

Carbon Descent Plan - Tunbridge Wells Borough Council

Prepared by :	Steven Marks – Carbon Strategy Lead
Reviewed by :	Andy Morgan – Head of Energy Management

21 January 21

Table of Contents

Background	4
Executive Summary	5
Key findings	6
Scoping	8
Data Collection and Footprint	9
Data Collection	9
Emissions Factors	9
Carbon Footprint	9
Key findings:	11
Forecast	13
Carbon Budget and Pathway	14
Carbon Budgets	14
Evaluating TWBC's Carbon Budget	14
Leading The Way	16
Business As Usual Scenario	18
Conclusion	19
Options Appraisal	19
Success Factors and Carbon Reduction Options (CROs)	21
Key points	22
Other Initiatives Proposed by Councillors	22
Zero Carbon Electricity Supply Options	24
REGOs (Renewable Electricity Guarantee of Origin)	24
Traceability	24
Additionality	24
PPAs	25
Products Available	25

Zero Carbon Modelling, Outputs & Strategy	27
Scenario Analysis	28
Scenario Cashflow	30
Carbon Offsetting	31
Agreed Actions and Assumptions	33
Treatment of Outsourced Services	33
Conclusion	35
Evolution of Strategy and Model	35
Key points	36
Next Steps	36
LASER Background	38
Key People	39
Legal Information	40
Appendix 1 – Organisational Scoping Chart	41
Appendix 2 – Operational Scoping Table	42
Appendix 3 – Carbon Footprint Data	44
Appendix 4 - Emissions from TWBC Buildings	46
Appendix 5 – Forecast of Emissions to 2050 under a BAU Scenario	48
Appendix 6 – Year on year carbon budgets for TWBC to 2050	49
Appendix 7 – Zero Carbon Electricity Supply Options	50
Option 1 – Green Tariff	50
Option 2 – Green Basket	51
Option 3 – PPA or PEPPPA	52
Appendix 8 – Model Outputs from Scenarios	53
Central Scenario	53
Central Scenario - 0% Estate Rationalisation	54
Increased LED & ASHPs	55
Increased LED, ASHPs & PEPPPA	56
Central Scenario - 40% Estate Rationalisation	57
With Solar Park (owned or 3rd party)	58

Background

As of October 2020, around 75% of councils across the UK had declared a climate emergency*, with the majority of these setting target dates to be carbon neutral either for their own operations or across their area as a whole. Numerous other public bodies have also made declarations or are putting plans in place to begin this transition. The ambition of declarations vary significantly and will also vary in scope as public bodies begin to define exactly what they are committing to include in terms of operations and emissions sources. Of those councils who have declared a climate emergency, approximately three quarters have stated a target, with dates ranging between 2025 and 2050, but the majority being 2030 in line with Tunbridge Wells Borough Council.

The progress with planning and implementation is mixed. Some organisations are clearly taking large scale action towards developing new renewables, others have committed significant resource to planning yet many others have a clear target but little detail at this stage on how it will be achieved.

Regardless of current progress, these bodies have a mandate to take positive action to address the issue of climate change and will need to formulate detailed plans and take steps towards meeting these targets imminently. If action isn't taken now, the bodies could face substantial political pressure in the short term and face not meeting their self-imposed targets in the longer term. Not only that, but according to Energy Live News, Environmental law firm ClientEarth has threatened 100 councils with legal action if they do not provide adequate evidence of planning to meet for their carbon reduction targets.†

In 2015, the EU and 196 nations signed on to the first truly global commitment to aggress climate change, namely the Paris Agreement. The aim of this was to limit global warming well below 2°C and in pursuit of 1.5°C. On the 3rd December 2020m the UK government unveiled its target to reduce emissions by 68% by 2030, compared to 1990 levels and net zero by 2050. This will be termed the UK's NDC (National Determined Contribution) to the Paris Agreement and meets the recommendation made by the CCC (Climate Change Committee).

* [Declare a Climate Emergency | Go Zero Carbon by 2030](#)

† <https://www.energylivenews.com/2019/09/03/environmental-lawyers-threaten-councils-with-legal-action-over-climate-inaction/>

TWBC's climate emergency declaration made on 17th July 2019 sets out a commitment for the council's operations and services to be carbon neutral by 2030. LASER's expertise in conjunction with OJEU compliant frameworks means that we are well equipped to assist TWBC on their journey to net zero. LASER can not only assist in the carbon footprint and planning stages but are also able to offer compliant procurement routes to support TWBC through the implementation of emissions reduction projects and initiatives.

Executive Summary

This document collates the activity and findings of the Carbon Footprint Audit and Action Plan exercise LASER have carried out for TWBC. The key elements, findings and conclusions are summarised below:

- A scope was defined in order to frame the target, this was based on operational control principles from the GHG Protocol.
- Carbon footprint was calculated, based on 2018/19 data, and shown to be dominated by outsourced services such as waste and leisure.
- Business As Usual forecast shows that emissions will continue to drop without further activity by TWBC because of reducing electricity grid emissions, however this will plateau at around 78% of current emissions.
- In order to align with science based targets and contributing their fair share of Paris Agreement reductions requires TWBC to cut emissions rapidly, by 49% by 2025. At current emission levels, TWBC would use their entire carbon budget to 2100 by 2027.
- Exercises and modelling were carried out to assess 6 separate scenarios, assessing carbon and high level financial implications. TWBC will need to consider their options and select their chosen strategy. Options with biggest impact include reducing the property portfolio, requiring waste and leisure providers to operate at zero carbon and committing to enhanced levels of energy savings in buildings combined with investment in large scale renewables or green electricity procurement.

Key findings

- Substantial early action is needed to align with Paris Agreement pathway and an effective, well thought out procurement strategy would contribute to this.
- Direction on the TWBC estate and leisure buildings is extremely important. Without this officers are unable to plan projects as they are uncertain which buildings will be retained and unable to plan a renewable energy purchasing strategy as future energy volumes could potentially fluctuate significantly.
- The majority of the possible scenarios outlined in the modelling rely on some carbon offsetting to achieve net zero by 2030. There are risks inherent in this and it is important to highlight that there would be no financial return or saving from offsetting.
- Investment in large scale renewables is possible in some format as there are a variety of ways in which to structure arrangements.

Next steps are as follows:

- 1. Determine Estate Future**
- 2. Develop detailed action plans**
- 3. Immediate action in retained buildings**
- 4. Procure green energy for estate**
- 5. Address less significant emissions sources**
- 6. Update carbon footprint to latest year**

LASER would be happy to assist in either more detailed action planning or modelling of particular options and helping deliver activities via our public sector frameworks.

Important points to note on interpreting this document

- Analysis of financial impacts is based on energy costs only, for example the savings from reducing the size of the estate only accounts for reductions in energy consumption and costs and do not take into account revenue from selling or leasing properties.
- Financing options are available, for example finance in renewable assets could be structured in a number of different ways such as loans or PPAs where rates

are paid back through consumption. They can also be structured differently internally as well to facilitate budgeting.

- This is an evolving strategy that will be refined but allows TWBC to understand their current positions, the challenge and options to meet the challenge.
- There are not defined regulations or conventions at this time around reporting emissions from green energy, so decisions will need to be made based on the council's preference or interpretation of what it is felt the public would favour.

Scoping

LASER conducted an initial kick off meeting with the relevant representatives from TWBC in February last year. This was a productive meeting with good input and collaboration from all parties. At this meeting it was decided that the council would adopt an operational approach when conducting the organisational and operational scoping exercise, as laid out in the GHG Protocol. This consolidation approach was selected as it was felt to best tie in with the council's setup, operation and objectives.

The organisational scoping exercise is conducted prior to the operational scoping and looks at the organisational structure to determine which entities fall within the scope. Tunbridge Wells Property Holding Company and interest in the Mid Kent Authority were identified as areas to be assessed. It was determined that the property holding company and the areas of the Mid Kent Authority that the council control would be included as depicted in the chart in Appendix 1.

However, at the operational scoping stage it was determined that TWBC controlled very little of the energy use from the property holdings company and the energy use associated with the contribution to the Mid Kent Authority could be gathered within the council's main energy data. As part of the operational scoping, a number of areas were discussed and decisions made as outlined in the table in Appendix 2. The most notable of these were the decisions to include the leisure operations, grounds maintenance contract and waste collection and street cleaning services within the scope. Although these are not operated by the council directly it was felt that they were important due to their significance and the influence that the council exercises over these operations.

It was decided to use FY 18/19 as the base year as data would be available immediately, although it was noted that the baseline is not as vital when looking to achieve net zero due to the emphasis being on the absolute target. The work detailed throughout this report will give TWBC context for the challenge facing them and allow visibility of the significance of the contribution of each emissions source over time. The footprint calculation differs very slightly throughout this report depending on the stage at which the calculation was undertaken, with data for very minor emissions sources added after the initial footprint calculation. The total baseline emissions for TWBC however remain at around 3,500 tCO₂e.

Data Collection and Footprint

Data Collection

LASER worked with TWBC to collate energy, fuel, water, waste and waste data as well as data regarding other emissions sources. LASER would like to take this opportunity to thank TWBC personnel for their assistance and cooperation in this exercise which certainly facilitated the process significantly. However, this remained a lengthy procedure as substantial quantities of data were gathered from numerous different sources in many different formats and the interruptions caused by the pandemic hindered these efforts as well.

Emissions Factors

Once the data gathering had been completed, LASER utilised emissions factors gathered from various government sources and calculated factors where specific government factors were not available. LASER have put significant time and resource into the compilation and generation of these figures, for both the footprint and the forecast, to ensure that as accurate a calculation of emissions as possible has been made for TWBC.

Carbon Footprint

The council's carbon footprint was calculated and broken down in a variety of ways which allows for insight into the emissions the significance of the different emissions sources. In essence a carbon footprint is divided into three different categories of emissions:

- Scope 1 – Direct GHG (Greenhouse Gas) Emissions, where the emission occurs directly from sources controlled or operated by the council, for example the gases emitted from a boiler flue as a result of burning natural gas for heating.
- Scope 2 – Electricity indirect GHG Emissions, where the consumption of a utility on site has a direct bearing on the emissions offsite. This predominantly relates to electrical consumption but can also include district heating and cooling.
- Scope 3 – Other indirect GHG Emissions, where emissions are a consequence of the activities of the council, but occur from sources not owned or controlled by them.

Scope 3 is a very wide category and includes all emissions sources not included in the other two scopes. As part of the scoping exercise a decision has to be made as to

which Scope 3 emissions sources to include within scope, if any. TWBC decided to include emissions associated with disposal of waste generated by their own estate, water consumption, grey fleet (employees using their own vehicles on council business) and the three outsourced contracts mentioned above (waste collection and street cleaning, grounds maintenance and leisure).

Chart 4.1 below shows that Scope 3 emissions dominate the carbon footprint, comprising 60% of total emissions.

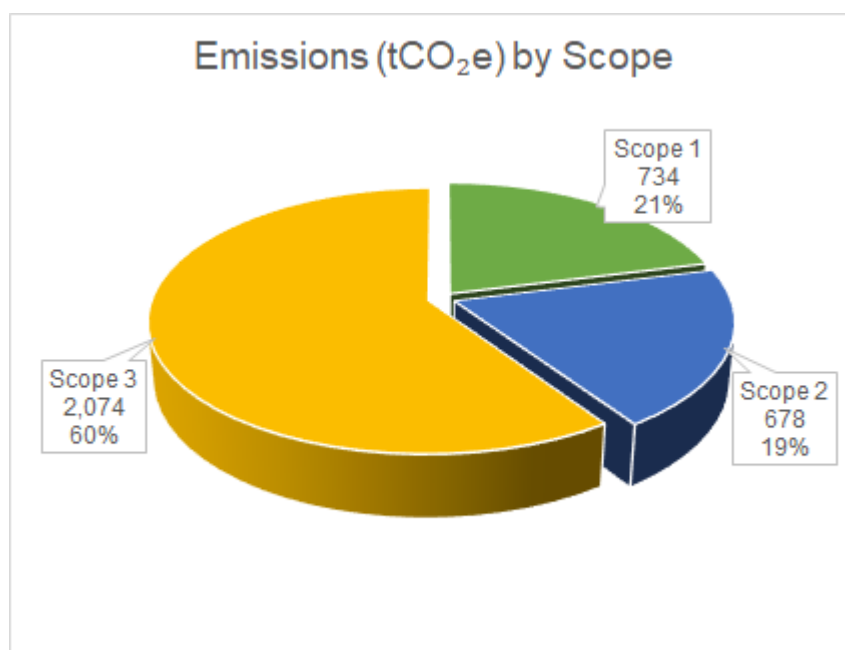
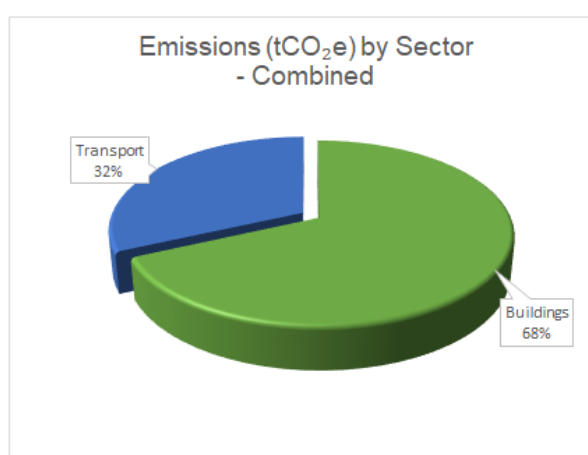
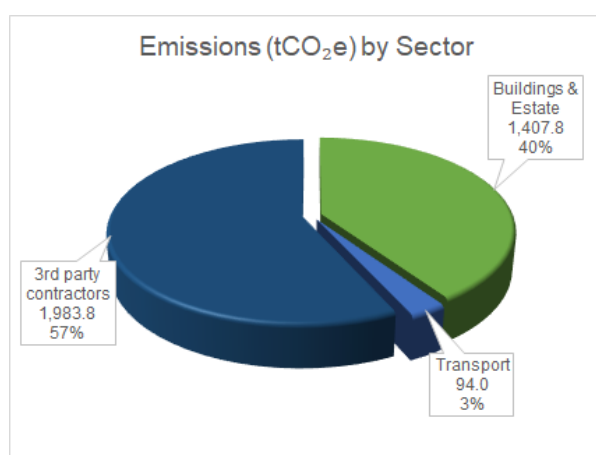


Chart 4.1 – TWBC emissions by scope



Charts 4.2 & 4.3 – TWBC emissions by sector

In addition to the high level representations above, the footprint was also broken down at more granular level to allow for greater insight.

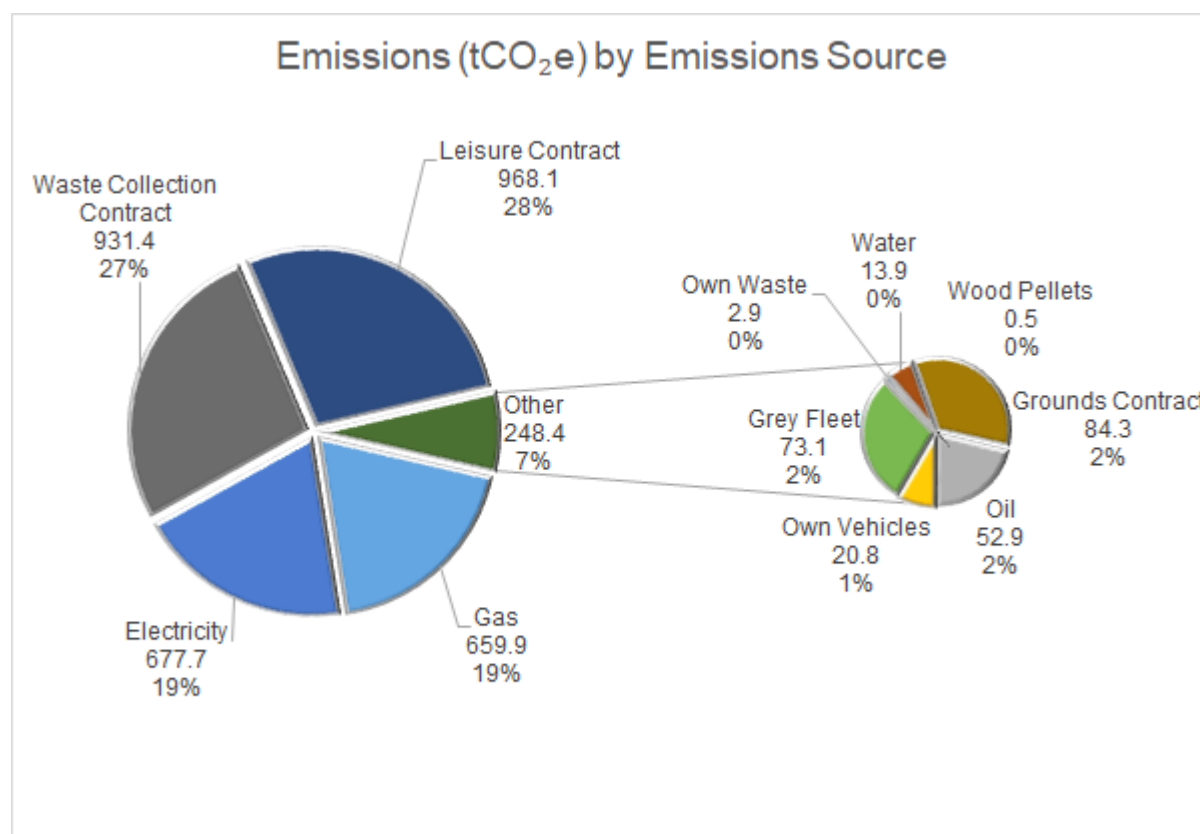


Chart 4.4 – TWBC emissions by emissions source

Key findings:

- The majority of emissions are Scope 3, making up 60% of the total with the other scopes comprising approximately 20% each, the lion's share being natural gas (Scope 1) and electricity (Scope 2).
- Of these Scope 3 emissions, the chief contributor is the outsourced services, accounting for 57% of the 60% total.
- The vast majority of transport emissions shown in Chart 4.3 are associated with the collection of waste by Urbaser.
- The waste collection and leisure contract make up over half of total emissions, each accounting for just over a quarter.
- Other emissions, as shown in Chart 4.4 above, contribute only 7% to the total footprint. This is made up mainly of the grounds maintenance contract, grey fleet, oil use and, to a lesser extent, owned vehicles.

