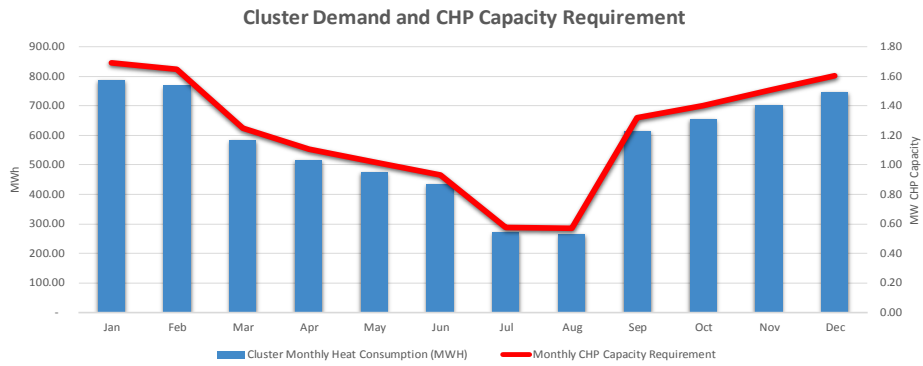


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Energy Details													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Heat Demand
Cluster Monthly Heat Consumption (MWH)	786.50	766.56	581.02	515.68	473.96	434.32	268.67	265.50	614.67	653.02	700.95	746.50	6,807.36
System Technical Details													
Monthly CHP Capacity Requirement	1.69	1.65	1.25	1.11	1.02	0.93	0.58	0.57	1.32	1.40	1.51	1.60	
Baseload CHP Capacity Requirement	0.63												
Average load CHP Capacity Requirement	1.22												
Gas Back-up boiler capacity requirement (MW)	0.86												
Bimoass Back-up boiler capacity requirement (MW)	0.93												
Network Details													
Transmission Mains (m)	1214.00												
Distribution Mains (m)	331.00												
Network m3	85.82												
MWh Thermal Storage Potential	3.90												
System run hrs storage potential	2.03												
CHP Details													
	Dual CHP			Dual CHP (TS)			BL CHP		BL CHP (TS)				
	CHP1	CHP2	Totals	CHP1	CHP2	Totals	CHP1	CHP2	CHP1	CHP2			
Average Electrical output (Mwe)	0.49	0.51	0.99	0.49	0.60	1.09	0.49	-			0.61	-	
Average Heat output (MWt)	0.63	0.65	1.28	0.63	0.77	1.40	0.63	-			0.78	-	
Overall CHP Efficiency (%)	80%	80%	1.60	80%	80%	1.60	80%	-			80%	-	
Fuel input (gross CV basis) (MW)	1.39	1.45	2.84	1.39	1.71	3.10	1.41	-			1.73	-	
CHP hours run per year (hrs)	5,585	5,585		5,585	6,570		5,585	-			6,570	-	
Annual CHP Displaced Electricity (MWH)	2,726	2,826	5,551	2,726	3,929	6,655	2,753	-			3,984	-	
Annual Electricity Generated (parasitic network load adj)	2,222	2,305	4,526	2,222	3,224	5,446	2,693	-			3,897	-	
Monthly Electricity Generated (parasitic network load adj)	222	230	453	222	322	545	224	-			325	-	
Monthly CHP Delivered Heat (network heat-loss adj)	263	272	535	263	379	642	265	-			384	-	
Input Fuel (MWH)	7,788	8,073	15,861	7,788	11,225	19,013	7,866	-			11,383	-	
Annual Net CO2 Saving p/a (tonnes)	648	672	1,320	648	934	1,583	655	-			948	-	
Annual Net CO2 Saving p/a (£)	10,373	10,753	21,125	10,373	14,950	25,323	10,476	-			15,161	-	
Combined heat Capacity (MW) (CHP & Back-up)	1.49	0.65	2.14	1.12	0.77	1.89	2.42	-			2.16	-	



System CAPEX Costs	Dual CHP						Dual CHP (TS)						BL CHP						BL CHP (TS)					
	Gas Only	Biomass BU	3rd Party BU	WSHP BU	Gas Only	Biomass BU	3rd Party BU	WSHP BU	Gas Only	Biomass BU	3rd Party BU	WSHP BU	Gas Only	Biomass BU	3rd Party BU	WSHP BU	Gas Only	Biomass BU	3rd Party BU	WSHP BU	Gas Only	Biomass BU	3rd Party BU	WSHP BU
CHP	497,045	497,045	497,045	497,045	497,045	497,045	497,045	497,045	497,045	497,045	497,045	497,045	497,045	497,045	497,045	497,045	497,045	497,045	497,045	497,045	497,045	497,045	497,045	497,045
Boiler	25,720	-	-	-	-	-	-	-	14,868	-	-	-	53,498	-	-	-	1,744,485	-	-	-	41,308	-	-	-
WSHP	-	-	-	-	-	-	-	-	484,841	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biomass Boiler, store & assoc. plant	-	-	327,048	-	-	-	-	-	188,549	-	-	-	678,411	-	-	-	-	-	-	-	523,836	-	-	-
Plant BGS (Balance of System)	-	-	123,614	74,557	200,704	-	-	-	109,739	81,456	154,183	-	138,736	36,974	298,647	-	-	-	-	-	124,057	45,482	247,533	-
Thermal Store	-	-	-	-	-	-	-	-	74,443	74,443	74,443	-	-	-	-	-	69,981	69,981	69,981	-	-	-	-	-
Network Transmission	1,194,576	1,194,576	1,194,576	1,194,576	1,194,576	1,194,576	1,194,576	1,194,576	1,194,576	1,194,576	1,194,576	1,194,576	1,194,576	1,194,576	1,194,576	1,194,576	1,194,576	1,194,576	1,194,576	1,194,576	1,194,576	1,194,576	1,194,576	1,194,576
Network Distribution	198,600	198,600	198,600	198,600	198,600	198,600	198,600	198,600	198,600	198,600	198,600	198,600	198,600	198,600	198,600	198,600	198,600	198,600	198,600	198,600	198,600	198,600	198,600	198,600
Building Connections	170,675	170,675	170,675	170,675	170,675	170,675	170,675	170,675	170,675	170,675	170,675	170,675	170,675	170,675	170,675	170,675	170,675	170,675	170,675	170,675	170,675	170,675	170,675	170,675
WSHP Network & Civils	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EC building Cost	243,280	291,936	145,449	340,592	215,311	258,373	158,910	301,435	275,065	380,078	72,131	385,091	245,424	294,509	88,728	343,593	-	-	-	-	-	-	-	-
Total Capital (£)	2,408,391	2,803,494	2,280,902	3,443,173	2,495,203	2,737,998	2,421,703	3,121,796	2,183,906	2,957,569	1,919,449	4,238,567	2,275,453	2,879,444	2,071,253	3,875,175	-	-	-	-	-	-	-	-

System OPEX & Revenue	Dual CHP						Dual CHP (TS)						BL CHP						BL CHP (TS)						
	Revenue			Opex Costs			Revenue			Opex Costs			Revenue			Opex Costs			Revenue			Opex Costs			
	Price/Cost (MWh)	Energy Sales (MWh)	Income non-energy	Energy Direct costs	Overhead Costs	Net	Price/Cost (MWh)	Energy Sales (MWh)	Income non-energy	Energy Direct costs	Overhead Costs	Net	Price/Cost (MWh)	Energy Sales (MWh)	Income non-energy	Energy Direct costs	Overhead Costs	Net	Price/Cost (MWh)	Energy Sales (MWh)	Income non-energy	Energy Direct costs	Overhead Costs	Net	
Private Wire Elec Sales	116.85	540,577				289,536	116.85	647,988				347,662	116.85	321,698				207,575	116.85	465,553				303,476	
Export Elec Sales	45	208,181				42,859	45	249,546				50,780	45	123,889				9,766	45	179,289				17,212	
Standing Charge			45,323						45,323						45,323						45,323				
Heat Sales (CHP)	52.00	278,368					52.00	333,679					52.00	165,657					52.00	239,734					
Heat Sales (Boiler)	52.00	76,603					52.00	31,151					52.00	188,326					52.00	126,218					
Input Fuel (CHP)	25.3			401,293.62			25.3			481,029.66			25.3			199,008.68			25.3				288,000.00		
Input Fuel (Boiler)	25.2			44,547.38			25.2			18,115.62			25.2			109,518.66			25.2				73,400.59		
Biomass Fuel Costs	46			84,704.85		326,571	46			34,446.04		362,722	46			208,244.80		298,623	46			139,567.91		364,498	
Biomass RRI Income T1	52.4		65,613			5,825	52.4		26,682			35,720	52.4		161,308			100,814	52.4		108,111			78,234	
Biomass RRI Income T2	22.7		11,579				22.7		4,709				22.7		28,466				22.7		19,078				
WSHP RRI																									
WSHP RRI Income T1	89.5		112,088				89.5		45,574				89.5		275,517				89.5		184,654				
WSHP RRI Income T2	26.7		5,000				26.7		1,399				26.7		14,505				26.7		9,721				
Opex Overhead:																									
Network maintenance	13					88,750.98	13					91,273.72	13					88,495.69	13					91,540.43	
Bureaux costs	11.1					75,779.68	11.1					77,933.71	11.1					75,561.70	11.1					78,161.44	
Business rates	6					40,961.99	6					42,126.33	6					40,844.16	6					42,249.43	

System Financial Performance (NPV, IRR, Capex Offset)	Dual CHP						Dual CHP (TS)						BL CHP						BL CHP (TS)					
	Income - Electricity	Income - Heat	Income - non-energy	Energy Direct costs	Overhead	Net income	Income - Electricity	Income - Heat	Income - non-energy	Energy Direct costs	Overhead	Net income	Income - Electricity	Income - Heat	Income - non-energy	Energy Direct costs	Overhead	Net income	Income - Electricity	Income - Heat	Income - non-energy	Energy Direct costs	Overhead	Net income
Gas only PW	540,577	354,970	45,323	445,841.01	205,492.65	289,536.47	647,988	364,830	45,323	499,145.28	211,333.76	347,661.83	321,698	353,983	45,323	308,527.34	204,901.56	207,574.95	465,553	365,952	45,323	361,400.59	211,951.29	303,476.18
Biomass PW	540,577	354,970	122,515	485,998.47	205,492.65	326,570.90	647,988	364,830	76,714	515,475.70	211,333.76	362,722.34	321,698	353,983	235,098	407,253.48	204,901.56	298,623.20	465,553	365,952	172,512	427,567.92	211,951.29	364,497.70
3rd Party BU PW	540,577	278,368	45,323	401,293.62	161,132.08	301,161.54	647,988	331,679	45,323	401,029.66	193,148.62	352,881.30	321,698	165,657	45,323	199,008.68	15,889.93	177,718.59	465,553	239,734	45,323	288,000.00	138,769.33	321,840.79
WSHP BU PW	471,723	354,970	163,291	445,841.01	205,492.65	338,650.54	619,988	364,830	93,296	499,145.28	211,333.76	367,634.54	152,422	353,983	335,345	308,527.34	204,901.56	328,320.72	352,102	365,952	239,699	361,400.59	211,951.29	384,401.30
Gas only Exp	208,181	354,970	45,323	445,841.01	205,492.65	42,859.17	249,546	364,830	45,323	499,145.28	211,333.76	357,719.58	123,889	353,983	45,323	308,527.34	204,901.56	100,814.07	179,289	365,952	45,323	361,400.59	211,951.29	17,212.14
Biomass Exp	208,181	354,970	122,515	485,998.47	205,492.65	5,824.74	249,546	364,830	76,714	515,475.70	211,333.76	357,719.58	123,889	353,983	235,098	407,253.48	204,901.56	100,814.07	179,289	365,952	172,512	427,567.92	211,951.29	78,233.66

System Financial Performance (NPV, IRR, Capex Offset)

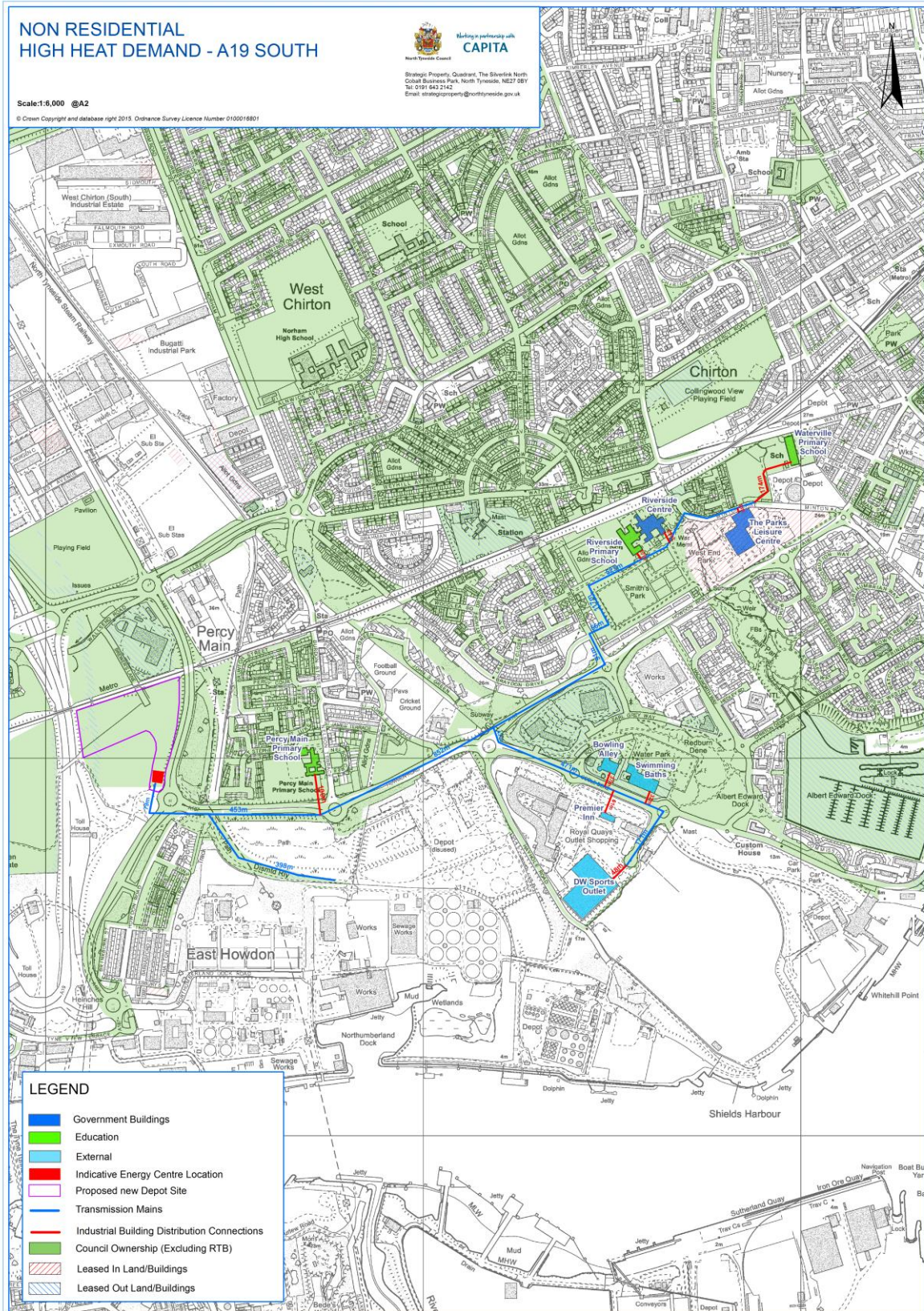
		Dual CHP													
RR/IRR	GAS PW (Option 1)		GAS EXP (Option 2)		GAS BIO PW (Option 3)		GAS BIO EXP (Option 4)		3rd Party PW Bio (Option 5)		WSPB Bio PW (Option 6)				
	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40			
1%	3,705,291	6,835,624	-3,286,005	-3,749,378	4,093,048	7,623,779	-2,898,249	-2,961,223	4,090,337	7,353,708	3,713,774	7,375,105			
2%	3,007,726	5,275,382	-3,155,908	-3,491,582	3,307,102	5,864,812	-2,856,532	-2,902,151	3,360,893	5,724,925	2,903,959	5,556,278			
3%	2,422,394	4,073,322	-3,042,946	-3,287,313	2,647,729	4,509,714	-2,817,611	-2,850,621	2,748,497	4,449,486	2,225,299	4,156,157			
4%	1,929,001	3,136,569	-2,944,099	-3,122,863	2,092,038	3,454,066	-2,781,081	-2,805,354	2,231,989	3,499,879	1,654,017	3,066,465			
5%	1,511,256	2,398,727	-2,856,942	-2,988,312	1,621,658	2,622,644	-2,746,540	-2,764,394	1,794,385	2,719,573	1,171,185	2,209,197			
6%	1,156,033	1,811,237	-2,779,518	-2,876,530	1,221,781	1,960,791	-2,713,770	-2,726,951	1,422,000	2,105,050	761,331	1,527,679			
7%	852,710	1,338,588	-2,710,240	-2,782,163	880,427	1,428,454	-2,682,523	-2,692,298	1,103,759	1,610,288	412,078	980,376			
8%	592,656	954,529	-2,647,819	-2,701,382	587,863	996,024	-2,656,612	-2,659,892	830,664	1,207,917	113,330	536,589			
9%	368,632	610,512	-2,591,203	-2,633,264	368,632	610,512	-2,591,203	-2,633,264	368,632	610,512	113,330	536,589			
10%	175,473	378,730	-2,538,516	-2,569,607	336,150	348,000	-2,562,307	-2,569,290	301,881	603,777	164,072	326,340			
11%	7,837	161,090	-2,492,059	-2,514,744	-69,581	103,275	-2,569,477	-2,572,562	215,238	375,005	-555,020	-375,770			
12%	-137,989	-21,990	-2,448,232	-2,465,403	-63,360	-102,523	-2,543,603	-2,545,961	61,366	188,295	-720,545	-584,869			
13%	-265,248	-177,116	-2,404,540	-2,428,594	-67,209	-276,804	-2,518,599	-2,520,267	73,118	18,780	-864,443	-761,361			
14%	-376,440	-309,435	-2,362,516	-2,379,544	-50,173	-425,313	-2,484,129	-2,495,491	-191,028	-107,596	-989,868	-911,253			
15%	-474,417	-422,987	-2,334,032	-2,341,641	-36,792	-553,784	-2,470,408	-2,477,447	-294,714	-241,008	-1,099,454	-1,039,340			

2. A19 South Phase 1 & 2 System Technical Overview and Financial Performance Summary

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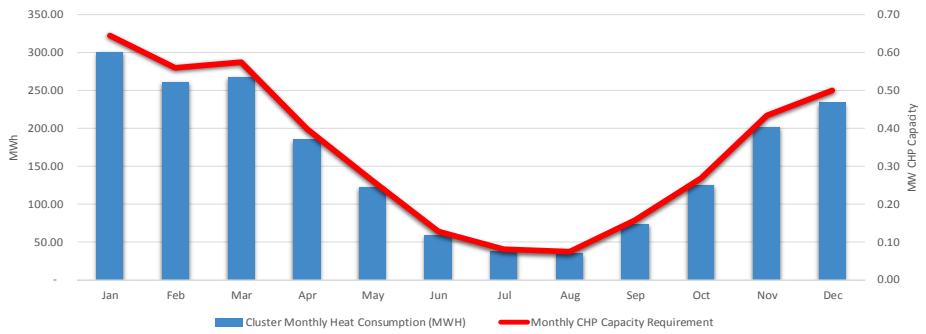
Strategic Property, Quadrant, The Silverlink
Cobalt Business Park, North Tyneside, NE27
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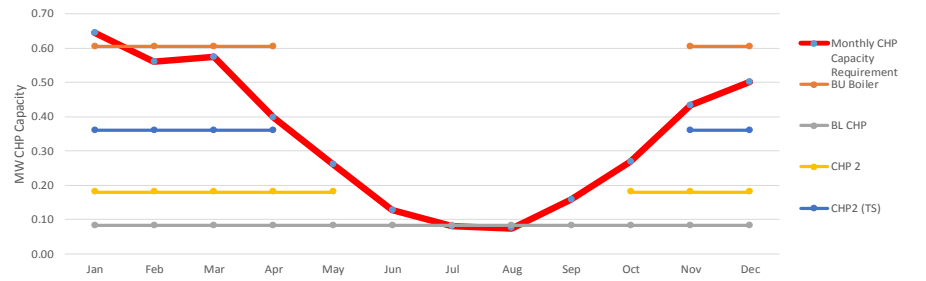


