Report to support a funding application to decarbonise the Kent Innovation Centre, Broadstairs

for Thanet District Council

by Square Gain and Carbon Free Group

21st December 2020

Contents

Background

The Department for Business, Energy and Industrial Strategy (BEIS) has launched the Public Sector Decarbonisation Scheme (PSDS) which will be delivered by Salix and which aligns with BEIS' new mission and priorities: fighting coronavirus, backing business, unleashing innovation and tackling climate change.

The scheme will be available for public sector bodies (PSBs) in England to apply for a grant to finance up to 100% of the costs of capital energy efficiency and heat decarbonisation projects that meet the scheme criteria, and aims to achieve the following objectives:

- Deliver stimulus to the energy efficiency and heat decarbonisation sectors, supporting jobs.
- Deliver significant carbon savings within the public sector.

Thanet District Council (TDC) declared a Climate Emergency in July 2019 and made a commitment to become carbon neutral by 2030, and that TDC has recently undertaken an assessment of the electricity and gas consumption at various buildings that the Council owns.

TDC has appointed Square Gain (and subcontractor Carbon Free Group) to investigate opportunities for improvement to the high energy use at the Kent Innovation Centre, located at Millennium Way, Westwood, Broadstairs. CT10 2QQ. The building has relatively high gas usage and, given that it is a relatively young building, (constructed in 2002). Opportunities may include the potential to reduce energy use through improved insulation and air-tightness, decarbonise the heat supply, and install renewable energy, ideally to achieve zero carbon or net zero carbon (subject to the purchase of carbon offsets, which is outside the scope of this project).

Aims

Our overarching approach aims are to provide maximum value to TDC, and our outputs will include:

- The Salix Public Sector Decarbonisation Scheme (PSDF) worksheet 2
- Square Gain/ CFG more detailed breakdown worksheet, providing greater cost granularity than the PSDS sheet, including design, equipment, installation and contingency costings
- Items that we recommend as Low and Zero Carbon solutions, but that are not eligible for funding via PSDS.

Methodology

Site investigation

The site was visited by Greg Chant-Hall and Anthony Morgan on 17th December 2020 who met with Amanda Buckingham, the building manager and who escorted the energy assessors around the building and answered specific questions.

Areas that were visited included energy generation areas (all plant rooms) and also indicative parts of the building that use energy; offices, corridors. The roof area was also visited to undertake an analysis of suitability for additional rooftop plant or PV.

Current usage:

No billing data was viewable as part of this energy assessment, although data was provided by TDC as follows:

- Gas usage at the KIC is £12,373 (including CCL) and standing charge for 381,524 kWh of gas last year.
- Electricity

Assessment of suitable interventions

There were two tiers to our assessment of suitable interventions;

- Firstly, all of the most appropriate interventions for the building based on our experience of taking buildings to zero carbon
- Secondly those solutions that were acceptable to achieve compliance with the Salix PSDS requirements (e.g. CCHP is excluded unless replacing coal)

The resulting analysis in the Findings and Key recommendations section provides further detail.

Description of the site.

The Kent Innovation Centre is a three-storey steel frame structure built in 2002, which is in reasonable condition, apart from a problem with internal downpipes that cause water ingress and damage. Water ingress also occurs when windows are left open on 'tilt'.

- Fabric: The building's fabric is a rainscreen cladding over a steel studwork panel and cavity wall construction.
- Glazing: The building is double glazed throughout. Windows open on side axis and tilt. Water run-off from windows on tilt has caused damage to the window sills, and also water penetration where the windows are screwed into the wall.
- Existing boilers:
- Existing water heaters: Water heaters are provided in each kitchen area
- Existing lighting is predominantly compact fluorescent, both in corridors and offices and is assumed to be approximately 35% of the buildings' total electrical load. Replacement to LED will save approximately 65% of this electrical usage, and in addition will save KIC a significant amount in maintenance and replacement costs (where a third-party contractor is currently used).
- Exiting air handling unit and extract – This is thought to have a total load of around 5 kW which runs 24/7 and equates to around 14% of the total building electrical load.
- There is no existing air conditioning at the building.
- Regarding current electrical metering, usage is metered as a spur connection from the adjacent Canterbury Christchurch University campus building. Usage is however under some dispute which may be due to KIC paying for a standing charge that is surplus to their requirements. Estimated usage is 306,000 kWh/ year (based on 85% of the total Christchurch University campus bill), which we note may be higher than

the actual electricity use. Existing meters are outdated and would benefit from replacement with smart-meters (and the university building is being sold making this imperative.

- Gas usage is metered although the billing data has not been viewed as part of this energy assessment, we have been informed that the KIC used 381,524 kWh of gas during 2019.