- The top 10 buildings account for over 60% of total emissions (this includes sports centres which are included under the leisure contract). A breakdown of these buildings is shown in Chart 4.5 below.
- The top 2 sites (TWSC and Town Hall) account for approximately 50% of total building emissions.
- The top 5 buildings (TWSC, Town Hall, Weald LC, Crematorium and Assembly Hall) account for over 75% of total building emissions.

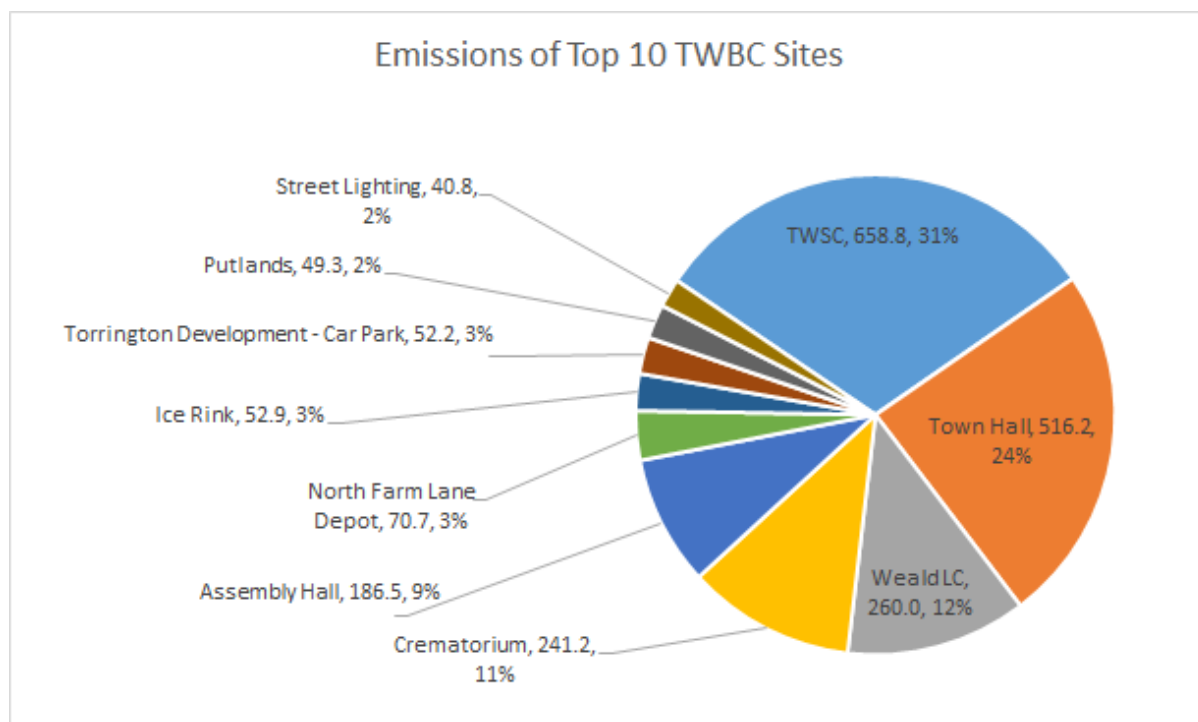


Chart 4.5 – TWBC emissions by emissions source

N.B. The percentages in this chart relate to % of the total emissions of the Top 10 buildings.

Further breakdown of emissions associated with all buildings is detailed in Appendix 4 of this report.

Forecast

LASER used the carbon footprint data and the emissions factors touched on above to generate a forecast of TWBCs emissions to 2050. This is designed to act as a representation of emissions levels if TWBC took no action to reduce them.

The chart below shows that total emissions at the baseline equate to 3,500 tCO₂e. The foremost categories below are TWBC gas (blue), TWBC electricity (dark grey), waste collection diesel (orange), leisure gas (peach) and leisure electricity (light grey). Further detail and breakdown of the forecast data can be seen in Appendix 5.

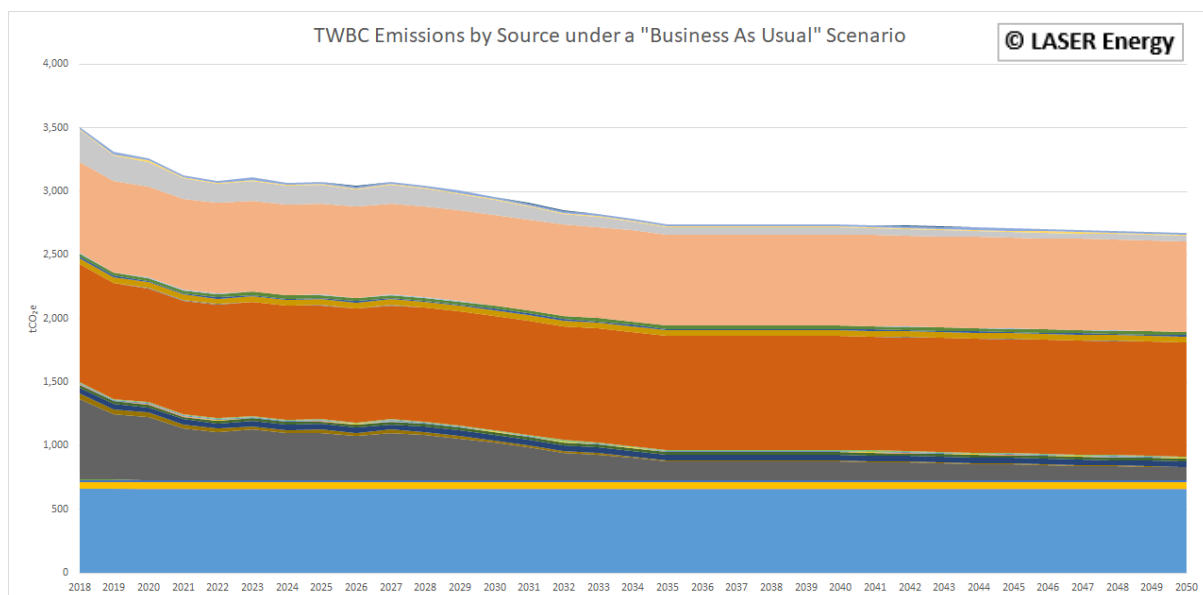


Chart 5.1 – TWBC emissions to 2050 under a “BAU” Scenario

It can be seen that emissions reduce reasonably rapidly over the initial few years, primarily due to reduced emissions associated with electricity consumption as renewable generation is forecast to make up a larger proportion of the total. This is also influenced by a slight reduction in emissions associated with fuel consumption as biofuel content continues to increase in the short term.

In the medium and longer term emissions associated with this level of use would reduce to just under 3,000 tCO₂e in 2030 and 2,675 tCO₂e in 2050.

Reductions are largely due to forecasts around electricity generation becoming cleaner and it can be seen that emissions associated with gas remain largely static throughout and make up an increasing proportion of the total. These figures are based on government forecasts so, while they are long term forecasts and liable to change, they are as realistic estimates as possible at this point in time.

Carbon Budget and Pathway

As part of an ongoing project for TWBC, LASER were commissioned to provide a science based carbon budget in line with the Paris Agreement. Aligning efforts with international agreements and recognised scientific research will give TWBC's planning and actions more credibility both socially and politically.

Carbon Budgets

A carbon budget is a total amount of CO₂ that can be emitted by a party in a particular timeframe. In the United Nations Paris Agreement, nations signed up to science based targets with the aim of limiting global temperature rises to “well below 2°C and pursuing 1.5°C”. The total global carbon budget has been distributed ‘fairly’ between nations dependent on their stage of economic development and the national budget has then been further divided to give sub-national budgets per region.

There are a number of advantages to generating a carbon budget using the science based approach. Carbon budgets are extremely valuable as the critical factor in whether we are predicted to restrict rising global temperatures is the total volume of emissions. The science based budgets require a rapid reduction in emissions in the short term and allow a more moderate rate of reduction in the medium term. This encourages early action by organisations to avoid falling behind targets. Therefore, meeting these budgets will result in an earlier reduction in emissions and generate a greater total reduction than a linear approach. There will then be benefits associated with this, for residents in terms of air quality and other local environmental issues, but also on a wider scale as well.

It should be noted that this budget does not account for LULUCF (Land Use, Land Use Change and Forestry) or for aviation and shipping.

Evaluating TWBC's Carbon Budget

The Tyndall Centre, an academic partnership aimed at bringing together climate change experts across a range of disciplines and informing policy makers, have determined sub-national carbon budgets through detailed research and analysis. As outlined above, The Tyndall Centre's budgets are based on the principles of a global temperature target “well below 2°C and pursuing 1.5°C” and equity principles in the United Nations Paris Agreement. LASER have determined an apportionment of the carbon budget for the Tunbridge Wells region to TWBC in line with the established

methodology. The apportionment of both the region's share as part of the national budget and the council's share as part of the region, have been determined using a grandfathering approach. This is based upon the average proportion of emissions from each party in recent years.

The Tyndall Centre data and budgets are designed around CO₂ only energy use data and are not aimed at non-CO₂ emissions (such as methane and nitrous oxide) due to the differing atmospheric lifetimes and warming effects of the different gases, meaning that a single budget is not appropriate. However, they assume that significant action is taken to abate non-CO₂ emissions as well and consequently LASER have applied the same ambitious pathway and budget for these on a CO₂ equivalent basis.

LASER's analysis on behalf on TWBC has determined the following:

- To be in line with the Paris Agreement, TWBC have a total carbon budget of 23,561 tCO₂e from 2020 to 2100 or 30,315 tCO₂e from 2018 to 2100.
- The budget for the 5 years from 2018 to 2022 (inclusive) is 14,564 tCO₂e.
- At current emission levels, Tunbridge Wells BC would use the entire budget to 2100 within 7 years from 2020.

In order to stay within the calculated carbon budget TWBC will need to deliver a rapid and very significant drop in emissions. A recommended carbon budget pathway is shown below with 5-year carbon budgets from 2018 to 2048. A full breakdown of year-on-year carbon budgets is contained in Appendix 6 of this report.

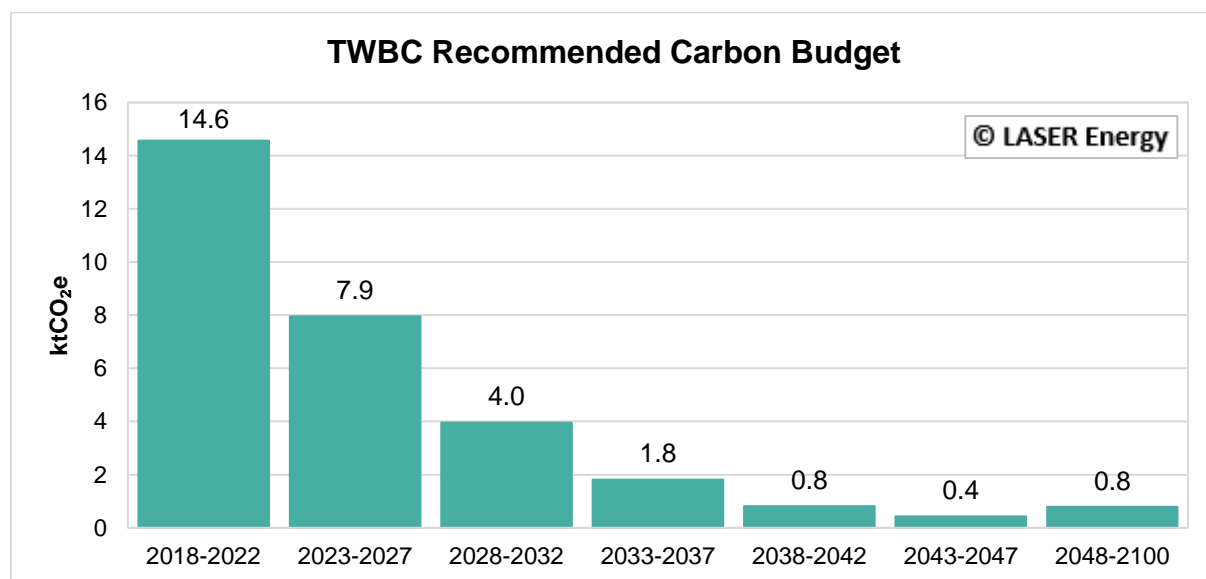


Chart 6.1 – TWBC Recommended Carbon Budgets from 2018 - 2100

Carbon Budget Period	Recommended Carbon Budget (ktCO ₂ e)
2018-2022	14.6
2023-2027	7.9
2028-2032	4.0
2033-2037	1.8
2038-2042	0.8
2043-2047	0.4
2048-2100	0.8
Total Budget	30.315

Table 6.1 – TWBC Recommended Carbon Budgets from 2018 - 2100

Leading The Way

LASER's methodology means that TWBC will be leading the way by targeting a "fair" contribution to the region and the UK's carbon budgets in line with the Paris Agreement. If all parties within the district follow the council's lead, then the Tunbridge Wells district will be in line with the science based targets set out in the Paris Agreement.

The pathway set out below effectively provides a year by year carbon budget that, if met, will ensure TWBC adhere to the 5-year budgets set out above and make their contribution to the UK's efforts to limit damaging climate change. LASER's figures predict the Tyndall Centre data with an accuracy of approximately 99.7% with any error due to the degree of accuracy of figures publicly available.

The charts below illustrate the pathway over different time periods:

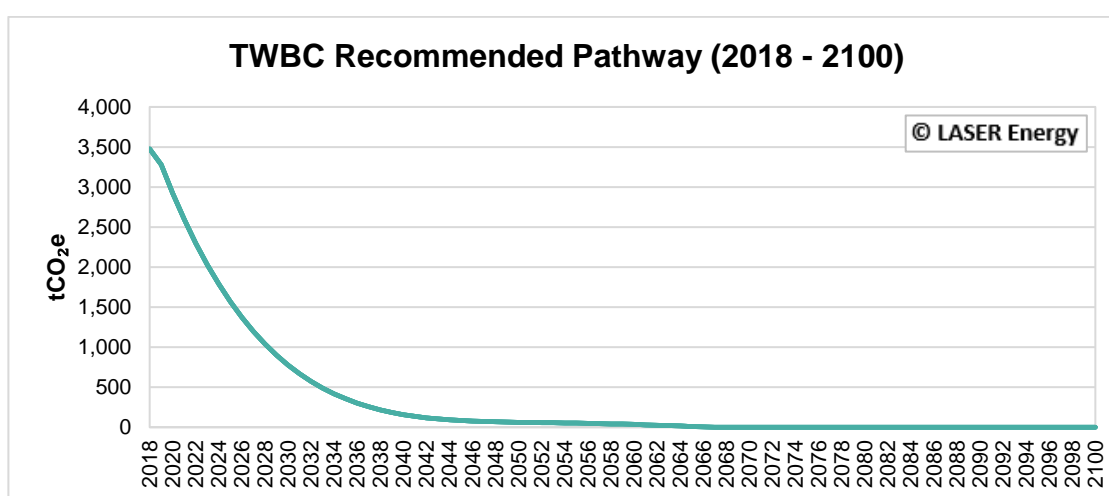


Chart 6.2 – TWBC Recommended Pathway from 2018 – 2100

Charts 6.3 and 6.4 contrast the recommended pathway with the current BAU (Business As Usual) scenario represented by the red line. This scenario assumes that all consumption and use remains constant and so the slight reductions seen are due to the prediction that some fuels will become less carbon intensive over time.