Energy Details													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Heat Demand
Cluster Monthly Heat Consumption (MWH)	300.24	260.70	267.36	185.11	121.83	59.35	37.50	34.91	73.42	125.12	201.95	233.22	1,900.71
System Technical Details													
Monthly CHP Capacity Requirement	0.65	0.56	0.57	0.40	0.26	0.13	0.08	0.08	0.16	0.27	0.43	0.50	
Baseload CHP Capacity Requirement	0.08												
Average load CHP Capacity Requirement	0.34												
Gas Back-up boiler capacity requirement (MW)	0.60												
Bimoss Back-up boiler capacity requirement (MW)	0.66												
Network Details													
Transmission Mains (m)	314.00												
Distribution Mains (m)	228.00												
Network m3	22.20												
MWh Thermal Storage Potential	1.01												
System run hrs storage potential	1.29												
CHP Details													
	Dual CHP			Dual CHP (TS)			BL CHP			BL CHP (TS)			
	CHP1	CHP2	Totals	CHP1	CHP2	Totals	CHP1	CHP2	CHP1	CHP2	CHP1	CHP2	
Average Electrical output (Mwe)	0.06	0.14	0.20	0.06	0.28	0.34	0.06	-			0.17	-	
Average Heat output (MWt)	0.08	0.18	0.26	0.08	0.36	0.44	0.08	-			0.22	-	
Overall CHP Efficiency (%)	80%	80%	1.60	80%	80%	1.60	80%	-			80%	-	
Fuel input (gross CV basis) (MW)	0.18	0.40	0.58	0.18	0.80	0.99	0.19	-			0.49	-	
CHP hours run per year (hrs)	5,585	6,570		5,585	6,570		5,585	-			6,570	-	
Annual CHP Displaced Electricity (MWH)	358	922	1,281	358	1,845	2,203	362	-			1,121	-	
Annual Electricity Generated (parasitic network load adj)	263	762	1,025	263	1,531	1,793	354	-			1,096	-	
Monthly Electricity Generated (parasitic network load adj)	29	76	105	29	153	182	30	-			91	-	
Monthly CHP Delivered Heat (network heat-loss adj)	35	89	123	35	178	212	35	-			108	-	
Input Fuel (MWH)	1,024	2,635	3,659	1,024	5,270	6,294	1,034	-			3,203	-	
Annual Net CO2 Saving p/a (tonnes)	85	219	305	85	439	524	86	-			267	-	
Annual Net CO2 Saving p/a (£)	1,364	3,510	4,873	1,364	7,019	8,383	1,378	-			4,266	-	
Combined heat Capacity (MW) (CHP & Back-up)	0.69	0.18	0.87	0.38	0.36	0.74	0.99	-			0.88	-	

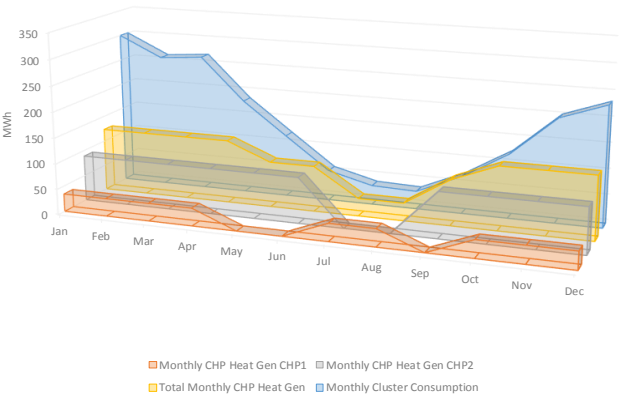
Cluster Demand and CHP Capacity Requirement



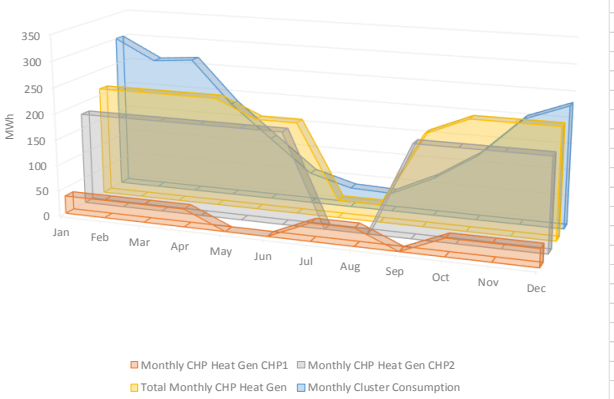
CHP Load Matching



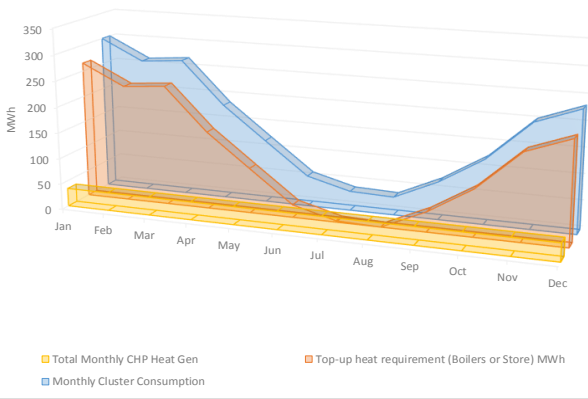
Dual CHP Cluster Demand vs. CHP Output



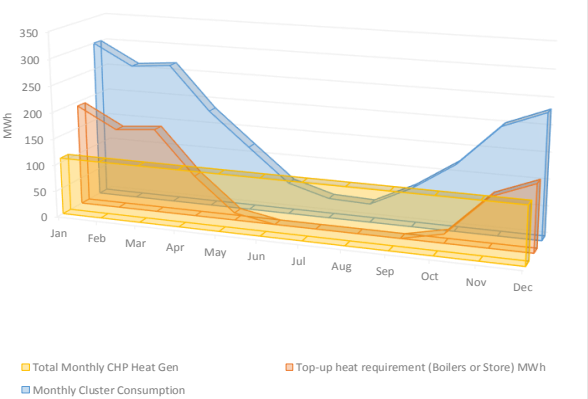
Dual CHP TS Cluster Demand vs. CHP Output



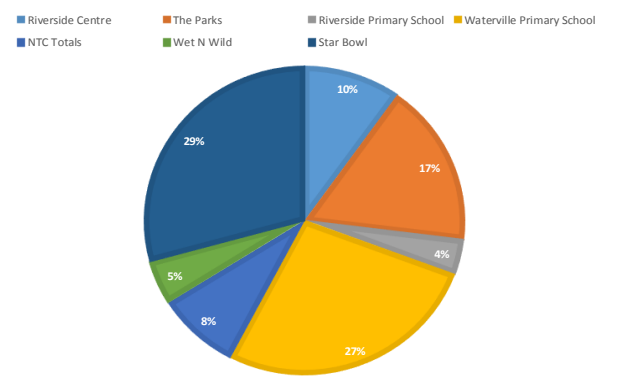
BL CHP Cluster Demand vs. CHP Output



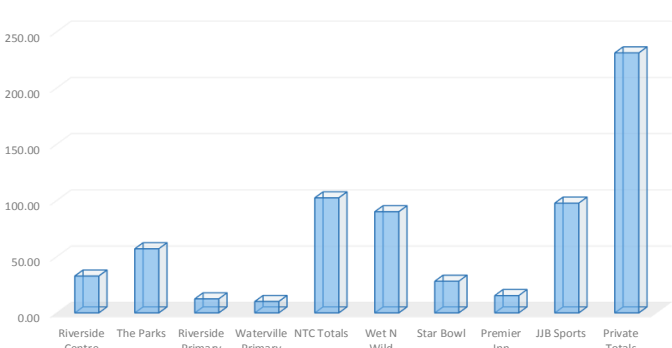
BL CHP TS Cluster Demand vs. CHP Output



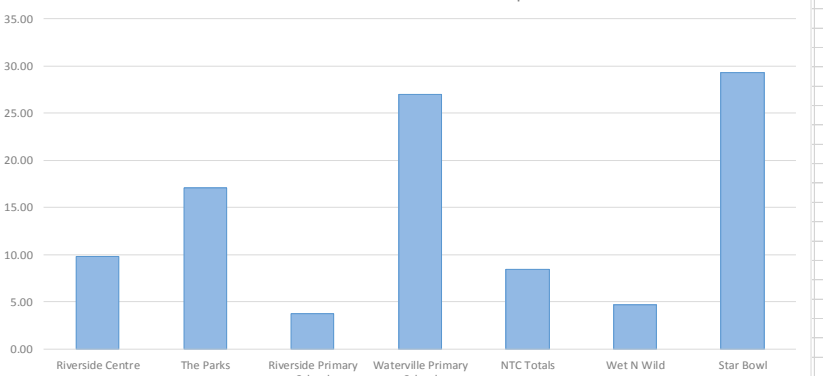
A19 SOUTH PHASE 1 CLUSTER POWER CONSUMPTION



Building Power Consumption as % of System Power Generation



A19 South Cluster Power consumption



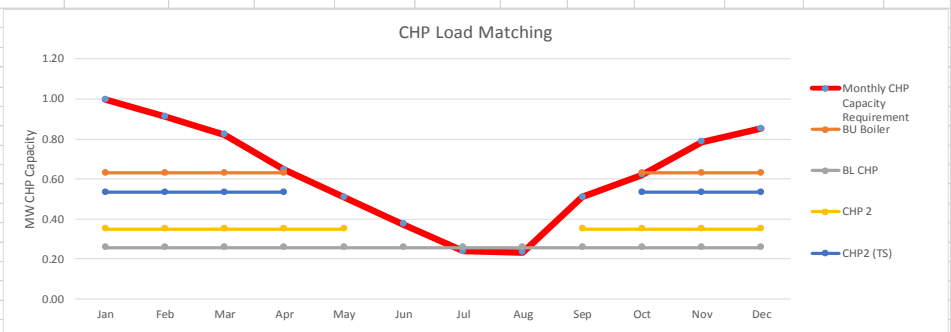
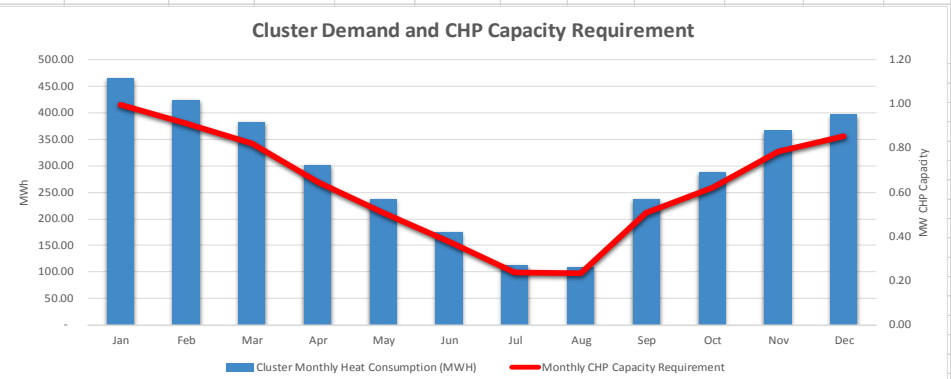
System CAPEX Costs	Dual CHP				Dual CHP (TS)				BL CHP				BL CHP (TS)			
	Gas Only	Biomass BU	3rd Party BU	WSHP BU	Gas Only	Biomass BU	3rd Party BU	WSHP BU	Gas Only	Biomass BU	3rd Party BU	WSHP BU	Gas Only	Biomass BU	3rd Party BU	WSHP BU
CHP	102,279	102,279	102,279	102,279	172,469	172,469	172,469	172,469	32,410	32,410	32,410	32,410	85,315	85,315	85,315	85,315
Boiler	18,148	-	-	-	9,016	-	-	-	27,244	-	-	-	19,729	-	-	-
WSHP	-	-	-	-	-	-	-	-	-	-	-	-	888,399	-	-	643,328
Biomass Boiler, store & assoc. plant	-	230,137	-	-	-	114,336	-	-	-	345,488	-	-	-	250,183	-	-
Plant BOS (Balance of System)	-	49,862	15,342	104,109	-	43,021	25,870	69,971	-	56,085	4,862	138,121	-	50,325	12,797	109,297
Thermal Store	-	-	-	-	-	71,645	71,645	71,645	-	-	-	-	44,007	44,007	44,007	44,007
Network Transmission	308,976	308,976	308,976	308,976	308,976	308,976	308,976	308,976	308,976	308,976	308,976	308,976	308,976	308,976	308,976	308,976
Network Distribution	136,800	136,800	136,800	136,800	136,800	136,800	136,800	136,800	136,800	136,800	136,800	136,800	136,800	136,800	136,800	136,800
Building Connections	47,518	47,518	47,518	47,518	47,518	47,518	47,518	47,518	47,518	47,518	47,518	47,518	47,518	47,518	47,518	47,518
WSHP Network & Cables	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EC building Cost	98,771	118,525	29,930	138,280	84,671	101,605	50,469	118,539	112,831	135,397	9,484	157,963	99,803	119,764	24,966	130,725
Total Capital (£)	730,556	994,098	640,844	1,429,743	858,317	996,369	813,747	1,219,926	674,727	1,063,274	540,050	1,710,187	757,905	1,042,888	660,379	1,514,966

System OPEX & Revenue	Dual CHP						Dual CHP (TS)						BL CHP						BL CHP (TS)							
	Revenue			Opex Costs			Revenue			Opex Costs			Revenue			Opex Costs			Revenue			Opex Costs				
	Price/Cost	Energy Sales	Income non-energy	Energy Direct costs	Overhead Costs	Net	Price/Cost	Energy Sales	Income non-energy	Energy Direct costs	Overhead Costs	Net	Price/Cost	Energy Sales	Income non-energy	Energy Direct costs	Overhead Costs	Net	Price/Cost	Energy Sales	Income non-energy	Energy Direct costs	Overhead Costs	Net		
	(MWh)	(MWh)					(MWh)	(MWh)					(MWh)	(MWh)					(MWh)	(MWh)						
Private Wire Elec Sales	116.85	121,218				59,631	116.85	121,026				106,630	116.85	42,299					21,113	116.85	130,994				82,362	
Export Elec Sales	45	46,682				14,905	45	81,268				23,128	45	16,290						45	50,647				1,815	
Standing Charge			10,949						10,949						10,949							10,949				
Heat Sales (CHP)	52.00	62,421					52.00	108,667					52.00	21,782						52.00	67,455					
Heat Sales (Boiler)	52.00	38,685					52.00	11,012					52.00	77,056						52.00	43,134					
Input Fuel (CHP)	25.3			92,576.19			25.3		159,244.64				25.3			26,166.81				25.3			81,035.50			
Input Fuel (Boiler)	25.2			22,496.54			25.2		6,403.80				25.2			44,810.74							25,084.15			
Biomass Fuel Costs	46			42,776.17		78,333	46		12,176.53				46		111,954							46		47,696.38	103,216	
Biomass RH income T1	52.4		33,135			3,797	52.4		9,432			17,804	52.4			66,001		61,149				52.4		36,946	22,668	
Biomass RH income T2	22.7		5,847				22.7		1,664				22.7			11,647						22.7		6,520		
WSHP RH																										
WSHP RH income T1	89.5		56,595				89.5		16,110				89.5		112,731							89.5		63,104		
WSHP RH income T2	26.7		2,979				26.7		848				26.7		5,935							26.7		3,122		
Opex Overhead:																										
Network maintenance	13			25,295.59			13			29,962.94			13			24,709.36						13		27,663.12		
Bureau Costs	11.1			21,598.54			11.1			25,583.74			11.1			21,097.91						11.1		23,620.05		
Business rates	8			11,674.89			8			13,829.05			8			11,404.28						8		12,767.59		

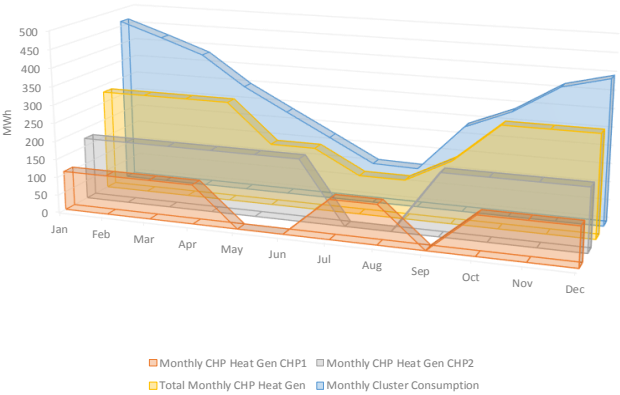
System Financial Performance (NPV, IRR, Capex Offset)	Dual CHP						Dual CHP (TS)						BL CHP						BL CHP (TS)					
	Income - Electricity	Income - Heat	Income - non-energy	Energy Direct costs	Overhead	Net income	Income - Electricity	Income - Heat	Income - non-energy	Energy Direct costs	Overhead	Net income	Income - Electricity	Income - Heat	Income - non-energy	Energy Direct costs	Overhead	Net income	Income - Electricity	Income - Heat	Income - non-energy	Energy Direct costs	Overhead	Net income
Gas only PW	121,218	101,105	10,949	115,072.73	69,375.72	59,830.75	121,218	101,105	10,949	115,072.73	69,375.72	59,830.75	121,218	101,105	10,949	115,072.73	69,375.72	59,830.75	121,218	101,105	10,949	115,072.73	69,375.72	59,830.75
Biomass PW	121,218	101,105	10,949	115,072.73	69,375.72	59,830.75	121,218	101,105	10,949	115,072.73	69,375.72	59,830.75	121,218	101,105	10,949	115,072.73	69,375.72	59,830.75	121,218	101,105	10,949	115,072.73	69,375.72	59,830.75
3rd Party BU PW	121,218	101,105	10,949	115,072.73	69,375.72	59,830.75	121,218	101,105	10,949	115,072.73	69,375.72	59,830.75	121,218	101,105	10,949	115,072.73	69,375.72	59,830.75	121,218	101,105	10,949	115,072.73	69,375.72	59,830.75
WSHP BU PW	121,218	101,105	10,949	115,072.73	69,375.72	59,830.75	121,218	101,105	10,949	115,072.73	69,375.72	59,830.75	121,218	101,105	10,949	115,072.73	69,375.72	59,830.75	121,218	101,105	10,949	115,072.73	69,375.72	59,830.75
Gas only Exp	46,682	101,105	10,949	115,072.73	69,375.72	59,830.75	46,682	101,105	10,949	115,072.73	69,375.72	59,830.75	46,682	101,105	10,949	115,072.73	69,375.72	59,830.75	46,682	101,105	10,949	115,072.73	69,375.72	59,830.75
Biomass Exp	46,682	101,105	10,949	115,072.73	69,375.72	59,830.75	46,682	101,105	10,949	115,072.73	69,375.72	59,830.75	46,682	101,105	10,949	115,072.73	69,375.72	59,830.75	46,682	101,105	10,949	115,072.73	69,375.72	59,830.75

System Financial Performance (NPV, IRR, Capex Offset)																								
RR/IRR	Dual CHP																							
	GAS PW (Option 1)		GAS EX (Option 2)		GAS BIO PW (Option 3)		GAS BIO EX (Option 4)		2nd Party Bio PW (Option 5)		WSPB BU PW (Option 6)													
	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40												
1%	530,894	1,175,594	-1,036,822	-1,197,969	663,332	1,510,234	-904,385	-863,329	751,154	1,463,415	360,307	1,273,162												
2%	389,506	856,535	-992,617	-1,109,154	477,932	1,091,440	-904,191	-874,448	593,134	1,310,308	163,946	825,231												
3%	271,188	611,180	-954,351	-1,039,134	322,833	769,465	-902,706	-881,051	450,434	936,656	17	481,586												
4%	171,761	420,468	-920,974	-983,139	192,544	519,248	-900,192	-864,354	349,637	716,013	215,234	316,181												
5%	87,874	270,650	-891,644	-937,130	82,661	322,764	-896,656	-885,217	265,435	457,366	-252,072	107,482												
6%	16,822	151,763	-865,679	-899,109	10,366	166,898	-897,867	-894,276	175,444	324,820	-215,325	158,057												
7%	-43,580	56,488	-842,530	-867,543	-89,409	42,044	-888,359	-881,987	107,242	217,566	-441,166	289,476												
8%	-95,109	-20,581	-821,802	-840,377	-241,804	-56,141	-878,699	-878,699	48,870	27	-395,127	500,707												
9%	-139,214	-83,472	-802,967	-816,904	-214,447	-141,221	-878,200	-874,008	44,361	6,732	-559,788	-480,872												
10%	-177,081	-135,219	-785,886	-796,349	-263,904	-208,911	-872,709	-870,043	40,481	1,603	-610,118	-550,845												
11%	-209,685	-178,122	-770,257	-778,147	-306,452	-264,989	-867,024	-865,014	81,866	-46,965	-683,046	-608,355												
12%	-237,832	-213,941	-755,877	-761,848	-341,148	-311,766	-861,195	-859,673	114,299	-87,905	-695,740	-655,893												
13%	-262,188	-240,071	-742,173	-747,119	-374,873	-353,028	-855,248	-854,342	152,242	-122,468	-695,381	-665,881												
14%	-281,308	-269,467	-730,206	-733,665	-402,351	-384,168	-849,248	-848,368	167,147	-151,855	-747,920	-728,322												
15%	-301,657	-291,063	-718,654	-721,303	-426,191	-412,277	-841,188	-842,514	188,686	-176,084	-770,885	-755,887												