Key findings and recommendations

Fabric

Although glazing is a technology on the PSDS allowable solutions list, the existing glazing appeared to be in relatively good condition and simply needed new seals and draft proofing, rather than the considerable expense of replacement (and these saved funds can be better spent on other elements within the building).

Re-roofing would be preferable at KIC but it is not an allowable 'enabling works' so we have embedded this cost in the PV package, including the repair of the water down-pipes.
Roof build-up to allow the PV would involve:

- a layer of ~200mm insulation (e.g. Kingspan/Celotex), covered by
- a 25mm plywood boarding, with
- a GRP (glass reinforced plastic) waterproof membrane (with 50 year guarantee), and
- Sarna roof fixings (or similar) to avoid penetrations.

Passive measures

Briese Solaire would be the ideal solution on the southern facing aspect of the building, in preference over mechanical cooling, which could be used in conjunction with a phase change material embedded into new ceiling tiles. This however is not on the Decarbonisation Fund allowable technologies list, and therefore if the air handling unit is replaced with a heat recovery unit, an integrated cooling coil should be considered for the provision of air conditioning.

Heating and cooling

Ideally at the KIC we would recommend a CCHP (to allow for summer time cooling) in addition to heat and power, but this technology is only allowable on the Public Sector Decarbonisation Scheme if replacing coal or oil fuelled boilers. Therefore, although there are challenges, we are recommending a reversable ASHP. The challenges are that:

- The cost of upgrading the existing fenestration at KIC is likely to be prohibitive, and therefore we have tackled the buildings high air permeability rate with simple draft proofing and servicing of windows to improve the seal (and to help mitigate against water ingress).

- The ASHP solution will involve re-plumbing the heating system to provide a low temperature solution (and circa 3-4 times the radiator surface area to run the system at 45°C).
- ASHPs can be used to displace the existing boilers, and ASHP fan coil units could be located to the south side of the KIC adjacent to the plant room where the heat pumps would be located. This may require aesthetic screening, and visual impact could be minimised by earth sheltering the units and appropriate landscaping.
- Although not listed under the sub-options for 'Ventilation', we recommend installation of a heat recovery unit and if this option was selected, we recommend a new unit rather than retrofitting the heat recovery to the existing AHU.

Lighting

Replacement of all lamps with LED, as opposed to a rolling-replacement. This is due not only to energy efficiency but also due to the high call out charges for lamp replacement that the KIC is currently paying to the third-party maintenance contractor.

Onsite energy generation

Photovoltaics – 46.2 kW of PV is suggested for the northern wing of the roof (where there is currently no existing plant).

Energy storage

Battery storage. A 30kW battery has been included in the PSDS worksheet. Battery storage and PV could be used as generation assets as part of the smart grid flex market, selling back to National Grid.

Sub-metering

Sub-metering - to primarily split the regulated (building loads) and the unregulated loads (from live performances power and lighting requirements on both stages), in order to measure project success.

Concluding statement

Significant improvement to the energy and carbon performance, would help the KIC to not only provide a home for innovative local businesses, but also act as an innovative demonstrator of best practice in the South East. These improvements will provide significant cost savings for the council and may even increase revenues by attracting other innovative businesses to want to call the KIC their home.

Separate to this energy analysis, Square Gain/ Carbon Free Group is able to provide support for Project governance which is also part of the project application scoring process (in addition to technical and financial cases). If TDC wish to pursue this, the work will cover project risks and mitigations, project implementation/schedule, case study examples of previous experience, and a demonstrable supply-chain to assist procurement and deliverability within the grant funding time window.

Appendix 1 - Public Sector Decarbonisation Fund Categories

Category Definitions	
Category 1	Technologies that directly contribute to the heat decarbonisation of a building by installation of a low carbon heating technology. For example, heat pumps and connections to low carbon heat networks.
Category 2	Technologies that do not directly contribute to the heat decarbonisation of a building but reduce overall energy demand and so will support future heat decarbonisation. For example, insulation, glazing, ventilation.*
Category 3	Technologies that do not reduce carbon emissions but enable future heat decarbonisation projects to take place – these technologies are exempt from the requirement to meet the £500/tCO_2 lifetime criteria. For example, metering, electrical infrastructure, battery storage.*
Category 4	Technologies that are only permitted if: (a) they are used to replace coal-fuelled heating systems or oil-fuelled heating systems, AND (b) if, in Salix's reasonable opinion, it has been demonstrated that it is not viable for a low carbon heating system to be installed within the building as a replacement for the coal-fuelled heating or oil-fuelled heating system. For example, gas-fired CHP and gas boiler replacement projects would fit into this Category provided they meet the above conditions.

Appendix 2 - KIC PSDS Funding Model

This spreadsheet is attached separately as the primary output of this commission.
A summary is shown below.