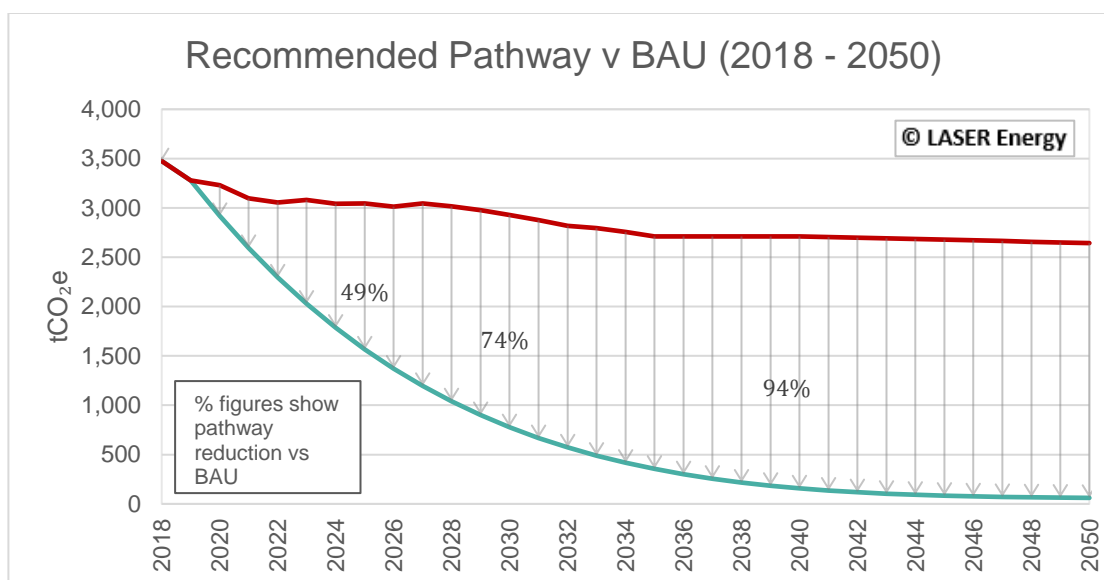


Chart 6.3 – TWBC Recommended Pathway v BAU from 2018 - 2050

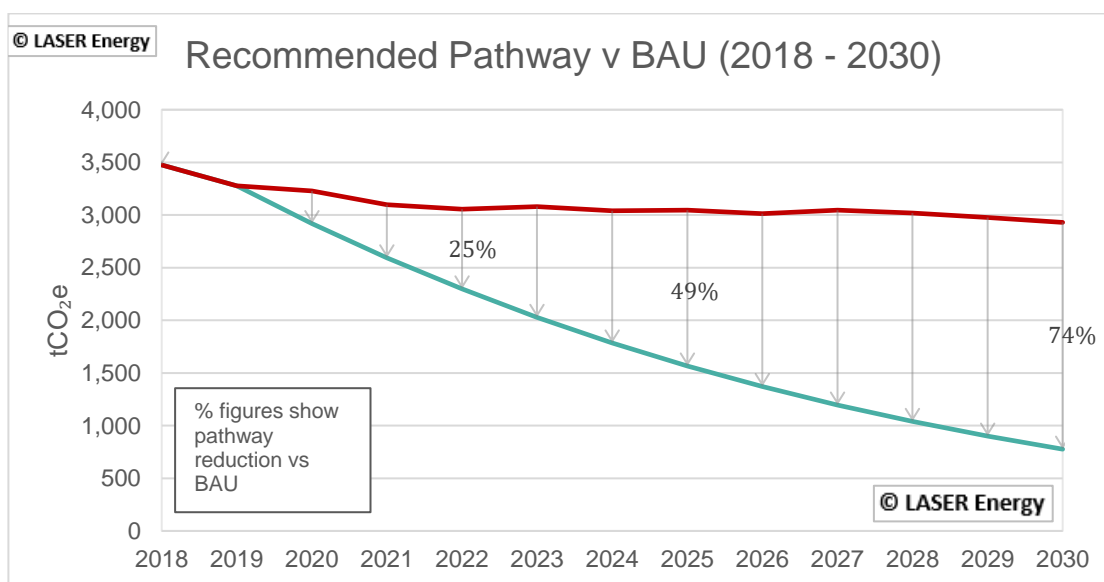


Chart 6.4 – TWBC Recommended Pathway v BAU from 2018 - 2030

The charts above really highlight the scale of action that is required in order to meet the science based targets. Action of this degree will not only be required a local level but also on national and global level as well. The timescale in which these changes

are required is also underscored by these charts. For example, a reduction of 25% against BAU emissions is required by 2022 and 49% by 2025.

Business As Usual Scenario

When the BAU scenario is compared to the budget, the reality becomes even more stark.

Year	BAU Emissions (tCO ₂ e)	Cumulative BAU Emissions (tCO ₂ e)	% Budget Remaining
2018	3,475.1	3,475.1	88.5%
2019	3,278.0	6,753.1	77.7%
2020	3,229.0	9,982.1	67.1%
2021	3,098.2	13,080.3	56.9%
2022	3,055.8	16,136.1	46.8%
2023	3,081.0	19,217.1	36.6%
2024	3,041.4	22,258.5	26.6%
2025	3,046.8	25,305.4	16.5%
2026	3,012.4	28,317.8	6.6%
2027	3,046.4	31,364.2	-3.5%

Table 6.2 – BAU Emissions Against Carbon Budget

Table 6.2 above shows how the apportioned carbon budget diminishes and as stated earlier in this document, at current emission levels, TWBC would use their entire budget to 2100 within 7 years from 2020. This is also illustrated graphically in Chart 6.5 below.

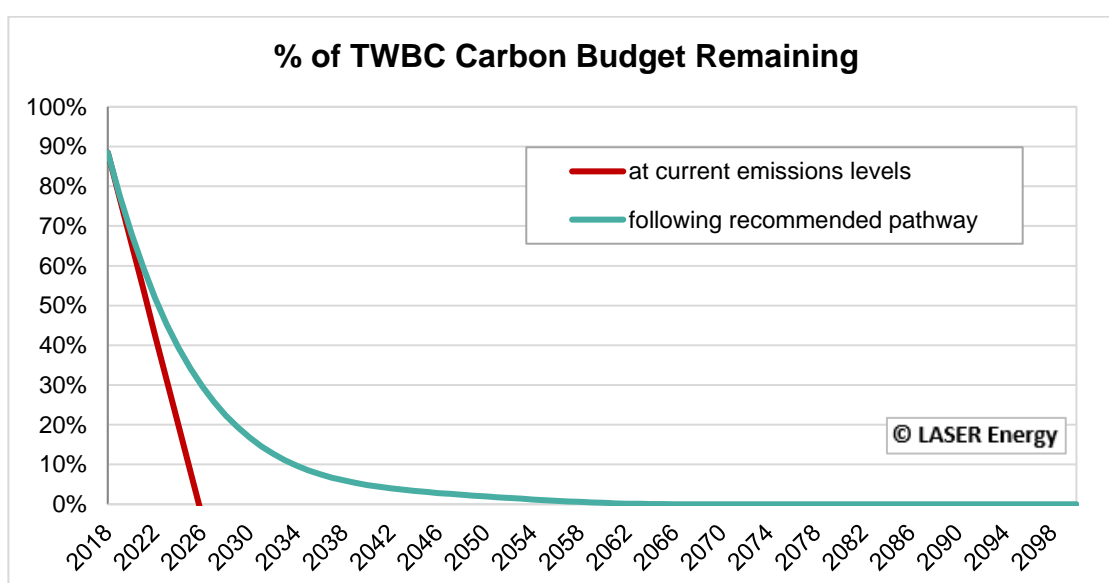


Chart 6.5 – BAU Emissions Against Carbon Budget

Conclusion

It is apparent that in order to align with the science based targets that the UK signed up to as part of the Paris Agreement, the council need to take significant and immediate action. Action at this unprecedented scale will be required globally and TWBC can be at the forefront of this action in the public sector.

Options Appraisal

Having established the council's current position and quantified the scale of the task and reductions required, the next step was to devise a strategy covering TWBC's estate, outsourced services and other emissions sources. LASER's modelling would help to inform the development of this high level strategy and then demonstrate that it could credibly achieve the scale of emissions reductions required to achieve TWBC's net zero target.

In order to update and gain input from members and senior officers an initial options appraisal workshop was run with officers and then a subsequent presentation was given to members at the CEAP working group. The aim of this was to ensure that LASER had a good understanding of which issues, subjects and concerns were of the importance to the council and which were of less importance.

To achieve this, feedback was gathered from members and officers pertaining to the relative importance of different success factors (listed below). Comment on each of these and findings from the feedback are provided below. Following this, a list of technologies/initiatives was then rated against each of the different factors and these ratings were then weighted according to the feedback. This exercise allowed LASER to better understand TWBC's situation and stance and which approaches, purchasing strategies and technologies would provide the best fit.

Success Factors

- **Scale of investment** was seen by officers as the most important/limiting factor. Members acknowledged its significance and the limited resources and also noted the importance of potential partner/grant funding.
- **Speed/ease of implementation** was ranked more highly by Officers; members noted it was more important to select the right options to achieve 2030 target.
- **Financial returns** saw a wide variation in response with different stances from members being apparent, some accepting low/no financial returns with other rating it

as very important. As an average it is of moderate importance in line with the response from the Officers' workshop.

- **Scale of emissions reductions** was unanimously ranked as the most important factor by Members, showing a strong commitment to the target. For Officers this figured lower down the ranking, possibly as a result of them envisaging the target being achieved by a wide portfolio of smaller scale measures.
- **Political acceptability** was generally ranked quite low which reflects the opinion that the public will accept that sacrifices will need to be made in some areas to achieve this target and that all parties are aligned in their commitment to the target.
- **Project certainty** was rated as far more important by Members than by Officers, possibly reflecting the different stages of involvement in project planning, with Members requiring firm information for final decision making but Officers prepared to accept higher level estimates to contribute towards action planning.
- **Impact on operations** was seen as of less importance. Although it was acknowledged that this issue will need to be managed, it is widely accepted that there may need to be some impact on operations to achieve goals.

The scores for each of the success factors given by officers and each of the political parties are shown in the table below. The average scores have then been ranked to give an overall rating.

Factor	Cons	Lab	Lib	TWA	Overall
Scale of emissions reductions	1	1	1	1	1
Project certainty	4	2	2	4	2
Scale of investment	2	5	3	3	3
Financial returns	7	4	4	2	4
Speed/ease of implementation	6	3	7	5	5
Impact on operations	3	6	6	6	5
Political acceptability	5	7	5	7	7

Table 7.1 – Ranking of success factors

The rankings from the table above have been reversed to weight each of the factors once the individual Carbon Reduction Options (CRO) have been assessed against each of these categories, so level 1 is the most heavily favoured.

These ratings show members' cross-party commitment to the project and achieving the net zero target, but still acknowledging the financial restraints resulting from the current situation. The low ranking of political acceptability also mirrors this conclusion and also indicates that members feel the public will also be accepting that sacrifices will need to be made in some areas to achieve this target.

Success Factors and Carbon Reduction Options (CROs)

The Success Factor ranking above was then applied to a list of potential CROs in order to prioritise them. It should be noted that these findings rank each initiative based on how suited it is to the council and their objectives. The initiatives were then divided between CROs which would reduce consumption and replacement energy sources which would reduce the amount of emissions associated with consumption. This allowed for prioritisation on both fronts.

At this point, it should be noted that those initiatives that figure lower down the list (shown in orange or red in Table 7.2 below) are not valueless but are not as well aligned to the council's objectives as those higher up the list (shown in darker green). For example, a move to EVs is a very effective carbon reduction initiative in some circumstance however TWBC's own fleet make up c1% of their footprint and the scale of reductions are of high importance to TWBC and hence moving to EVs ranked low even though it is an action worth taking.

Another example are heat pumps. This is a developing technology and as such score fairly poorly on project certainty, however with improved efficiencies (COPs in excess of 5) now emerging and gas heating presenting a significant issue to address they are likely to figure in efforts at some point. Although this may be further down the line once other CROs are underway and potentially there has been further indication from government on supporting heat decarbonisation measures at a national level.

CROs for immediate consideration/action	CROs for future consideration/action	Preferred replacement of energy sources	Less Favoured replacement of energy sources
Estate Rationalisation	Reduce Own Fleet Mileage	PPAs	Owned Solar Farm (in borough)
LED Lighting Roll Out	Improve Building Fabric	Offsetting	Owned Wind Farm (in borough)
Reduce Grey Fleet Mileage	Install Heat Pumps		Owned Solar Farm (out of borough)
LED Streetlighting and Controls	Move to EVs (Own Fleet)		Owned Wind Farm (out of borough)
Rooftop Solar			District Heating Network
Move to EVs (Grey Fleet)			

Table 7.2 – Ranking and grouping of Carbon Reduction Options

Naturally, many of the other CROs are highly dependent upon any potential estate rationalisation, so it is hugely important that a clear direction on this is ascertained as soon as possible to allow for additional planning.

Key points

- Investment in owned large scale renewable generation, either in or out of borough, is unlikely due to importance of scale of investment and low rating of political acceptability. TWBC could explore financing options such as PPAs which could make owned asset or third party asset arrangements more attractive. See the next section for more information.
- However, investment in in-borough assets was marginally more appealing to members than investment in out-of-borough assets.
- Given the above but the need for zero carbon electricity supplies, PPAs seem to be an attractive option for TWBC. PPAs received a high rating of Political Acceptability.
- LED and rooftop solar seem likely to figure in early actions.
- Estate rationalisation remains politically unclear with an average rating of 3.5 for Political Acceptability (neutral). A clear direction on which buildings are to be retained and which are not will be needed to allow for project and strategy planning. If estate rationalisation is limited then greater activity will be needed in other areas as shown in the modelling.
- Efficiency improvements are likely to figure once estate issues are clarified. As well as LED, insulation and heat pumps would seem likely to figure heavily. Heating strategy will need to be a focus but may be developed more clearly as government policy evolves.
- 3rd party contracts have been a point of discussion. Grounds Maintenance and Leisure could be reviewed in the nearer term but Waste Collection and Street Cleaning is a longer term contract and these considerations will be factored into the strategy.

Other Initiatives Proposed by Councillors

- Community energy generation – Small scale energy generation will be covered by rooftop solar and potentially district heating. LASER would suggest that community energy generation will figure more prominently in the

area wide strategy unless it would directly impact the council's estate or operations.

- Well-connected green infrastructure – LASER agree this is important but would need to understand how TWBC's green infrastructure and sequestration plan impacts upon carbon emissions in order to factor in the impact.

As touched on above, one of the key areas to consider is green electricity procurement. The section below gives background and explanation and describes the different options available and common terminology.

Zero Carbon Electricity Supply Options

There are various zero or low carbon electricity procurement products available and emerging onto the market. Selecting the products and the procurement strategy that provides the best fit for the council's situation and objectives is an important challenge. Some of the key issues are as follows:

REGOs (Renewable Electricity Guarantee of Origin)

REGO certificates are the most widely recognised certification of environmental credentials for energy generation across Europe. They are well administered and the provision of a REGO with each MWh of electricity should guarantee that the energy was generated from "renewable" sources. The largest problem with REGOs from a zero carbon perspective is that their definition of "renewable" is not confined to zero carbon technologies but can also include technologies such as gas-fired CHP generation. Another issue is that as a consumer you cannot necessarily trace the generation back to a specific asset so do not know whether it is zero carbon or not. REGO backed supply can be reported as zero emissions but the validity of this is open to debate.

Therefore REGO backed supplies are definitely "greener" than grid average electricity supplies but generation cannot be traced to a specific asset and they are not categorically zero carbon.

Traceability

As touched on above it is considered important in environmental fields to be able to trace generation to particular assets to provide assurance of renewable origin and add credibility.

Additionality

Additionality is a term that has arisen in recent years and has come to define a very important factor when considering investment in renewable assets or supply contracts. This is namely that the investment has a genuine impact that would not have been realised otherwise. In this case additionality can be seen as the investment resulting in the construction of a new generation asset such as a solar array or wind farm rather than the consumer receiving energy from an existing renewable asset that would be generating regardless of the consumer's investment.

PPAs

PPAs are essentially contractual agreements between offtakers (consumers) and suppliers or generators where an agreement is made to buy and sell an amount of energy generated from a renewable asset for a set term, usually between 10 and 20 years. These agreements allow generators to invest in assets with certainty and guarantees long term green energy supply to the consumer.

Due to the nature of PPAs they tend to be long-term, large volume contracts which can preclude some consumers from entering the market. In order to provide a solution, LASER has created a model where multiple public sector bodies are aggregated in order to increase buying power and are calling this the Public Energy Partnership Power Purchase Agreement (PEPPPA).

Products Available

There are a number of routes that you could go down to procure varying degrees of renewable electricity. The choice will be based on what you deem as a suitably green/renewable approach and recognising the potential obligations/flexibility of each option.