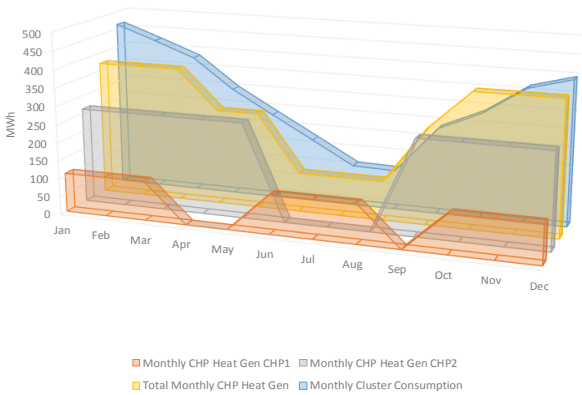
Energy Details														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Heat Demand	
Cluster Monthly Heat Consumption (MWh)	463.75	424.21	382.50	300.25	236.98	174.49	111.35	108.75	236.93	288.63	365.46	396.73	3,490.04	
System Technical Details														
Monthly CHP Capacity Requirement	1.00	0.91	0.82	0.65	0.51	0.37	0.24	0.23	0.51	0.62	0.79	0.85		
Baseload CHP Capacity Requirement	0.26													
Average load CHP Capacity Requirement	0.62													
Gas Back-up boiler capacity requirement (MW)	0.63													
Biomass Back-up boiler capacity requirement (MW)	0.68													
Network Details														
Transmission Mains (m)	1579.00													
Distribution Mains (m)	584.00													
Network m3	111.62													
MWh Thermal Storage Potential	5.07													
System run hrs storage potential	4.56													
CHP Details														
	Dual CHP			Dual CHP (TS)			BL CHP		BL CHP (TS)					
	CHP1	CHP2	Totals	CHP1	CHP2	Totals	CHP1	CHP2	CHP1	CHP2				
Average Electrical output (Mwe)	0.20	0.27	0.47	0.20	0.41	0.61	0.20	-	0.29	-				
Average Heat output (MWt)	0.26	0.35	0.61	0.26	0.53	0.79	0.26	-	0.37	-				
Overall CHP Efficiency (%)	80%	80%	1.60	80%	80%	1.60	80%	-	80%	-				
Fuel input (gross CV basis) (MW)	0.57	0.78	1.35	0.57	1.19	1.76	0.57	-	0.83	-				
CHP hours run per year (hrs)	5,585	6,570		5,585	6,570		5,585	-	6,570	-				
Annual CHP Displaced Electricity (MWh)	1,117	1,786	2,902	1,117	2,726	3,842	1,117	-	1,916	-				
Annual Electricity Generated (parasitic network load adj)	819	1,468	2,287	819	2,026	2,845	1,092	-	1,873	-				
Monthly Electricity Generated (parasitic network load adj)	91	147	238	91	225	316	91	-	156	-				
Monthly CHP Delivered Heat (network heat-loss adj)	108	172	280	108	263	371	108	-	185	-				
Input Fuel (MWh)	3,190	5,103	8,293	3,190	7,788	10,978	3,190	-	5,473	-				
Annual Net CO2 Saving p/a (tonnes)	266	425	690	266	648	914	266	-	456	-				
Annual Net CO2 Saving p/a (£)	4,249	6,796	11,045	4,249	10,373	14,622	4,249	-	7,289	-				
Combined heat Capacity (MW) (CHP & Back-up)	0.89	0.35	1.24	0.58	0.53	1.11	1.48	-	1.33	-				



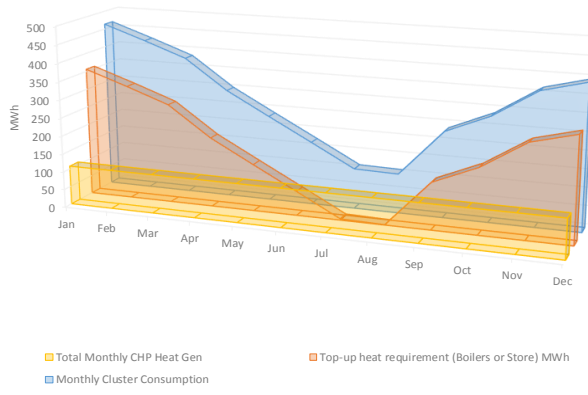
Dual CHP Cluster Demand vs. CHP Output



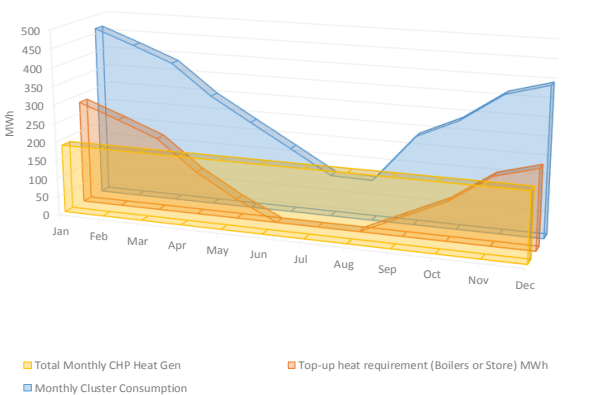
Dual CHP TS Cluster Demand vs. CHP Output



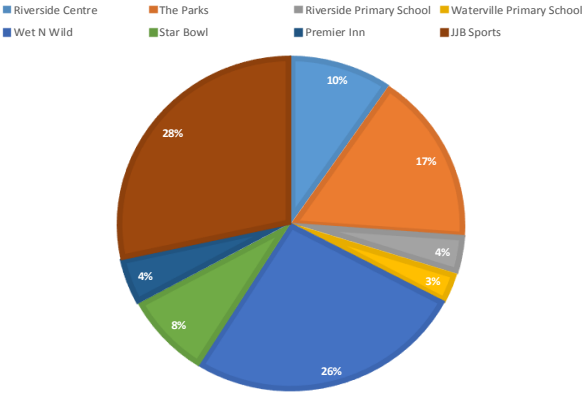
BL CHP Cluster Demand vs. CHP Output



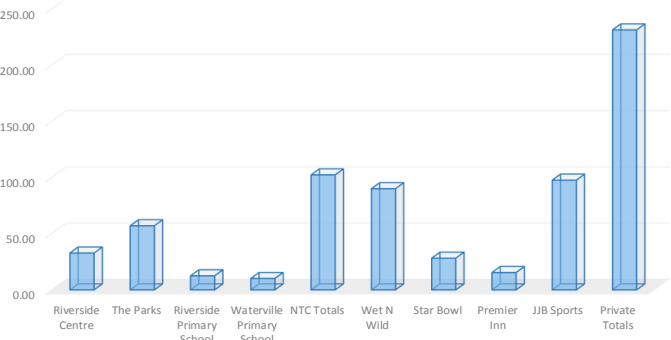
BL CHP TS Cluster Demand vs. CHP Output



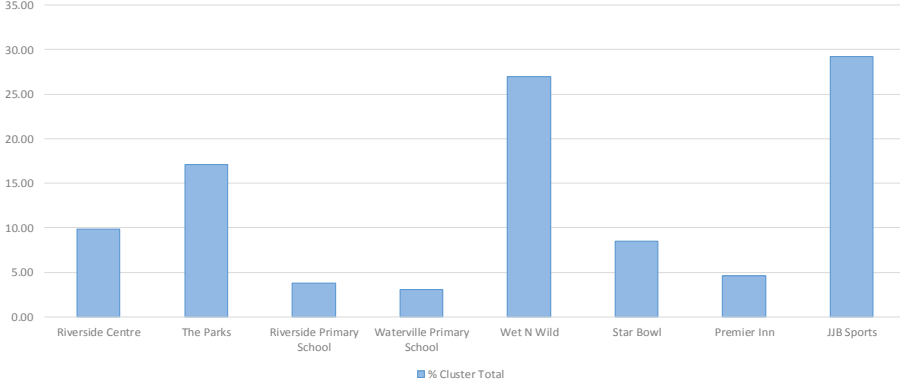
A19 SOUTH PHASE 2 CLUSTER POWER CONSUMPTION



Building Power Consumption as % of System Power Generation



A19 South Cluster Power consumption



System CAPEX Costs	Dual CHP				Dual CHP (TS)				BL CHP				BL CHP (TS)			
	Gas Only	Biomass BU	3rd Party BU	WSPH BU	Gas Only	Biomass BU	3rd Party BU	WSPH BU	Gas Only	Biomass BU	3rd Party BU	WSPH BU	Gas Only	Biomass BU	3rd Party BU	WSPH BU
CHP	235,883	235,883	235,883	235,883	235,883	235,883	235,883	235,883	235,883	235,883	235,883	235,883	235,883	235,883	235,883	235,883
Boiler	18,880	-	-	-	18,880	-	-	-	18,880	-	-	-	18,880	-	-	-
WSPH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biomass Boiler, store & assoc. plant	-	239,417	-	-	-	239,417	-	-	-	239,417	-	-	-	239,417	-	-
Plant BOS (Balance of System)	-	71,295	35,382	127,729	-	71,295	35,382	127,729	-	71,295	35,382	127,729	-	71,295	35,382	127,729
Thermal Store	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Network Transmission	1,553,736	1,553,736	1,553,736	1,553,736	1,553,736	1,553,736	1,553,736	1,553,736	1,553,736	1,553,736	1,553,736	1,553,736	1,553,736	1,553,736	1,553,736	1,553,736
Network Distribution	350,400	350,400	350,400	350,400	350,400	350,400	350,400	350,400	350,400	350,400	350,400	350,400	350,400	350,400	350,400	350,400
Building Connections	87,251	87,251	87,251	87,251	87,251	87,251	87,251	87,251	87,251	87,251	87,251	87,251	87,251	87,251	87,251	87,251
WSPH Network & Civils	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EC building Cost	140,643	168,772	69,026	196,901	126,273	151,527	89,599	176,782	167,947	201,537	29,253	235,126	151,344	181,613	42,658	211,882
Total Capital (£)	2,425,008	2,706,755	2,331,679	3,922,273	2,573,221	2,735,072	2,523,898	3,724,436	2,316,343	2,841,091	2,135,602	4,467,302	2,432,345	2,847,504	2,290,709	4,289,106

System OPEX & Revenue	Dual CHP						Dual CHP (TS)						BL CHP					
	Price/Cost (MWh)	Energy Sales (MWh)	Income non-energy	Energy Direct costs	Overhead Costs	Net	Price/Cost (MWh)	Energy Sales (MWh)	Income non-energy	Energy Direct costs	Overhead Costs	Net	Price/Cost (MWh)	Energy Sales (MWh)	Income non-energy	Energy Direct costs	Overhead Costs	Net
Private Wire Elec Sales	116.85	271,756	-	-	-	116.85	116.85	271,756	-	-	-	116.85	116.85	271,756	-	-	-	116.85
Export Elec Sales	45	104,656	-	-	-	45	45	104,656	-	-	-	45	45	104,656	-	-	-	45
Standing Charge	-	-	23,823	-	-	23,823	-	-	23,823	-	-	23,823	-	-	23,823	-	-	23,823
Heat Sales (CHP)	52.00	139,940	-	-	-	52.00	52.00	139,940	-	-	-	52.00	52.00	139,940	-	-	-	52.00
Heat Sales (Boiler)	52.00	41,543	-	-	-	52.00	52.00	41,543	-	-	-	52.00	52.00	41,543	-	-	-	52.00
Input Fuel (CHP)	25.3	-	-	209,807.25	-	25.3	25.3	-	-	209,807.25	-	25.3	25.3	-	-	209,807.25	-	25.3
Input Fuel (Boiler)	25.2	-	-	24,158.62	-	25.2	25.2	-	-	24,158.62	-	25.2	25.2	-	-	24,158.62	-	25.2
Biomass Fuel Costs	46	-	-	45,936.53	-	46	46	-	-	45,936.53	-	46	46	-	-	45,936.53	-	46
Biomass RH income T1	52.4	-	35,583	-	-	52.4	52.4	-	35,583	-	-	52.4	52.4	-	35,583	-	-	52.4
Biomass RH income T2	22.7	-	6,279	-	-	22.7	22.7	-	6,279	-	-	22.7	22.7	-	6,279	-	-	22.7
WSPH RH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WSPH RH income T1	89.5	-	60,776	-	-	89.5	89.5	-	60,776	-	-	89.5	89.5	-	60,776	-	-	89.5
WSPH RH income T2	26.7	-	3,000	-	-	26.7	26.7	-	3,000	-	-	26.7	26.7	-	3,000	-	-	26.7
Opex Overhead:	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Network maintenance	13	-	-	45,370.56	-	13	13	-	-	45,370.56	-	13	13	-	-	45,370.56	-	13
Bureau Costs	11.1	-	-	20,940.26	-	11.1	11.1	-	-	20,940.26	-	11.1	11.1	-	-	20,940.26	-	11.1
Business rates	6	-	-	-	-	6	6	-	-	-	-	6	6	-	-	-	-	6

	Income - Electricity	Income - Heat	Income - non-energy	Energy Direct costs	Overhead	Net income	Income - Electricity	Income - Heat	Income - non-energy	Energy Direct costs	Overhead	Net income	Income - Electricity	Income - Heat	Income - non-energy	Energy Direct costs	Overhead	Net income
Gas only PW	271,756	181,482	23,823	233,965.87	105,050.29	138,045.36	271,756	181,482	23,823	233,965.87	105,050.29	138,045.36	271,756	181,482	23,823	233,965.87	105,050.29	138,045.36
Biomass PW	271,756	181,482	65,085	255,743.78	105,050.29	158,129.61	271,756	181,482	65,085	255,743.78	105,050.29	158,129.61	271,756	181,482	65,085	255,743.78	105,050.29	158,129.61
3rd Party BU PW	271,756	181,482	23,823	233,965.87	105,050.29	138,045.36	271,756	181,482	23,823	233,965.87	105,050.29	138,045.36	271,756	181,482	23,823	233,965.87	105,050.29	138,045.36
WSPH BU PW	234,616	181,482	87,799	233,965.87	105,050.29	323,043	234,616	181,482	87,799	233,965.87	105,050.29	323,043	234,616	181,482	87,799	233,965.87	105,050.29	323,043
Gas only Exp	104,656	181,482	23,823	233,965.87	105,050.29	29,054.92	104,656	181,482	23,823	233,965.87	105,050.29	29,054.92	104,656	181,482	23,823	233,965.87	105,050.29	29,054.92
Biomass Exp	104,656	181,482	65,085	255,743.78	105,050.29	8,970.67	104,656	181,482	65,085	255,743.78	105,050.29	8,970.67	104,656	181,482	65,085	255,743.78	105,050.29	8,970.67

System Financial Performance (NPV, IRR, Capex Offset)

RR/IRR	Dual CHP						Dual CHP (TS)						BL CHP					
	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40
1%	502,518	1,994,999	-1,012,112	-1,326,240	645,994	2,355,617	-2,868,636	-2,965,622	735,062	2,299,578	-419,703	1,360,746	502,518	1,994,999	-1,012,112	-1,326,240	645,994	2,355,617
2%	182,325	1,263,500	-2,916,226	-3,143,785	278,526	1,517,001	-2,830,025	-2,890,281	397,373	1,530,730	-791,683	498,099	182,325	1,263,500	-2,916,226	-3,143,785	278,526	1,517,001
3%	-84,597	702,486	-2,831,106	-2,997,766	-27,907	873,689	-2,775,415	-2,826,563	115,565	940,637	-1,100,309	161,361	-84,597	702,486	-2,831,106	-2,997,766	-27,907	873,689
4%	-307,919	267,826	-2,757,699	-2,878,778	-284,383	375,127	-2,734,164	-2,771,578	-120,499	483,034	-1,357,110	-670,277	-307,919	267,826	-2,757,699	-2,878,778	-284,383	375,127
5%	-495,400	-72,271	-2,691,358	-2,780,416	-499,791	-15,102	-2,695,750	-2,723,247	-318,955	124,596	-1,571,338	-1,066,568	-495,400	-72,271	-2,691,358	-2,780,416	-499,791	-15,102
6%	-653,252	-346,968	-2,631,792	-2,697,550	-653,252	-346,968	-2,631,792	-2,697,550	-653,252	-346,968	-2,631,792	-2,697,550	-653,252	-346,968	-2,631,792	-2,697,550	-653,252	-346,968
7%	-780,654	-554,998	-2,577,802	-2,626,366	-780,654	-554,998	-2,577,802	-2,626,366	-780,654	-554,998	-2,577,802	-2,626,366	-780,654	-554,998	-2,577,802	-2,626,366	-780,654	-554,998
8%	-899,594	-727,060	-2,528,630	-2,564,944	-899,594	-727,060	-2,528,630	-2,564,944	-899,594	-727,060	-2,528,630	-2,564,944	-899,594	-727,060	-2,528,630	-2,564,944	-899,594	-727,060
9%	-995,464	-866,421	-2,483,516	-2,510,676	-995,464	-866,421	-2,483,516	-2,510,676	-995,464	-866,421	-2,483,516	-2,510,676	-995,464	-866,421	-2,483,516	-2,510,676	-995,464	-866,421
10%	-1,077,097	-986,098	-2,443,989	-2,469,398	-1,077,097	-986,098	-2,443,989	-2,469,398	-1,077,097	-986,098	-2,443,989	-2,469,398	-1,077,097	-986,098	-2,443,989	-2,469,398	-1,077,097	-986,098
11%	-1,146,474	-1,075,408	-2,403,205	-2,418,588	-1,146,474	-1,075,408	-2,403,205	-2,418,588	-1,146,474	-1,075,408	-2,403,205	-2,418,588	-1,146,474	-1,075,408	-2,403,205	-2,418,588	-1,146,474	-1,075,408
12%	-1,205,732	-1,150,425	-2,367,126	-2,376,766	-1,205,732	-1,150,425	-2,367,126	-2,376,766	-1,205,732	-1,150,425	-2,367,126	-2,376,766	-1,205,732	-1,150,425	-2,367,126	-2,376,766	-1,205,732	-1,150,425
13%	-1,256,318	-1,214,299	-2,333,285	-2,342,129	-1,256,318	-1,214,299	-2,333,285	-2,342,129	-1,256,318	-1,214,299	-2,333,285	-2,342,129	-1,256,318	-1,214,299	-2,333,285	-2,342,129	-1,256,318	-1,214,299
14%	-1,299,517	-1,267,474	-2,301,406	-2,308,155	-1,299,517	-1,267,474	-2,301,406	-2,308,155	-1,299,517	-1,267,474	-2,301,406	-2,308,155	-1,299,517	-1,267,474	-2,301,406	-2,308,155	-1,299,517	-1,267,474
15%	-1,336,396	-1,311,875	-2,271,253	-2,276,414	-1,336,396	-1,311,875	-2,271,253	-2,276,414	-1,336,396	-1,311,875	-2,271,253	-2,276,414	-1,336,396	-1,311,875	-2,271,253	-2,276,414	-1,336,396	-1,311,875

RR/IRR		Dual CHP (TS)															
		GAS PW (Option 1)		GAS EXP (Option 2)		GAS BU PW (Option 3)		GAS BU EXP (Option 4)		3rd Party BU PW (Option 5)		WSPB BU PW (Option 6)					
		NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40				
1%		680,001	2,338,126	-1,675,095	-1,755,601	682,648	2,420,435	-1,672,447	-1,753,291	778,911	2,463,795	-256,271	1,507,499				
2%		322,078	1,524,247	-1,516,441	-1,536,967	306,872	1,567,749	-1,530,647	-1,551,465	415,366	1,635,919	-626,331	653,369				
3%		25,361	899,799	-1,376,169	-1,406,307	-2,459	913,589	-1,367,889	-1,371,517	112,900	1,000,548	-933,599	-1,441				
4%		-223,894	415,751	-1,253,469	-1,483,437	269,806	406,569	-1,299,411	-1,432,018	142,107	507,860	-1,189,498	-509,100				
5%		-413,308	36,782	-1,194,394	-1,318,971	-823,803	6,671	-1,204,090	-1,334,002	355,714	121,962	-1,403,194	-801,154				
6%		-609,828	2,966,405	-1,162,945	-1,182,910	-667,112	2,119,309	-1,139,209	-1,234,148	1,149,323	1,589,071	-1,149,071	-212,071				
7%		-759,075	1,068,551	-1,068,765	-1,068,765	-483,082	-554,141	-1,034,354	-1,121,029	-688,319	-426,798	-1,792,105	-1,458,339				
8%		-885,614	-693,931	-2,904,207	-2,897,255	-1,068,730	-2,904,207	-2,974,830	-3,032,728	-817,619	-682,832	-1,855,614	-1,654,249				
9%		-993,168	-489,908	-2,837,004	-2,871,355	-956,218	-918,441	-2,912,587	-2,955,901	927,763	-722,093	-1,964,146	-1,811,648				
10%		-1,044,786	-2,916,407	-2,899,877	-2,916,407	-1,068,730	-2,899,877	-2,955,901	-3,000,000	-1,068,730	-2,916,407	-2,916,407	-2,916,407				
11%		-1,162,973	-1,081,793	-2,720,213	-2,740,651	-1,246,160	-1,161,081	-2,803,423	-2,827,941	-1,101,724	-1,019,238	-2,128,413	-2,042,061				
12%		-1,229,793	-1,168,349	-2,668,916	-2,696,027	-1,315,950	-1,251,553	-2,755,072	-2,773,631	-1,170,339	-1,107,903	-2,191,535	-2,126,175				
13%		-1,286,962	-1,240,282	-2,621,471	-2,637,814	-1,376,629	-1,326,703	-2,710,134	-2,729,136	-1,229,136	-1,181,700	-2,248,592	-2,194,875				
14%		-1,335,913	-1,300,314	-2,577,387	-2,589,581	-1,425,692	-1,404,692	-2,668,167	-2,678,919	-1,279,562	-1,243,704	-2,302,977	-2,251,801				
15%		-1,377,621	-1,350,181	-2,536,319	-2,546,277	-1,468,734	-1,450,734	-2,626,219	-2,636,884	-1,329,827	-1,301,827	-2,354,927	-2,302,977				

