

Building Energy Assessments To Support PSDS and Salix Finance Applications



Introduction

Using award winning software, we are able to produce a desktop (COVID secure) building and renewable energy assessment that meets the Salix Finance requirements for the Public Sector Decarbonisation Scheme (PSDS) application process.

Our services are tailored to provide the local authority with the ability to assess each building in the following ways:

01 Decarbonisation of Heat

Financial modelling to demonstrate the viability of air and ground source pumps and potential of water source pumps.
PSDS - category 1

02 Building Energy Assessments

Every measures is assessed for energy and carbon reduction to demonstrate the financial payback.
PSDS - category 2

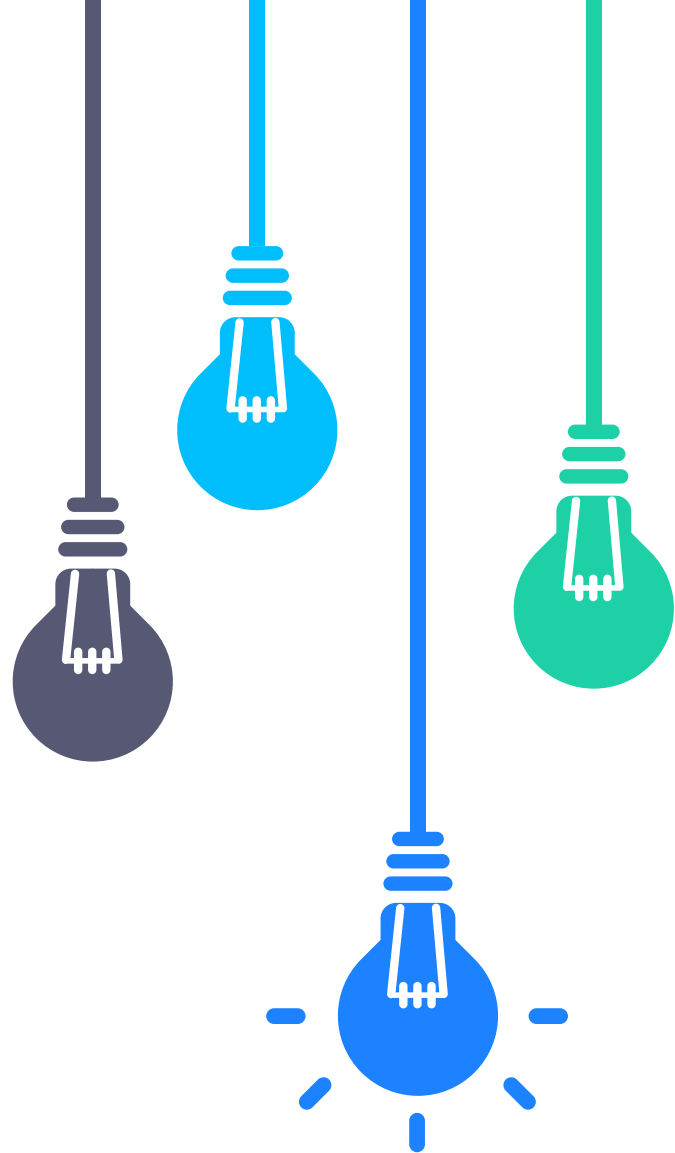
03 Renewable Energy Assessments

Financial modelling to demonstrate the viability of different technologies together with a grid constraints test.
PSDS - category 2 and 3



How We Can Help

We offer a number of services to assess your buildings for carbon and energy savings. You can either choose our Complete Assessment or one or more of its component parts.



OPTION 1 : Complete Assessment

This combines all elements of Options 2, 3 and 4 to complete all areas of the PSDS application.



OPTION 2 : Heat Pump Assessment ONLY

Financial viability for Air and Ground Source Pumps and the potential for Water Pumps to meet category 1 of the PSDS.



OPTION 3 : Building Energy Assessment ONLY

All 'measures' as part of category 2 of PSDS are assessed with capital cost, energy and carbon savings and payback.



OPTION 4 : Renewable Energy Assessment ONLY

Financial viability of possible technologies with a grid constraint test are produced to maximise possible results.

Award Winning Software

We have an exclusive partnership with Arbnco and utilise their ward winning building software developed in partnership with University of Strathclyde.

arbnco™

Arbnco is a building performance technology company developing disruptive and scalable solutions and in 2020 Arbnco won two major awards.

They were named as one of the **UK's Top 100 SmartTech Innovators...** coming in at number **37**.

They also won the award for **Product/Innovation of the Year – Wellbeing** at the CIBSE Building Performance Awards for their environmental monitoring solution.

Key elements of our service include :