By way of an example of the range of products available, LASER's offerings in this area are outlined below. LASER recognises the challenges our customers face in reducing their electricity consumption whilst managing a public sector estate and the uncertainty that comes with that. As such, LASER have create three tailored options to procure green electricity:



Table 8.1 below illustrates and highlights some of the key factors associated with each option to help with comparison of the different routes.




Important factors to consider to your organisation			
	OPTION 1 Green Tariff	OPTION 2 Green Basket	OPTION 3 PEPPPA
Volume Commitment	Annual	2-4 years	10+ years
REGOs	Yes	Yes	Yes
Direct Funding of Renewables	Minimal	Yes	Yes
Traceability	No	Yes	Yes
Additionality	No	Unlikely	Yes
Lead time to delivery	Within a year	Within a year	Up to 36 months
Ease of Procurement	Very High	Very High	High

Table 8.1 – Summary of LASER's Carbon Net Zero Electricity Options

Further detail on each of these 3 options is contained in Appendix 7 of this report. LASER's support is not confined to these 3 options and LASER are in a position to assist with investigating investment in renewable assets through other models, for example directly or through other PPA structures.

It is important to note that some certainty around long term energy requirements is vital when planning in this area.

Zero Carbon Modelling, Outputs & Strategy

Following on from the creation of the forecast of emissions in a business as usual scenario and taking into account the feedback from the options appraisal workshop, LASER worked with TWBC to identify a number of potential different scenarios which TWBC would like to assess.

In order to achieve this, the BAU forecast has been used as a baseline and the impact of individual initiatives have been built into this to assess the net impact on emissions of a range of options in a particular scenario.

LASER created a central scenario demonstrating the impact of a set of agreed actions and assumptions (such as an assumed estate rationalisation level of 5% by 2030) against the BAU baseline.

The most powerful output from this work are the charts of net emissions and net cashflow which clearly demonstrate the cumulative impact of the selected option on the council's emissions. Chart 9.1 below shows how the different emissions sources fluctuate over the period and how the net emissions compare to the BAU baseline shown in red.

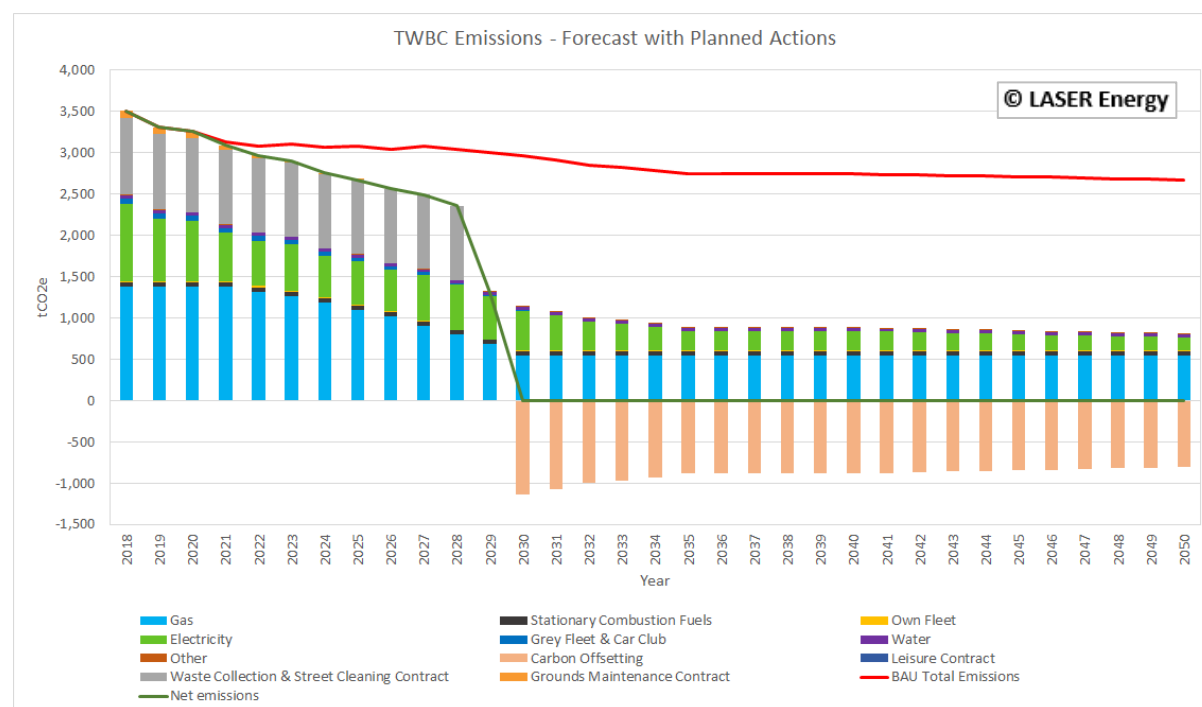


Chart 9.1 – TWBC emissions under central scenario

Chart 9.2 shows the cashflow of the projects with those generating a positive cashflow shown above the x-axis and those negative ones below. The net position is shown by the dark green line.

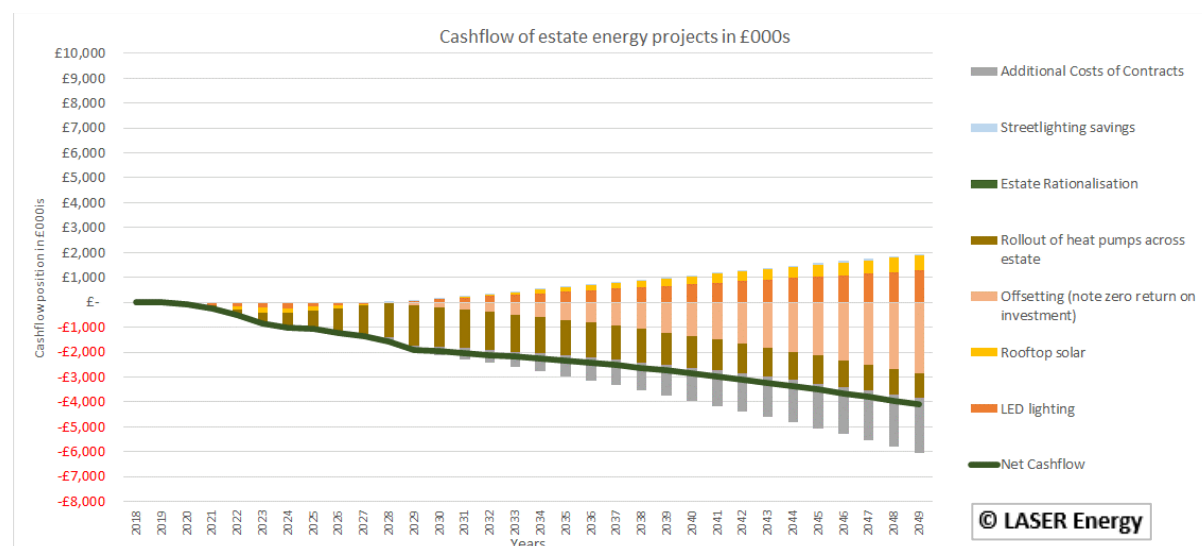


Chart 9.2 – TWBC emissions under central scenario

In this scenario significant quantities of gas and grid electricity consumption remain at 2030 (the target date) and so there is a heavy reliance on offsetting to achieve the net zero target set by the council. This is also reflected in the cashflow with offsetting becoming an increasing cost over time for TWBC to remain net zero emitters. Carbon offsetting is discussed in more detail later in this section.

Scenario Analysis

Once the central scenario had been agreed, in conjunction with TWBC, 5 additional scenarios were also created demonstrating the effect of particular variations to give TWBC further insight into impacts and help inform decision making.

This resulted in the list of 6 scenarios as follows:

1. Central Scenario
2. With no estate rationalisation
3. Increased coverage of LED & ASHPs
4. Increased coverage of LED & ASHPs and electricity procurement through PPA
5. With 40% estate rationalisation
6. With investment in Solar Park (owned or 3rd party – investment structure tba)

Detailed outputs from each of these scenarios are contained in Appendix 8.

Comparisons have been made across all scenarios and the total net emissions under each scenario have been plotted against each other on the chart below. These charts also show the recommended Paris Agreement Pathway as a comparison.

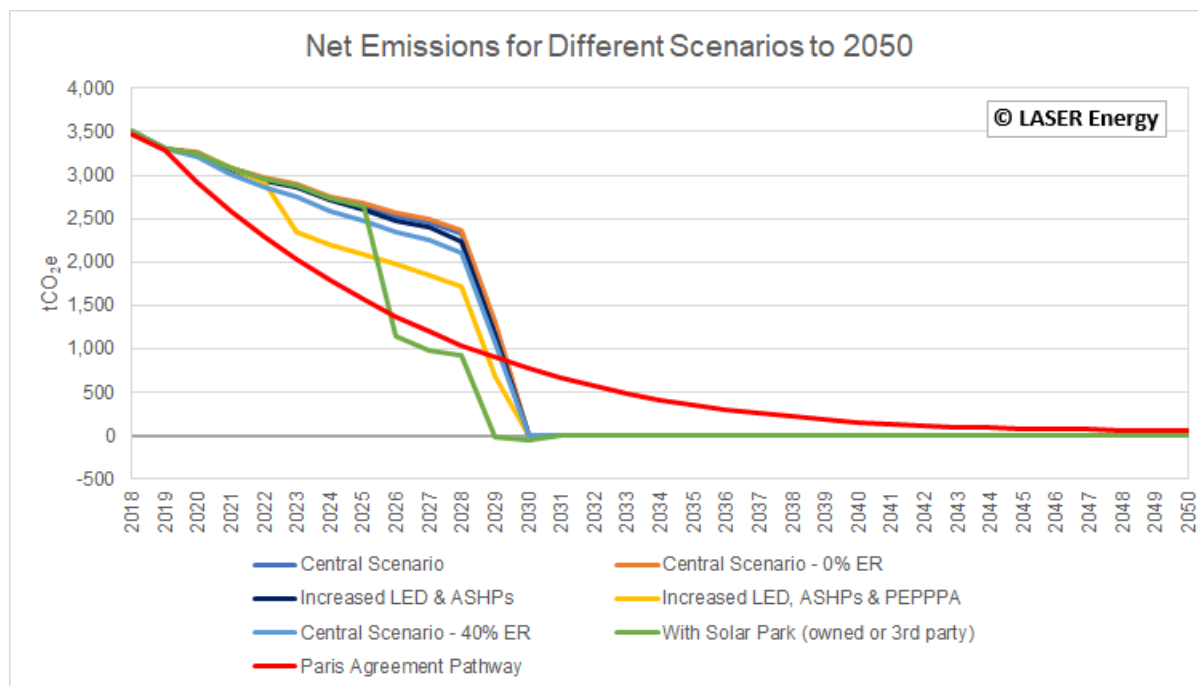


Chart 9.3 – TWBC emissions under various scenarios to 2050

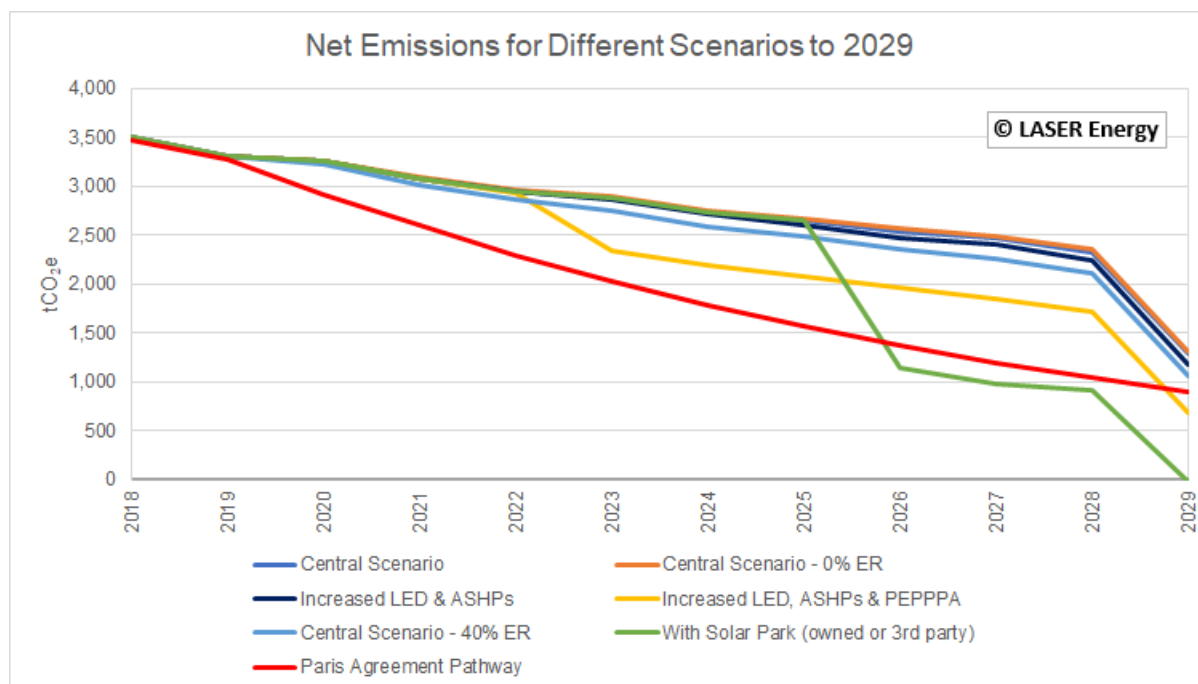


Chart 9.4 – TWBC emissions under various scenarios to 2029

Chart 9.3 shows all scenarios reaching net zero by 2030 as the assumption has been made that TWBC would offset all remaining emissions to reach the target set. Chart 9.4 demonstrates that there is a heavy reliance on offsetting in many scenarios which is not advantageous from an environmental perspective or from a risk perspective. Again, this issue will be expanded upon in the section below.

It can be seen that only the scenario with investment in a solar park reaches net zero without offsetting. However, in general terms this is to be expected as the solar park creates a positive carbon impact, counteracting those emissions that the council have not yet abated.

It is also worth noting that the scenarios including PEPPPA and the solar park generate more significant early impact from the electricity procurement strategy and so are more closely aligned with the Paris Agreement Pathway than other scenarios.

Scenario Cashflow

The chart below shows the net cashflow of the various scenarios and it should be noted that this accounts purely for energy costs. For example, the estate rationalisation calculation accounts for the savings from reduced energy consumption from any buildings or sites that are disposed of but does not account for revenue from sale or leasing of properties.

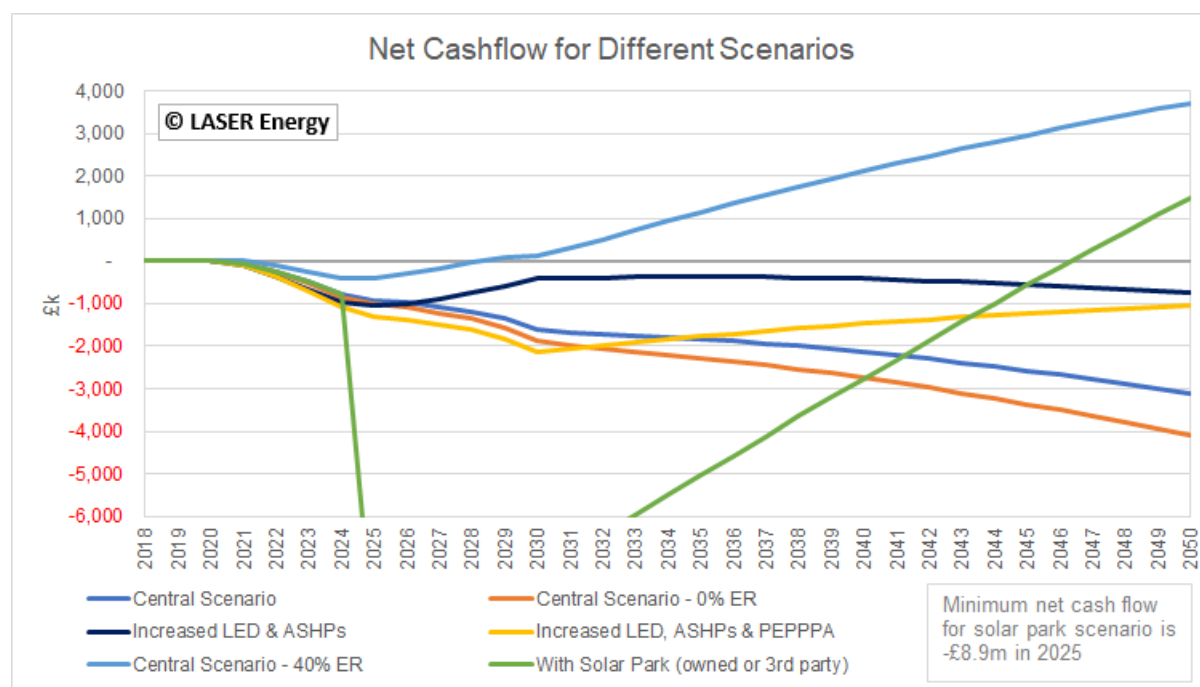


Chart 9.5 – TWBC net cashflow under various scenarios

The most financially attractive scenario above is the 40% estate rationalisation scenario due to the ongoing savings in energy costs and the council would break even by 2029. However there are evident considerations in terms of service delivery from a reduced estate. The only other that breaks even before 2050 is the solar park scenario where the returns are more considerable than in other scenarios and the large investment offers positive returns in the long-term.