3. Killingworth System Technical Overview and Financial Performance Summary

NON RESIDENTIAL HIGH HEAT DEMAND - KILLINGWORTH

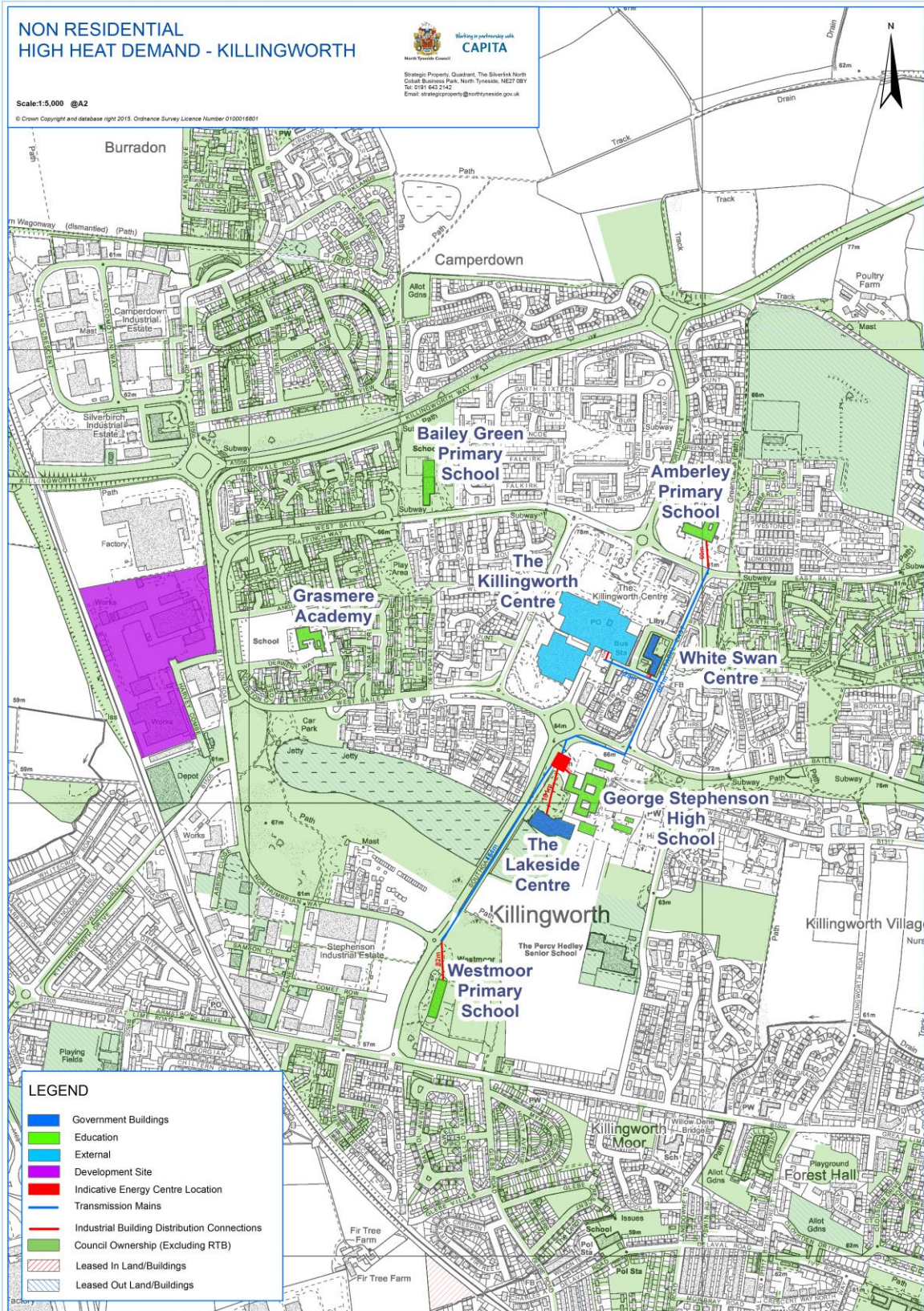


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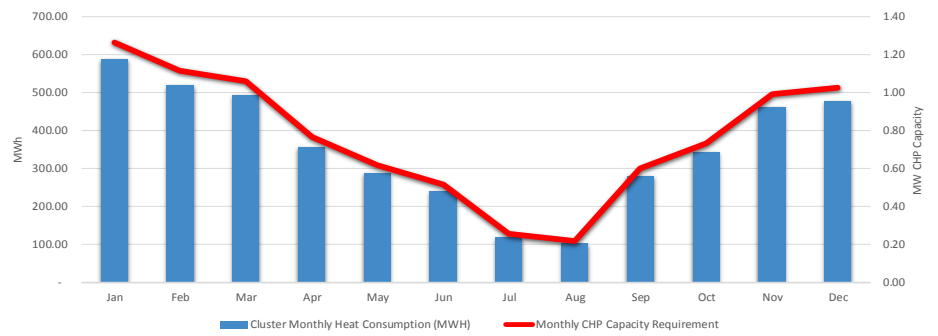
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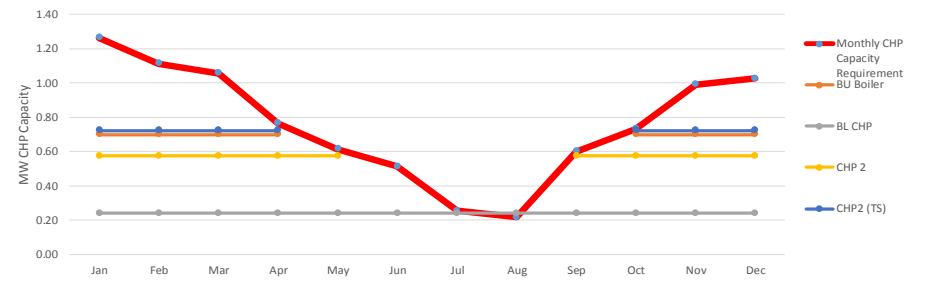


Energy Details													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Heat Demand
Cluster Monthly Heat Consumption (MWH)	588.57	518.45	492.44	356.59	286.59	239.01	118.93	101.66	280.12	340.88	461.63	478.02	4,262.88
System Technical Details													
Monthly CHP Capacity Requirement	1.26	1.11	1.06	0.77	0.62	0.51	0.26	0.22	0.60	0.73	0.99	1.03	
Baseload CHP Capacity Requirement	0.24												
Average load CHP Capacity Requirement	0.76												
Gas Back-up boiler capacity requirement (MW)	0.70												
Bimooass Back-up boiler capacity requirement (MW)	0.76												
Network Details													
Transmission Mains (m)	1203.00												
Distribution Mains (m)	279.00												
Network m3	85.04												
MWh Thermal Storage Potential	3.87												
System run hrs storage potential	2.83												
CHP Details													
	Dual CHP			Dual CHP (TS)			BL CHP		BL CHP (TS)				
	CHP1	CHP2	Totals	CHP1	CHP2	Totals	CHP1	CHP2	CHP1	CHP2			
Average Electrical output (Mwe)	0.19	0.45	0.63	0.19	0.56	0.75	0.19	-	0.35	-			
Average Heat output (MWt)	0.24	0.58	0.82	0.24	0.72	0.96	0.24	-	0.45	-			
Overall CHP Efficiency (%)	80%	80%	1.60	80%	80%	1.60	80%	-	80%	-			
Fuel input (gross CV basis) (MW)	0.53	1.28	1.81	0.53	1.61	2.14	0.54	-	0.99	-			
CHP hours run per year (hrs)	5,585	6,570		5,585	6,570		5,585	-	6,570	-			
Annual CHP Displaced Electricity (MWH)	1,044	2,940	3,984	1,044	3,698	4,742	1,054	-	2,274	-			
Annual Electricity Generated (parasitic network load adj)	766	2,431	3,197	766	3,063	3,828	1,031	-	2,224	-			
Monthly Electricity Generated (parasitic network load adj)	85	243	328	85	306	391	86	-	185	-			
Monthly CHP Delivered Heat (network heat-loss adj)	101	284	384	101	357	457	102	-	219	-			
Input Fuel (MWH)	2,982	8,400	11,382	2,982	10,567	13,549	3,012	-	6,498	-			
Annual Net CO2 Saving p/a (tonnes)	248	699	947	248	880	1,128	251	-	541	-			
Annual Net CO2 Saving p/a (£)	3,972	11,188	15,160	3,972	14,074	18,045	4,011	-	8,654	-			
Combined heat Capacity (MW) (CHP & Back-up)	0.94	0.58	1.52	0.69	0.72	1.41	1.91	-	1.71	-			

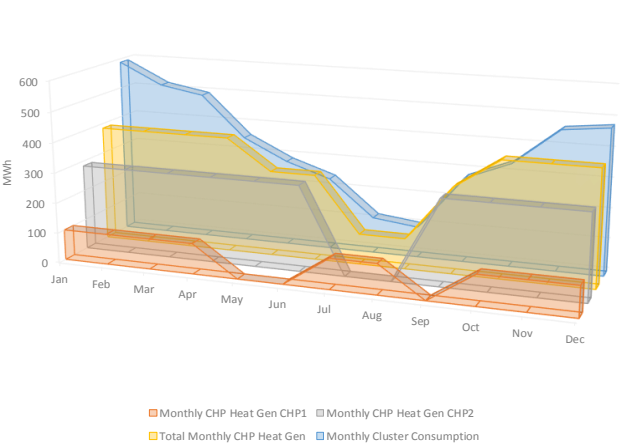
Cluster Demand and CHP Capacity Requirement



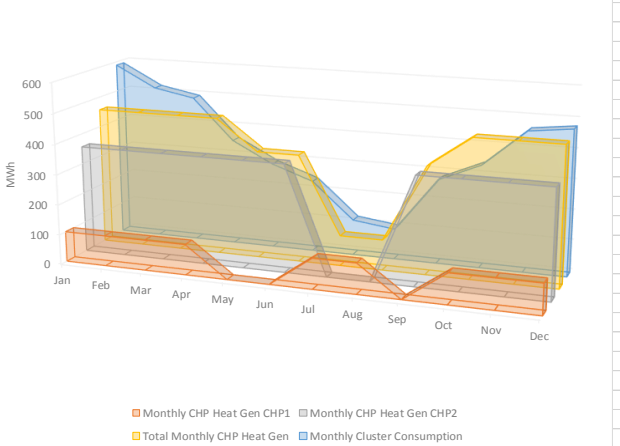
CHP Load Matching



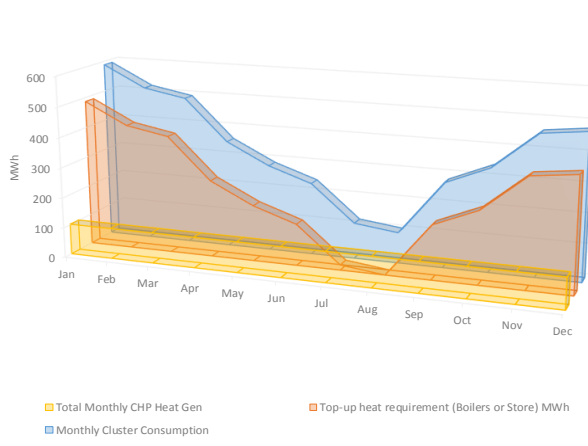
Dual CHP Cluster Demand vs. CHP Output



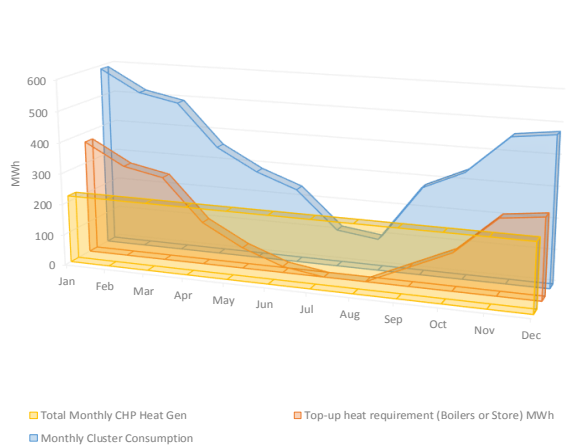
Dual CHP TS Cluster Demand vs. CHP Output



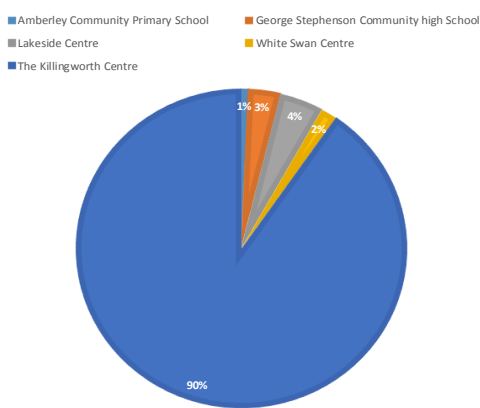
BL CHP Cluster Demand vs. CHP Output



BL CHP TS Cluster Demand vs. CHP Output



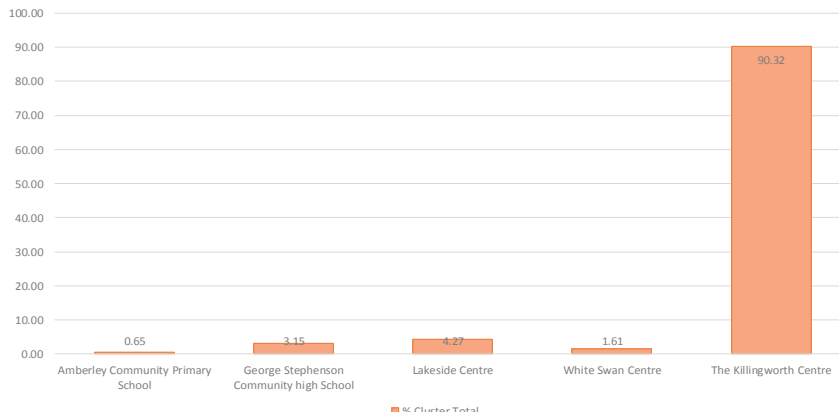
KILLINGWORTH CLUSTER POWER CONSUMPTION



Building Power Consumption as % of System Power Generation



Killingworth Cluster Power consumption



System CAPEX Costs	Dual CHP						Dual CHP (T5)						BL CHP						BL CHP (T5)					
	Gas Only	Biomass BU	3rd Party BU	WSHP BU	Gas Only	Biomass BU	3rd Party BU	WSHP BU	Gas Only	Biomass BU	3rd Party BU	WSHP BU	Gas Only	Biomass BU	3rd Party BU	WSHP BU	Gas Only	Biomass BU	3rd Party BU	WSHP BU	Gas Only	Biomass BU	3rd Party BU	WSHP BU
CHP	317,196	317,196	317,196	317,196	317,196	317,196	317,196	317,196	317,196	317,196	317,196	317,196	317,196	317,196	317,196	317,196	317,196	317,196	317,196	317,196	317,196	317,196	317,196	317,196
Boiler	20,990	-	-	-	13,482	-	-	-	49,997	-	-	-	84,378	-	-	-	37,917	-	-	-	173,073	-	-	173,073
WSHP	-	-	-	684,442	-	-	-	439,630	-	-	-	-	1,630,327	-	-	-	-	-	-	-	-	-	-	1,236,411
Biomass Boiler, store & assoc. plant	-	266,172	-	-	-	170,967	-	-	-	634,016	-	-	-	480,826	-	-	-	480,826	-	-	-	98,085	25,961	211,423
Plant BOS (Balance of System)	-	87,505	-	475,578	-	150,246	-	-	-	81,880	-	-	109,239	-	-	-	69,364	-	-	-	69,364	69,364	69,364	69,364
Thermal Store	-	-	-	-	-	69,353	-	69,353	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Network Transmission	1,183,752	1,183,752	1,183,752	1,183,752	1,183,752	1,183,752	1,183,752	1,183,752	1,183,752	1,183,752	1,183,752	1,183,752	1,183,752	1,183,752	1,183,752	1,183,752	1,183,752	1,183,752	1,183,752	1,183,752	1,183,752	1,183,752	1,183,752	1,183,752
Network Distribution	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400
Building Connections	109,540	109,540	109,540	109,540	109,540	109,540	109,540	109,540	109,540	109,540	109,540	109,540	109,540	109,540	109,540	109,540	109,540	109,540	109,540	109,540	109,540	109,540	109,540	109,540
WSHP Network & Cables	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EC building Cost	172,441	206,929	92,821	241,417	160,849	193,018	109,707	225,188	217,272	260,726	27,638	304,180	194,476	233,372	50,646	272,267								
Total Capital (£)	2,022,047	2,338,495	1,918,288	2,853,994	2,137,535	2,350,813	2,070,889	2,699,944	1,843,995	2,559,071	1,596,844	3,748,284	1,967,171	2,515,412	1,779,736	3,423,229								

System OPEX & Revenue	Dual CHP						Dual CHP (T5)						BL CHP						BL CHP (T5)						
	Revenue			Opex Costs			Revenue			Opex Costs			Revenue			Opex Costs			Revenue			Opex Costs			
	Price/Cost (MWh)	Energy Sales (MWh)	Income non-energy	Energy Direct costs	Overhead Costs	Net	Price/Cost (MWh)	Energy Sales (MWh)	Income non-energy	Energy Direct costs	Overhead Costs	Net	Price/Cost (MWh)	Energy Sales (MWh)	Income non-energy	Energy Direct costs	Overhead Costs	Net	Price/Cost (MWh)	Energy Sales (MWh)	Income non-energy	Energy Direct costs	Overhead Costs	Net	
Private Wire Elec Sales	116.85	377,758				199,369	116.85	451,593				237,445	116.85	123,172				81,361	116.85	265,737				176,520	
Export Elec Sales	45	145,478				32,910	45	173,913				40,236	45	47,435				5,623	45	102,138				13,121	
Standing Charge			33,053						33,053						33,053						33,053				
Heat Sales (CHP)	52.00	194,525					52.00	232,546					52.00	63,427					52.00	136,840					
Heat Sales (Boiler)	52.00	33,196					52.00	13,939					52.00	158,243					52.00	95,959					
Input Fuel (CHP)	25.3			287,970.31			25.3			342,781.29			25.3			76,196.68			25.3			164,390.45			
Input Fuel (Boiler)	25.2			19,304.61			25.2			8,106.21			25.2			92,024.22			25.2			55,803.68			
Biomass Fuel Costs	46			36,706.85			46			15,413.60			46			244,184			46			106,108.18			
Biomass RH Income T1	52.4		28,433			16,862	52.4		11,940			33,496	52.4		135,541			82,128	52.4		82,192			59,513	
Biomass RH Income T2	22.7		5,018				22.7		2,107				22.7		33,919				22.7		14,505				
WSHP RH																									
WSHP RH Income T1	89.5		48,565				89.5		20,393				89.5		231,506				89.5		140,386				
WSHP RH Income T2	26.7		2,557				26.7		1,074				26.7		12,188				26.7		7,391				
Opex Overhead																									
Network maintenance	13					56,960.99	13					61,673.65	13					55,417.41	13					58,251.47	
Bureaux Costs	11.1					48,635.92	11.1					52,659.81	11.1					47,317.95	11.1					49,737.79	
Business rates	6					26,289.69	6					28,464.76	6					25,577.27	6					26,885.29	

System Financial Performance (NPV, IRR, Capex Offset)	Dual CHP						Dual CHP (T5)						BL CHP						BL CHP (T5)					
	Income - Electricity	Income - Heat	Income - non-energy	Energy Direct costs	Overhead	Net Income	Income - Electricity	Income - Heat	Income - non-energy	Energy Direct costs	Overhead	Net Income	Income - Electricity	Income - Heat	Income - non-energy	Energy Direct costs	Overhead	Net Income	Income - Electricity	Income - Heat	Income - non-energy	Energy Direct costs	Overhead	Net Income
Gas only PW	377,758	227,721	33,053	307,274.92	131,886.60	199,369.32	451,593	246,485	33,053	350,887.50	142,798.22	237,444.72	123,172	221,670	33,053	168,220.89	128,312.63	81,360.72	265,737	232,799	33,053	220,194.13	134,874.55	176,520.45
Biomass PW	377,758	227,721	66,504	324,677.16	131,886.60	215,418.20	451,593	246,485	47,099	358,194.89	142,798.22	244,183.81	123,172	221,670	192,512	251,176.58	128,312.63	157,864.97	265,737	232,799	129,749	270,498.63	134,874.55	222,912.79
3rd Party BU PW	377,758	194,525	33,053	287,970.31	112,599.94	204,764.83	451,593	232,546	33,053	342,781.29	134,608.28	239,801.62	123,172	61,427	33,053	76,196.68	36,714.45	106,740.41	265,737	136,840	33,053	164,390.45	79,209.56	192,030.41
WSHP BU PW	347,920	227,721	84,174	307,274.92	131,886.60	226,652.91	419,064	246,485	54,519	350,887.50	142,798.22	246,881.92	19,064	221,670	276,746	168,220.89	128,312.63	182,818.63	179,485	232,799	180,829	220,194.13	134,874.55	238,044.74
Gas only Exp	145,478	227,721	33,053	307,274.92	131,886.60	32,910.48	175,913	246,485	33,053	350,887.50	142,798.22	40,235.59	47,435	221,670	33,053	168,220.89	128,312.63	5,623.31	102,138	232,799	33,053	220,194.13	134,874.55	13,121
Biomass Exp	145,478	227,721	66,504	324,677.16	131,886.60	16,861.61	173,913	246,485	47,099	358,194.89	142,798.22	33,496.50	47,435	221,670	192,512	251,176.58	128,312.63	82,127.59	102,138	232,799	129,749	270,498.63	134,874.55	59,513.23

