Please note that the results presented in this assessment are specific to XRGI 9G LoadTracker

|	
Number of CHP units at 9 kWe	1
Recommended heat storage vessel	At least 500 ltr per CHP
Type of usage	Detached House + Indoor &Outdoor Pool
Data reference	Email; Ross Emmerton @ Inspire Consulting to SA dated 28 Apil '17. SAP + Pool loads

1.0 Summary of Usage:

Annual electricity consumption	51,258 kWh
Electricity price (without CCL)	13.19 p/kWh
Annual gas consumption	136,608 kWh
Gas price (without CCL)	3.48 p/kWh

1.1 CO2 Emission Factors used:

- For grid electricity = 0.519 kg/kWh
- For grid displaced electricity = 0.519 kg/kWh
- For gas = 0.216 kg/kWh

2.0 Carbon Footprint of Project User Centre:

CO_2 (conv)	56,110 kg CO_2 pa (a)
CO_2 (CHP)	46,392 kg CO_2 pa (b)
Net reduction	9,718 kg CO_2 pa

Carbon Footprint
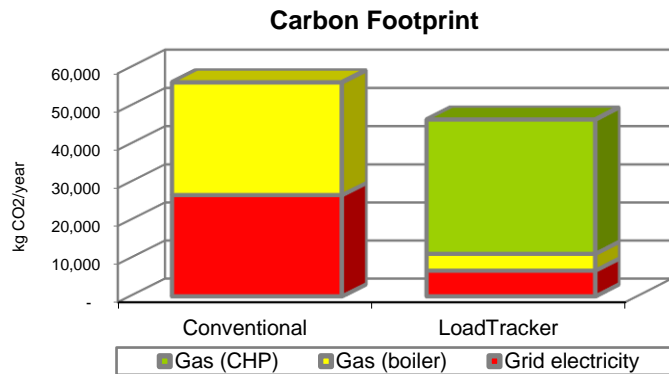
By introducing a CHP, a reduction of 9.7 tonnes of CO_2 emissions (9,718/56,110 = 17%) could be expected relative to a conventional mains supply/gas boiler system.
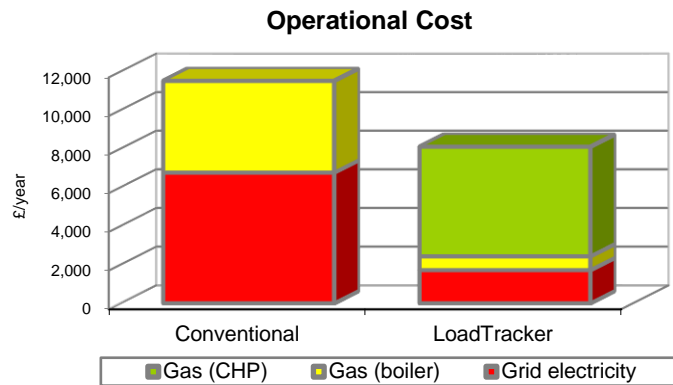
Notes:

(a) = (electricity consumption x 0.519) + (gas consumption x 0.216)

=(51,258 kWh x 0.519) + (136,608 kWh x 0.216) = 56,110 CO_2 pa

(b) = (CHP gas consumption x 0.216) + (supporting boiler gas consumption x 0.216) + (electricity consumption x 0.519) - (CHP electricity production x 0.519)

=(163,064 kWh x 0.216) + (20,491 kWh x 0.216) + (51,258 kWh x 0.519) - (38,264 kWh x 0.519) = 46,392) kg CO_2 pa

3.0 Cost Savings:

Comparisons are shown between the operational costs of a conventional system (mains supply/gas boiler) and 1 x LoadTracker 9G CHP unit.

|	Conv.	CHP
Electricity	£6,761 (c)	£1,714 (d)
Gas (Boiler)	£4,754 (e)	£713 (f)
Gas (CHP)	0	£5,675 (g)
Total	£11,515	£8,102

Operational Cost

The use of LoadTracker CHP would result in annual savings of £11,515 - £8,102 = £3,413 pa relative to a conventional mains supply/boiler system.