Applicant:	Thanet District Council
Project Phase	Pre-tender
Compliance Criteria:	£500 /tCO_2e LT

Step 2: Support Tool

Version 1.5

salix

Planned Start Date	Planned Completion Date	Site Life	Project Description
1/1/21	1/3/21	50	ent Innovation Center

	Total Grant Funding Requested	Total Project Value	Payback in Years	Total Financial Savings	Total tCO_2e pa	£/tCO_2e LT	Compliance
Category 1,2 & 4	£829,497.00	£829,497.00	9.94	£83,466	171.33	320.87	Compliant
Category 3	£140,409.00	£140,409.00	Total Project Value	£363,906.00	Total Grant Value	£363,906.00	

Category 1,2 and 4 projects

	Description of Work	Energy Type	Fuel Cost p/kWh	Category	Project Type	Technology - Work Type	Annual kWhrs Pre-Project	Annual kWhrs Post-Project	Annual kWh savings	% kWh savings	Project Value	Annual Financial Savings	Payback in Years	tCO_2e pa	£/tCO_2e LT	Data Entry Check
1	Around all windows of the building	Gas	3.60	2	Insulation - draught proofing	Insulation - draught proofing	381,524	362,449	19,075	5%	£5,206.00	£687	7.58	3.51	50.75	OK
2	46.2kW of roof mounted PV (280m2 of PV panels, 330w/1.3m2	Electricity	16.00	2	Renewable energy	Solar PV	306,000	256,145	49,855	16%	£72,273.00	£7,977	9.06	3.67	874.50	OK
3	Boiler to Heat Pump	Gas	3.60	1	Heating	Air Source Heat Pump (air to water)	381,524	0	381,524	100%	£372,003.00	£13,735	27.08	70.15	422.88	OK
4	Boiler to Heat Pump	Electricity	16.00	1	Heating	Air Source Heat Pump (air to water)	381,524	351,526	29,998	8%	£0.00	£4,800	-	2.94	-	OK
5	Replacement of CFL lighting with LED and installation of PIR on all	Electricity	16.00	2	LED lighting	LED - new fitting	306,000	281,911	24,089	8%	£74,782.00	£3,854	19.40	1.70	1,758.18	OK
6	Heating system upgrade to low temp	Gas	3.60	2	Heating	Heating - distribution pipework improvements	381,524	0	381,524	100%	£77,232.00	£13,735	5.62	70.15	72.43	OK
7	Heating system upgrade to low temp	Electricity	16.00	2	Heating	Heating - distribution pipework improvements	381,524	273,735	107,789	28%	£0.00	£17,246	-	9.55	-	OK
8	AHU to heat recovery ventilation	Electricity	16.00	2	Ventilation	Fans - air handling unit	381,524	247,573	133,951	35%	£228,001.00	£21,432	10.64	3.66	993.80	OK
9										0%						
10										0%						

If you have more than 10 projects you wish to apply for, please contact: grants@salixfinance.co.uk

Category 3 projects

	Description of Work	Project Type	Technology - Work Type	Details of Projects Enabled	Project Number	Project Value	Data Entry Check
1	New direct electrical connection to national grid	Electrical Infrastructure	Incoming Electricity Provision	Solar PV	2	£72,000.00	OK
2	MPAN half-hour Smart meter installation	Metering	Metering Other	Solar PV	2	£5,400.00	OK
3	Submetering x 8	Metering	Metering Other	Solar PV	2	£27,009.00	OK
4	30kW Lithium Iron Phosphate battery storage	Battery Storage	Battery in combination with renewable	Solar PV	2	£36,000.00	OK

Appendix 3 – fully detailed technologies and solutions appraised by Square Gain/ CFG

Note this model works technically, but not all solutions are allowable within the PSDS for funding.

This model is provided separately as an Excel Worksheet and a summary is shown below

Red shaded cells are not included in the Public Sector Decarbonisation Scheme application sheet