Sensitivity Analysis Performance (NPV, IRR, Capex, Opex)																									
		Dual CHP												Dual CHP (T5)											
		GAS PW (Option 1)		GAS EX (Option 2)		GAS BIO PW (Option 3)		GAS EX (Option 4)		3rd Party Bio PW (Option 5)		WSPB Bio PW (Option 6)		NPV 25		NPV 40		NPV 25		NPV 40		NPV 25		NPV 40	
RR/IRR		NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40
1%		2,191,320	4,346,807	2,694,235	-3,050,047	2,215,362	4,544,562	2,699,993	-2,892,202	2,407,535	4,621,354	1,815,269	4,200,864	2,877,817	5,444,958	2,877,817	5,444,958	2,877,817	5,444,958	2,877,817	5,444,958	2,877,817	5,444,958	2,877,817	5,444,958
2%		1,714,519	3,275,984	2,559,660	-2,850,416	1,701,871	3,389,032	2,605,308	-2,737,368	1,916,293	3,520,015	1,293,548	3,021,707	2,307,330	4,167,002	2,307,330	4,167,002	2,307,330	4,167,002	2,307,330	4,167,002	2,307,330	4,167,002	2,307,330	4,167,002
3%		1,314,933	2,451,662	2,504,275	-2,691,919	1,271,582	2,499,815	2,547,627	-2,643,765	1,504,184	2,671,876	857,168	2,115,248	1,828,854	3,182,675	1,828,854	3,182,675	1,828,854	3,182,675	1,828,854	3,182,675	1,828,854	3,182,675	1,828,854	3,182,675
4%		978,586	1,810,095	2,426,761	-2,564,021	909,595	1,808,038	2,495,753	-2,566,078	1,157,455	2,011,467	490,666	1,410,942	1,428,546	2,416,055	1,428,546	2,416,055	1,428,546	2,416,055	1,428,546	2,416,055	1,428,546	2,416,055	1,428,546	2,416,055
5%		694,266	1,309,361	2,354,254	-2,459,129	603,794	1,264,081	2,448,726	-2,500,409	863,980	1,493,627	181,635	857,867	1,084,647	1,812,440	1,084,647	1,812,440	1,084,647	1,812,440	1,084,647	1,812,440	1,084,647	1,812,440	1,084,647	1,812,440
6%		452,913	904,094	2,297,250	-2,371,725	344,416	831,894	2,406,768	-2,443,925	614,701	1,078,072	-79,925	419,399	794,776	1,428,546	794,776	1,428,546	794,776	1,428,546	794,776	1,428,546	794,776	1,428,546	794,776	1,428,546
7%		247,277	581,844	2,242,531	-2,297,759	123,559	485,058	2,366,249	-2,394,545	402,082	745,703	-302,105	68,179	547,474	945,937	547,474	945,937	547,474	945,937	547,474	945,937	547,474	945,937	547,474	945,937
8%		71,556	320,535	2,195,105	-2,234,238	49,193	204,044	2,329,654	-2,350,729	220,029	475,951	-491,475	215,695	47,134	471,134	471,134	471,134	471,134	471,134	471,134	471,134	471,134	471,134	471,134	471,134
9%		-79,675	105,639	2,148,162	-2,179,922	-227,077	-25,705	2,329,654	-2,311,315	23,624	254,974	-483,396	47,134	471,134	471,134	471,134	471,134	471,134	471,134	471,134	471,134	471,134	471,134	471,134	471,134
10%		-306,386	138,848	2,130,136	-2,188,183	-714,597	-714,597	2,329,654	-2,311,315	23,624	254,974	-483,396	47,134	471,134	471,134	471,134	471,134	471,134	471,134	471,134	471,134	471,134	471,134	471,134	471,134
11%		-322,238	216,711	2,069,178	-2,088,598	-486,626	-372,601	2,231,566	-2,242,491	188,183	-79,800	-1,014,670	-794,877	-794,877	-794,877	-794,877	-794,877	-794,877	-794,877	-794,877	-794,877	-794,877	-794,877	-794,877	-794,877
12%		-419,726	-339,851	2,034,136	-2,047,321	-500,245	-500,245	2,206,135	-2,211,890	288,584	-207,548	-1,014,670	-794,877	-794,877	-794,877	-794,877	-794,877	-794,877	-794,877	-794,877	-794,877	-794,877	-794,877	-794,877	-794,877
13%		-504,481	-433,795	2,003,531	-2,011,548	-651,088	-651,088	2,170,135	-2,175,135	402,082	-1,014,670	-794,877	-794,877	-794,877	-794,877	-794,877	-794,877	-794,877	-794,877	-794,877	-794,877	-794,877	-794,877	-794,877	-794,877
14%		-578,300	-532,083	1,971,048	-1,978,687	-799,721	-799,721	2,152,409	-2,156,313	454,994	-486,131	-1,014,670	-794,877	-794,877	-794,877	-794,877	-794,877	-794,877	-794,877	-794,877	-794,877	-794,877	-794,877	-794,877	-794,877
15%		-647,933	-607,490	1,940,422	-1,948,269	-828,299	-799,033	2,127,807	-2,130,003	520,503	-486,131	-1,247,273	-1,247,273	-1,247,273	-1,247,273	-1,247,273	-1,247,273	-1,247,273	-1,247,273	-1,247,273	-1,247,273	-1,247,273	-1,247,273	-1,247,273	-1,247,273

4. North Shields System Technical Overview and Financial Performance Summary

NON RESIDENTIAL HIGH HEAT DEMAND - NORTH SHIELDS

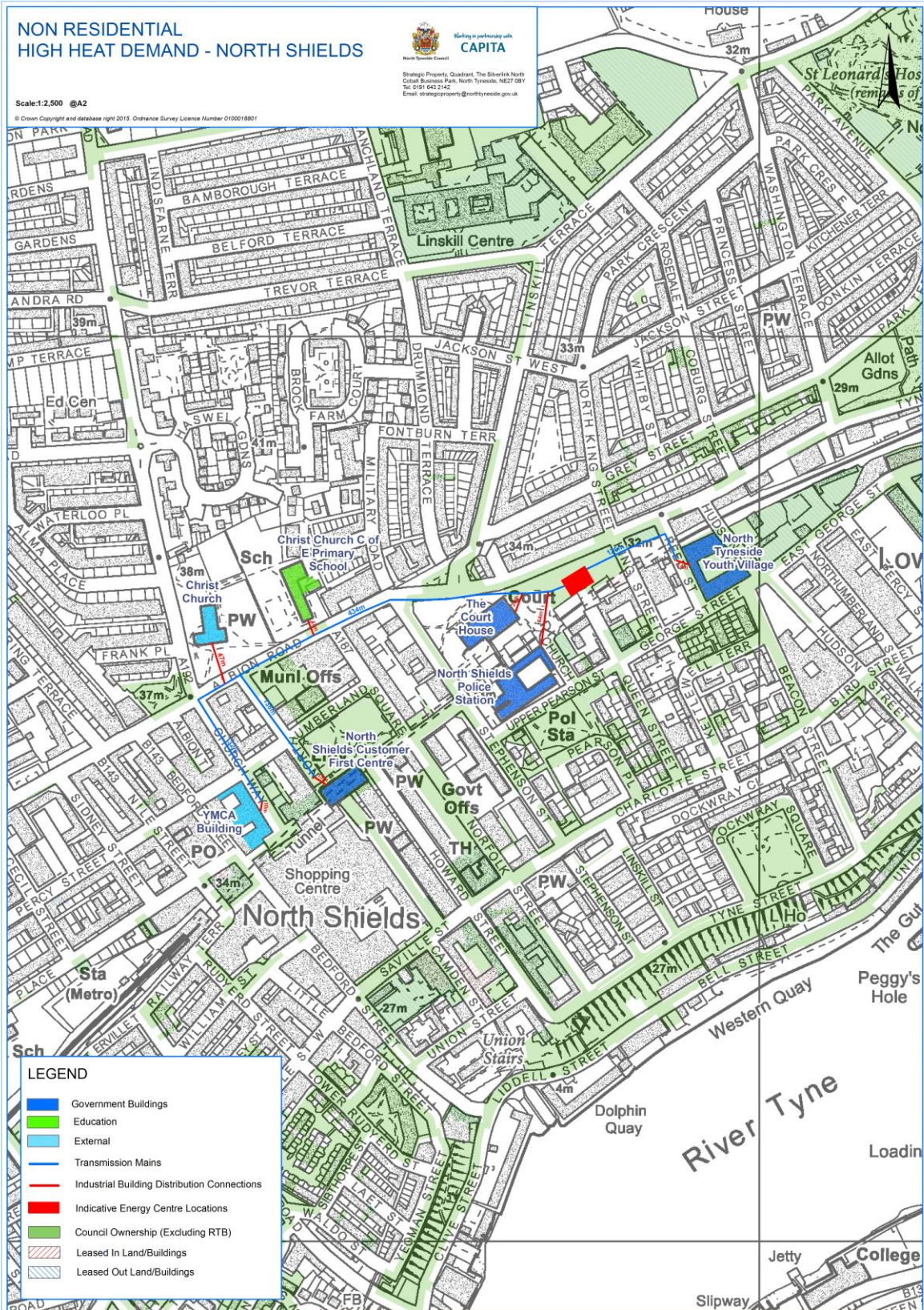


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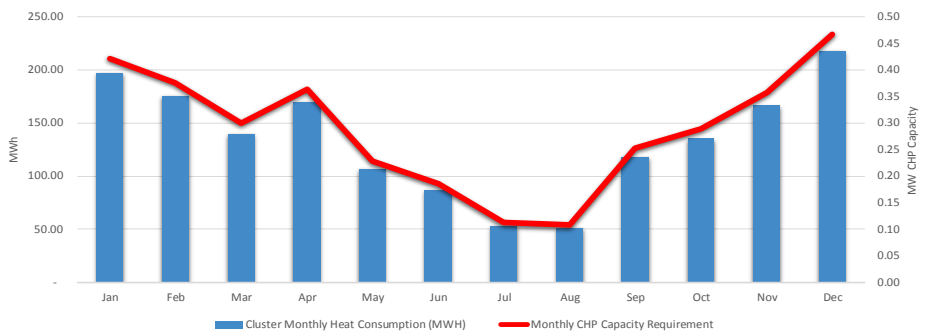
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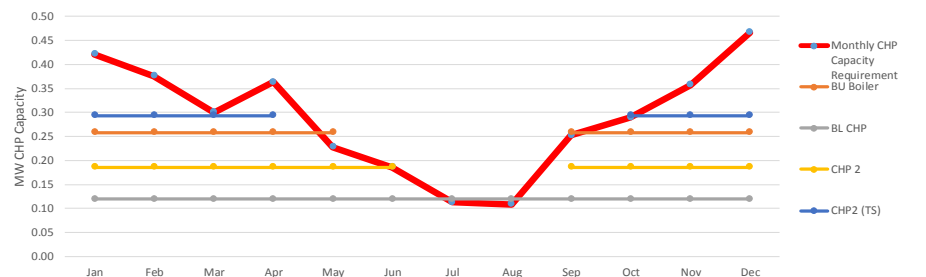


Energy Details													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Heat Demand
Cluster Monthly Heat Consumption (MWH)	196.20	175.07	139.71	169.24	106.28	86.46	52.75	50.67	117.53	134.85	166.18	217.08	1,612.03
System Technical Details													
Monthly CHP Capacity Requirement	0.42	0.38	0.30	0.36	0.23	0.19	0.11	0.11	0.25	0.29	0.36	0.47	
Baseload CHP Capacity Requirement	0.12												
Average load CHP Capacity Requirement	0.29												
Gas Back-up boiler capacity requirement (MW)	0.26												
Bimoss Back-up boiler capacity requirement (MW)	0.28												
Network Details													
Transmission Mains (m)	830.00												
Distribution Mains (m)	189.00												
Network m3	58.67												
MWh Thermal Storage Potential	2.67												
System run hrs storage potential	5.26												
CHP Details													
	Dual CHP			Dual CHP (TS)			BL CHP		BL CHP (TS)				
	CHP1	CHP2	Totals	CHP1	CHP2	Totals	CHP1	CHP2	CHP1	CHP2			
Average Electrical output (Mwe)	0.09	0.14	0.24	0.10	0.23	0.33	0.09	-	0.17	-			
Average Heat output (MWt)	0.12	0.19	0.31	0.13	0.29	0.43	0.12	-	0.22	-			
Overall CHP Efficiency (%)	80%	80%	1.60	80%	80%	1.60	80%	-	80%	-			
Fuel input (gross CV basis) (MW)	0.27	0.41	0.68	0.29	0.65	0.95	0.27	-	0.49	-			
CHP hours run per year (hrs)	5,585	6,570		5,585	6,570		5,585	-	6,570	-			
Annual CHP Displaced Electricity (MWH)	520	949	1,470	572	1,502	2,074	525	-	1,128	-			
Annual Electricity Generated (parasitic network load adj)	382	782	1,163	326	1,241	1,567	514	-	1,104	-			
Monthly Electricity Generated (parasitic network load adj)	42	78	121	47	124	171	43	-	92	-			
Monthly CHP Delivered Heat (network heat-loss adj)	50	92	142	55	145	200	51	-	109	-			
Input Fuel (MWH)	1,486	2,712	4,199	1,635	4,291	5,926	1,501	-	3,224	-			
Annual Net CO2 Saving p/a (tonnes)	124	226	350	136	357	493	125	-	268	-			
Annual Net CO2 Saving p/a (£)	1,980	3,613	5,592	2,177	5,715	7,892	1,999	-	4,294	-			
Combined heat Capacity (MW) (CHP & Back-up)	0.38	0.19	0.56	0.19	0.29	0.48	0.69	-	0.59	-			

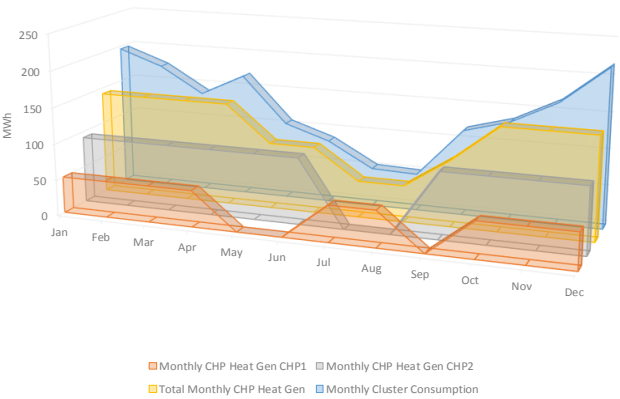
Cluster Demand and CHP Capacity Requirement



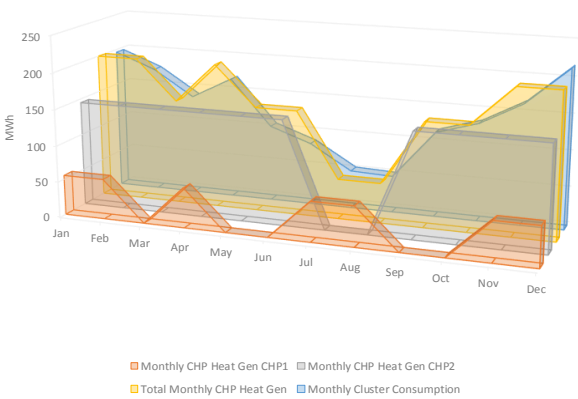
CHP Load Matching



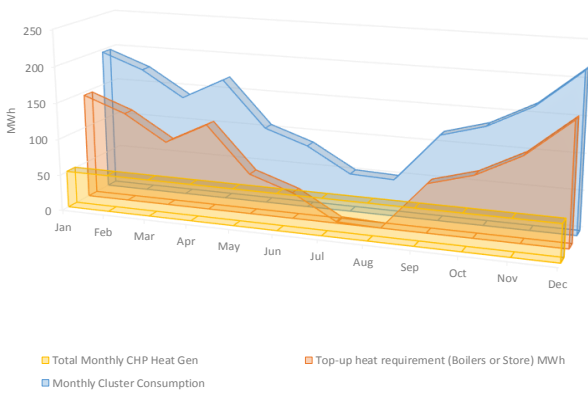
Dual CHP Cluster Demand vs. CHP Output



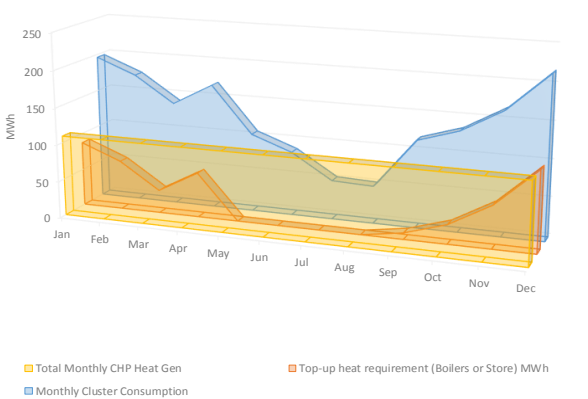
Dual CHP TS Cluster Demand vs. CHP Output



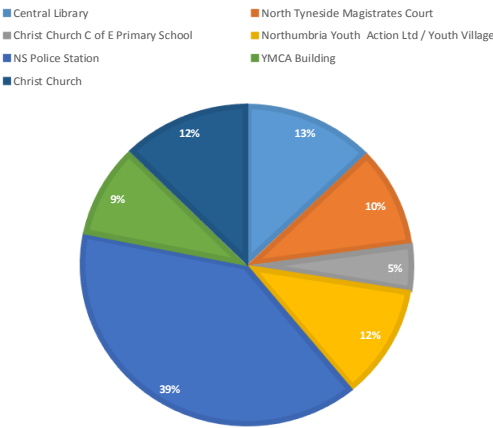
BL CHP Cluster Demand vs. CHP Output



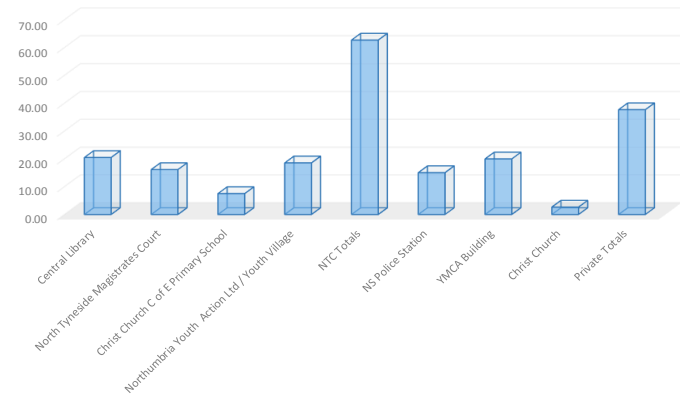
BL CHP TS Cluster Demand vs. CHP Output



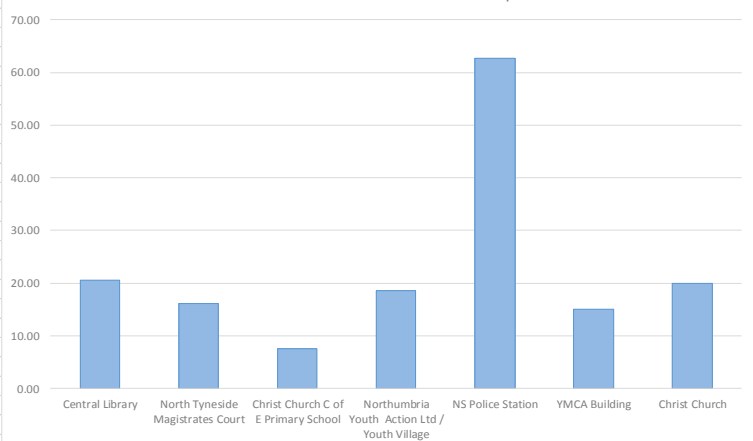
NORTH SHIELDS CLUSTER POWER CONSUMPTION



Building Power Consumption as % of System Power Generation



North Shields Cluster Power consumption



System CAPEX Costs	Dual CHP				Dual CHP (T5)				BL CHP				BL CHP (T5)			
	Gas Only	Biomass BU	3rd Party BU	WSHP BU	Gas Only	Biomass BU	3rd Party BU	WSHP BU	Gas Only	Biomass BU	3rd Party BU	WSHP BU	Gas Only	Biomass BU	3rd Party BU	WSHP BU
CHP	118,824	118,826	118,826	118,826	105,520	165,520	165,520	165,520	47,041	47,041	47,041	47,041	47,041	85,877	85,877	85,877
Boiler	7,740	-	-	-	1,641	-	-	-	17,088	-	-	-	11,117	-	-	-
WSP	-	-	-	252,376	-	-	57,244	-	-	-	557,213	-	-	-	-	362,520
Biomass Boiler, store & assoc. plant	-	98,146	-	-	-	22,261	-	-	-	216,694	-	-	-	140,980	-	-
Plant BOS (Balance of System)	-	32,546	17,824	55,680	-	28,167	24,828	33,415	-	39,540	7,096	90,638	-	34,029	12,883	67,259
Thermal Store	-	-	-	-	-	-	-	-	-	-	-	-	47,849	47,849	47,849	47,849
Network Transmission	816,720	816,720	816,720	816,720	816,720	816,720	816,720	816,720	816,720	816,720	816,720	816,720	816,720	816,720	816,720	816,720
Network Distribution	113,400	113,400	113,400	113,400	113,400	113,400	113,400	113,400	113,400	113,400	113,400	113,400	113,400	113,400	113,400	113,400
Building Connections	40,649	40,649	40,649	40,649	40,649	40,649	40,649	40,649	40,649	40,649	40,649	40,649	40,649	40,649	40,649	40,649
WSHP Network & Civils	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EC building Cost	64,130	76,956	34,772	89,783	54,662	65,594	48,436	76,526	78,586	94,303	13,766	110,020	67,302	80,762	25,130	94,222
Total Capital (£)	1,180,450	1,297,243	1,142,190	1,487,434	1,217,666	1,252,312	1,209,553	1,303,474	1,123,103	1,368,367	1,038,632	1,775,681	1,197,463	1,360,265	1,142,506	1,628,496