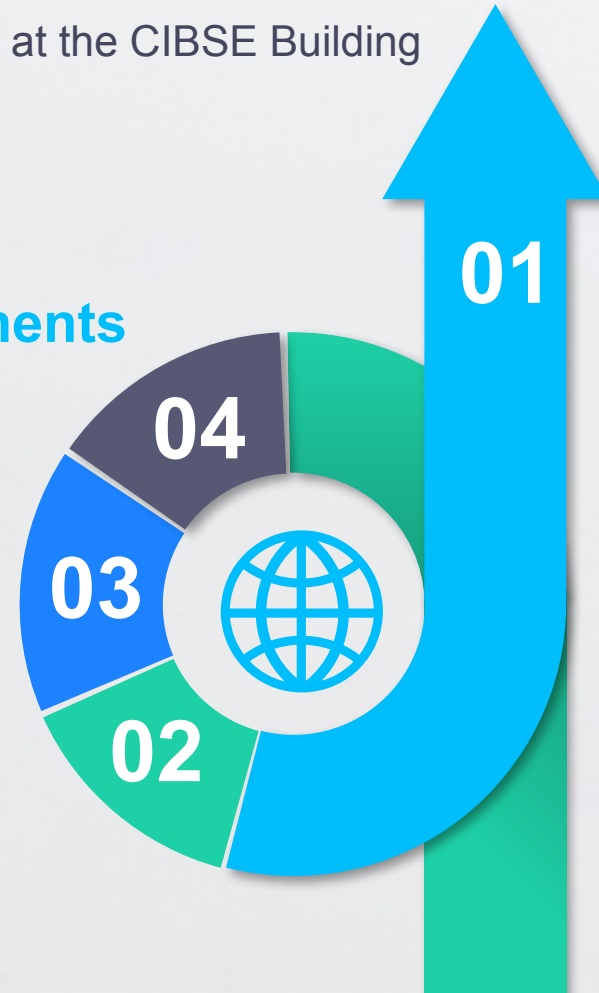
01 Desktop (COVID) Secure Assessments

02 Prepared to Meet PSDS Template

03 Cost Effective Solutions

04 Technical Justification of Results

To meet the Salix Finance requirements via their consultants Atkins.



Our Proposals Apply To All Your Buildings.

CORPORATE OFFICES

Town Halls, civic buildings and offices.

EDUCATIONAL BUILDINGS SCHOOLS AND COLLEGES

LEISURE CENTRES

Includes all leisure and activity centres.

OPERATIONAL BUILDINGS

Including depots and other operational assets such as crematoria

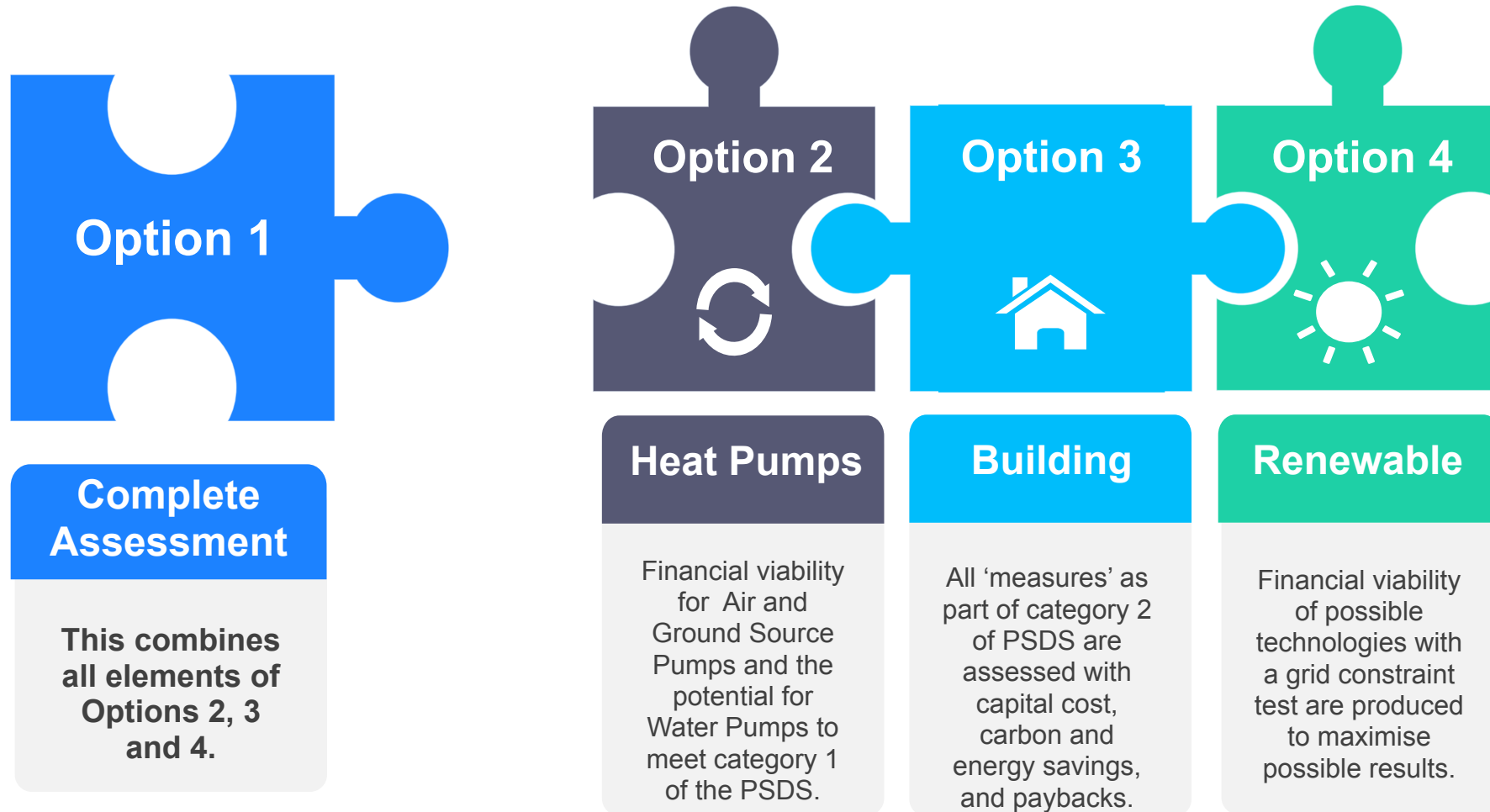
ARTS, CULTURAL AND COMMUNITY VENUES

Including libraries, galleries and museums and community venues.