The general downward curve from 2030 onwards is due to the slowly rising forecast cost of offsetting. The scenario with PEPPPA shows some positive trend but this diminishes over time and the remaining three scenarios all show a downward trend.

The estimated £8m investment in the solar park scenario constitutes a large investment however there will be a range of financing options available and the investment shouldn't necessarily be seen as prohibitive. For instance, capital could be secured as a loan, or a PPA could possibly be structured to return the investment to a lender over a prolonged period. There is also potential for internal arrangements to be made, for example building in a recovery into electricity rates across the portfolio to recoup investment from energy budgets.

However it remains the case that the Green Basket and PEPPPA provide the easiest access to green electricity with traceability to renewable assets.

It should be noted that these scenarios are not the only options and it is likely that a strategy will evolve that may incorporate elements from different scenarios. It is anticipated that this modelling will evolve over time but this report and analysis should help inform decision making and strategy.

Carbon Offsetting

There is a reliance on carbon offsetting to achieve targets in some scenarios. This is a drawback from an environmental perspective as conventionally only emissions that can't be abated by other means should be offset. It also contains inherent risks as it leaves the council exposed to the market. Additionally, offsetting is seen by some as 'greenwashing' so needs careful management to ensure emissions saving are real.

The carbon offsetting costs (£/tCO₂e) used in this analysis are based on government forecast figures in a mid-range scenario. Although these are the best possible representation at this time, carbon offsetting is an evolving market and as such more difficult to predict. Therefore there is a risk that the cost of carbon offsetting could be substantially higher by 2030 especially as demand is likely to drastically increase at that point and over the intervening period.

As touched on, the increasing cost of offsetting creates the downward curve seen in the series from 2030 onwards in Chart 9.5 above. It is also very important to highlight

that there is no financial return from investment in carbon offsetting and so this creates the negative trend. Costs of offsetting have been separated and are shown below.

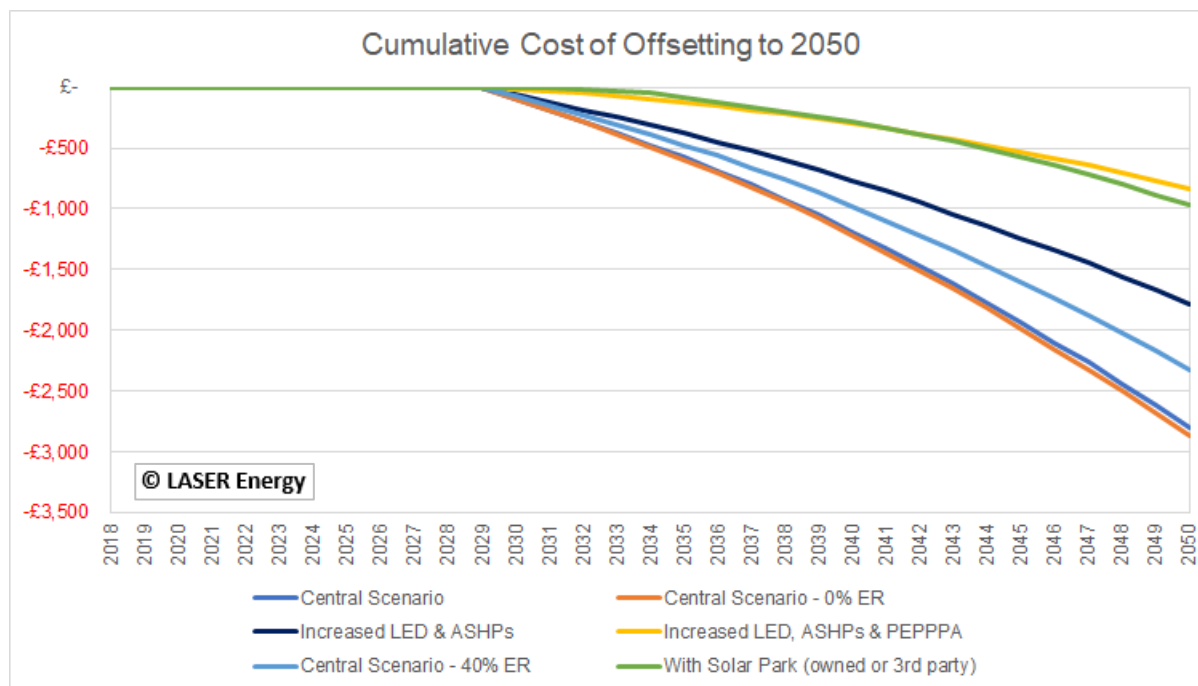


Chart 9.6 – Cumulative costs of offsetting under various scenarios

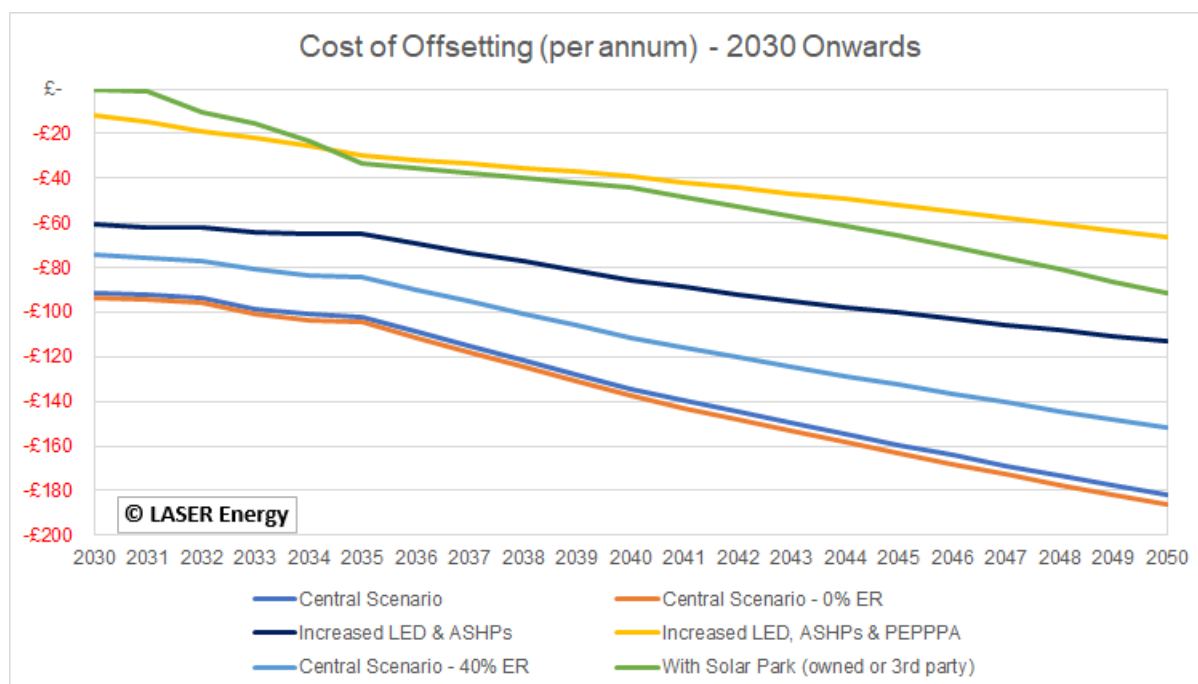


Chart 9.7 – Cumulative costs of offsetting under various scenarios

Offsetting has a chequered history including well documented cases where offsetting schemes claimed to invest in projects across the globe but in some cases were later found to offer little overall benefit and others fraudulent. It is recommended that offsetting is seen as the last resort after reducing direct emissions as far as possible. There is however merit in the type of actions that offsetting schemes often make (or claim) for example tree planting or land use changes. It may be that this marketplace develops in the next few years and offers potential to work alongside other local Councils for example jointly with the Kent Wildlife Trust to assess local opportunities to invest in activity which extracts CO₂ from the atmosphere.

Agreed Actions and Assumptions

Assumptions have been made in the modelling pertaining to transport and streetlighting reductions which are consistent throughout although these do not have a sizeable impact on emissions due to the relative significance of these emissions sources. These assumptions are as follows:

- Reduce own fleet miles travelled by 50% by 2030
- 90% of own fleet miles to be via electric vehicle by 2030
- Reduce grey fleet miles travelled by 70% by 2030
- 70% of grey fleet miles to be via electric vehicle by 2030
- Continued conversion of streetlighting to LED, switch offs, further trimming and dimming to reduce energy use by 10% by 2030.
- Conversion of ice rink generator fuel use to electricity in 2025.

In addition to these assumptions were made around outsourced services which are detailed below.

Treatment of Outsourced Services

In all of these scenarios, a common approach was taken to the treatment of the outsourced contracts. It was decided that, as the waste collection and street cleaning contract is a long-term contract which the council are already committed to, TWBC would look to achieve a step change in emissions from current levels to zero carbon at the contract renewal. This would be reflected in emissions from 2029 onwards. This was believed to be a realistic approach as for long-term contracts of this nature, contractors are likely to purchase equipment and vehicles specifically to service the contract, making the current contract difficult to negotiate but meaning that the zero carbon requirements can reasonably be integrated through the tender process. By this point in time contractors will also be more accustomed to the requirement to provide services with zero net emissions.

Differing approaches were adopted for the Grounds Maintenance and Leisure Services contracts. As the council own the leisure centres, the emissions from these buildings have been handled within the council's own estate as TWBC may decide to assume responsibility for the buildings when the leisure contract renews in 2021. The mechanics of these arrangements are still to be decided.

The emissions for the Grounds Maintenance contract were assumed to abate in a linear fashion from current levels to net zero over the course of the next contract. This would again be built into the tender specifications at contract renewal in 2021.

Conclusion

In order to get close to the Paris Agreement pathway it is evident that substantial early action will need to be taken to reduce emissions.

Direction on estate rationalisation is extremely important, without this officers are unable to plan projects as they do not wish to invest in buildings where there is a risk that they will not be retained. Officers are also unable to plan an energy purchasing strategy as required energy volumes may potentially fluctuate significantly and long term volume commitments are required for most zero carbon electricity purchasing options.

Further work will need to be undertaken regarding the outsourced contracts, both internally and with contractors. Both the method by which these emissions will be abated and the costs associated with this are unclear at the moment. Companies like Urbaser are already looking into these issues and it seems likely that very low or zero carbon services will be available in some areas by contract renewal.

The leisure service remains extremely difficult to plan for with the definitive future of the buildings and service unclear. As with estate rationalisation it is important that a clear direction is decided upon to allow for carbon forecasts to be updated and action to commence.

Evolution of Strategy and Model

At this stage the modelling gives a view of potential and possibilities and shows that there are different ways to achieve the target set by the council. It does not attempt to assess project options at individual building level.

The chosen strategy and model are expected to evolve and change as investigations into favoured options are taken forward and further information becomes available. The model can continue to be a useful tool in monitoring progress as well as for planning and decision making.

It is likely that opportunities for further emissions reductions will come to light in the medium term that are not included in the model. This may be through new technologies, reductions in costs of current technologies or government policies.

Key points

- TWBC can achieve net zero carbon by their target date and the model sets out differing strategies to achieve this.
- Substantial early action is needed to align with Paris Agreement pathway.
- Short term impact due to the pandemic has not yet been quantified.
- The majority of TWBC's carbon footprint is attributable to outsourced services.
- Clear long term policy on estate and services is needed to allow planning of energy efficiency actions.
- Clear medium and long term policy on estate and services is needed to allow commitment to most zero carbon electricity supply options.
- Investment in large scale renewables can be structured in a variety of ways and may not require vast up front capital investment.
- In most scenarios above, the council relies heavily on offsetting emissions to achieve targets. This comes with significant risks and importantly no financial returns on any investment.
- The offsetting market is expected to change and develop hugely over the next decade.
- Modelling is designed to help inform decision making and is based on current factors and state of the market technologies. Technologies and economics may change significantly over time and government funding and policy will also influence these issues. Regular review of the model as the technology, service and property landscape changes, will place TWBC in the best position to meet their net zero targets.

Next Steps

1. Determine estate future

As mentioned, establishing a firm direction for the estate and leisure service in particular is vital to allow for planning to reduce emissions and it is recommended that this is made a priority.

2. Develop Detailed Action Plan

It is recommended that the council develop a detailed action plan which would cover policies, responsibilities, working parties, site surveys, and consultations with

suppliers of outsourced services amongst other things. This plan should tie in all of the steps below and provide clear action points in each area. LASER can assist in this area as well and would be happy to discuss this further.

In order to create a meaningful action plan it is crucial that Step 1 is carried out as soon as possible.

3. Immediate action in retained buildings

For now, focus can be brought on those buildings (and car parks) where there is a strong likelihood that they will be retained, as well as on streetlighting. This investigation should focus on established technologies like LED lighting, rooftop solar and building fabric but should also look to assess low carbon heating solutions such as heat pumps and the applicability of other technologies and initiatives.

LASER are happy to assist with this and have frameworks in place to provide support.

4. Address less significant emissions sources

In addition to this the council can pursue established initiatives in other areas such as moving to electric fleet, encouraging electric vehicles within their grey fleet and car club and reducing mileage in all areas. Also reducing water use and waste generation should be considered and solutions for the ice rink should to be analysed, but these are relatively minor contributors to the overall footprint.

5. Update carbon footprint

Concurrent with these investigations 2019-20, and shortly 2020-21 data, can be built into the model to demonstrate the changes to the carbon footprint to date and pertinently, the impact of COVID-19 on the council's emissions.

6. Procure green energy for estate

Although commitment is dependent on Step 1 above, TWBC can establish a proposed procurement strategy for electricity and implement this once a clear direction is obtained.

LASER product offerings allow a natural progression from the Green Tariff, onto the Green Basket and finally onto a PPA. With each step there will be a greater requirement for commitment but enhanced green credentials for the supplies due to increased traceability and additionality. The Green Basket can be seen as an intermediary step or interim option before committing to a longer term PPA.

LASER Background

LASER Energy Buying Group was formed in 1989 by Kent County Council (KCC) with the aim of assisting Local Authorities and other public bodies to benefit from lower energy prices through deregulated gas and electricity markets and to offer management services that focus on reducing energy spend, saving time and hassle for our customers.

LASER Energy has grown to become one of the leading energy procurement and energy management service providers in the UK. Today our mission is to deliver unique end-to-end solutions to our customers helping reduce energy costs, manage market risk and provide OJEU compliance in an increasingly volatile market.

LASER's success and reputation has helped it to grow organically to its current position serving 200 public sector customers and buying in excess of £500m of energy per annum. We work with a large number of public sector bodies including NHS Trusts, Universities & colleges, Local Authorities and Housing Associations.

Key People

Name	Description
Steve Marks Carbon Strategy Lead	<p>Steve has a strong background in energy and carbon management having previously worked as an Energy Engineer for Schneider Electric and a Carbon & Compliance Manager for ENGIE. Throughout this time Steve conducted energy surveys across a wide range of sectors and has also dealt with numerous environmental schemes including CCAs, EUETS, GQCHP, CDP, CRC and ESOS. Steve is a CIBSE Low Carbon Consultant and remains an accredited DEC Assessor and ESOS Lead Assessor.</p> <p>Steve managed LASER's team of Energy Surveyors and has led LASER's response to assist the public sector in addressing the climate emergency declarations and carbon net zero targets enacted by many authorities.</p>
Helen Cartledge Zero Carbon Advisor	<p>Helen has over 10 years of experience within the energy industry, having worked in the marine, timber, gas and electricity sectors. Helen procured fuel for the fleet at P&O Ferries and researched alternative fuel types and technologies to help reduce carbon emissions.</p> <p>Helen has also worked for a national timber company and in energy procurement and undertaken a carbon reduction project for a local charity, identifying financially advantageous sustainable power alternatives.</p>
Andy Morgan Head of Energy Management	<p>Andy has over 25 years' experience in energy efficiency and procurement since graduating as an Energy Engineer. He has previously worked for Matthew Hall, procuring energy and operating EPCs for large clients, and the City of London Corporation, taking responsibility for saving and procuring energy for the City portfolio. Now Andy manages LASER's Bureau Services, LED Lighting Services and other energy management and water services.</p> <p>As a CMVP, Andy is expert in handling and analysing data and also specialises in energy efficiency, renewable energy, energy supply markets, energy industry infrastructure and Government energy policy and schemes.</p>

Legal Information

Copyright

© LASER Energy. All rights reserved.

This document (including formulas, macros or other calculations) is protected under the copyright laws of the United Kingdom. This document contains information that is proprietary and confidential to LASER Energy and subject to applicable legislation, shall not be disclosed outside the recipient's company or duplicated, used or disclosed in whole or in part by the recipient for any purpose other than for which the report was commissioned. Any other use or disclosure in whole or in part of this information without the express written permission of LASER Energy is prohibited.