System OPEX & Revenue	Dual CHP						Dual CHP (T5)						BL CHP						BL CHP (T5)						
	Revenue			Opex Costs			Revenue			Opex Costs			Revenue			Opex Costs			Revenue			Opex Costs			
	Price/Cost (MWh)	Energy Sales (MWh)	Income non-energy	Energy Direct costs	Overhead Costs	Net	Price/Cost (MWh)	Energy Sales (MWh)	Income non-energy	Energy Direct costs	Overhead Costs	Net	Price/Cost (MWh)	Energy Sales (MWh)	Income non-energy	Energy Direct costs	Overhead Costs	Net	Price/Cost (MWh)	Energy Sales (MWh)	Income non-energy	Energy Direct costs	Overhead Costs	Net	
Private Wire Elec Sales	116.85	138,034				70,931	116.85	185,235				86,679	116.85	61,393				39,710	116.85	131,856				86,482	
Export Elec Sales	45	53,158				13,945	45	71,336				27,220	45	23,643				1,960	45	50,779				5,404	
Standing Charge			11,356						11,356						11,356						11,356				
Heat Sales (CHP)	52.00	71,080				52.00	95,386					52.00	31,614					52.00	67,899						
Heat Sales (Boiler)	52.00	13,458				52.00	831					52.00	52,211					52.00	23,057						
Input Fuel (CHP)	25.3			106,228.82			25.3		149,916.86			25.3			37,979.07			25.3			81,568.85				
Input Fuel (Boiler)	25.2			7,826.52			25.2		483.37			25.2			30,362.99			25.2			13,408.68				
Biomass Fuel Costs	46			14,881.78		77,437	46		919.11			87,081	46		57,733.86			64,953	46		25,496.00			97,629	
Biomass RH income T1	52.4		11,528			7,438	52.4		712			26,818	52.4		44,721			27,203	52.4		19,749			16,552	
Biomass RH income T2	22.7		2,034				22.7		126				22.7		7,892				22.7		3,485				
WSHP RH																									
WSHP RH income T1	89.5		19,689				89.5		1,216			89.5		76,384				89.5		33,732					
WSHP RH income T2	26.7		1,037				26.7		64			26.7		4,021				26.7		1,776					
Opex Overhead																									
Network maintenance	13				21,137.59		13				24,068.71		13				20,956.43		13				22,764.05		
Bureau Costs	11.1				18,048.25		11.1				20,550.99		11.1				17,893.56		11.1				19,437.51		
Business rates	6				9,755.81		6				11,106.64		6				9,677.20		6				10,506.76		

	Income - Electricity	Income - Heat	Income - non-energy	Energy Direct costs	Overhead	Net income	Income - Electricity	Income - Heat	Income - non-energy	Energy Direct costs	Overhead	Net income	Income - Electricity	Income - Heat	Income - non-energy	Energy Direct costs	Overhead	Net income	Income - Electricity	Income - Heat	Income - non-energy	Energy Direct costs	Overhead	Net income
Gas only PW	138,034	84,518	11,356	114,055.35	48,941.64	70,930.82	185,235	96,217	11,356	150,400.23	55,728.36	86,679.00	61,393	83,826	11,356	68,342.07	48,522.18	39,710.45	131,856	90,956	11,356	94,977.53	52,708.92	86,481.57
Biomass PW	138,034	84,518	24,918	121,110.61	48,941.64	77,427.39	185,235	96,217	12,103	150,915.97	55,728.36	87,980.45	61,393	83,826	63,969	95,712.94	48,522.18	64,952.70	131,856	90,956	34,590	107,064.85	52,708.92	87,638.36
3rd Party BU PW	138,034	71,080	11,356	106,228.82	41,144.35	73,096.32	185,235	95,386	11,356	149,916.86	55,213.75	86,845.79	61,393	31,614	11,356	37,979.07	18,299.76	48,084.37	131,856	67,899	11,356	81,568.85	39,302.97	90,238.96
WSHP BU PW	125,937	84,518	32,082	114,055.35	48,941.64	79,559.66	184,488	96,217	12,636	150,400.23	55,728.36	87,211.93	14,463	83,826	91,761	68,342.07	48,522.18	73,186.05	111,131	90,956	46,864	94,977.53	52,708.92	101,264.82
Gas only Exp	53,158	84,518	11,356	114,055.35	48,941.64	13,944.91	71,336	96,217	11,356	150,400.23	55,728.36	27,220.17	23,643	83,826	11,356	68,342.07	48,522.18	1,960.30	50,779	90,956	11,356	94,977.53	52,708.92	5,404.39
Biomass Exp	53,158	84,518	24,918	121,110.61	48,941.64	7,438.34	71,336	96,217	12,103	150,915.97	55,728.36	26,818.12	23,643	83,826	63,969	95,712.94	48,522.18	27,202.55	50,779	90,956	34,590	107,064.85	52,708.92	16,551.68

System Financial Performance (NPV, IRR, Capex Offset)

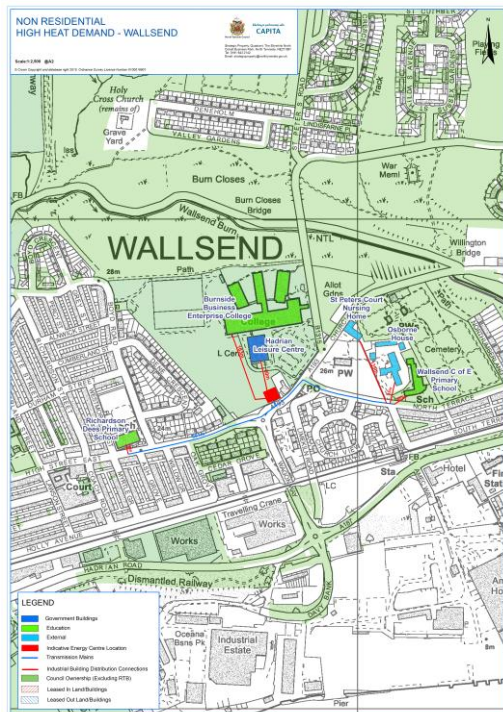
RR/IRR		Dual CHP															
		GAS PW (Option 1)		GAS EXP (Option 2)		GAS BIO PW (Option 3)		GAS BIO EXP (Option 4)		3rd Party BU PW (Option 5)		WSPH BU PW (Option 6)					
		NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40				
1%	323,130	1,090,001	-1,462,066	-1,612,832	344,346	1,181,562	-1,440,850	-1,521,270	406,557	1,196,841	200,676	1,060,838	-	-			
2%	157,971	713,503	-1,415,885	-1,525,102	164,119	770,611	-1,409,737	-1,467,994	235,835	808,127	179,012	640,125	-	-			
3%	20,196	424,617	-1,375,354	-1,454,862	13,787	455,306	-1,381,763	-1,424,179	92,947	509,715	-135,969	317,651	-	-			
4%	-95,163	200,667	-1,339,488	-1,397,648	-112,075	210,892	-1,356,399	-1,387,422	-26,628	278,234	-263,837	67,892	-	-			
5%	-192,096	25,317	-1,307,496	-1,350,239	-217,821	19,535	-1,333,221	-1,356,021	-127,200	96,850	-371,065	-127,200	-	-			
6%	-279,844	-113,340	-1,278,718	-1,318,295	-386,088	-133,294	-1,311,864	-1,338,178	-323,081	-46,236	-283,149	-348,149	-	-			
7%	-342,916	-223,885	-1,252,699	-1,276,101	-382,325	-252,376	-1,292,108	-1,304,591	-283,948	-161,283	-537,325	-403,813	-	-			
8%	-401,515	-312,863	-1,228,956	-1,246,385	-446,226	-349,442	-1,273,666	-1,282,963	-344,979	-253,620	-601,638	-502,201	-	-			
9%	-451,332	-385,027	-1,207,163	-1,220,198	-500,540	-428,153	-1,256,371	-1,263,324	-396,948	-328,619	-656,127	-581,757	-	-			
10%	-493,737	-444,246	-1,188,027	-1,200,239	-564,807	-467,823	-1,236,526	-1,243,383	-454,308	-369,637	-702,317	-604,317	-	-			
11%	-530,008	-492,464	-1,168,346	-1,175,727	-586,293	-545,303	-1,224,630	-1,228,567	-479,254	-440,564	-761,674	-699,363	-	-			
12%	-560,984	-532,566	-1,150,804	-1,156,481	-620,041	-589,017	-1,209,951	-1,212,932	-511,773	-482,488	-775,104	-739,120	-	-			
13%	-590,494	-564,566	-1,134,811	-1,138,766	-648,630	-617,943	-1,196,943	-1,199,927	-530,660	-517,488	-808,163	-779,331	-	-			
14%	-619,630	-593,736	-1,119,092	-1,122,320	-673,820	-655,664	-1,184,511	-1,184,229	-563,655	-546,668	-827,748	-809,303	-	-			
15%	-629,649	-617,050	-1,104,454	-1,106,971	-694,808	-681,053	-1,169,652	-1,170,973	-584,266	-571,282	-848,317	-834,185	-	-			

RR/IRR		Dual CHP (T5)															
		GAS PW (Option 1)		GAS EXP (Option 2)		GAS BIO PW (Option 3)		GAS BIO EXP (Option 4)		3rd Party BU PW (Option 5)		WSPH BU PW (Option 6)					
		NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40				
1%	617,514	1,554,647	-1,778,133	-2,072,425	591,664	1,533,141	-1,803,984	-2,093,931	629,056	1,567,991	543,766	1,486,660	-	-			
2%	413,504	1,092,376	-1,698,536	-1,911,725	386,980	1,069,009	-1,725,051	-1,935,082	424,551	1,104,729	319,254	1,022,407	-	-			
3%	243,000	737,211	-1,629,761	-1,784,961	251,971	712,473	-1,656,791	-1,809,698	253,619	748,781	168,454	665,704	-	-			
4%	99,928	461,440	-1,569,895	-1,683,422	72,507	435,694	-1,597,317	-1,709,168	110,175	472,382	25,234	388,968	-	-			
5%	-20,584	245,099	-1,517,397	-1,600,831	48,299	218,616	-1,545,112	-1,627,314	-10,665	255,529	95,302	172,015	-	-			
6%	-127,466	73,884	-1,487,027	-1,530,625	-180,340	-46,067	-1,498,564	-1,525,296	-123,675	-83,698	-197,106	-348,149	-	-			
7%	-208,893	-63,435	-1,429,779	-1,475,458	-236,965	-90,832	-1,457,850	-1,502,851	-199,523	-53,785	-283,375	-137,022	-	-			
8%	-282,448	-174,113	-1,392,834	-1,426,855	-310,610	-201,773	-1,420,995	-1,454,514	-273,310	-164,766	-356,704	-247,703	-	-			
9%	-345,235	-339,214	-1,359,524	-1,384,960	-373,442	-292,040	-1,387,731	-1,412,860	-336,307	-255,125	-419,212	-337,468	-	-			
10%	-398,195	-386,336	-1,340,366	-1,368,366	-428,293	-363,813	-1,368,366	-1,393,366	-383,637	-303,637	-465,037	-383,637	-	-			
11%	-445,067	-399,217	-1,309,715	-1,331,121	-473,287	-427,195	-1,329,905	-1,344,406	-436,503	-390,560	-518,191	-472,231	-	-			
12%	-484,758	-450,031	-1,276,390	-1,287,295	-512,899	-470,019	-1,304,530	-1,315,279	-476,555	-441,561	-557,668	-522,728	-	-			
13%	-518,932	-492,548	-1,253,015	-1,261,301	-547,002	-528,691	-1,281,085	-1,289,248	-510,677	-484,242	-591,433	-564,488	-	-			
14%	-548,434	-528,304	-1,231,313	-1,237,615	-578,495	-558,193	-1,259,314	-1,265,519	-540,807	-520,148	-620,698	-600,265	-	-			
15%	-573,907	-555,830	-1,211,126	-1,215,961	-607,285	-586,317	-1,239,600	-1,243,768	-565,919	-550,492	-645,541	-630,940	-	-			

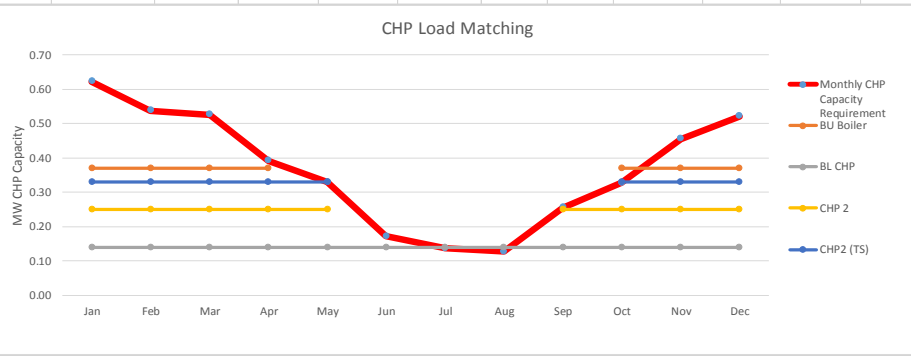
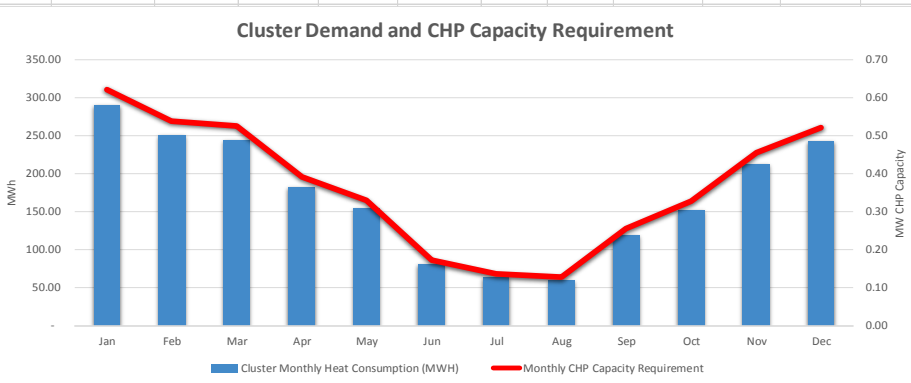
RR/IRR		BL CHP															
		GAS PW (Option 1)		GAS EXP (Option 2)		GAS BIO PW (Option 3)		GAS BIO EXP (Option 4)		3rd Party BU PW (Option 5)		WSPH BU PW (Option 6)					
		NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40				
1%	276,741	132,546	1,076,752	-1,040,554	11,383	711,571	-762,666	-488,348	16,987	802,818	-218,714	379,479	-	-			
2%	364,728	-53,715	1,064,732	-1,040,378	-137,114	371,597	-837,118	-624,067	-126,635	249,963	-383,770	189,425	-	-			
3%	437,461	-211,047	1,058,160	-1,046,983	-260,542	109,794	-881,240	-726,141	-217,764	56,395	-526,017	-103,318	-	-			
4%	497,730	-322,419	1,051,168	-1,042,992	-363,496	-92,598	-916,934	-803,480	-293,742	-93,197	-649,439	-329,302	-	-			
5%	540,785	-430,665	1,045,861	-1,037,851	-449,627	-94,723	-904,627	-824,323	-382,323	-149,723	-725,323	-455,323	-	-			
6%	580,361	-459,690	1,038,121	-1,031,885	-521,875	-98,835	-968,835	-807,278	-435,258	-301,713	-808,651	-643,035	-	-			
7%	621,973	-557,331	1,028,617	-1,025,327	-582,620	-473,621	-987,264	-941,614	-459,268	-347,678	-875,034	-752,218	-	-			
8%	662,779	-601,147	1,020,800	-1,018,350	-633,792	-552,612	-1,001,813	-967,814	-492,629	-423,813	-930,669	-839,199	-	-			
9%	676,742	-610,939	1,018,621	-1,011,081	-681,215	-610,146	-1,014,627	-971,146	-517,627	-473,146	-973,146	-873,146	-	-			
10%	696,650	-665,771	1,004,963	-1,001,033	-713,440	-667,842	-1,021,781	-1,002,285	-551,660	-517,769	-1,016,678	-965,988	-	-			
11%	713,148	-692,100	997,061	-996,024	-744,264	-709,884	-1,028,177	-1,013,579	-577,074	-548,618	-1,049,292	-1,010,554	-	-			
12%	726,772	-710,882	989,146	-988,361	-770,317	-744,294	-1,032,691	-1,021,793	-590,190	-573,888	-1,067,786	-1,047,465	-	-			
13%	737,962	-731,821	980,162	-980,666	-791,212	-771,523	-1,037,621	-1,027,621	-603,192	-595,192	-1,079,618	-1,077,618	-	-			
14%	747,085	-779,876	973,425	-972,970	-810,883	-795,807	-1,037,223	-1,030,990	-627,780	-611,619	-1,118,881	-1,101,823	-	-			
15%	754,448	-747,394	965,644	-965,296	-826,501	-814,964	-1,037,698	-1,032,866	-634,146	-625,025	-1,134,625	-1,121,625	-	-			

RR/IRR		BL CHP (T5)															
		GAS PW (Option 1)		GAS EXP (Option 2)		GAS BIO PW (Option 3)		GAS BIO EXP (Option 4)		3rd Party BU PW (Option 5)		WSPH BU PW (Option 6)					
		NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40				
1%	633,365	1,558,360	-1,071,936	-1,013,504	706,636	1,762,154	-1,298,605	-835,248	766,807	1,742,428	517,536	1,832,360	-	-			
2%	429,600	1,106,976	-1,070,749	-1,011,422	476,745	1,243,177	-1,026,674	-897,041	553,020	1,259,956	319,615	1,674,304	-	-			
3%	259,369	752,544	-1,070,725	-1,042,911	284,595	843,258	-1,044,098	-954,127	374,504	889,013	83,660	1,611,314	-	-			
4%	116,460	477,148	-1,072,175	-1,049,635	123,145	581,526	-1,065,290	-996,238	224,808	600,747	81,265	341,080	-	-			
5%	1,538	261,611	-1,060,419	-1,052,853	12,495	286,752	-1,070,975	-1,027,242	97,780	337,939	-226,171	90,220	-	-			
6%	-106,743	89,955	-1,056,684	-1,052,446	-117,147	93,581	-1,077,147	-1,024,261	97,780	337,939	-226,171	90,220	-	-			
7%	-192,128	-47,001	-1,060,194	-1,052,125	-224,792	-60,958	-1,093,858	-1,066,002	-101,491	50,941	-489,051	-266,566	-	-			
8%	-266,666	-125,578	-1,056,075	-1,045,421	-307,735	-185,715	-1,098,145	-1,077,658	-187,150	-65,366	-520,651	-394,087	-	-			
9%	-328,438	-214,613	-1,045,613	-1,040,411	-387,265	-287,265	-1,100,544	-1,092,968	-249,475	-402,065	-578,668	-477,668	-	-			
10%	-380,325	-323,513	-1,040,640	-1,040,640	-430,737	-370,648	-1,100,411	-1,089,793	-301,593	-338,232	-663,325	-628,232	-	-			
11%	-428,381	-382,606	-1,038,150	-1,035,285	-499,213	-439,537	-1,100,981	-1,092,220	-360,612	-302,848	-705,517	-651,917	-	-			
12%	-468,092	-433,444	-1,031,601	-1,029,436	-535,574	-496,860	-1,099,483	-1,092,862	-392,609	-356,756	-759,015	-709,625	-	-			
13%	-502,245	-475,653	-1,024,970	-1,021,225	-574,553	-546,636	-1,097,998	-1,092,968	-429,475	-402,065	-788,492	-757,668	-	-			
14%	-531,885	-511,812	-1,018,003	-1,016,748	-607,858	-585,157	-1,093,975	-1,090,134	-461,150	-440,204	-821,348	-797,943	-	-			
15%	-557,444	-542,082	-1,011,037	-1,010,077	-636,646	-615,309	-1,090,239	-1,097,289	-486,634	-472,025	-845,549	-811,341	-	-			

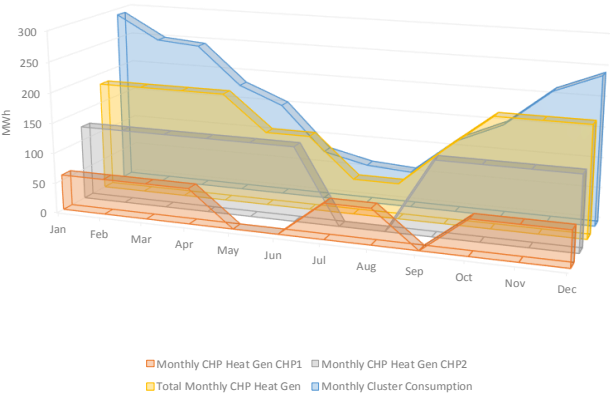
5. Wallsend System Technical Overview and Financial Performance Summary