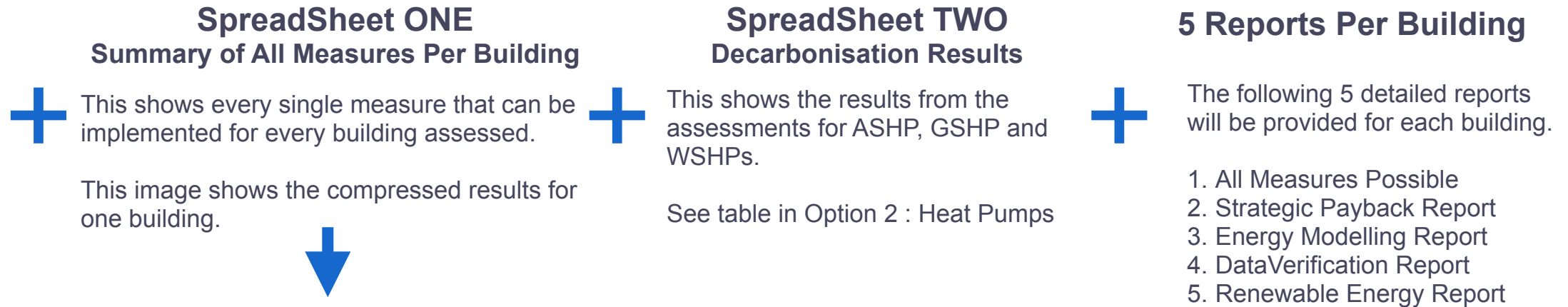
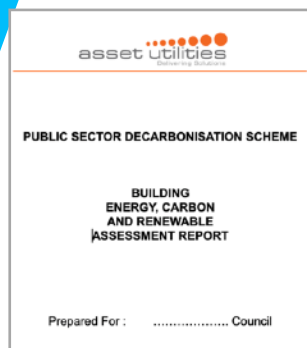
Option 1 : Complete Assessment.

We offer a complete assessment to match the PSDS requirements and to maximise the carbon and energy savings that can be achieved for each building. The complete assessment combines all the elements in **Option 2 - Heat Pumps**, **Option 3 - Building Assessment** and **Option 4 Renewable Energy Assessment**.

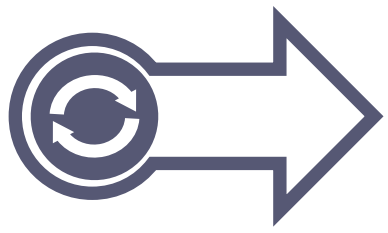


Option 1 : Complete Assessment.

Together with our main report, we provide a two spreadsheets that summarise the results produced from the five reports that are produced for each building. This is best explained in the following diagram.



Measures of Work	Description	Energy Type	Category	Lower Cost	Upper Cost	Financial Savings	Simple Payback for Lower Costs (years)	Simple Payback for Higher Costs (years)	SBEM Annual kWhrs Pre Project	Actual kWh Pre-project	SBEM kWhrs Reduction	Actual kWh Reduction	% kWh Reduction	Annual tCO2e Pre Project	tCO2e pa reduction	% tCO2e Reduction
Air Source Heat Pump		Electricity	1	£73,917	£96,093	£12,560	5.89	7.65	377,879	267,382	148,259	124,600	46.6%	195	91	46.6%
Replace T8 fluorescent tubes with high frequency fluorescent fittings or LED equivalent		Electricity	2	£1578	£2052	£599	2.6	3.4	377,879	267,382	1,039	735	0.3%	195	0.54	0.3%
Replace tungsten lamps with LEDs (lamp and luminaire)		Electricity	2	£208	£270	£192	1.08	1.40	377,879	267,382	11	8	0.0%	195	0.01	0%
Replace T5 fluorescent tubes with LEDs (lamp)		Electricity	2	£816	£1061	£109	7	10	377,879	267,382	73	51	0.0%	195	0.04	0%
Replace CFLs with LEDs (lamp)		Electricity	2	£86	£112	£132	0.65	0.85	377,879	267,382	40	29	0.0%	195	0.02	0%
Replace CFLs with LEDs (lamp and luminaire)		Electricity	2	£1092	£1420	£140	8	10	377,879	267,382	43	30	0.0%	195	0.02	0%
Install external wall insulation		Electricity	2	£75147	£187868	£5780	13	33	377,879	267,382	58,350	41,288	15.4%	195	30	15%



Option 2 : Heat Pump Assessment.

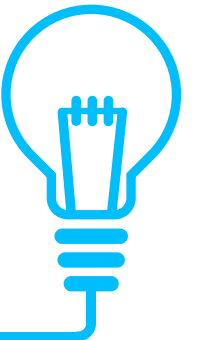
Each building is assessed for the suitability of all three technologies - air, ground and water source heat pumps. If a building is clearly unsuitable for a technology, the financial modelling will be excluded. Please note full financial feasibility is provided for the Air and Ground Source Heat Pumps, with the Water Source Heat Pumps being reported as being viable or not.