Kent Innovation Centre

Catetories 1,2,and 4	Energy type	Category	Project type	Project Technology type	Design	Equipment Unit	Equipment Rate	Equipment Quantity	Equipment -	Installation	Total costs	Contingency at 20%	TOTAL COST ex VAT	TOTAL COST inc VAT
Around all windows of the building	Gas	2	Insulation - draught proofing	Insulation - draugh	0	m2	45	160		2000	9405	1881	11286	13543.2
46.2kW of roof mounted PV (280m2 of PV panels. 330w/1.9m2 panel)	Electricity	2	Renewable energy	Solar PV	3500	kW	46.2	1200		0	60186.2	12037.24	72223.44	86668.128
Provided by the Reversible ASHP	Electricity	2	Cooling	Cooling - plant rep	1500	unit - cooling	5000	3		0	21503	4300.6	25803.6	30964.32
Replacing the roof-mounted AHU with a heat exchanger to allow for cooling.	Electricity	2	Ventilation	Fans - air handling	5000	Unit - upgrade	80000	1		25000	190001	38000.2	228001.2	273601.44
7.5kW Electric Vehicle charging points	Electricity		Vehicle charging	EV charging	0	10	5500	10		25001	85521	17104.2	102625.2	123150.24
3 x 100 kW reversible ASHPs	Electricity	1	Heating	Air Source Heat Pu	10000	unit - heating	60000	3		60000	310003	62000.6	372003.6	446404.32
Upgrading heating system to run on low temperature (45C)	Electricity		Heating	Heating - distribut	2500	radiator	150	210		30000	64360	12872	77232	92678.4
Replacement of CFL lighting with LED and installation of PIR on all corridor lighting.	Electricity		LED lighting - offices	LED - new fitting			55	800		12500	57355	11471	68826	82591.2
			LED lighting - corridoors	LED - new fitting			10	80		2500	3390	678	4068	4881.6
			LED lighting - stairwells	LED - new fitting			22	24		1000	1574	314.8	1888.8	2266.56
													TOTAL	**1067010**

Category 3 (enabling works)

New direct electrical connection to national grid	Electrical Infrastructure		Incoming Electricity Provision		0	Connection		0		60000	60000	12000	72000	86400
MPAN half-hour Smart meter installation	Metering		Metering Other		0	Meter		0		4500	4500	900	5400	6480
Submetering x 8, including 8 distribution panels and 4 sub-meters per panel (32 submeters total)	Metering		Metering Other		0	Panel (inc met	2500	8		0	22508	4501.6	27009.6	32411.52
30kW Lithium Iron Phosphase battery storage	Battery Storage		Battery in combination with renewable		0	Unit		0	30000	0	30000	6000	36000	43200
													TOTAL	**168492**

Appendix 4 - Evidence of costs

Costings for the project have been developed with reference to a Library of Innovative Low and Zero Carbon Solutions (an internal tool), which itself has been developed by CFG and Square Gain based on market information in 2020 and contains extensive list of appropriate technologies and fabric solutions for buildings to drive towards zero carbon.

Appendix 5 - Supporting calculations

PV calculations

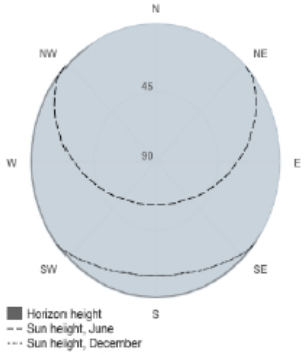
Provided inputs:

Latitude/Longitude:	51.359, 1.404
Horizon:	Calculated
Database used:	PVGIS-SARAH
PV technology:	Crystalline silicon
PV installed:	46.2 kWp
System loss:	14 %

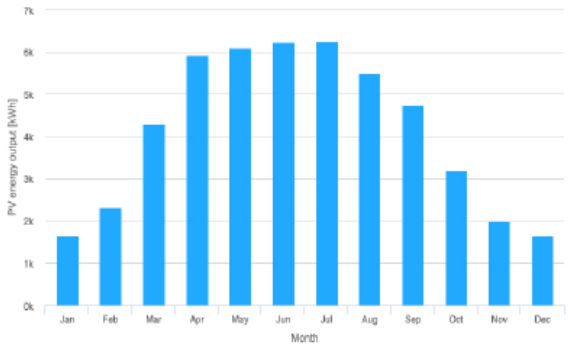
Simulation outputs

Slope angle:	35 °
Azimuth angle:	0 °
Yearly PV energy production:	49855.38 kWh
Yearly in-plane irradiation:	1313.34 kWh/m²
Year-to-year variability:	1816.24 kWh
Changes in output due to:	
Angle of incidence:	-3.03 %
Spectral effects:	1.6 %
Temperature and low irradiance:	-3.03 %
Total loss:	-17.83 %

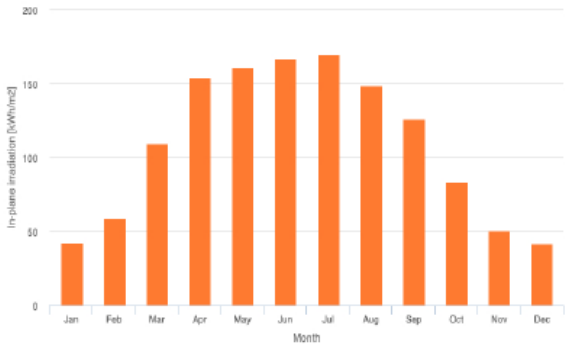
Outline of horizon at chosen location:



