ATKINS
Member of the SNC-Lavalin Group

Technical Note

To:	Elaine McKenna and Sadam Farley-Kiwanuka		
From:	Sergey Barekyan	Email:	sergey.barekyan@atkinsglobal.com
Date:	4 March 2022	Phone:	N/A
Ref:	SCC SIL	cc:	N/A
Subject:	Technical Note - SCC SIL Energy and Carbon Assessment Results for March Cabinet paper		

Background

The energy and carbon assessment results presented in this technical note are based the proposed energy strategies for the Manor School, Horley Library and Coveham Hostel sites and the following key assumptions.

The energy and carbon baselines for all the sites are based on the Part L 2013 natural gas fuel baselines.

Key Assumptions

- Baseline energy and carbon outputs are based on Part L 2013 Notional Buildings with natural gas boilers
- “Proposed Strategy” energy and carbon outputs are based on LETI guidance, Air Source Heat Pumps (ASHPs) and Photovoltaics (PVs)
- Estimated PV capacity: Manor School – 74.1 kWp, Horley Library – 74.1 kWp, Coveham Hostel - 71.7 kWp
- Assessment period – 29 years (until 2050)
- Price of carbon - £95 per tonne
- Average Energy Prices during the assessment period: Electricity – circa 15.49 p/kWh, Gas – 4.84 p/kWh
- Average Carbon Factors during the assessment period: Electricity – circa 0.43 CO_{2eq}/kWh, Gas – 0.184 CO_{2eq}/kWh
- Indicative price for electricity export from PV – 5 p/kWh
- Estimated electricity export proportion – 60%

ATKINS
Member of the SNC-Lavalin Group

Energy and carbon Assessment Results

Manor School Site

Carbon assessment outputs on projected average carbon factors between 2022-2050

	CO_2 emissions (tonnes/year)		
	Regulated	**Unregulated**	**Total**
Total CO_2 Emissions Baseline	12.97	0.92	13.88
Proposed Strategy with ASHP and PV	-1.11	0.92	-0.19

	Regulated Energy CO_2 savings		**Regulated and Unregulated Energy CO_2 savings**
	Tonnes per annum	**%**	%
Total cumulative savings over baseline	14.08	109%	**101%**
	Tonnes CO_2		**Tonnes CO_2**
Cumulative CO_2 savings	**32.2**		**5.6**
Cost saving from avoided cost of carbon	**£3,061**		**£529**

Energy assessment results

Type	Baseline Energy (kWh)	Actual Energy (kWh)	Baseline Energy Cost (£)	Actual Energy Cost 1 (£)	Actual Energy Cost 2 (£)
Unregulated	625,479	625,479	£96,897	£96,897	£96,897
DHW	567,155	264,301	£27,467	£40,945	£40,945
Lighting	108,589	109,435	£16,822	£16,953	£16,953
Aux Energy	18,575	182,469	£2,877	£28,267	£28,267
Space Heating	1,448,407	232,566	£70,146	£36,028	£36,028
Elec generated by PV	-	-1,545,241	-	-£239,383	-£142,110
Total	**2,768,205**	**-130,990**	**£214,210**	**-£20,293**	**£76,980**

Note:

* Energy Cost 1 - the PV cost savings are based on the assumption that there is no PV electricity export from the site (indicative to show maximum possible benefit)

** Energy Cost 2 - the PV cost savings are based on the assumption that there is 60% PV electricity export from the site (more realistic estimate)

Horley Library Site

Carbon assessment outputs on projected average carbon factors between 2022-2050

	CO_2 emissions (tonnes/year)		
	Regulated	**Unregulated**	**Total**
Total CO_2 Emissions Baseline	13.0	0.9	13.9
After use of renewable energy	-1.1	0.9	-0.2

	Regulated Energy CO_2 savings		**Regulated and Unregulated Energy CO_2 savings**
	Tonnes per annum	**%**	%
Total cumulative savings over baseline	14	109%	**101%**
	-1.1	-	**-0.2**
Cumulative CO_2 savings	**Tonnes CO_2**		**Tonnes CO_2**
Cost saving from avoided cost of carbon	**33.2**		**5.7**
Total cumulative savings over baseline	**£3,159**		**£539**

Energy assessment results

Type	Baseline Energy (kWh)	Actual Energy (kWh)	Baseline Energy Cost (£)	Actual Energy Cost 1 (£)	Actual Energy Cost 2 (£)
Unregulated	625,479	625,479	£96,897	£96,897	£96,897
DHW	567,155	264,301	£27,467	£40,945	£40,945
Lighting	108,589	109,435	£16,822	£16,953	£16,953
Aux Energy	18,575	182,469	£2,877	£28,267	£28,267
Space Heating	1,448,407	232,546	£70,146	£36,025	£36,025
Elec generated by PV	-	-1,543,201	-	-£239,067	-£141,923
Total	**2,768,205**	**- 128,971**	**£214,210**	**-£19,980**	**£77,164**

Note:

* Energy Cost 1 - the PV cost savings are based on the assumption that there is no PV electricity export from the site (indicative to show maximum possible benefit)

** Energy Cost 2 - the PV cost savings are based on the assumption that there is 60% PV electricity export from the site (more realistic estimate)

Coveham Hostel Site

Carbon assessment outputs on projected average carbon factors between 2022-2050

	CO_2 emissions (tonnes/year)		
	Regulated	**Unregulated**	**Total**
Total CO_2 Emissions Baseline	10.6	0.6	11.3
After use of renewable energy	-0.7	0.6	-0.1

	Regulated Energy CO_2 savings		**Regulated and Unregulated Energy CO_2 savings**
	Tonnes per annum	**%**	%
Total cumulative savings over baseline	11.4	107%	**101%**
	-0.7	-	**-0.1**
Cumulative CO_2 savings	**Tonnes CO_2**		**Tonnes CO_2**
Cost saving from avoided cost of carbon	**22.4**		**3.2**
Total cumulative savings over baseline	**£2,127**		**£306**

Energy assessment results

Type	Basline Energy (kWh/y)	Actual Energy (kWh/y)	Basline Energy Cost (£)	Actual Energy Cost 1 (£)	Actual Energy Cost 2 (£)
Unregulated	434,669	434,669	67,337	67,337	67,337
DHW	788,967	404,800	38,210	62,710	62,710
Lighting	109,240	109,667	16,923	16,989	16,989
Aux Energy	28,449	43,799	4,407	6,785	6,785
Space Heating	854,595	191,031	41,388	29,594	29,594
Elec generated by PV	-	-1,257,413	-	-194,794	-115,640
Total	**2,215,920**	**-73,447**	**168,265**	**-11,378**	**67,776**

Note:

* Energy Cost 1 - the PV cost savings are based on the assumption that there is no PV electricity export from the site (indicative to show maximum possible benefit)

** Energy Cost 2 - the PV cost savings are based on the assumption that there is 60% PV electricity export from the site (more realistic estimate)