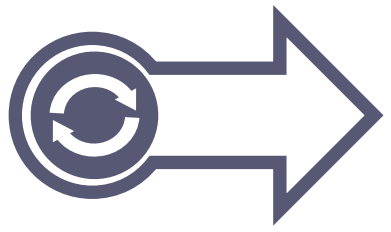
Deliverables : Together with the final report, the local authority will receive a summary spreadsheet (below) and a detailed financial report for each suitable technology.

Spreadsheet TWO summarises all the results for each technology for all the buildings to compare results.

		Category 1 : Decarbonisation of Heat						
Air Source Heat Pump								
	Sum of Affected Area	Lower Cost	Upper Cost	tCO2e Savings	Annual kWh Reduction	Financial Savings (Heating)	Simple Payback Based on LOWER COST	Simple Payback Based on UPPER COST
Building 1	1,607	£73,917	£96,093	91	124,600	£12,560	5.89	7.65
Building 2	196	£8,995	£11,694	1	1,626	£1,328	6.77	8.81
Building 3	179	£8,231	£10,700	7	14,160	£1,427	5.77	7.50
Building 4	88	£3,619	£4,704	5	9,112	£918	3.94	5.12

This spreadsheet is intended to support the authority's PSDS applications.



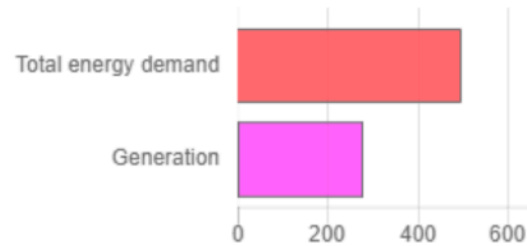


Option 2 : Heat Pump Assessment.

The feasibility report for each suitable technology is produced and includes the following elements:

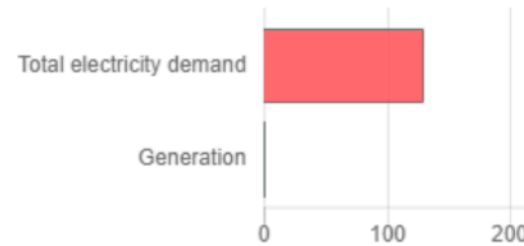
Total Energy and Heat Met

Total Energy Demand Met



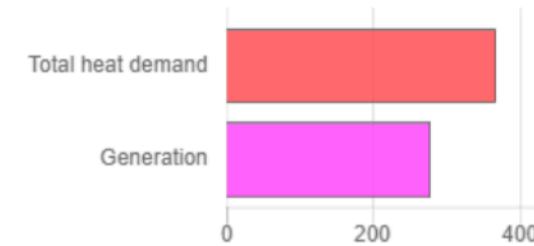
- Total energy demand 492.949 MWh/year
- Battery Storage (elec) 0.00 MWh/year
- Biomass CHP (elec) 0.00 MWh/year
- Gas CHP (elec) 0.00 MWh/year
- PV Ground (elec) 0.00 MWh/year
- Wind (elec) 0.00 MWh/year
- Air Source Heat (heat) 276.69 MWh/year
- Biomass CHP (heat) 0.00 MWh/year
- Biomass Heating (heat) 0.00 MWh/year
- Gas CHP (heat) 0.00 MWh/year
- Ground Source Heat (heat) 0.00 MWh/year

Electricity Demand Met



- Electricity demand 128.88 MWh/year
- Battery Storage 0.00 MWh/year
- Biomass CHP 0.00 MWh/year
- Gas CHP 0.00 MWh/year
- PV Ground 0.00 MWh/year
- Wind 0.00 MWh/year

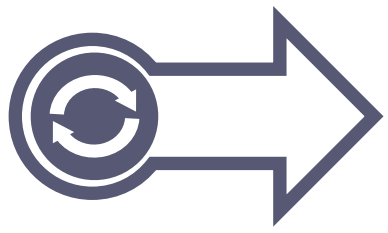
Heat Demand Met



- Heat demand 364.07 MWh/year
- Air Source Heat 276.69 MWh/year
- Biomass CHP 0.00 MWh/year
- Biomass Heating 0.00 MWh/year
- Gas CHP 0.00 MWh/year
- Ground Source Heat 0.00 MWh/year