Monthly energy output from fix-angle PV system:



Monthly in-plane irradiation for fixed-angle:



Monthly PV energy and solar irradiation

Month	E_m	H(i)_m	SD_m
January	1669.1	42.2	232.5
February	2312.8	58.5	582.1
March	4291.3	109.2	729.1
April	5937.5	154.4	764.6
May	6098.2	161.4	627.9
June	6226.3	166.8	726.9
July	6247.2	169.7	614.5
August	5490.8	148.6	664.8
September	4743.5	126.5	313.5
October	3194.3	83.5	421.0
November	1989.8	50.8	443.0
December	1654.7	41.7	304.4

E_m: Average monthly electricity production from the given system [kWh].

H(i)_m: Average monthly sum of global irradiation per square meter received by the modules of the given system [kWh/m²].

SD_m: Standard deviation of the monthly electricity production due to year-to-year variation [kWh].

Heat loss calculations

All gas is currently used for space heating and a simple heat loss calculation based on total floor areas.

The building's total heat loss is approximately 254kWh/m2/year, with a total peak heat loss of 300kW, and an estimated 200W/m2 peak heat loss

To undertake a full heat loss calculation room by room data is needed regarding u-values and air-tightness. This was not part of the scope of works and could not have been completed within the timeline required to meet the PSCS application.

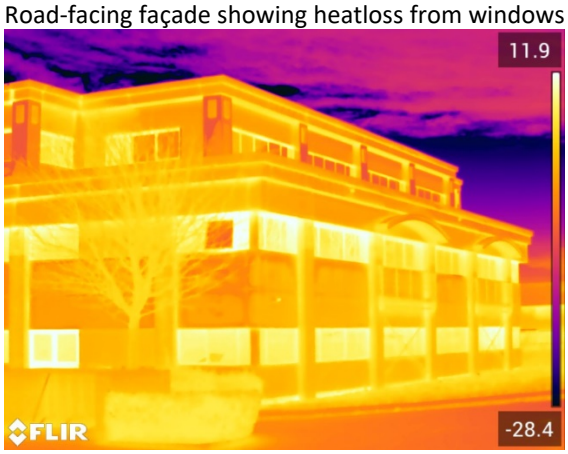
Appendix 6 - Risk register

Risk item	Detail	Mitigation
Cost	Cost estimations for emerging technologies are inaccurate	CFG/ Square Gain have experience in low and zero carbon building delivery, with supply chains that are local to the project.
Time	Programme delays result that the carbon saving technologies cannot be implemented within a timeline that is required by PSDS.	The programme is tight in order to deliver the large-scale decarbonisation project by September 2021, but to some extent this is alleviated through the known supply-chain and local presence of CFG.
Quality	Poor quality equipment and workmanship and installation results that designed carbon savings are not achieved.	Materials and equipment have been specified in order to deliver best value to TDC, which includes an assessment of equipment quality. Installation quality would be subject to the scrutiny of a Clerk of Works and it is recommended also to be delivered by a skilled and experienced supply chain known to CFG/ Square Gain.

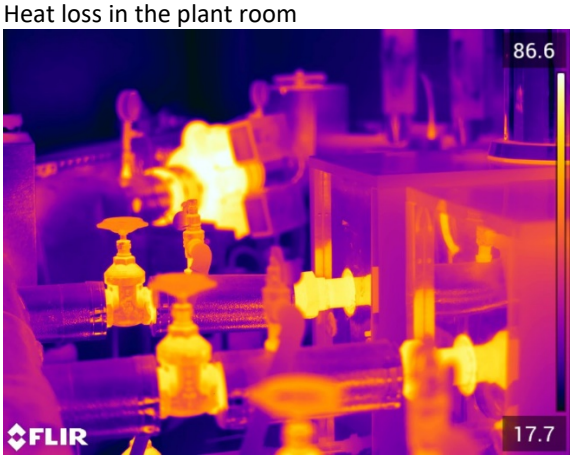
Appendix 7 - Site surveys and building condition – thermal imaging

External façade showing heatloss from windows

Road-facing façade showing heatloss from windows

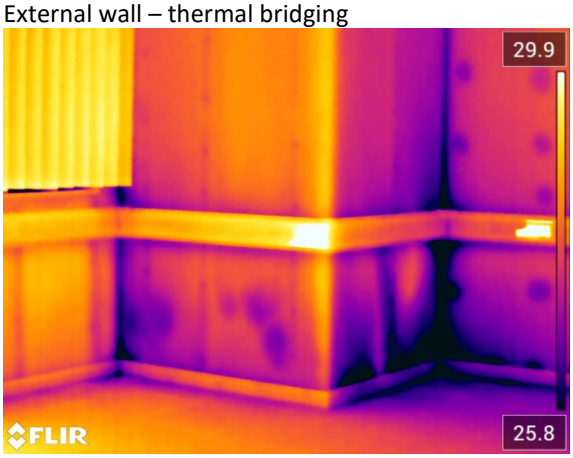


Heat loss in the plant room



Lighting

External wall – thermal bridging



Heat loss from the roof

Appendix 8 – Overview of experience

The following outlines our team's expertise with case study examples in the specialist field of Environmental Assessment, including Natural Capital, Carbon Quantification, Biodiversity and Ecology.