Disclaimer

Where conclusions have been drawn based upon information provided to LASER Energy by the recipient of this document, LASER Energy has relied upon the accuracy of the information provided.

To the extent that this document contains prospective financial information, that information has been based on current expectations about future events and is subject to risks, uncertainties and assumptions that could cause actual results to differ materially from the expectations described in such prospective financial information.

Past performance is not indicative of future performance.

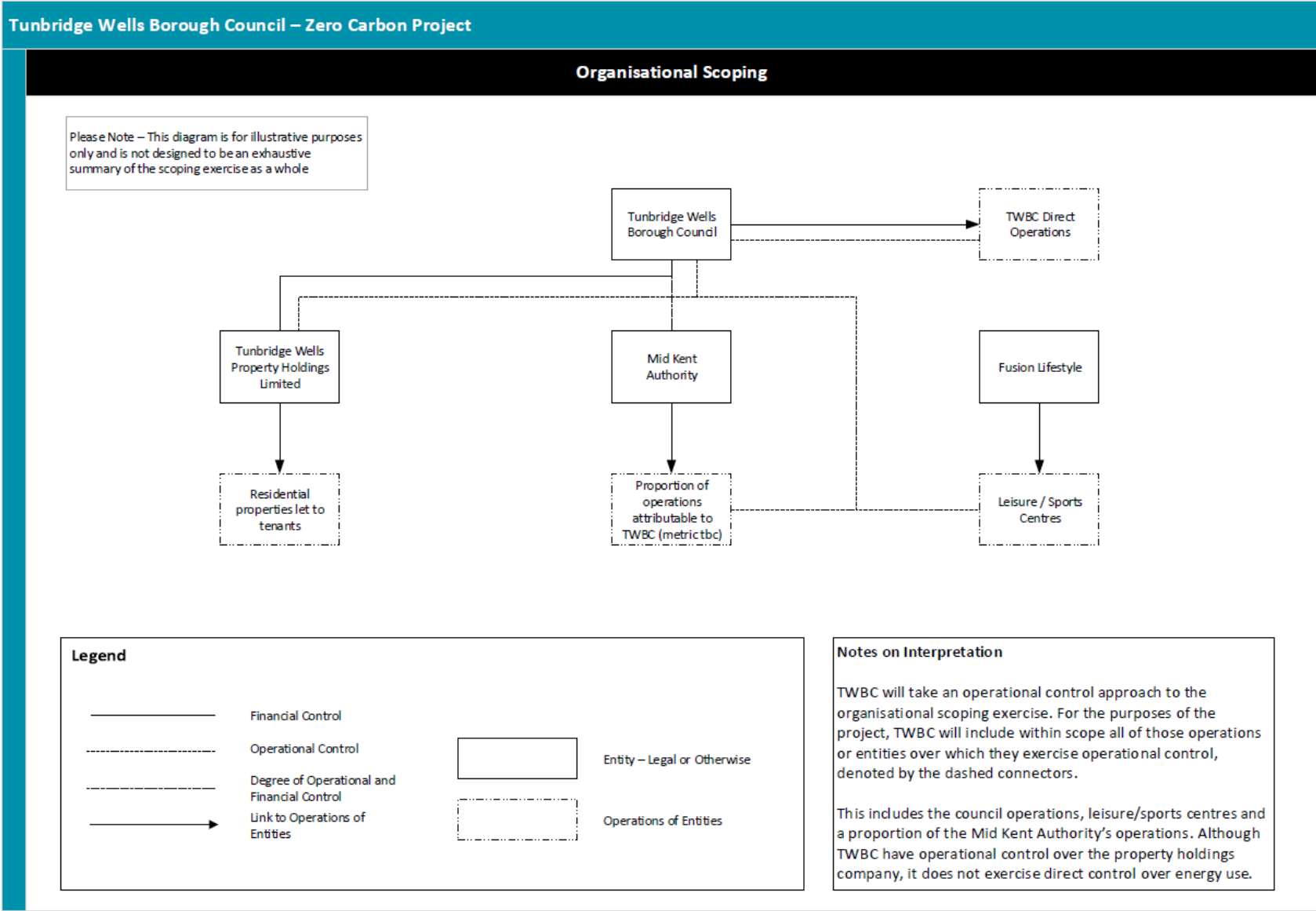
If any formulas or macros in this document are unlocked or editable, LASER Energy makes no representation or warranty, express or implied, as to the accuracy, adequacy or reliability of the results of any calculations within this document.

Depending on your agreement, LASER Energy may be able to provide a version of this document with all charts, formulas and calculations locked and un-editable.

This notice must not be removed from this document.

Appendix 1 – Organisational Scoping Chart

Chart depicting results of organisational scoping



Appendix 2 – Operational Scoping Table

The table below was generated following the initial meeting and shows some of the detail surrounding decisions made on scope:

Area	Details	In/out of Scope?
Own buildings estate	Data for gas and electricity supplies procured through LASER will be sourced by LASER. Other gas, electricity and other fuel data will be provided by TWBC.	Include
Housing	TWBC own a property holding co which owns and privately rents out residential properties. TWBC own and operate this company so it will be included within the organisational scope. At operational level, energy use will be assessed to ascertain where TWBC have control.	Include
Other property	TWBC own some commercial units which are leased out. To be excluded at operational scoping stage as TWBC do not operate.	Exclude
Leisure	Fusion run centres on behalf of TWBC. To be included in scope.	Include
Waste Disposal and Street Cleaning	Biffa were providing waste management services however TWBC do not believe any data will be forthcoming from them. Urbaser have recently (30th March 19) taken on the contract and may be able to provide a better breakdown. It was noted that the contract is shared with TMBC and fleet serviced at TWBC depot so a decision will need to be made on how this is handled.	Include
Water use and sewerage	The scope of the water data included will match the energy data. LASER hold estimated quantity data from suppliers gathered for mini-tender although not ongoing data.	Include
Fuel cards	Fuel card data will be made available to LASER (through supplier portal or otherwise) which will provide fuel consumption (litres) of owned vehicles.	Include
Grey fleet	TWBC to supply a sample output from the expenses system to show the level of detail available. LASER will	Include

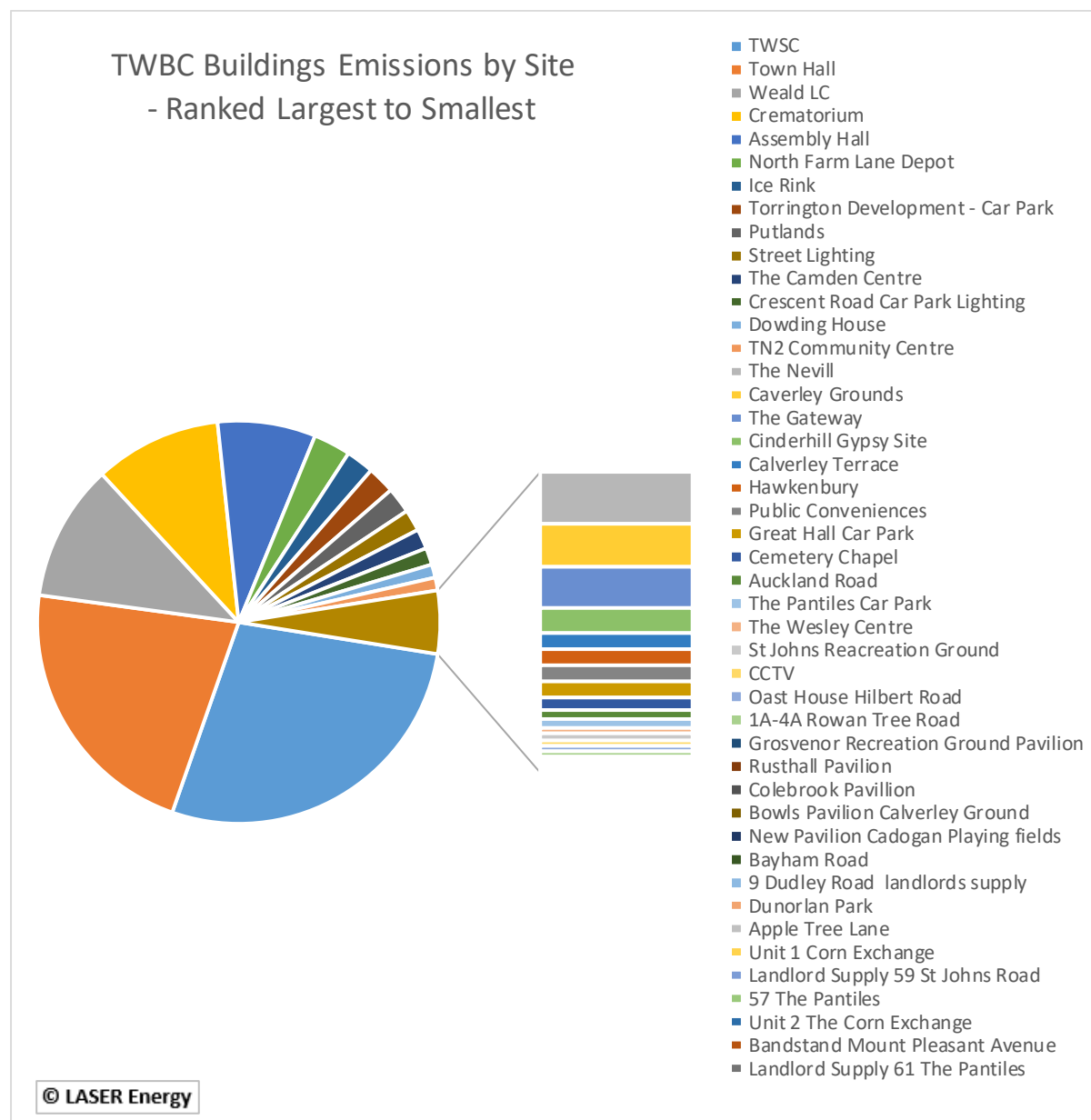
	then recommend a course of action and how the data should be handled to convert cost or mileage to CO ₂ e .	
Other vehicles	<p>Car club (Co Wheels) – TWBC to source mileage/ expenses data relating to staff travel if possible.</p> <p>Consumption from EVs at depot included in main electricity supply so are accounted for.</p>	<p>Include</p> <p>Include</p>
Waste disposal from own operations	<p>Will ask Veolia for data although not optimistic of obtaining. TWBC will explore other waste data available.</p> <p>Countrystyle took over contract from 1st Jan 20 and TWBC believe will provide better breakdown of waste by weight. Some waste streams will not have records (e.g. maintenance where waste is disposed of by contractors) and LASER can assist with implementing data collection processes going forwards.</p> <p>LASER will assess data available and advise on the best way to estimate emissions.</p>	Include
Purchased goods and services	<p>It was decided that the list of suppliers would be reviewed and those which are believed to have the largest volumes of emissions associated with their goods/services will be asked to provide data. The quality of this return will then be assessed and emissions can be calculated where possible or estimated for screening purposes to assess significance.</p> <p>These will not be included in the scope initially but it was agreed that it is important to understand the significance of these emissions.</p>	Exclude
Mid-Kent Authority	After speaking to other authorities, it was decided to account for energy use within the estate, in line with the other authorities.	Include
Renewables	100kWp PV array mounted on tennis centre roof (St John's)	Include

Appendix 3 – Carbon Footprint Data

Operation	Scope	Emissions Category	Emissions Source	Fuel Type	Units	2018-19 Quantity	Emissions Factor	tCO ₂ e
TWBC Own Operations	Scope 1	Gas		Natural Gas	kWh	3,587,072	0.184	659.9
TWBC Own Operations	Scope 1	Stat Combust Fuels	Others					
TWBC Own Operations	Scope 1	Stat Combust Fuels	Standby Generators	Gas Oil	litres	0	2.763	0.0
TWBC Own Operations	Scope 1	Stationary Combustion Fuels	Biomass	Wood Pellets	tonnes	7.5	70.473	0.5
TWBC Own Operations	Scope 1	Stationary Combustion Fuels	Ice Rink Generator (Biodiesel)	Diesel	litres	21,063	2.511	52.9
TWBC Own Operations	Scope 1	Owned Vehicles	Fuel Cards	Diesel	litres	6,327.90	2.511	15.9
TWBC Own Operations	Scope 1	Owned Vehicles	Fuel Cards	Petrol	litres	2,225.02	2.130	4.7
TWBC Own Operations	Scope 1	Owned Vehicles	Credit Cards	Diesel	litres	86.15	2.511	0.2
TWBC Own Operations	Scope 1	Fugitive			tCO ₂ e	0	1000.000	0.0
TWBC Own Operations	Scope 2	Electricity	Own Operations	Grid Electricity	kWh	3,614,104	0.177	639.2
TWBC Own Operations	Scope 2	Electricity	UMS	Grid Electricity	kWh	240,291	0.177	42.5
TWBC Own Operations	Scope 3	Grey Fleet	Expenses	Petrol	tCO ₂ e	47.37	1000.000	47.4
TWBC Own Operations	Scope 3	Grey Fleet	Expenses	Diesel	tCO ₂ e	24.11	1000.000	24.1
TWBC Own Operations	Scope 3	Grey Fleet	Expenses	Hybrid	tCO ₂ e	0.18	1000.000	0.2
TWBC Own Operations	Scope 3	Grey Fleet?	CoWheels	Petrol	tCO ₂ e	1.16	1000.000	1.2

Operation	Scope	Emissions Category	Emissions Source	Fuel Type	Units	2018-19 Quantity	Emissions Factor	tCO ₂ e
TWBC Own Operations	Scope 3	Grey Fleet	CoWheels	Hybrid	tCO ₂ e	0.31	1000.000	0.3
TWBC Own Operations	Scope 3	Waste			tCO ₂ e	2.89	1000.000	2.9
TWBC Own Operations	Scope 3	Water	Water Supply	Water Supply	cum	15,471.00	0.344	5.3
TWBC Own Operations	Scope 3	Water	Sewerage	Water Treatment	cum	12,105.74	0.708	8.6
TWBC Own Operations	Scope 2	Renewables	PV Panels	Grid Electricity	kWh	-22,161.50	0.177	-3.9
Waste Collection & Street Cleaning Contract	Scope 3	Contractor Fuel Use		Diesel	litres	370,163.31	2.511	929.4
Waste Collection & Street Cleaning Contract	Scope 3	Contractor Fuel Use		Petrol	litres	948.34	2.130	2.0
Grounds Maintenance	Scope 3	Contractor Fuel Use	White Diesel	Diesel	litres	18,092	2.511	45.4
Grounds Maintenance	Scope 3	Contractor Fuel Use	Red Diesel	Diesel	litres	4,200	2.511	10.5
Grounds Maintenance	Scope 3	Contractor Fuel Use	Petrol	Petrol	litres	11,622	2.130	24.8
Grounds Maintenance	Scope 3	Waste			tCO ₂ e	3.54	1000.000	3.5
Leisure Contract	Scope 3	Gas		Natural Gas	kWh	3,883,694	0.184	714.4
Leisure Contract	Scope 3	Electricity		Grid Electricity	kWh	1,427,931	0.177	252.5
Leisure Contract	Scope 3	Water	Water Supply	Water Supply	cum	25	0.344	0.0
Leisure Contract	Scope 3	Water	Water Sewerage	Water Treatment	cum	25	0.708	0.0
Leisure Contract	Scope 3	Fugitive				0		0.0
Leisure Contract	Scope 3	Waste			tCO ₂ e	1.13	1000.000	1.1

Appendix 4 - Emissions from TWBC Buildings

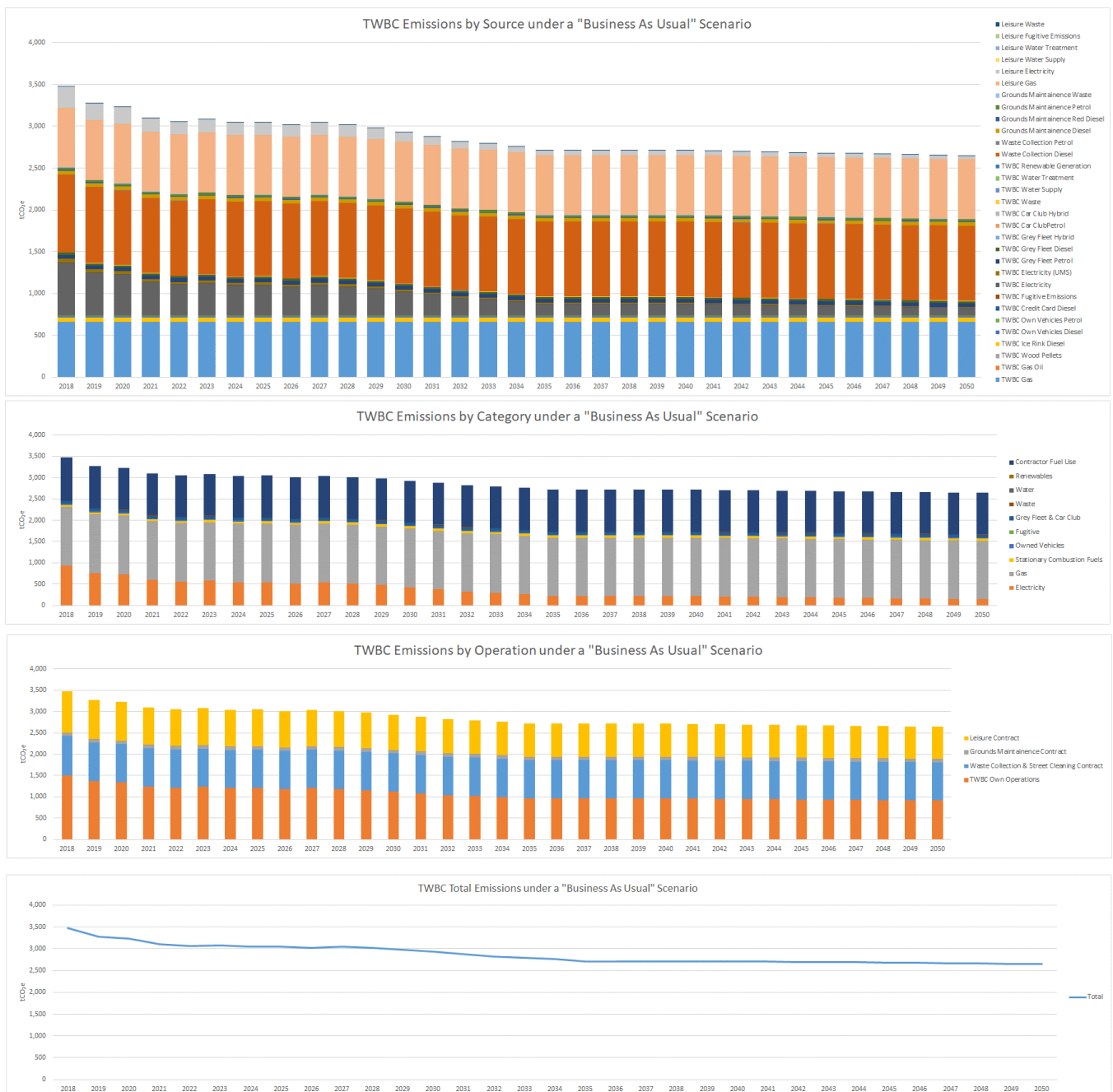


N.B. Emissions attributable to water consumption was not included at this point in time as data for all sites is not yet available.