Notes:

(c) = 51,258 kWh x 0.1319 £/kWh = £6,761

(d) = Assessed by LoadTracker programme

(e) = 136,608 kWh x 0.0348 £/kWh = £4,754

(f) = Assessed by LoadTracker programme

(g) = Assessed by LoadTracker programme

**4.0 LoadTracker CHP Contribution to Electrical Needs of User Centre**

Typical seasonal variations in electricity consumption have been assumed, in producing an approximate consumption pattern for the User Centre.
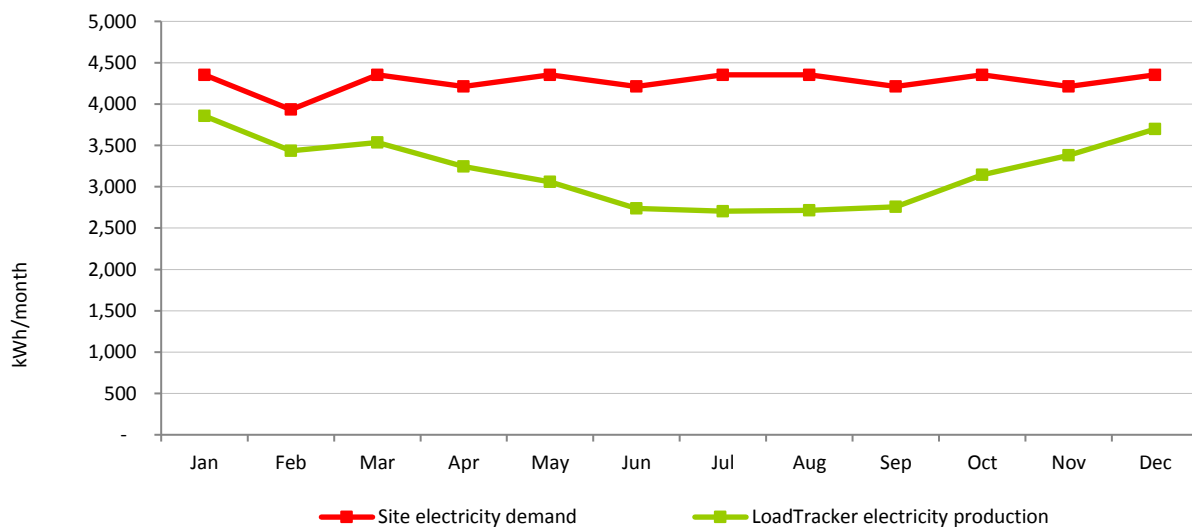
CHP accounts for 38,264 kWh / 51,258 kWh = 75% of electricity requirements of the User Centre.

5.0 LoadTracker CHP Contribution to Heat Needs of User Centre

Similarly to item 4.0, typical seasonal variations in heat requirements have been assumed.
The CHP LoadTracker units can maintain a similar profile for heat production, as shown below:
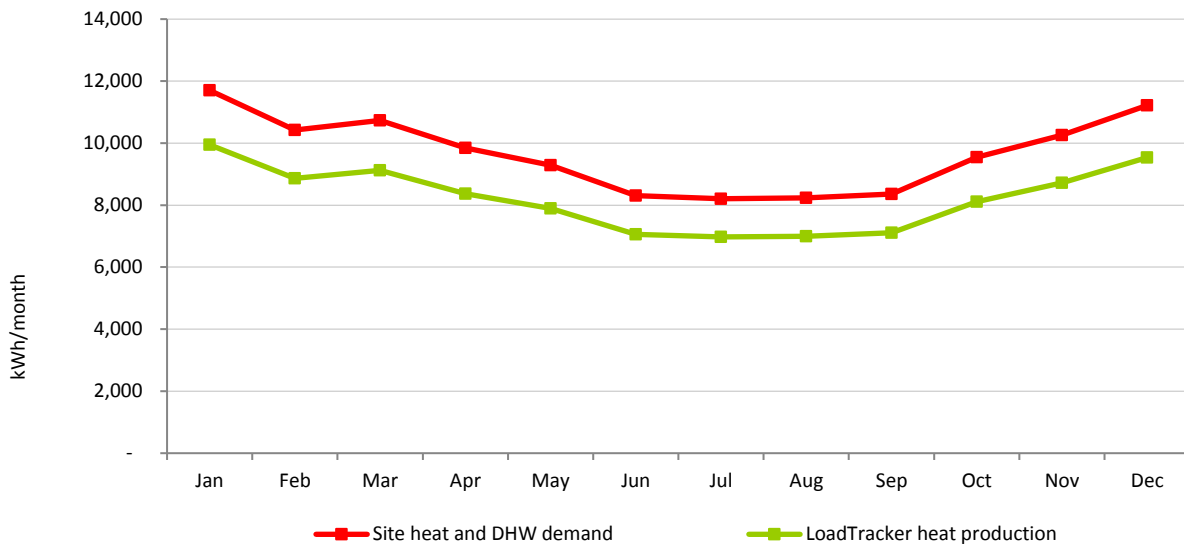
6.0 Heat Balance for User Centre