Our experts have a wealth of experience in Environmental Planning and Management within the UK and internationally.

For **Carbon Management and Quantification**, Carbon Free Group CIC has a wealth of experience delivering zero carbon and innovative award-winning projects with a focus on the energy and decarbonisation of the built environment evaluating; buildings, major infrastructure and organisations. Our work has pioneered the deployment of practical, cost effective designs for affordable zero-carbon homes, buildings and infrastructure for the UK and overseas market. Our energy and carbon project work ranges from community/commercial energy strategy modelling, building physics modelling and Whole Life Carbon Assessments for new developments. Scope 1 & 2 Emissions analysis is also carried out for existing organisations who wish to measure, monitor and reduce their carbon footprint.

Approach and examples include the following:

Community and Commercial Energy and Carbon Management Strategies:

Our work addresses project drivers and existing and emerging local, regional and national policies on energy and climate change, working with project teams in order to establish the site-wide energy options for a given site, with the objective to minimise demand on non-renewable resources utilising a combination of passive design techniques, ultra-low energy design, integrated renewable technologies, community and district energy and any other appropriate emerging technologies. Through an investigation of the constraints and opportunities of a site, we identify the potential for peer-to-peer and peer-to-grid energy trading and identify the benefits of real-time decentralised energy monitoring using our in-house 'Digital Energy Platform' to enhance and optimise renewable energy assets on a site and identify flex-capacity for revenue generation.

Our community and commercial energy strategy work includes a review of decentralised energy, storage, to develop a bespoke strategy for zero carbon and offset potential in compliance with and to exceed planning requirements to support planning gain.

Following a review of basic site information, including area schedules, site location plans, layouts and elevations, we calculate the 'Base Case' energy demands through energy modelling, considering both regulated and unregulated emissions for the following stages; assessment of appropriate energy efficiency measures for the site (**Be Lean**), then calculating optimum configuration for energy use, energy loads and the associated energy balance and carbon reduction (**Be Clean**). We then carry out an assessment of suitable renewable technologies for the site and explore the opportunities offered by the site (**Be Green**).

Following this analysis, which includes Standard Building Energy Modelling using: Dynamic Thermal Simulation software in line with the EPC Regulations and CIBSE TM52 & TM49 to

support overheating analysis, where relevant, we then recommend a commercial way forward tailored to the project / sites requirements.

Examples of energy analysis work includes: NHS Estates Kent, Obonjan Island (Croatia) and Corby Northamptonshire Zero Carbon Homes

Whole Life Carbon Assessment

To fully capture a development's carbon impact, we conduct whole life-cycle analysis to build upon a developments unregulated emission (i.e. those associated with cooking and small appliances), in order to evaluate its embodied emissions (i.e. those associated with raw material extraction, manufacture and transport of building materials, and construction) and emissions associated with maintenance and eventual material disposal. A Whole life-cycle carbon emission assessment is undertaken to demonstrate whole life-cycle carbon during construction and operation. The purpose is to demonstrate the superior performance of construction, whole-life cash savings, paybacks, carbon savings, and provide demonstrable evidence of the forward-thinking innovative energy- efficiency and cost-effectiveness in order to address issues of deprivation, running costs, fuel poverty etc.

Our calculation methodology is based on the nationally recognised Whole Life-Cycle Carbon Assessment (LCA) in accordance with EN 15978 using IMPACT (BRE methodology) to demonstrate site specific actions that can be taken to reduce life-cycle carbon emissions. The IMPACT database provides Benchmarking and Options Appraisals of elements including Superstructure; Substructure and Hard Landscaping and M&E services.

Outputs from this process enable the project to identify the 'Carbon Profile' and the emissions of the building/infrastructure over the period of a year measured as kg of CO2/m2/year. This can be combined with the output from the Commercial Energy Strategy, similarly measured in kg of CO2/m2/year. Whole life-cycle carbon emission and cost assessment is undertaken to compare 60-year predictions for capital and running costs and carbon emissions for agreed scenarios and to support RIBA Stage 3 and 4 reporting stages.