Site	Total (tCO ₂ e)	% of Σ TWBC footprint
TWSC	658.8	18.9%
Town Hall	516.2	14.8%
Weald LC	260.0	7.5%
Crematorium	241.2	6.9%
Assembly Hall	186.5	5.3%
North Farm Lane Depot	70.7	2.0%
Ice Rink	52.9	1.5%
Torrington Development - Car Park	52.2	1.5%
Putlands	49.3	1.4%
Street Lighting	40.8	1.2%
The Camden Centre	37.8	1.1%
Crescent Road Car Park Lighting	32.2	0.9%
Dowding House	25.1	0.7%
TN2 Community Centre	24.5	0.7%
The Nevill	20.8	0.6%
Caverley Grounds	17.2	0.5%
The Gateway	16.5	0.5%
Cinderhill Gypsy Site	9.9	0.3%
Calverley Terrace	6.6	0.2%
Hawkenbury	6.3	0.2%
Public Conveniences	6.2	0.2%
Great Hall Car Park	6.1	0.2%
Cemetery Chapel	5.5	0.2%
Auckland Road	3.6	0.1%
The Pantiles Car Park	2.9	0.1%
The Wesley Centre	2.8	0.1%
St Johns Recreation Ground	2.5	0.1%
CCTV	2.2	0.1%
Oast House Hilbert Road	2.1	0.1%
1A-4A Rowan Tree Road	1.9	0.1%
Grosvenor Recreation Ground Pavilion	1.6	0.0%
Rusthall Pavilion	1.5	0.0%
Colebrook Pavillion	0.9	0.0%
Bowls Pavilion Calverley Ground	0.7	0.0%
New Pavilion Cadogan Playing fields	0.6	0.0%
Bayham Road	0.5	0.0%
9 Dudley Road landlords supply	0.5	0.0%
Dunorlan Park	0.2	0.0%
Apple Tree Lane	0.1	0.0%
Unit 1 Corn Exchange	0.1	0.0%
Landlord Supply 59 St Johns Road	0.0	0.0%
57 The Pantiles	0.0	0.0%
Unit 2 The Corn Exchange	0.0	0.0%
Bandstand Mount Pleasant Avenue	0.0	0.0%
Landlord Supply 61 The Pantiles	0.0	0.0%

Appendix 5 – Forecast of Emissions to 2050 under a BAU Scenario

The charts below show TWBC emissions to 2050 assuming consumption remains static and broken down in different ways. This is designed to act as a representation of emissions levels if TWBC took no action to reduce them.



Appendix 6 – Year on year carbon budgets for TWBC to 2050

Year	tCO ₂ e	% of budget used	% of budget remaining	BAU Emissions	% Less
2018	3,475.6	11%	89%	3,475.1	0%
2019	3,277.8	22%	78%	3,278.0	0%
2020	2,919.6	32%	68%	3,229.0	10%
2021	2,593.4	40%	60%	3,098.2	16%
2022	2,297.1	48%	52%	3,055.8	25%
2023	2,028.6	55%	45%	3,081.0	34%
2024	1,786.0	61%	39%	3,041.4	41%
2025	1,567.5	66%	34%	3,046.8	49%
2026	1,371.3	70%	30%	3,012.4	54%
2027	1,195.6	74%	26%	3,046.4	61%
2028	1,038.9	78%	22%	3,017.5	66%
2029	899.6	81%	19%	2,976.7	70%
2030	776.3	83%	17%	2,929.8	74%
2031	667.7	85%	15%	2,878.3	77%
2032	572.4	87%	13%	2,818.4	80%
2033	489.2	89%	11%	2,795.2	82%
2034	417.0	90%	10%	2,756.7	85%
2035	354.7	91%	9%	2,712.7	87%
2036	301.3	92%	8%	2,712.7	89%
2037	255.8	93%	7%	2,712.7	91%
2038	217.3	94%	6%	2,712.7	92%
2039	185.1	95%	5%	2,712.7	93%
2040	158.3	95%	5%	2,712.7	94%
2041	136.3	96%	4%	2,705.8	95%
2042	118.4	96%	4%	2,698.9	96%
2043	104.0	96%	4%	2,692.0	96%
2044	92.5	97%	3%	2,685.1	97%
2045	83.5	97%	3%	2,678.2	97%
2046	76.6	97%	3%	2,671.3	97%
2047	71.2	97%	3%	2,664.4	97%
2048	67.1	98%	2%	2,657.5	97%
2049	63.9	98%	2%	2,650.6	98%
2050	61.4	98%	2%	2,643.7	98%

Appendix 7 – Zero Carbon Electricity Supply Options

Option 1 – Green Tariff

Green Tariff works by the supplier promising to match all or some of the electricity you use with renewable energy.

★= Key Features

- Renewable Energy Guarantees Origin (REGO) are sourced through the electricity supply framework to match your consumption.
- This is performed by your electricity supplier.
- The REGO's are able to be used under GHG scope 2 emissions reporting Market-based approach.

⊕⊖ Key Considerations

- **Additionality:** widely accepted applying a REGO-backed tariff does not currently cause additional, new renewable generation to be constructed.

☑= Key Advantages

- **Flexibility:** with commitment only needed year-to-year (sufficient notice required).
- **Entirety:** unlike other options, you can comfortably commit your entire portfolio and volume management is performed as a part of LASER's service.
- **Price:** a relatively cheap option with prices currently (in 2020) below 0.1p/kWh.

Option 2 – Green Basket

Green Basket is a PPA backed green option that's simple to commit to for flexible volumes and runs for the length of your energy supply agreement.

Key Features

- LASER will use best endeavours to source PPA's from renewable generators on your behalf, in lieu of energy that would have been purchased over the wholesale market.
- The volume and price will be passed through to the 'basket' and only allocated to those customers and the volume that they've opted in.
- The associated REGO's will be passed through to your portfolio via your supply contract.
- This will be in aggregate with other public sector bodies.
- The length of the commitment to this will be in with your current commitment to the supply framework.
- The source of the electricity will likely be from existing assets – this is due to the relatively short time period the PPA's will be required for.

Key Considerations

- **Additionality:** sourcing from an existing asset does not cause 'Additionality'. However, the PPA will directly finance renewable assets, the customers would be the only people buying that energy and would minimise the risk of double-counting when reporting carbon.
- **Volume:** the volume committed will need to for the duration of your supply framework and cannot be removed.

Key Advantages

- **Flexibility:** relatively short commitment time allows accessibility to areas of your portfolio that may not be able to commit to new-build PPA's (e.g. schools).
- **Traceability:** when compared to the Green Tariff, this could be considered deeper green due to its link and larger financial support to a named asset.
- **Speed:** due to the asset being existing it could be a live PPA in months.
- **Ease of Procurement:** as this would be part of your current commitment, this does not require a full sign-off process.

Option 3 – PPA or PEPPPA

Public Energy Partnership Power Purchase Agreement is a customisable option for PPAs that encourages new build generation.

Key Features

- A combined procurement exercise with other public sector bodies to source a PPA.
- A Virtual PPA.
- New-build generation.
- 10-15 year duration.
- REGO's from the asset will be transferred to your organisation.

Key Considerations

- **Volume:** you will be obligated to purchase the volume power committed to for the duration of the PPA.
- **Lead-time:** as the PPA will initiate construction of a new-build asset, it will likely take 12-24 months from contract awarded to electricity being generated.

Key Advantages

- **Additionality:** New-build means there is clear additionality.
- **Simplicity:** a Virtual PPA means a reduction in the complexity of contracting and volume management.
- **Ease of Procurement:** an existing compliant procurement route, pre-existing Terms & Conditions and LASER managing the mini-competition process removes much of the Procurement resource required from your organisation.
- **Economies of Scale:** aggregating volume from multiple public sector bodies could drive value.

Appendix 8 – Model Outputs from Scenarios

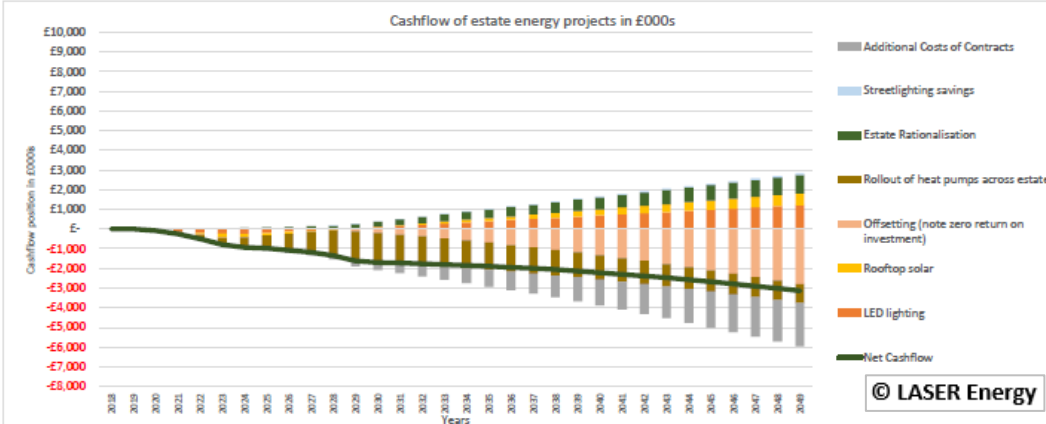
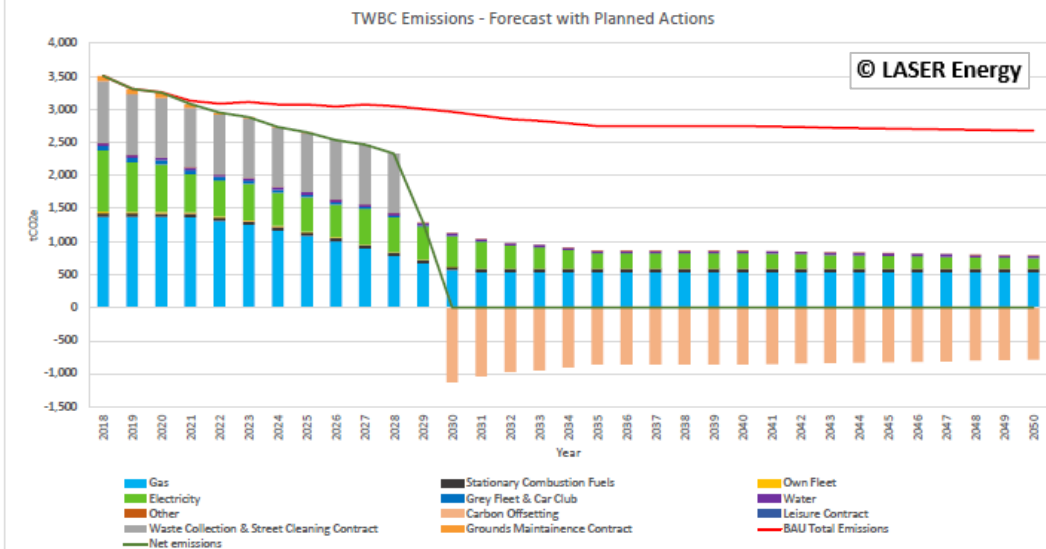
Central Scenario

Key Points	Investment required (£millions)	3.13	
	Cumulative net financial benefit to 2050 (£ millions)	-3.13	
	Breakeven year	0	
	Year to start Carbon Offsetting	2030	A requirement to offset will be required from 2030 onwards. Either through an offset scheme or new technology.
	Carbon Offsetting required (Tonnes CO2e) 2030	-1,128	

Strategic Actions						
Transport Actions						
	Target	By	Start	Shape	Cap	
Reduce own fleet miles travelled by x% by xx date	50%	2030	2020	Shaped	Yes	
% of own fleet miles to be via electric vehicle by xx date	90%	2030	2020	Shaped	Yes	
Reduce grey fleet miles travelled by x% by xx date	70%	2030	2021	Linear	Yes	
% of grey fleet miles to be via electric vehicle by xx date	70%	2030	2025	Shaped	No	
Estate Rationalisation Action						
Rationalisation to reduce TWBC buildings estate energy use by xx% by 2030	5%	2030	2020	Linear	Yes	
Streetlighting - switch offs or further trimming and dimming to reduce energy use by 2030	10%	2030	2020	Linear	Yes	
Outsourced Contracts						
Grounds Maintenance	100%	2026	2021	Linear	Yes	
Waste Collection & Street Cleaning	100%	2029	2029	Linear	Yes	
As all Leisure Contract emissions reported are from buildings and responsibility for these emissions going forward is unclear, they have been included in the TWBC estate figures.						