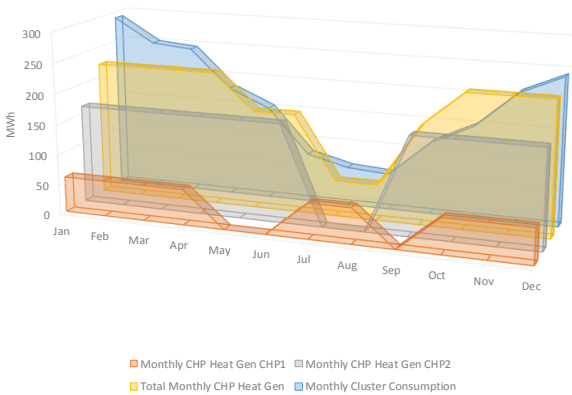
Energy Details													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Heat Demand
Cluster Monthly Heat Consumption (MWH)	289.76	250.56	244.69	182.40	153.63	80.36	63.84	59.16	119.10	152.16	212.31	242.66	2,050.63
System Technical Details													
Monthly CHP Capacity Requirement	0.62	0.54	0.53	0.39	0.33	0.17	0.14	0.13	0.26	0.33	0.46	0.52	
Baseload CHP Capacity Requirement	0.14												
Average load CHP Capacity Requirement	0.37												
Gas Back-up boiler capacity requirement (MW)	0.37												
Bimoss Back-up boiler capacity requirement (MW)	0.40												
Network Details													
Transmission Mains (m)	591.00												
Distribution Mains (m)	456.00												
Network m3	41.78												
MWh Thermal Storage Potential	1.90												
System run hrs storage potential	2.78												
CHP Details													
	Dual CHP			Dual CHP (TS)			BL CHP		BL CHP (TS)				
	CHP1	CHP2	Totals	CHP1	CHP2	Totals	CHP1	CHP2	CHP1	CHP2			
Average Electrical output (Mwe)	0.11	0.19	0.30	0.11	0.26	0.37	0.11	-	0.22	-			
Average Heat output (MWt)	0.14	0.25	0.39	0.14	0.33	0.47	0.14	-	0.29	-			
Overall CHP Efficiency (%)	80%	80%	1.60	80%	80%	1.60	80%	-	80%	-			
Fuel input (gross CV basis) (MW)	0.31	0.56	0.87	0.31	0.73	1.04	0.31	-	0.64	-			
CHP hours run per year (hrs)	5,585	6,570		5,585	6,570		5,585	-	6,570	-			
Annual CHP Displaced Electricity (MWH)	607	1,278	1,885	607	1,685	2,292	613	-	1,467	-			
Annual Electricity Generated (parasitic network load adj)	446	1,054	1,499	446	1,393	1,838	600	-	1,435	-			
Monthly Electricity Generated (parasitic network load adj)	50	105	155	50	139	189	50	-	120	-			
Monthly CHP Delivered Heat (network heat-loss adj)	59	123	182	59	162	221	59	-	141	-			
Input Fuel (MWH)	1,735	3,651	5,387	1,735	4,813	6,549	1,753	-	4,192	-			
Annual Net CO2 Saving p/a (tonnes)	144	304	448	144	401	545	146	-	349	-			
Annual Net CO2 Saving p/a (£)	2,311	4,863	7,175	2,311	6,411	8,722	2,334	-	5,584	-			
Combined heat Capacity (MW) (CHP & Back-up)	0.51	0.25	0.76	0.38	0.33	0.70	0.93	-	0.79	-			



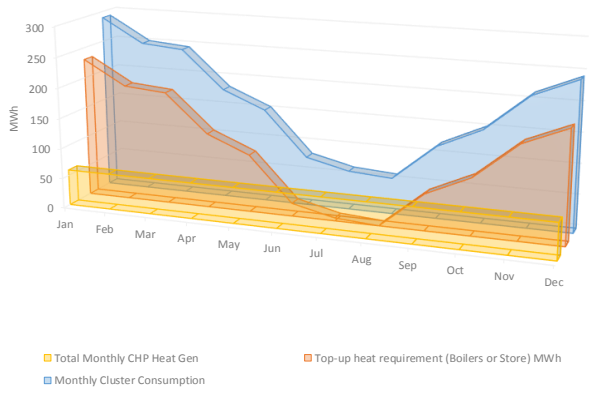
Dual CHP Cluster Demand vs. CHP Output



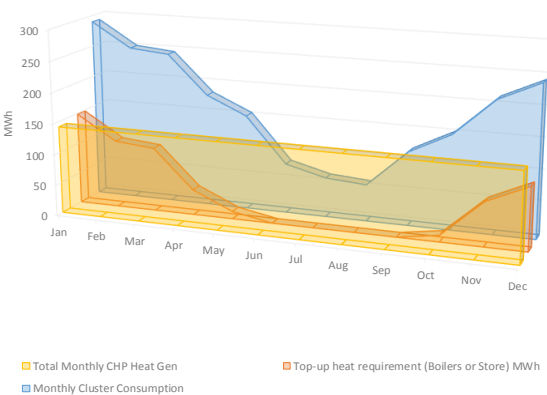
Dual CHP TS Cluster Demand vs. CHP Output



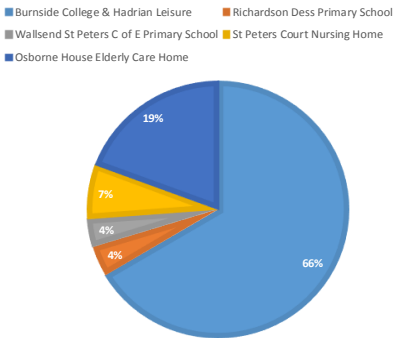
BL CHP Cluster Demand vs. CHP Output



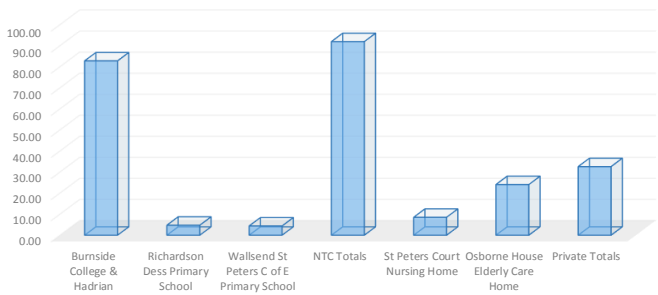
BL CHP TS Cluster Demand vs. CHP Output



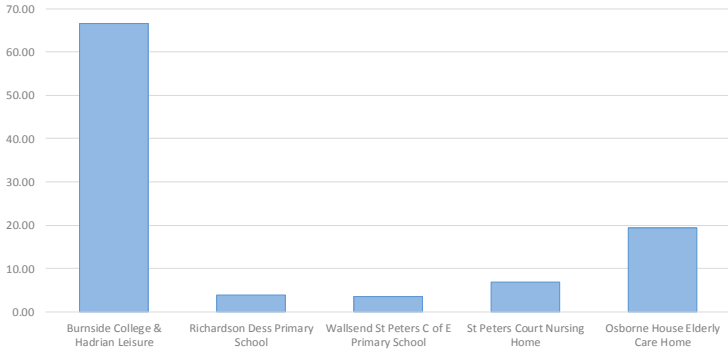
WALLSEND CLUSTER POWER CONSUMPTION



Building Power Consumption as % of System Power Generation



Wallsend Cluster Power consumption



System CAPEX Costs	Dual CHP				Dual CHP (TS)				BL CHP				BL CHP (TS)			
	Gas Only	Biomass BU	3rd Party BU	WSPH BU	Gas Only	Biomass BU	3rd Party BU	WSPH BU	Gas Only	Biomass BU	3rd Party BU	WSPH BU	Gas Only	Biomass BU	3rd Party BU	WSPH BU
CHP	151,544	151,642	151,642	151,642	182,388	182,588	182,588	182,588	54,925	54,925	54,925	54,925	111,670	111,670	111,670	111,670
Boiler	11,088	-	-	-	7,058	-	-	-	23,678	-	-	-	15,223	-	-	-
WSPH	-	-	-	-	361,442	-	-	-	230,154	-	-	-	772,100	-	-	-
Biomass Boiler, store & assc. plant	-	140,561	-	-	-	89,504	-	-	300,261	-	-	-	193,050	-	-	-
Plant BOS (Balance of System)	-	43,830	22,746	76,961	-	49,814	27,388	61,911	53,278	8,239	124,054	-	49,037	16,750	91,213	-
Thermal Store	-	-	-	-	48,885	48,885	48,885	48,885	-	-	-	-	49,037	49,037	49,037	49,037
Network Transmission	581,544	581,544	581,544	581,544	581,544	581,544	581,544	581,544	581,544	581,544	581,544	581,544	581,544	581,544	581,544	581,544
Network Distribution	273,600	273,600	273,600	273,600	273,600	273,600	273,600	273,600	273,600	273,600	273,600	273,600	273,600	273,600	273,600	273,600
Building Connections	53,182	53,182	53,182	53,182	53,182	53,182	53,182	53,182	53,182	53,182	53,182	53,182	53,182	53,182	53,182	53,182
WSPH Network & Civils	-	-	-	-	639,600	-	-	-	639,600	-	-	-	639,600	-	-	-
EC building Cost	86,423	103,705	44,373	120,989	80,204	96,245	53,431	112,286	105,890	127,068	16,073	148,246	90,425	108,510	32,678	126,595
Total Capital (£)	1,181,881	1,348,064	1,127,088	2,258,961	1,255,508	1,366,362	1,220,618	2,183,750	1,104,610	1,443,859	987,563	2,647,252	1,193,715	1,416,301	1,118,461	2,422,855

System OPEX & Revenue	Dual CHP						Dual CHP (TS)						BL CHP						BL CHP (TS)					
	Revenue			Opex Costs			Revenue			Opex Costs			Revenue			Opex Costs			Revenue			Opex Costs		
	Price/Cost (MWh)	Energy Sales (MWh)	Income non-energy	Energy Direct costs	Overhead Costs	Net	Price/Cost (MWh)	Energy Sales (MWh)	Income non-energy	Energy Direct costs	Overhead Costs	Net	Price/Cost (MWh)	Energy Sales (MWh)	Income non-energy	Energy Direct costs	Overhead Costs	Net	Price/Cost (MWh)	Energy Sales (MWh)	Income non-energy	Energy Direct costs	Overhead Costs	Net
Private Wire Elec Sales	116.85	177,675	-	-	-	95,615	116.85	217,271	-	-	-	116,211	116.85	71,683	-	-	-	50,516	116.85	171,458	-	-	-	116,398
Export Elec Sales	45	68,424	-	-	-	13,636	45	83,673	-	-	-	17,388	45	27,606	-	-	-	6,438	45	66,030	-	-	-	10,970
Standing Charge	-	-	-	-	-	18,813	-	-	-	-	-	18,813	-	-	-	-	-	18,813	-	-	-	-	-	18,813
Heat Sales (CHP)	52.00	91,493	-	-	-	52.00	111,883	-	-	-	-	52.00	36,913	-	-	-	-	52.00	88,292	-	-	-	-	88,292
Heat Sales (Boiler)	52.00	19,001	-	-	-	52.00	7,612	-	-	-	-	52.00	69,720	-	-	-	-	52.00	30,960	-	-	-	-	30,960
Input Fuel (CHP)	25.3	-	-	136,286.51	-	-	25.3	-	-	165,680.49	-	-	25.3	-	-	44,344.46	-	-	25.3	-	-	106,067.54	-	-
Input Fuel (Boiler)	25.2	-	-	11,049.68	-	-	25.2	-	-	4,426.72	-	-	25.2	-	-	40,544.73	-	-	25.2	-	-	18,004.33	-	-
Biomass Fuel Costs	46	-	-	21,010.48	-	-	46	-	-	8,417.21	-	-	46	-	-	-	-	84,222	46	-	-	-	-	111,366
Biomass RHI income T1	52.4	-	16,275	-	-	4,450	52.4	-	6,520	-	-	13,707	52.4	-	59,718	-	-	40,145	52.4	-	26,518	-	-	25,938
Biomass RHI income T2	22.7	-	-	-	-	22.7	-	-	1,151	-	-	10,538	22.7	-	-	-	-	4,680	22.7	-	-	-	-	-
WSPH RHI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WSPH RHI income T1	89.5	-	27,798	-	-	-	89.5	-	11,136	-	-	101,999	89.5	-	101,999	-	-	61,097.61	89.5	-	45,294	-	-	-
WSPH RHI income T2	26.7	-	1,463	-	-	-	26.7	-	586	-	-	5,370	26.7	-	-	-	-	2,385	26.7	-	-	-	-	-
Opex Overhead	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Network maintenance	13	-	-	-	27,654.50	-	13	-	-	-	29,913.69	-	13	-	-	-	26,658.15	13	-	-	-	-	29,823.66	-
Bureaux Costs	11.1	-	-	-	23,612.69	-	11.1	-	-	-	25,541.69	-	11.1	-	-	-	22,761.96	11.1	-	-	-	-	25,464.82	-
Business rates	6	-	-	-	12,763.62	-	6	-	-	-	13,806.32	-	6	-	-	-	12,303.76	6	-	-	-	-	13,764.77	-

	Income - Electricity	Income - Heat	Income - non-energy	Energy Direct costs	Overhead	Net income	Income - Electricity	Income - Heat	Income - non-energy	Energy Direct costs	Overhead	Net income	Income - Electricity	Income - Heat	Income - non-energy	Energy Direct costs	Overhead	Net income	Income - Electricity	Income - Heat	Income - non-energy	Energy Direct costs	Overhead	Net income	
Gas only PW	177,675	110,494		18,813	147,336.19	64,030.81	95,615.09	217,271	119,495	18,813	170,107.21	69,261.69	116,210.55	71,683	106,633	18,813	84,889.19	61,723.87	50,515.63	171,458	119,252	18,813	124,071.87	69,053.25	116,398.07
Biomass PW	177,675	110,494		37,960	157,296.98	64,030.81	104,801.24	217,271	119,495	26,484	174,097.70	69,261.69	119,899.74	71,683	106,633	89,069	121,438.45	61,723.87	84,222.46	171,458	119,252	50,011	140,301.96	69,053.25	131,365.95
3rd Party BU PW	177,675	91,493		18,813	136,286.51	64,030.81	98,734.41	217,271	111,883	18,813	165,680.49	64,763.02	117,523.91	71,683	36,913	18,813	44,344.46	21,366.84	61,097.61	171,458	88,292	18,813	106,067.54	51,107.36	121,388.46
WSPH BU PW	160,596	110,494		48,074	147,336.19	107,797.52	210,429	119,495	30,536	170,107.21	69,261.69	121,091.11	9,016	106,633	126,182	84,889.19	61,723.87	95,216.74	143,630	119,252	66,491	124,071.87	69,053.25	136,248.08	
Gas only Exp	68,424	110,494		18,813	147,336.19	64,030.81	13,635.69	83,673	119,495	18,813	170,107.21	69,261.69	17,387.53	27,606	106,633	18,813	84,889.19	61,723.87	6,438.46	66,030	119,252	18,813	124,071.87	10,969.87	
Biomass Exp	68,424	110,494		37,960	157,296.98	64,030.81	4,449.55	83,673	119,495	26,484	174,097.70	69,261.69	17,307.38	27,606	106,633	89,069	121,438.45	61,723.87	40,145.30	66,030	119,252	50,011	140,301.96	25,937.35	

System Financial Performance (NPV, IRR, Capex Offset)

		Dual CHP											
RR/IRR		GAS PW (Option 1)		GAS EXP (Option 2)		GAS BIO PW (Option 3)		GAS BIO EXP (Option 4)		3rd Party BU PW (Option 5)		WSPW BU PW (Option 6)	
		NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40
1%		840,898	1,874,644	-1,456,980	-1,604,403	869,574	2,002,630	-1,428,304	-1,476,410	960,757	2,028,227	30,716	1,196,172
2%		614,290	1,363,149	-1,411,555	-1,518,350	621,705	1,442,511	-1,404,139	-1,438,988	725,850	1,499,140	-215,772	628,503
3%		424,672	969,833	-1,371,660	-1,449,409	434,371	1,011,908	-1,381,960	-1,407,338	529,158	1,092,104	-420,730	193,893
4%		265,345	664,126	-1,336,331	-1,393,201	240,228	677,322	-1,361,448	-1,380,903	363,761	775,552	-591,708	142,118
5%		130,930	424,004	-1,304,796	-1,346,591	93,382	414,613	-1,342,344	-1,355,903	224,107	526,742	-734,764	-404,349
6%		17,096	233,468	-1,276,429	-1,307,283	-30,916	206,243	-1,324,441	-1,334,510	105,720	329,151	-854,777	-610,838
7%		-79,664	80,791	-1,250,723	-1,273,606	-136,508	39,362	-1,307,567	-1,315,034	4,981	170,670	-955,697	-774,799
8%		-162,197	-42,694	-1,227,847	-1,244,305	-236,515	-95,531	-1,291,585	-1,297,148	-41,053	42,348	-986,009	-986,009
9%		-232,828	-143,449	-1,205,723	-1,218,469	-303,485	-205,519	-1,276,379	-1,280,539	-154,782	-62,487	-1,112,489	-1,013,722
10%		-293,458	-226,336	-1,185,813	-1,195,381	-389,501	-295,930	-1,261,856	-1,264,086	-218,368	-148,850	-1,173,116	-1,097,441
11%		-345,652	-295,042	-1,167,310	-1,174,527	-426,278	-370,806	-1,247,936	-1,250,291	-272,829	-220,568	-1,224,372	-1,167,310
12%		-390,689	-352,392	-1,150,023	-1,155,486	-475,230	-433,243	-1,234,554	-1,236,338	-320,097	-280,540	-1,267,706	-1,224,519
13%		-429,671	-400,566	-1,133,795	-1,137,944	-517,530	-485,629	-1,221,654	-1,223,009	-363,077	-331,023	-1,304,323	-1,271,504
14%		-463,455	-441,262	-1,118,494	-1,121,659	-554,152	-529,826	-1,209,190	-1,210,223	-396,689	-373,771	-1,335,220	-1,310,198
15%		-492,796	-475,812	-1,104,009	-1,106,411	-585,910	-567,294	-1,197,123	-1,197,813	-427,699	-416,161	-1,361,232	-1,342,086
		Dual CHP (TS)											
RR/IRR		GAS PW (Option 1)		GAS EXP (Option 2)		GAS BIO PW (Option 3)		GAS BIO EXP (Option 4)		3rd Party BU PW (Option 5)		WSPW BU PW (Option 6)	
		NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40
1%		1,201,187	2,457,801	-1,608,790	-1,796,776	1,168,835	2,465,018	-1,641,142	-1,789,333	1,263,355	2,533,968	384,788	1,693,968
2%		924,010	1,834,174	-1,553,308	-1,680,488	883,571	1,822,558	-1,594,277	-1,701,104	982,569	1,903,019	104,469	1,052,857
3%		691,827	1,354,416	-1,504,830	-1,603,967	644,712	1,328,284	-1,551,945	-1,630,100	747,295	1,437,372	-129,132	561,284
4%		496,421	981,170	-1,462,130	-1,534,641	454,383	981,854	-1,514,677	-1,571,338	549,292	1,049,248	-388,588	398,588
5%		331,467	687,569	-1,424,221	-1,477,255	274,255	641,737	-1,483,123	-1,523,445	381,955	742,182	-688,435	-117,274
6%		191,487	454,465	-1,390,309	-1,425,456	130,481	401,787	-1,453,316	-1,482,393	239,952	505,902	-626,427	-352,405
7%		72,290	267,306	-1,359,749	-1,388,927	8,136	209,327	-1,423,903	-1,446,338	118,975	316,195	-742,912	-539,705
8%		-29,588	981,170	-1,332,016	-1,351,717	-96,537	-13,465	-1,398,918	-1,412,322	162,402	641,691	-841,691	-641,691
9%		-116,969	-8,338	-1,306,681	-1,322,934	-185,908	-73,827	-1,375,609	-1,388,421	-73,265	36,504	-925,106	-911,912
10%		-192,169	-110,587	-1,283,361	-1,295,590	-262,886	-178,721	-1,354,108	-1,363,731	-149,723	-123,209	-996,161	-912,514
11%		-257,086	-195,575	-1,261,857	-1,271,006	-329,277	-265,818	-1,334,048	-1,341,301	-215,777	-153,570	-1,056,635	-992,541
12%		-313,293	-266,734	-1,244,837	-1,248,064	-386,671	-338,659	-1,315,236	-1,320,737	-273,013	-225,928	-1,108,159	-1,059,646
13%		-362,088	-326,476	-1,223,172	-1,228,417	-436,470	-399,477	-1,297,514	-1,302,847	-322,647	-286,487	-1,159,477	-1,122,227
14%		-404,555	-377,581	-1,205,574	-1,209,610	-479,730	-451,902	-1,280,749	-1,283,931	-366,075	-338,796	-1,189,540	-1,161,493
15%		-441,596	-420,954	-1,189,022	-1,192,111	-517,402	-496,106	-1,264,828	-1,267,263	-403,909	-383,034	-1,221,658	-1,199,434

		BL CHP											
RR/IRR		GAS PW (Option 1)		GAS EXP (Option 2)		GAS BIO PW (Option 3)		GAS BIO EXP (Option 4)		3rd Party BU PW (Option 5)		WSPW BU PW (Option 6)	
		NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40
1%		-31,175	-280,641	954,252	988,641	244,893	1,252,487	-585,185	-151,151	31,895	68,345	-638,341	-83,095
2%		-146,236	-240,004	954,252	913,135	146,195	895,82,57	-536,712	-356,712	179,854	65,090	-628,341	-83,095
3%		-241,845	-46,177	-966,573	-929,864	-16,996	463,209	-741,725	-512,831	55,650	40,247	-1,004,548	-461,737
4%		-321,538	-110,853	-967,733	-940,880	-153,579	197,887	-799,774	-632,343	45,609	207,623	-1,149,505	-762,385
5%		-388,155	-233,317	-967,398	-947,567	-268,289	-10,135	-847,531	-724,480	-129,713	59,379	-1,259,895	-978,042
6%		-443,911	-329,648	-965,818	-951,281	-386,412	-80,412	-847,531	-724,480	-129,713	59,379	-1,259,895	-978,042
7%		-490,868	-406,097	-963,311	-942,567	-446,620	-305,284	-910,083	-851,714	-161,619	-158,082	-1,453,438	-1,293,653
8%		-530,317	-467,181	-960,019	-951,512	-515,834	-410,570	-945,356	-895,631	-312,929	-235,817	-1,522,905	-1,403,900
9%		-564,554	-516,333	-956,068	-950,045	-574,827	-495,859	-967,141	-929,616	-350,934	-289,921	-1,580,752	-1,491,745
10%		-591,551	-559,313	-951,611	-947,061	-634,878	-574,859	-967,141	-929,616	-350,934	-289,921	-1,580,752	-1,491,745
11%		-615,224	-588,485	-946,721	-943,311	-667,350	-627,702	-998,847	-977,558	-425,678	-393,021	-1,668,801	-1,618,402
12%		-635,161	-614,922	-941,509	-938,360	-703,790	-670,047	-1,010,318	-994,055	-452,937	-428,218	-1,701,834	-1,663,687
13%		-651,956	-636,579	-936,034	-934,076	-743,935	-709,298	-1,019,013	-1,006,794	-476,306	-450,536	-1,729,626	-1,700,043
14%		-666,077	-654,352	-930,152	-929,854	-781,567	-740,392	-1,025,862	-1,016,524	-496,360	-482,000	-1,751,256	-1,729,626
15%		-677,916	-668,943	-924,510	-929,365	-814,340	-769,370	-1,030,993	-1,022,804	-513,578	-500,578	-1,769,200	-1,752,345