Examples of this work conducted by the team includes: Thames Tideway Tunnel a £4bn linear infrastructure project and Hook Norton zero carbon residential scheme, Oxfordshire

Scope 1, 2 & 3 Emissions Inventory & Carbon Footprint Analysis

For existing organisations we **u**ndertake a carbon footprint to provide an energy carbon and solutions audit for a given year based on electricity and natural gas, classified as Scope 1 so activities that directly relate to the site; fuel combustion, owned transport, process emissions and fugitive emissions (e.g. refrigerants). These include emissions from the vehicles, appliances and the facilities owned by the organisation. Scope 2 emissions, known as indirect emissions, include electricity, heating and cooling purchased by the business for its own use. Scope 3 emissions are caused by the events and activities not necessarily under the control of the business.

We conduct analysis of the energy consumption and attributed carbon emissions and other greenhouse gases (GHG) that arise through the direct and indirect activities of the organisation. The purpose is to enable the organization to report externally based on progress against the baseline carbon footprint to measure and monitor carbon reductions and improved cost efficiency. Acts as a baseline for accurate cost benefit analysis and the development of a

sustainability plan.

Examples of this work conducted by the team includes: Halton UK business conference centre and multi-sports club, Queens Club, FootLocker, Finger Food Studios (Canada) and Port of Ramsgate.

For **Natural Capital, Biodiversity and Ecology** initiatives, we are currently helping direct the regenerative landscape and rewilding programmes for the education and visitor centres at Furnace Brook in East Sussex and Pines Calyx in East Kent, building collaboration with the Durrell Institute at the University of Kent. We experts have delivered a wide-ranging sustainable development strategy analysis involving biodiversity and ecology surveys for terrestrial and marine habitat management and community participation on Obonjan Island in the Adriatic and St. Helena in the South Atlantic.

Our experts also have extensive experience in wetland and reservoir ecology and community-led biodiversity management in diverse sites in Africa, SE Asia, Sri Lanka and Bangladesh, as well as with Wildfowl and Wetlands sites (Martin Mere, London Wetland Centres), Royal Botanic Gardens (Kew) and the Eden Project in the UK. In many of these sites, the engagement of local communities and eliciting and promoting ways to engage them was a core part of the programmes.

We are also advancing the development of distributed ledger technologies that integrate Natural Capital and financial accounting and report directly to the UN SDGs through engaging user interfaces that can help accelerate the regeneration of Nature values in commercial and operational decision-making.

Added Value

The specific value our niche specialism brings is not just the subject matter expertise. It is because we work within the holistic framework of a sustainable development paradigm, where all these parts are intimately connected via feedback loops and cannot be separate out one from another. As a Community Interest Company, we are also defined by our wide network of specialist partners, associates and a collaborative framework to quickly access these wider skills and experience. Our impact assessment thinking runs alongside all that we do. This lens can offer many insights and foresights into social, economic, environmental, technology and governance opportunities and constraints that would not be immediately apparent from within the blinkers of niche specialisms.

Team Experience

The following CVs demonstrate our teams' niche specialist skills and experience in the area of Energy and Environment Assessment.

Greg Chant-Hall

FIEMA FRSA CEnv MCIOB MCIBSE CEEQUAL A&V ENV SP BREEAM AP WELL AP RESET ASP

Summary profile

Greg is a Chartered Environmentalist, Fellow of the Institute of Environmental Management & Assessment, & Fellow of the Royal Society for the encouragement of Arts, Manufactures & Commerce, with over 20 years sustainability leadership experience spanning blue-chip, SME & the third-sector, across Europe, Asia & the Americas. Greg has significant technical knowledge across the environmental, social & ethical business arena, & has successfully incorporated this into commercial strategy, tactics & operations, with very successful financial results. He has positively influenced corporate culture & encouraged innovation, and has helped develop integrated solutions that have realised benefits on some of the largest construction projects in Europe & worldwide.

Employment and development experience

Square Gain (incorporating Building4Health). Director *April 2016 to present (p/t)*

- Focused on sustainable buildings, healthy buildings and sustainable finance. Clients including Multiplex, ISG, United Nations Principles for Responsible Investment and CIRIA

Carbon Free Group. Directorr *April 2018 to present (p/t)*

- Developing zero-carbon and zero-energy-bill housing projects, managing the collaboration with investors, land-owners, designers, product suppliers, installers and consultants. Home Quality Mark Assessments. Also incorporates work under the banner of Resilient Homes.
- Commercialising innovative yet tried & tested approaches to housing to achieve zero carbon performance through energy efficiencies and renewables for better quality, faster to construct buildings providing greater cost-certainty and high IRR. The environmental and social benefits, including removal of fuel poverty, and the finances are very attractive for commercial investors.