This example is for an air source heat pump



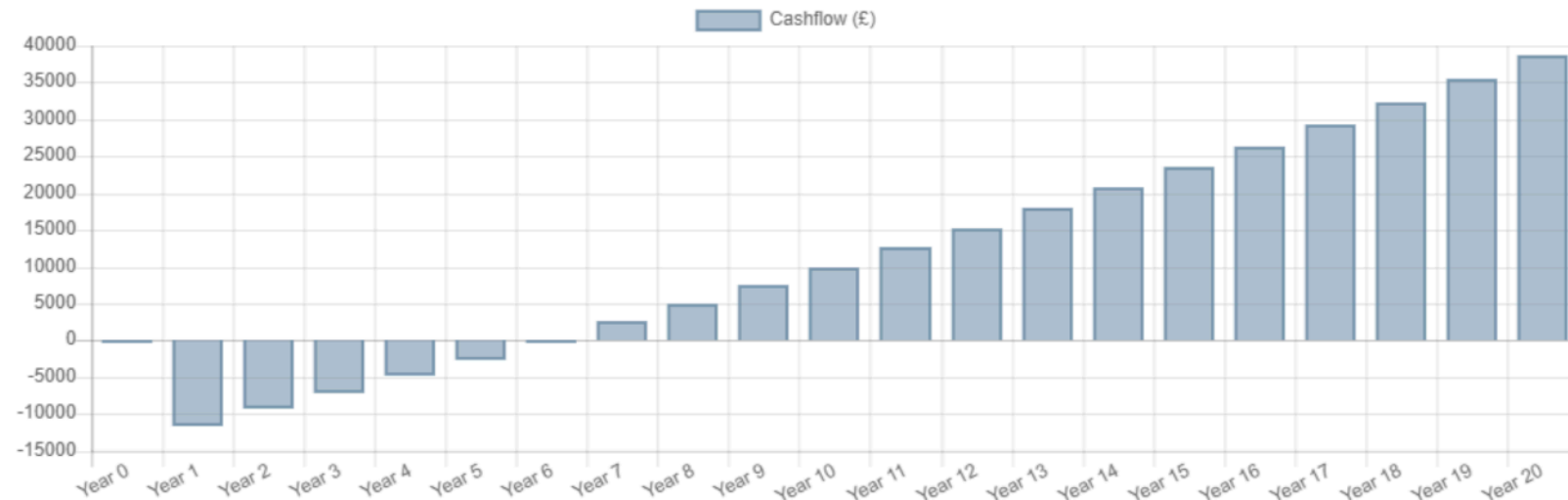


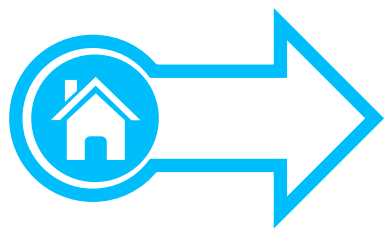
Option 2 : Heat Pump Assessment.

Heat Generation Summary includes the carbon savings achieved.

Technology	Technical Feasibility	Generation Potential	% of Energy Demands met		Carbon Emission Savings		Financial Breakdown				
Type	Based on questionnaires	Heat (MWh)	Heat	Of Total Energy	tCO ₂ e	% saving from total	Capital Cost (£k)	Revenue (£k/year)	MIRR (%)	NPV (£)	Simple Payback
Air Source Heat	FEASIBLE	276.69	95.0	65.9	53	61	48	9	9.5	106,320	6
Total		277	95	66	53	61	48	9	9	106,320	6

Cumulative Cashflow shows when the technology becomes cashflow positive:





Option 3 : Building Energy Assessment.

This assessment requires an **EPC to have been produced for the building**, which is fundable within the Low Carbon Skills Fund.

The EPC permits our software to assess every possible carbon and energy 'measure' that can be instigated as part of category 2 of the PSDS application.

The following 4 reports will be provided for each building. Each is over 20 pages :

1.All Measures Possible

- Considers every possible improvement

2.Strategic Payback Report

- shows measures based on payback and EPC gain

3.Energy Modelling Report

- shows how energy is consumed within the building

4.DataVerification Report

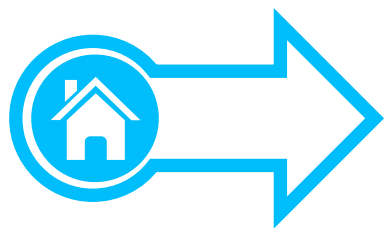
- considers any inaccuracies within the EPC

Individual Simulations

In the table below you can find the results summary for each of the individual recommendations available for this building.

Category	Recommendation	Affected area ²	Cost	Savings	Discounted Payback period (yrs)	Saved kgCO ₂ /m ²	Rating	MEES Exempt?
Lighting	Replace tungsten lamps with LEDs (lamp)	318m ²	£1,051 to £1,369	£3,490	0.3 to 0.4	0.25	F 131	✗
Lighting	Replace T8 fluorescent tubes with high frequency fluorescent fittings or LED equivalent	6,612m ²	£38,085 to £49,511	£16,502	2.4 to 3.2	1.21	F 129	✗
Lighting	Replace high pressure mercury/sodium lamps with LEDs (lamp and luminaire)	1,513m ²	£9,836 to £12,802	£526	30.9 to 55.5	0.04	F 131	✓
Lighting	Replace tungsten lamps with LEDs (lamp and luminaire)	318m ²	£21,010 to £27,314	£4,050	5.8 to 7.8	0.29	F 131	✗
Lighting	Replace T8 fluorescent tubes with LEDs (lamp and luminaire)	6,612m ²	£137,527 to £178,721	£24,896	6.2 to 8.4	1.83	F 128	✗
Lighting	Replace high pressure mercury/sodium lamps with T5 fluorescent tubes (lamp and luminaire)	1,513m ²	£6,598 to £8,595	£1,434	5.1 to 6.8	0.11	F 131	✗
Lighting	Install lighting controls	23,632m ²	£70,895 to £92,163	£20,344	3.8 to 5.0	1.49	F 128	✗
Solar control	Apply solar control film to existing glazing	7,901m ²	£395,061 to £513,579	£2,723	N.A.	0.20	F 131	✓
HVAC	Replace existing local electric heating and/or air source heat pump with a new air source heat pump system	850m ²	£39,110 to £50,843	£5,621	8.1 to 11.1	0.42	F 131	✓
Misc	Replace local electric heating system(s) with gas fired, wet radiator system	956m ²	£58,634 to £76,223	£5,044	15.2 to 21.9	0.29	F 131	✓
Misc	Replace existing air handling units	40,900m ²	£309,406 to £402,228	£218,406	1.5 to 1.9	16.9	D 98	✗

* Showing 11 recommendations with positive results from the total 11 recommendations processed.