Heat consumption by User Centre	116,117 kWh (h)
Heat production (CHP)	98,699 kWh (i)
Heat production (boiler)	17,417 kWh (j)
Consumption by boiler	20,491 kWh (k)
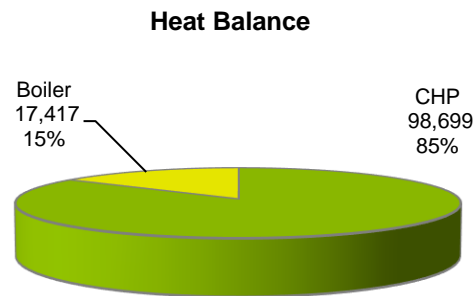
It can be seen that CHP account for 98,699 kWh/116,117 kWh = 85% of heat requirements of the user

Notes:

(h) = 136,608 kWh @ 85% (assumed boiler efficiency) = 116,117 kWh

(i) = Assessed by LoadTracker programme, to give max possible CHP usage

(j) = Net difference (h) - (i)

(k) = Heat production (j) factored up assuming 85% efficiency = 17,417/0.85

Appendix

CCL = Climate Change Levy. Exemption from this is granted to projects containing good quality CHP.

Site Demands:

Electrical @ 51258.09 kWh/yr

Gas consumption @ 136607.809 kW/yr

DHW share @ 79%

Data provided;

SAP;

DHW;

Output from water heater

(64)m=	284.31	251.4	265.94	241.04	238.13	215.53	209.61	226.4	224.87	249.81	260.83	278.37

Output from water heater (annual)$_{1...12}$ | 2946.22 | (64)

Space Heating;

Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m

(98)m=	5289.64	3893.16	2969.02	1426.8	483.97	0	0	0	0	1706.57	3691.19	5433.04

Total per year (kWh/year) = Sum(98)$_{1...5,9...12}$ = | 24893.39 | (98)

Electricity Loads;

Total Primary Energy, kWh/year   sum of (376)...(382) = | 23506.09 | (383)

Pool Loads;

Indoor Pool   (Calc'd as operating all year)

Electric   (Elec use)

Filtration Pump 0.75 kW	-	6570 kW/hr/year kWh/year
Chemical Control 0.55 kW	-	4818 kW/hr/year
UV Unit 0.055 kW	-	481 kW/hr/year
AHU	-	4014 kW/hr/year

Lphw   (Heat input;water + air warming)

AHU	-	15929 kW/hr/year

Outdoor Pool

Electric (all year)

Filtration Pump 0.75 kW	-	6570 kW/hr/year
Chemical Control 0.55 kW	-	4818 kW/hr/year
UV Unit 0.055 kW	-	481 kW/hr/year

Lphw (April 29deg.C)

Cover on pool for 20 hours per day

Cover off pool for 4 hours per day

An indicative month - for profiling

Heat Exchanger   -   10980 kW/hr/month

Lphw (July 29deg.C)

Cover on pool for 20 hours per day

Cover off pool for 4 hours per day

An indicative month - for profiling

Heat Exchanger   -   5856 kW/hr/month

Lphw (April – September 29deg.C) Average

Cover on pool for 20 hours per day

Cover off pool for 4 hours per day

Six months energy est for period of regular use

Heat Exchanger   -   50508 kW/hr/6 mth

Lphw (October – March 10deg.C) Average

Cover on pool for 24 hours per day

Six months energy est for period with no use but still ticking over

Heat Exchanger   -   21840 kW/hr/6 mth