Skanska. Various positions incl. Global Head of Sustainability *July 2005 - March 2018)*
Skanska Infrastructure Development & a range of senior leadership roles within Skanska UK

- Responsible for sustainability visioning, strategy development at a corporate level & tactical implementation for Skanska's mega-projects, bringing together commercial acumen, sustainability expertise, & leadership to the Executive Group. Advised business leaders on sustainability trends, markets & solutions to help Skanska win new projects & move into new geographies & sectors, & coordinate communication strategies with stakeholders ranging from ESG investors to local schools.
- Worked with teams to develop innovative ideas for delivering complex development & construction projects, with the ability to think outside traditional boundaries & ways of doing things. Examples include Skanska's 3 largest projects ever: M25 Highway widening in the UK, New Karolinska Hospital in Sweden & La Guardia Airport redevelopment in the US.
- Managed the management systems including Business, Knowledge, Risk and provided input to global market-making activities.

Private Development Projects

- Successfully redeveloped several residential sites for own inhabitation in London and Kent. Each time taking the project management role without the need for an external building company. Currently enjoying zero-energy costs on a 1960s refurbished property.

APPOINTMENTS

Resilient Homes (2018 – present)
Carbon Free Group (2018 – present)
66 Church Road Ltd (2002 – present)

IEMA – Sustainable Finance working group (Chair) (2017-present)
Annual Review of Social Partnerships – Advisory Board (2014 – present)
IEMA Full Membership Assessment Panel (2002 – 2015)
World Green Building Council – Green Buildings in Healthcare Group (2014 – 2015)

Square Gain (2016 – present)
Skanska (2012-2018)
Building Eco Systems (2000 – present)

IEMA – Strategic Advisory Committee (2016- present)
Energy Deck – Advisory Board member (2015 – present
Constructing Excellence Sustainability Group (2005 – 2012), UK Green Building Council Policy Committee (2009 – 2011), UK Contractors Group Environmental Forum (2001 – 2011)

Directorships

Square Gain	2016 to Date
Carbon Free Group CIC	2017 to Date
Project Rosemary Ltd	2018 to Date

Anthony Morgan **BSc Robotics & Automated Systems, Master of Renewables.**

Summary profile

- Low-carbon/clean-tech industry acknowledgement, for being a leading figure in the development of renewable energy technology solutions for application in low- and zero-carbon communities and homes. Winning a number of Industry awards in recognition for this work.
- Extensive R&D and product/systems development knowledge.
- Over 15 years of Directorship experience on the boards of private companies and associations.
- Experiences encompass a broad base of engineering knowledge, electrical/electronic & mechanical, energy storage and distribution, general business management, strategy, sales, marketing, systems implementation and entrepreneurial business start-up roles.
- Adroit negotiator, managing multi-stakeholder engagements at the highest levels, with a track record of success in strategic, financial and corporate negotiation.

Employment & development experience

CTO, Co-Founder Carbon Free Group CIC, UK/Europe/North America

June 2007-present

The Carbon Free Group CIC (CFG) is a movement for change focusing on accelerating decarbonisation through the connected innovations and collaborative working. With over 10 years track record within the construction sector and the successful delivery of a large number of low energy and zero-carbon commercial and residential buildings, our work has pioneered the deployment of practical, cost effective designs for affordable zero-carbon homes for the UK and overseas market.

Co-Founder, Director, CEO Power Transition Ltd.

May 2018-present

www.ptvolts.com

Developing and using next generation DLT enabled energy management technology, Transition Power Ltd has developed an operating model that allows energy trading between individual homes, neighbourhoods and even businesses known as peer-to-peer (P2P), or between communities and business, peer-to-grid (P2G).

Technical Lead, Director Resilient Homes Ltd.,

May 2015-Nov 2018

Resilient Homes is an SPV created by Carbon Free Group to build zero-carbon, smart homes using technologies and approaches developed by its members. The aim of the company is to spearhead new technology development providing a platform to demonstrate approaches that can drive the cost of delivery of truly zero-carbon homes.

Current Advisory Roles include:

Technical Lead, Glendale Ecohomes Ltd.

Technical Advisor to Velocity Capital Advisors.

Advisor to Tufeco Ltd.

M&E/Project Advisor to The Bay Trust.

OTHER RELEVANT DETAILS

Professional Qualifications

April 2016 to Present - Galileo Master of Renewables; European Energy Centre, John Napier University, Edinburgh

Directorships

Glendale Ecohomes Ltd. Technical Lead/Director	(May 2016 - November 2018)
Flint Engineering Ltd. Director	(March 2011 - February 2016)
Minimise Generation Ltd. Technical Lead/Director	(January 2015 - March 2016)
Newform Energy Ltd. CEO/Director	(June 2009 - December 2014)
Passivehouse Solutions Ltd. Managing Director	(November 2006 - June 2009)