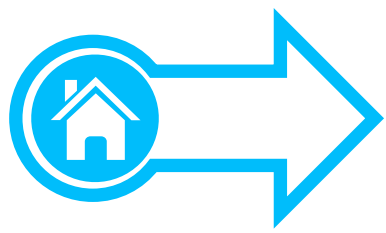


Option 3 : Building Energy Assessment.

We then collate the results into **Spreadsheet ONE**, which is a summary of all viable measures to reduce the building's carbon and energy.

We usually base this on measures with less than a 10 year payback. However, we can extend that at the authority's request to a longer period.

Measures of Work	Description	Energy Type	Category	Lower Cost	Upper Cost	Financial Savings	Simple Payback for Lower Costs (years)	Simple Payback for Higher Costs (years)	SBEM Annual kWhrs Pre Project	Annual kWhrs Reduction	% kWh Reduction	Annual tCO2e Pre Project	tCO2e pa reduction	% tCO2e Reduction
Air Source Heat Pump		Electricity	1	£8,995	£11,694	£1,328	6.77	8.81	84,941	1,626	2%	56	0.84	1.51%
Replace tungsten lamps with LEDs (lamp)		Electricity	2	£42	£54	£126	0.33	0.43	84,941	31	0%	56	0.02	0.03%
Replace T8 fluorescent tubes with high frequency fluorescent fittings or LED equivalent		Electricity	2	£748	£973	£426	1.8	2.3	84,941	335	0%	56	0.18	0.32%
Replace tungsten lamps with LEDs (lamp and luminaire)		Electricity	2	£676	£879	£131	5	7	84,941	32	0%	56	0.02	0.03%
Install lighting controls		Electricity	2	£2,216	£2,881	£473	5	6	84,941	1,810	2%	56	1.11	1.98%
Replace T5 fluorescent tubes with LEDs (lamp)		Electricity	2	£288	£374	£62	5	6	84,941	11	0%	56	0.01	0.01%
Replace CFLs with LEDs (lamp)		Electricity	2	£701	£911	£2,345	0.30	0.39	84,941	4,513	5%	56	3.43	6.15%
Replace CFLs with LEDs (lamp and luminaire)		Electricity	2	£8,164	£10,613	£2,524	3	4	84,941	4,786	6%	56	3.69	6.61%
Replace T8 fluorescent tubes with LEDs (lamp and luminaire)		Electricity	2	£5,852	£7,607	£640	9	12	84,941	501	1%	56	0.27	0.48%



Option 3 : Building Energy Assessment.

Report 3 : Building Energy Report

This report shows a key number of results including :

1. Modelled CO2 consumption per month
 2. Energy consumption by area
 3. Energy consumption by month
 - 4. Energy consumption by consumer**
 5. Lighting, heating and DHW in each area
 - 6. Building Zonal Information**
- can form the basis of the ASHP specification for the procurement document

Image : Locations and extent energy is consumed in the building for each m2.



Total
1401 kWh/m²



Lighting
30 kWh/m²



Hot Water
813 kWh/m²



Heating
151 kWh/m²

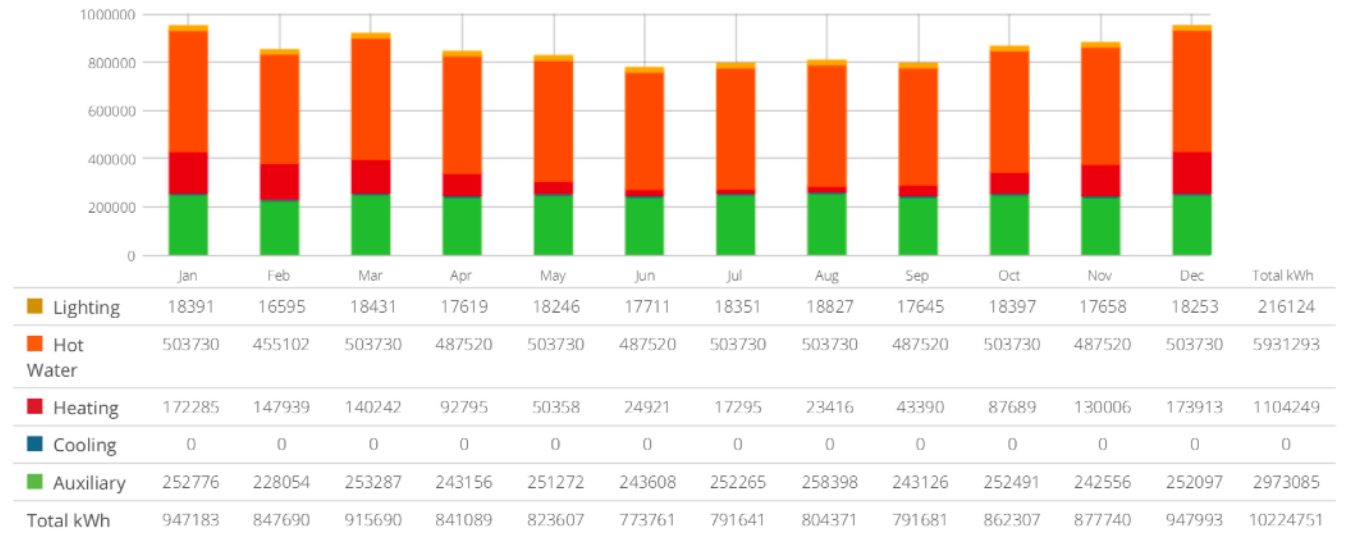


Cooling
0 kWh/m²



Auxiliary
407 kWh/m²

MODELLED CONSUMPTION BY CONSUMER



BUILDING ZONE INFORMATION SUMMARY

FITNESS SUITE/GYM 2206.00m² (30.23%)