6. Whitley Bay System Technical Overview and Financial Performance Summary

NON RESIDENTIAL HIGH HEAT DEMAND - WHITLEY BAY



Working in partnership with
CAPITA

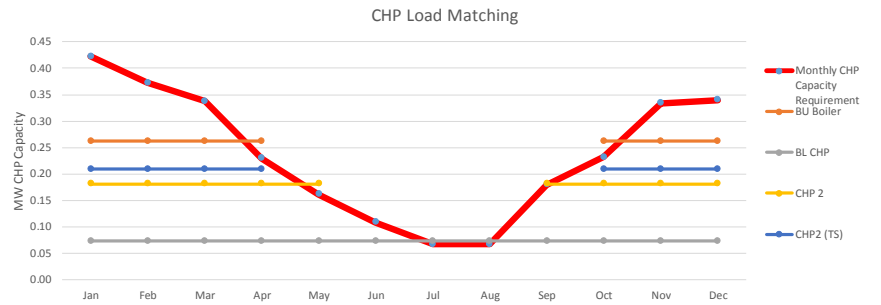
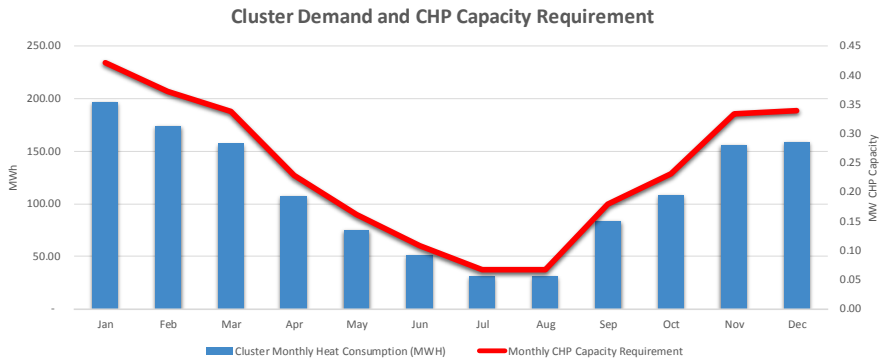
Strategic Property, Quadrant, The Silverlink North
Central Business Park, North Tyneside, NE27 9BY
Tel: 0191 643 2142
Email: strategicproperty@northtyneside.gov.uk

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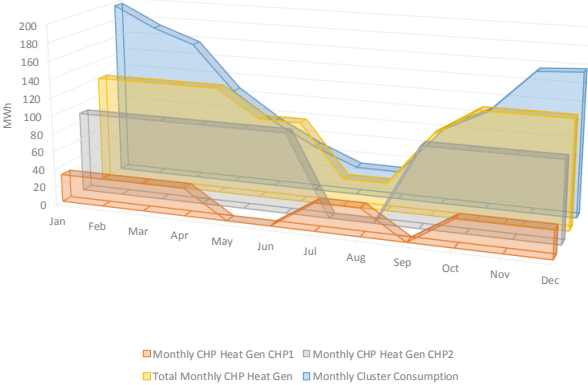
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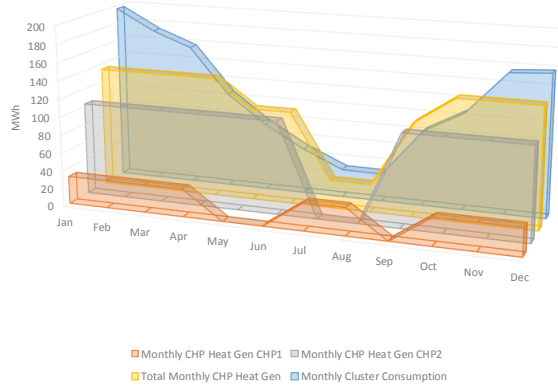
Energy Details													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Heat Demand
Cluster Monthly Heat Consumption (MWh)	196.36	173.40	157.11	106.67	75.14	50.60	31.29	31.00	83.69	107.97	155.31	158.22	1,326.77
System Technical Details													
Monthly CHP Capacity Requirement	0.42	0.37	0.34	0.23	0.16	0.11	0.07	0.07	0.18	0.23	0.33	0.34	
Baseload CHP Capacity Requirement	0.07												
Average load CHP Capacity Requirement	0.24												
Gas Back-up boiler capacity requirement (MW)	0.26												
Bimoass Back-up boiler capacity requirement (MW)	0.29												
Network Details													
Transmission Mains (m)	532.00												
Distribution Mains (m)	340.00												
Network m3	37.61												
MWh Thermal Storage Potential	1.71												
System run hrs storage potential	3.68												
CHP Details													
	Dual CHP			Dual CHP (TS)			BL CHP		BL CHP (TS)				
	CHP1	CHP2	Totals	CHP1	CHP2	Totals	CHP1	CHP2	CHP1	CHP2			
Average Electrical output (Mwe)	0.06	0.14	0.20	0.06	0.16	0.22	0.06	-	0.13	-			
Average Heat output (MWt)	0.07	0.18	0.25	0.07	0.21	0.28	0.07	-	0.17	-			
Overall CHP Efficiency (%)	80%	80%	1.60	80%	80%	1.60	80%	-	80%	-			
Fuel input (gross CV basis) (MW)	0.16	0.40	0.56	0.16	0.46	0.63	0.16	-	0.37	-			
CHP hours run per year (hrs)	5,585	6,570		5,585	6,570		5,585	-	6,570	-			
Annual CHP Displaced Electricity (MWh)	318	924	1,242	318	1,067	1,385	321	-	862	-			
Annual Electricity Generated (parasitic network load adj)	233	764	997	233	883	1,117	314	-	843	-			
Monthly Electricity Generated (parasitic network load adj)	26	76	102	26	88	114	26	-	70	-			
Monthly CHP Delivered Heat (network heat-loss adj)	31	89	120	31	103	134	31	-	83	-			
Input Fuel (MWh)	909	2,639	3,548	909	3,048	3,957	918	-	2,462	-			
Annual Net CO2 Saving p/a (tonnes)	76	220	295	76	254	329	76	-	205	-			
Annual Net CO2 Saving p/a (£)	1,211	3,515	4,726	1,211	4,059	5,270	1,223	-	3,279	-			
Combined heat Capacity (MW) (CHP & Back-up)	0.34	0.18	0.52	0.29	0.21	0.50	0.64	-	0.56	-			



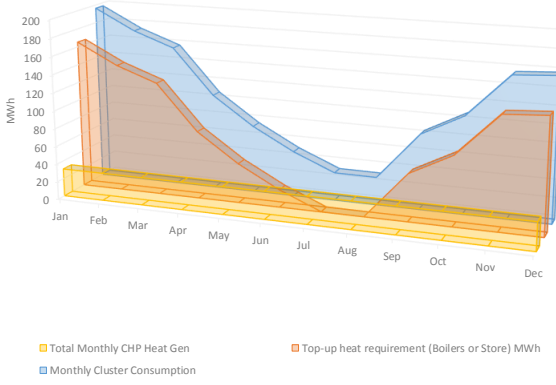
Dual CHP Cluster Demand vs. CHP Output



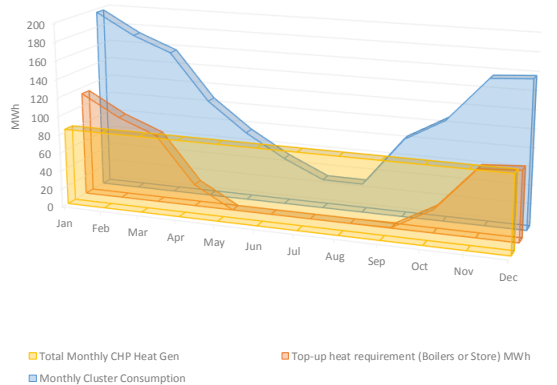
Dual CHP TS Cluster Demand vs. CHP Output



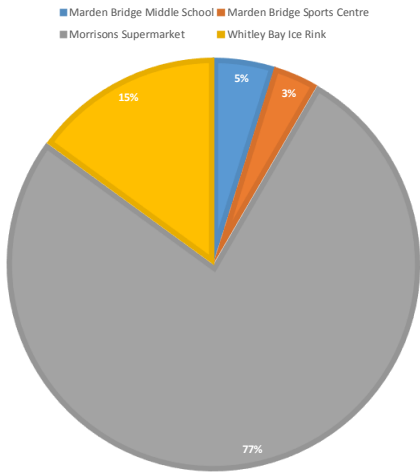
BL CHP Cluster Demand vs. CHP Output



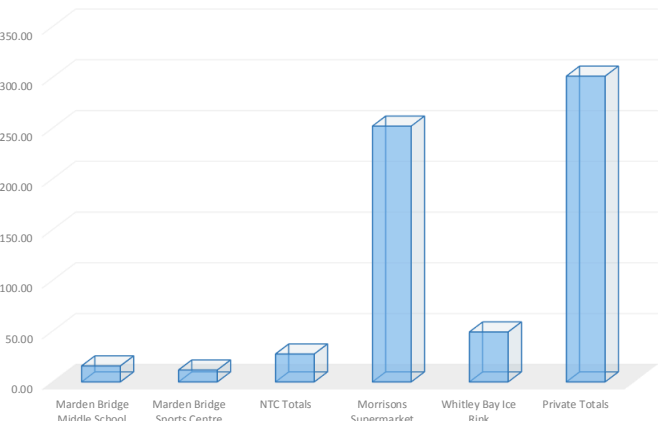
BL CHP TS Cluster Demand vs. CHP Output



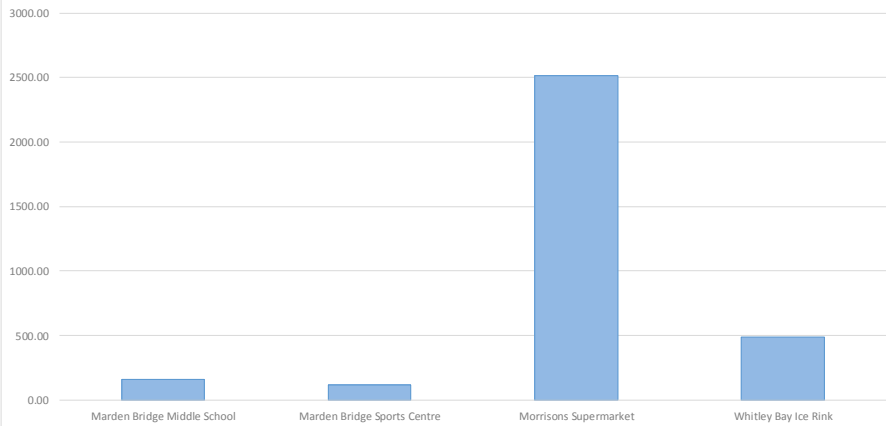
WHITLEY BAY CLUSTER POWER CONSUMPTION



Building Power Consumption as % of System Power Generation



Whitley Bay Cluster Power Consumption



System CAPEX Costs	Dual CHP				Dual CHP (T5)				BL CHP				BL CHP (T5)			
	Gas Only	Biomass BU	3rd Party BU	WSHP BU	Gas Only	Biomass BU	3rd Party BU	WSHP BU	Gas Only	Biomass BU	3rd Party BU	WSHP BU	Gas Only	Biomass BU	3rd Party BU	WSHP BU
CHP	98,783	98,783	98,783	98,783	109,677	109,677	109,677	109,677	28,779	28,779	28,779	28,779	65,576	65,576	65,576	65,576
Boiler	7,866	-	-	-	6,449	-	-	-	16,979	-	-	-	11,630	-	-	-
WSHP	-	-	-	256,501	-	-	-	210,281	-	-	-	553,666	-	-	-	379,246
Biomass Boiler store & assoc. plant	-	99,750	-	-	-	81,776	-	-	-	215,315	-	-	-	147,484	-	-
Plant BOS (Balance of System)	-	29,780	14,817	53,293	-	28,718	16,452	47,984	-	36,014	4,317	87,367	-	31,569	9,836	66,723
Thermal Store	-	-	-	-	30,822	30,822	30,822	30,822	-	-	-	-	30,716	30,716	30,716	30,716
Network Transmission	523,488	523,488	523,488	523,488	523,488	523,488	523,488	523,488	523,488	523,488	523,488	523,488	523,488	523,488	523,488	523,488
Network Distribution	204,000	204,000	204,000	204,000	204,000	204,000	204,000	204,000	204,000	204,000	204,000	204,000	204,000	204,000	204,000	204,000
Building Connections	35,234	35,234	35,234	35,234	35,234	35,234	35,234	35,234	35,234	35,234	35,234	35,234	35,234	35,234	35,234	35,234
WSHP Network & Civils	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EC building Cost	58,745	70,494	28,907	82,243	56,557	67,868	32,095	79,179	72,829	87,395	8,422	101,961	63,307	75,968	19,189	88,629
Total Capital (£)	944,114	1,061,530	905,229	1,253,542	983,646	1,081,584	951,768	1,240,676	888,174	1,130,825	804,240	1,534,495	945,531	1,114,425	888,039	1,393,612

System OPEX & Revenue	Dual CHP						Dual CHP (T5)						BL CHP						BL CHP (T5)						
	Revenue			Opex Costs			Revenue			Opex Costs			Revenue			Opex Costs			Revenue			Opex Costs			
	Price/Cost (MWh)	Energy Sales (MWh)	Income non-energy	Energy Direct costs	Overhead Costs	Net	Price/Cost (MWh)	Energy Sales (MWh)	Income non-energy	Energy Direct costs	Overhead Costs	Net	Price/Cost (MWh)	Energy Sales (MWh)	Income non-energy	Energy Direct costs	Overhead Costs	Net	Price/Cost (MWh)	Energy Sales (MWh)	Income non-energy	Energy Direct costs	Overhead Costs	Net	
Private Wire Elec Sales	116.85	117,825				61,828	116.85	131,765				69,008	116.85	37,550				24,770	116.85	100,686				66,531	
Export Elec Sales	45	45,376				10,621	45	50,744				12,013	45	14,465				1,674	45	38,775				4,620	
Standing Charge			10,263						10,263						10,263						10,263				
Heat Sales (CHP)	52.00	60,674				52.00	67,852					52.00	19,341					52.00	51,848						
Heat Sales (Boiler)	52.00	12,561				52.00	8,947					52.00	49,651					52.00	24,616						
Input Fuel (CHP)	25.3			89,767.45		25.3			100,115.58			25.3				23,235.35		25.3				62,286.18			
Input Fuel (Boiler)	25.2			7,304.60		25.2			5,202.75			25.2				28,873.92		25.2				14,315.23			
Biomass Fuel Costs	46			13,889.37		67,901	46		9,892.79			73,333	46			54,902.47		48,774	46			27,719.26		78,432	
Biomass RHI income T1	52.4		10,759			4,549	52.4		7,663			7,688	52.4		42,528			25,679	52.4		21,085			16,521	
Biomass RHI income T2	22.7		1,899				22.7		1,352				22.7		7,505				22.7		3,721				
WSHP RHI																									
WSHP RHI income T1	89.5		18,376				89.5		13,089				89.5		72,638				89.5		36,013				
WSHP RHI income T2	26.7		967				26.7		689				26.7		3,824				26.7		1,896				
OPEX Overhead:																									
Network maintenance	13				18,321.88		13			19,219.17		13				17,248.07						19,124.27			
Bureau Costs	11.1				15,644.07		11.1			16,410.21		11.1				14,727.20						16,329.19			
Business rates	6				8,456.25		6			8,870.38		6				7,960.65			6			8,826.59			

	Income - Electricity	Income - Heat	Income - non-energy	Energy Direct costs	Overhead	Net income	Income - Electricity	Income - Heat	Income - non-energy	Energy Direct costs	Overhead	Net income	Income - Electricity	Income - Heat	Income - non-energy	Energy Direct costs	Overhead	Net income	Income - Electricity	Income - Heat	Income - non-energy	Energy Direct costs	Overhead	Net income
Gas only PW	117,825	73,235	-	10,263	97,072.05	42,422.21	117,825	131,765	-	76,798	10,263	105,318.33	44,499.76	69,008.19	37,560	100,686	10,263	52,109.28	39,935.92	24,769.71	100,686	76,464	44,280.04	66,530.75
Gas only Exp	117,825	73,235	-	22,920	103,656.82	42,422.21	117,825	131,765	-	76,798	10,263	110,008.37	44,499.76	73,333.49	37,560	100,686	10,263	52,109.28	39,935.92	24,769.71	100,686	76,464	44,280.04	66,530.75
3rd Party BU PW	117,825	73,235	-	10,263	89,767.45	35,120.73	117,825	131,765	-	76,798	10,263	100,115.58	44,499.76	39,275.83	37,560	100,686	10,263	52,109.28	39,935.92	24,769.71	100,686	76,464	44,280.04	66,530.75
WSHP BU PW	117,825	73,235	-	29,606	97,072.05	42,422.21	117,825	131,765	-	76,798	10,263	105,318.33	44,499.76	74,744.29	37,560	100,686	10,263	52,109.28	39,935.92	24,769.71	100,686	76,464	44,280.04	66,530.75
Gas only Exp	45,376	73,235	-	10,263	97,072.05	42,422.21	45,376	76,798	-	10,263	10,263	105,318.33	44,499.76	12,013.02	14,465	68,992	10,263	52,109.28	39,935.92	1,674.41	38,775	76,464	44,280.04	4,620.01
Biomass Exp	45,376	73,235	-	22,920	103,656.82	42,422.21	45,376	76,798	-	10,263	10,263	110,008.37	44,499.76	7,687.72	14,465	68,992	10,263	52,109.28	39,935.92	25,679.79	38,775	76,464	44,280.04	16,520.96

System Financial Performance (NPV, IRR, Capex Offset)

		Dual CHP															
		GAS PW (Option 1)		GAS EXP (Option 2)		GAS BIO PW (Option 3)		GAS BIO EXP (Option 4)		3rd Party BU PW (Option 5)		WSHP BU PW (Option 6)					
RR/IRR		NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40	NPV 25	NPV 40		
1%		365,671	1,034,129	-1,158,168	-1,273,003	377,145	1,111,258	-1,146,695	-1,195,875	447,189	1,137,759	-228,695	984,223	-1,146,695	-1,195,875		
2%		220,884	705,124	-1,122,557	-1,205,744	218,176	750,178	-1,125,064	-1,160,691	296,931	797,190	-66,858	614,173	-1,125,064	-1,160,691		
3%		99,982	452,509	-1,091,237	-1,151,816	85,834	472,988	-1,105,404	-1,131,348	171,362	535,545	-68,017	330,422	-1,105,404	-1,131,348		
4%		-1,366	256,501	-1,063,518	-1,107,817	-25,237	257,957	-1,087,390	-1,106,361	66,008	332,404	-180,825	110,630	-1,087,390	-1,106,361		
5%		-86,366	102,877	-1,038,739	-1,071,295	-118,656	89,470	-1,070,759	-1,084,702	-22,725	173,056	-275,495	-61,298	-1,070,759	-1,084,702		
6%		-158,629	-18,715	-1,016,431	-1,049,467	-197,499	-4,844	-1,058,305	-1,065,595	-97,780	46,812	-355,190	-197,052	-1,058,305	-1,065,595		
7%		-216,612	-115,854	-996,261	-1,014,025	-354,253	-150,307	-1,040,843	-1,048,478	-161,349	-54,168	-422,472	-305,202	-1,040,843	-1,048,478		
8%		-271,425	-194,156	-977,727	-991,002	-320,942	-236,077	-1,027,244	-1,032,929	-215,482	-135,650	-479,421	-392,080	-1,027,244	-1,032,929		
9%		-315,569	-257,774	-960,745	-970,674	-369,213	-305,740	-1,014,388	-1,018,640	-261,682	-201,975	-527,732	-462,408	-1,014,388	-1,018,640		
10%		-352,275	-309,871	-945,041	-952,497	-410,416	-362,749	-1,008,184	-1,005,375	-301,220	-256,388	-568,793	-519,738	-1,008,184	-1,005,375		
11%		-385,532	-352,826	-930,455	-936,051	-445,651	-409,724	-990,544	-992,652	-335,139	-301,338	-603,748	-560,754	-990,544	-992,652		
12%		-413,235	-388,464	-916,781	-921,036	-475,864	-448,660	-979,410	-981,232	-364,301	-338,711	-633,536	-605,538	-979,410	-981,232		
13%		-437,014	-414,018	-903,955	-907,188	-501,783	-481,725	-968,724	-970,189	-389,421	-369,979	-658,048	-637,668	-968,724	-970,189		
14%		-457,664	-443,113	-891,853	-894,319	-524,050	-508,296	-958,440	-959,498	-411,092	-396,266	-680,006	-664,386	-958,440	-959,498		
15%		-475,065	-466,082	-880,391	-882,276	-543,192	-531,133	-948,518	-949,326	-429,801	-418,664	-699,077	-685,654	-948,518	-949,326		

Contact

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