HVAC: CENTRAL HEATING USING AIR DISTRIBUTION	2206.00m² (30.23%)
Lighting: LED	2128.0m² (29.16%)
Lighting: T8 Fluorescent - triphosphor - high frequency ballast	78.0m² (1.07%)

LIGHT PLANT ROOM 1028.00m² (14.09%)

HVAC: CENTRAL HEATING USING AIR DISTRIBUTION	1028.00m² (14.09%)
Lighting: T8 Fluorescent - triphosphor - high frequency ballast	1028.0m² (14.09%)

SWIMMING POOL 2172.00m² (29.77%)

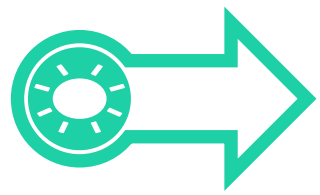
HVAC: CENTRAL HEATING USING AIR DISTRIBUTION	2172.00m² (29.77%)
Lighting: LED	2172.0m² (29.77%)

CHANGING FACILITIES WITH SHOWERS 1494.00m² (20.47%)

HVAC: CENTRAL HEATING USING AIR DISTRIBUTION	1494.00m² (20.47%)
Lighting: Fluorescent - compact	1369.0m² (18.76%)
Lighting: T8 Fluorescent - triphosphor - high frequency ballast	125.0m² (1.71%)

RECEPTION 397.00m² (5.44%)

HVAC: CENTRAL HEATING USING AIR DISTRIBUTION	397.00m² (5.44%)
Lighting: LED	397.0m² (5.44%)



Option 4. Renewable Energy Assessment.

Consideration will be given to most viable renewable energy technologies for each the building.

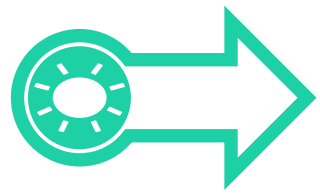
To determine if the renewable technology is financially viable, detailed modelling produces a profit & loss plus 20 year cashflow with breakeven period. This will include sizing the most suitable technology including a battery where appropriate.

Here is an example of the final report, where the optimum return is offered using five different financial considerations, namely :

- Unoptimised - maximum area plus battery
- Maximised Internal Rate of Return
- Maximise NPV
- Simple Payback
- Maximise CO₂ Reduction

Summary of Optimised Installation Options					
Description	Unoptimised	Maximise Internal Rate of Return	Maximise NPV	Simple Payback	Maximise CO ₂ Reduction
Area that can be used for PV (m ²)	3,313	3,313	3,313	3,313	3,313
Roof Orientation	South East	South East	South East	South East	South East
Roof Inclination	25°	25°	25°	25°	25°
Panel type	Monocrystalline silicon PV	Monocrystalline silicon PV	Monocrystalline silicon PV	Monocrystalline silicon PV	Monocrystalline silicon PV
Shading level	None 0%	None 0%	None 0%	None 0%	None 0%
Power output (kWh/kWp)	881.07	881.07	881.07	881.07	881.07
Battery type	ST-SES 100kWh	No Battery	No Battery	No Battery	ST-SES 100kWh
Battery capacity (kWh/kWp)	100.0	0.0	0.0	0.0	100.0
Generation Potential All figures here are estimate					
Estimated power generation (kWh/yr)	343,384	70,415	343,387	70,415	343,387
Installed capacity (kWp)	390	80	390	80	390
Electricity demand met (%)	33.8	6.9	33.8	6.9	33.8
Energy generated by solar panels used onsite (%)	69.89	93.61	69.89	93.61	69.89
Usable electricity generated (kWh/yr)	239,996	65,917	239,997	65,917	239,997
Commercial Summary Costs					
Engineering, procurement and construction (EPC)	650	750	650	750	650
Total capital investment (£) (assumes installation)	303,829	59,940	253,331	59,940	303,831
Annual operation and maintenance (£)	5,253	559	2,728	559	5,253
Revenue First Year £					
Generation FIT revenue (£)	0	0	0	0	0
Export revenue (£) (FIT/SEG)	4,119	86	4,322	86	4,119
Value of electricity saved (£)	41,254	11,963	38,691	11,963	41,255
Net operating revenue (£)	40,120	11,489	40,285	11,489	40,121
Investment Return					
Capital MIRR (%)	8.6	10.8	9.6	10.8	8.6
Simple payback (years)	7	5	6	5	7
NPV (£)	700,947	239,506	766,711	239,506	700,951
Average annual CO ₂ benefit (tonnes)	34.79	10.47	33.89	10.47	34.79

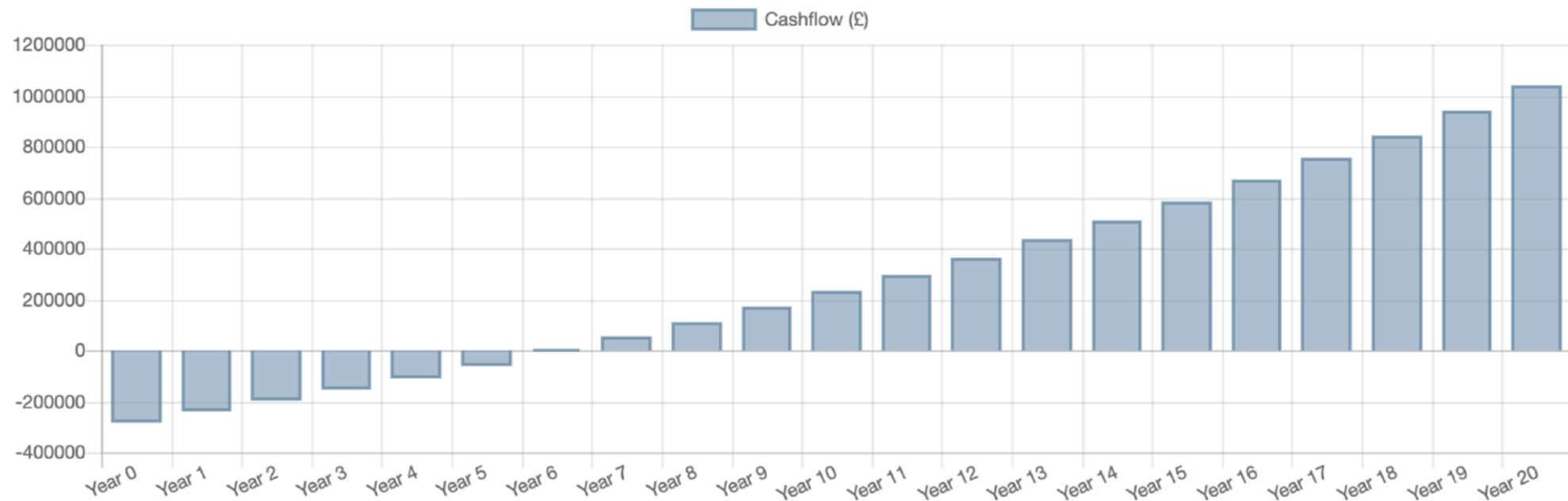
NB: A Full Cash Flow Model is provided as an app

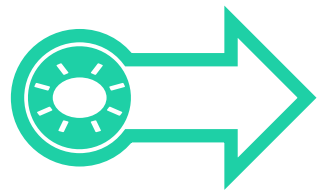


Option 4. Renewable Energy Assessment.

This is an example of the cumulative cashflow.

Cumulative Cashflow





Option 4. Renewable Energy Assessment.

Identifying Any Grid Issues

An important consideration is whether there are any constraint issues connecting the renewable technology to the grid.

If this assessment is ignored and it is discovered (following the submission of a formal grid application) that there are constraint issues resulting in expensive grid connections, it will mean the project is financially unviable.

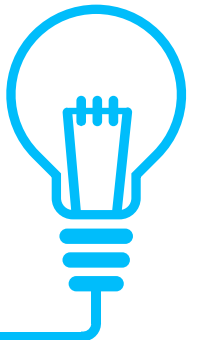
The loss to the authority would be a combination :

- **TIME** - three months of lost time for the the formal grid application process before discovered the impact of the grid constraints
- **MONEY** - circa £7,000 - £8,000 of costs from the formal application to the DNO and a consultant;s fee
- **EFFORT** - internal time that could be attributed to known viable projects



For these reasons, we test the grid to determine if there is sufficient capacity.

We also obtain budget grid connection costs to demonstrate that the project is financial viable.



Our Menu of Services.

Our proposals provide a **cost-effective desk top** assessment (COVID-19 secure) where the local authority is able to choose the service required from the following options. If **an EPC is required as in Option 1 and 3**, this can be produced by the authority or we can provide via our partners a quotation for its production. **The EPC is also funded under the Low Carbon Skills Fund.**

Option 1

Complete Assessment Includes Options 2, 3 and 4

Desktop Study (no site visit required)

Required Information:

- **An EPC is required**
- Annual Electricity and Gas Usage
- Energy Tariffs
- Building location and size

£2,600 plus vat
Buildings less than 4,000 m2

£2,950 plus vat
Buildings to 8,000 m2

Option 2

Heat Pump Assessment Only

Desktop Study (no site visit required)

Required Information:

- **No EPC required**
- Annual Electricity and Gas Usage
- Energy Tariffs
- Building location and size

£950 plus vat per building

Option 3

Building Assessment Only

Desktop Study (no site visit required)

Required Information:

- **An EPC is required**
- Annual Electricity and Gas Usage
- Energy Tariffs
- Building location and size

£1,250 plus vat
Buildings less than 4,000 m2

£1,550 plus vat
Buildings to 8,000 m2

Option 4

Renewable Energy Assessment Only

Desktop Study (no site visit required)

Required Information:

- **No EPC required**
- Annual Electricity and Gas Usage
- Energy Tariffs
- Building location and size

£950 plus vat per building

Additional Benefits Of Our Service



One of the potential benefits of our approach is the ability to align carbon reduction and energy efficiency measures to wider sustainable development goals.

Some of the goals and targets are more applicable to some Councils than others.

Demonstrating some of the co-benefits which can be achieved through decarbonising public buildings is an important component of the approach.





NEXT STAGE

Please feel free to contact us to discuss your requirements.

We are also able to prepare a quotation to demonstrate how our services can meet your carbon and energy reduction aspirations to support your PSDS applications.

Please contact :

Marc Wynn

marc@assetutilities.com
07798 646 936

Thank You

www.assetutilities.com



North Ayrshire Council
Comhairle Siorrachd Àir a Tuath



Nottingham
City Council



ROYAL BOROUGH OF
WINDSOR &
MAIDENHEAD
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Some our key clients include :