Secondary Actions - the investment amount and carbon reduction impact will update automatically based on the Strategic Actions set above"			
The investment and impact of these actions are dependent to the strategic actions			
Install solar on roofs of TWBC buildings			
Move 60% of Gas heating to Heat Pumps, insulate those buildings for 20% reduction in heat loss			60%
Roll out LED lighting in all TWBC buildings where practicable (assumed 40% of estate)			40%
Offset remaining emissions from 2030 onwards through an offset scheme			

Cashflow Model caveats - The cashflow model is intended to estimate the total investment required and financial savings/earnings received, it does not account for:	
Which organisation make the investment or receives the benefit	
Depreciation, capitalisation, interest charges	
Future energy prices	
Availability of government grants or interest free loans	
Availability of external investment	
Financial impacts not energy/carbon related e.g. rent savings by reducing buildings estate	
Costs or savings from switching to Electric Vehicles	



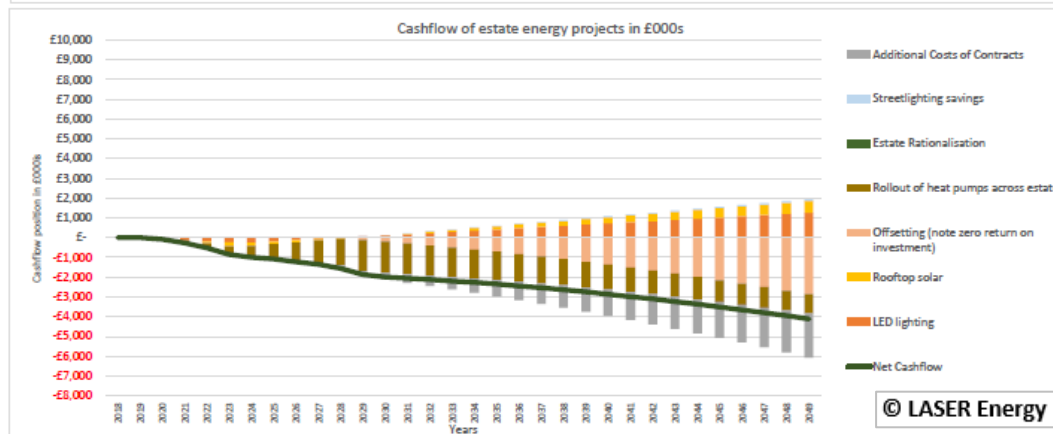
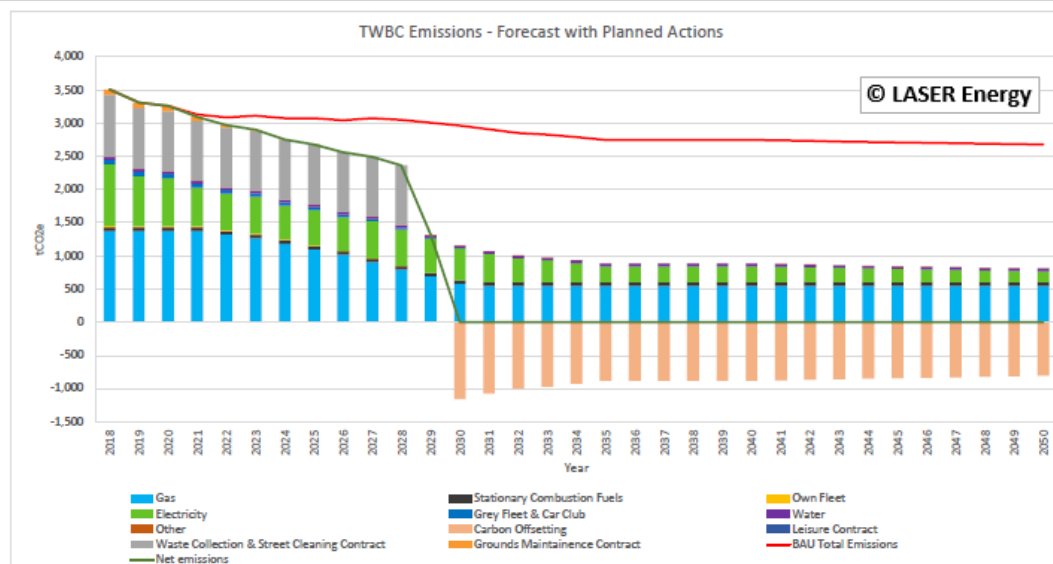
Central Scenario - 0% Estate Rationalisation

Key Points	Investment required (£millions)	4.10	
	Cumulative net financial benefit to 2050 (£ millions)	-4.10	
	Breakeven year	0	
	Year to start Carbon Offsetting	2030	A requirement to offset will be required from 2030 onwards. Either through an offset scheme or new technology.
	Carbon Offsetting required (Tonnes CO2e) 2030	-1,158	

Strategic Actions					
Transport Actions					
Reduce own fleet miles travelled by x% by xx date	50%	2030	2020	Shaped	Yes
% of own fleet miles to be via electric vehicle by xx date	90%	2030	2020	Shaped	Yes
Reduce grey fleet miles travelled by x% by xx date	70%	2030	2021	Linear	Yes
% of grey fleet miles to be via electric vehicle by xx date	70%	2030	2025	Shaped	No
Estate Rationalisation Action					
Rationalisation to reduce TWBC buildings estate energy use by xx% by 2030	0%	2030	2020	Linear	Yes
Streetlighting - switch offs or further trimming and dimming to reduce energy use by 2030	10%	2030	2020	Linear	Yes
Outsourced Contracts					
Grounds Maintenance	100%	2026	2021	Linear	Yes
Waste Collection & Street Cleaning	100%	2029	2029	Linear	Yes
As all Leisure Contract emissions reported are from buildings and responsibility for these emissions going forward is unclear, they have been included in the TWBC estate figures.					

Secondary Actions - the investment amount and carbon reduction impact will update automatically based on the Strategic Actions set above"			
The investment and impact of these actions are dependent to the strategic actions			
Install solar on roofs of TWBC buildings			
Move 60% of Gas heating to Heat Pumps, insulate those buildings for 20% reduction in heat loss			60%
Roll out LED lighting in all TWBC buildings where practicable (assumed 40% of estate)			40%
Offset remaining emissions from 2030 onwards through an offset scheme			

Cashflow Model caveats - The cashflow model is intended to estimate the total investment required and financial savings/earnings received, it does not account for:	
Which organisation make the investment or receives the benefit	
Depreciation, capitalisation, interest charges	
Future energy prices	
Availability of government grants or interest free loans	
Availability of external investment	
Financial impacts not energy/carbon related e.g. rent savings by reducing buildings estate	
Costs or savings from switching to Electric Vehicles	



Increased LED & ASHPs

Key Points

Investment required (£millions)	2.14
Cumulative net financial benefit to 2050 (£ millions)	-1.98
Breakeven year	0
Year to start Carbon Offsetting	2030
Carbon Offsetting required (Tonnes CO2e) 2030	-855

A requirement to offset will be required from 2030 onwards. Either through an offset scheme or new technology.

Strategic Actions

Transport Actions

	Target	By	Start	Shape	Cap
Reduce own fleet miles travelled by x% by xx date	50%	2030	2020	Shaped	Yes
% of own fleet miles to be via electric vehicle by xx date	90%	2030	2020	Shaped	Yes
Reduce grey fleet miles travelled by x% by xx date	70%	2030	2021	Linear	Yes
% of grey fleet miles to be via electric vehicle by xx date	70%	2030	2025	Shaped	No

Estate Rationalisation Action

Rationalisation to reduce TWBC buildings estate energy use by xx% by 2030	5%	2030	2020	Linear	Yes
Streetlighting - switch offs or further trimming and dimming to reduce energy use by 2030	10%	2030	2020	Linear	Yes

Outsourced Contracts

Grounds Maintenance	100%	2026	2021	Linear	Yes
Waste Collection & Street Cleaning	100%	2029	2029	Linear	Yes

As all Leisure Contract emissions reported are from buildings and responsibility for these emissions going forward is unclear, they have been included in the TWBC estate figures.

Secondary Actions - the investment amount and carbon reduction impact will update automatically based on the Strategic Actions set above"

The investment and impact of these actions are dependent to the strategic actions

Install solar on roofs of TWBC buildings

Move 60% of Gas heating to Heat Pumps, insulate those buildings for 20% reduction in heat loss 80%

Roll out LED lighting in all TWBC buildings where practicable (assumed 40% of estate) 60%

Offset remaining emissions from 2030 onwards through an offset scheme

Cashflow Model caveats - The cashflow model is intended to estimate the total investment required and financial savings/earnings received, it does not account for:

Which organisation make the investment or receives the benefit

Depreciation, capitalisation, interest charges

Future energy prices

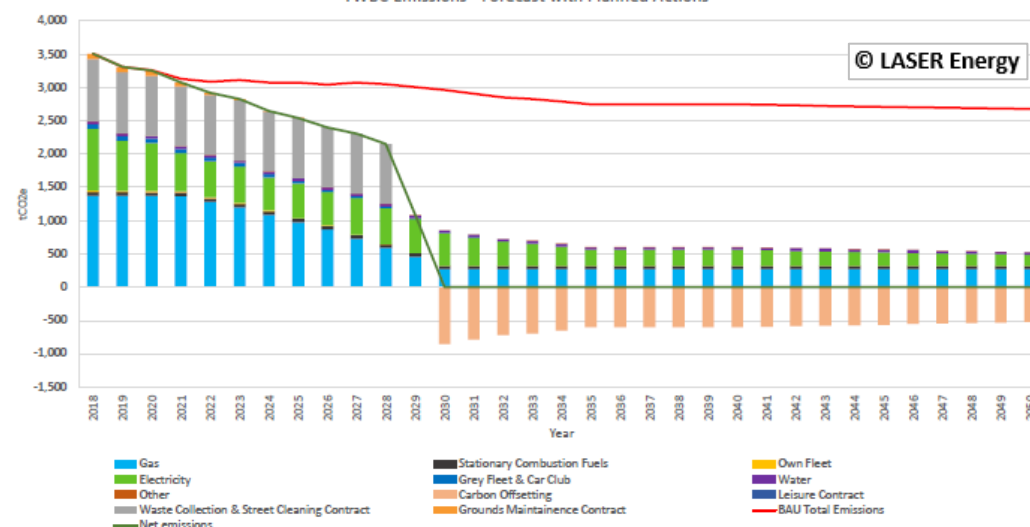
Availability of government grants or interest free loans

Availability of external investment

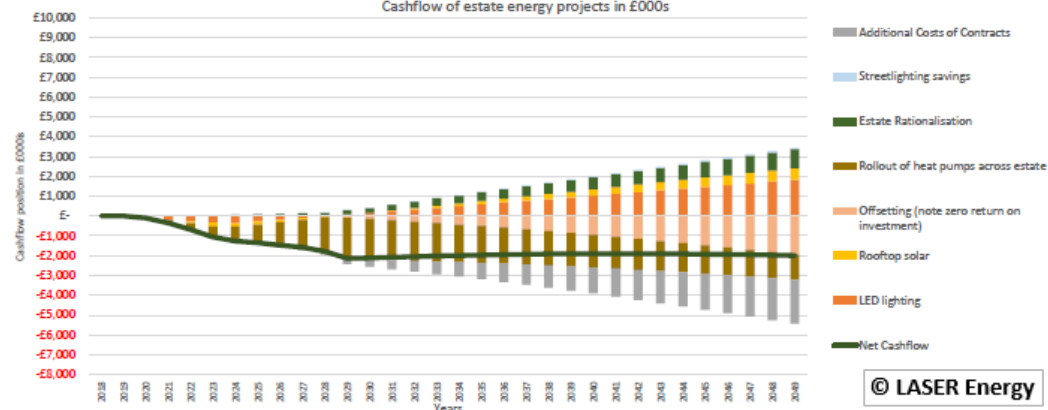
Financial impacts not energy/carbon related e.g. rent savings by reducing buildings estate

Costs or savings from switching to Electric Vehicles

TWBC Emissions - Forecast with Planned Actions



Cashflow of estate energy projects in £000s



Increased LED, ASHPs & PEPPPA

Key Points

Investment required (£millions)	2.14
Cumulative net financial benefit to 2050 (£ millions)	-1.05
Breakeven year	0
Year to start Carbon Offsetting	2030
Carbon Offsetting required (Tonnes CO2e) 2030	-498

A requirement to offset will be required from 2030 onwards. Either through an offset scheme or new technology.

Strategic Actions

Transport Actions

	Target	By	Start	Shape	Cap
Reduce own fleet miles travelled by x% by xx date	50%	2030	2020	Shaped	Yes
% of own fleet miles to be via electric vehicle by xx date	90%	2030	2020	Shaped	Yes
Reduce grey fleet miles travelled by x% by xx date	70%	2030	2020	Shaped	Yes
% of grey fleet miles to be via electric vehicle by xx date	70%	2030	2020	Shaped	No

Estate Rationalisation Action

Rationalisation to reduce TWBC buildings estate energy use by xx% by 2030	5%	2030	2020	Linear	Yes
Streetlighting - switch offs or further trimming and dimming to reduce energy use by 2030	10%	2030	2020	Linear	Yes

Outsourced Contracts

Grounds Maintenance	100%	2026	2021	Linear	Yes
Waste Collection & Street Cleaning	100%	2029	2029	Linear	Yes

As all Leisure Contract emissions reported are from buildings and responsibility for these emissions going forward is unclear, they have been included in the TWBC estate figures.

Secondary Actions - the investment amount and carbon reduction impact will update automatically based on the Strategic Actions set above"

The investment and impact of these actions are dependent to the strategic actions

Install solar on roofs of TWBC buildings

Move x% of Gas heating to Heat Pumps, insulate those buildings for 20% reduction in heat loss 80%

Roll out LED lighting in all TWBC buildings where practicable (assumed x% of estate) 60%

Offset remaining emissions from 2030 onwards through an offset scheme

Cashflow Model caveats - The cashflow model is intended to estimate the total investment required and financial savings/earnings received, it does not account for:

Which organisation make the investment or receives the benefit

Depreciation, capitalisation, interest charges

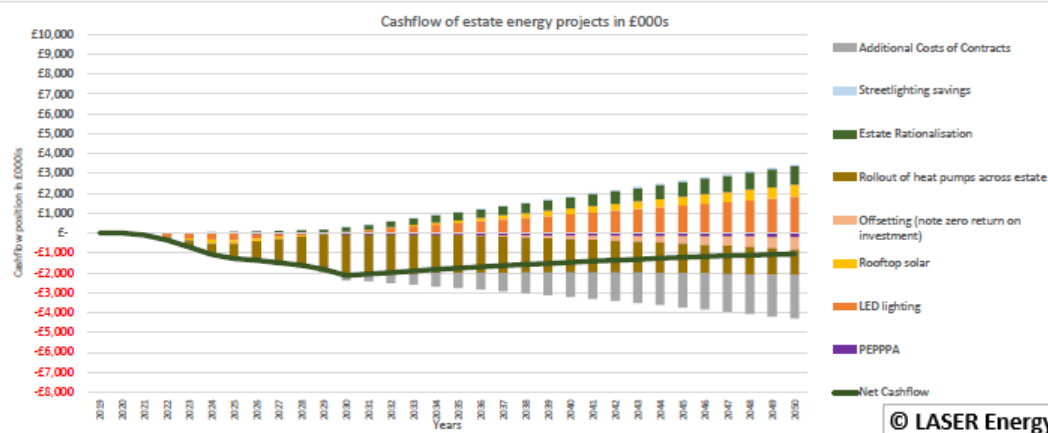
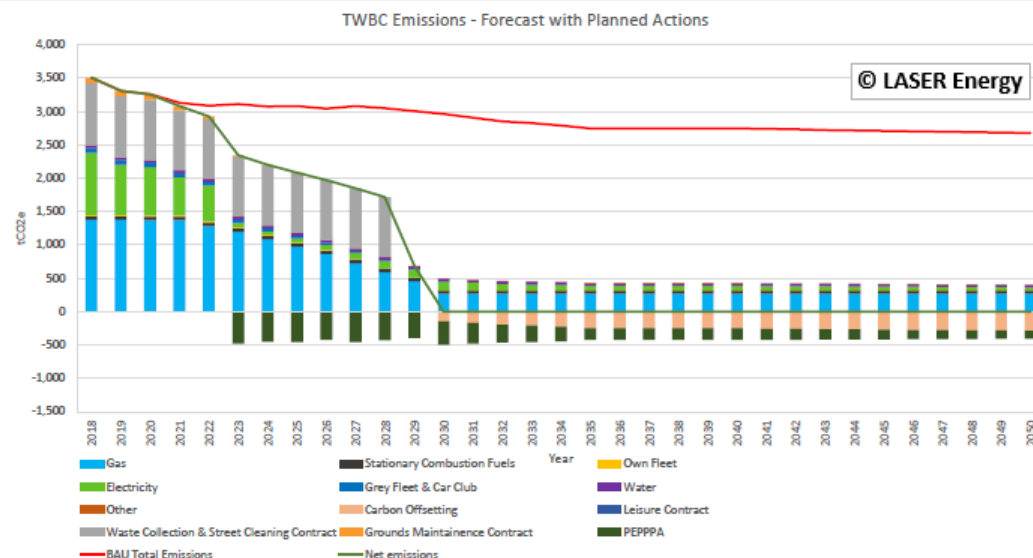
Future energy prices

Availability of government grants or interest free loans

Availability of external investment

Financial impacts not energy/carbon related e.g. rent savings by reducing buildings estate

Costs or savings from switching to Electric Vehicles



Central Scenario - 40% Estate Rationalisation

Key Points

Investment required (£millions)	0.40
Cumulative net financial benefit to 2050 (£ millions)	3.72
Breakeven year	2029
Year to start Carbon Offsetting	2030
Carbon Offsetting required (Tonnes CO2e) 2030	-920

A requirement to offset will be required from 2030 onwards. Either through an offset scheme or new technology.

Strategic Actions

Transport Actions

	Target	By	Start	Shape	Cap
Reduce own fleet miles travelled by x% by xx date	50%	2030	2020	Shaped	Yes
% of own fleet miles to be via electric vehicle by xx date	90%	2030	2020	Shaped	Yes
Reduce grey fleet miles travelled by x% by xx date	70%	2030	2021	Linear	Yes
% of grey fleet miles to be via electric vehicle by xx date	70%	2030	2025	Shaped	No

Estate Rationalisation Action

Rationalisation to reduce TWBC buildings estate energy use by xx% by 2030	40%	2030	2020	Linear	Yes
Streetlighting - switch offs or further trimming and dimming to reduce energy use by 2030	10%	2030	2020	Linear	Yes

Outsourced Contracts

Grounds Maintenance	100%	2026	2021	Linear	Yes
Waste Collection & Street Cleaning	100%	2029	2029	Linear	Yes

As all Leisure Contract emissions reported are from buildings and responsibility for these emissions going forward is unclear, they have been included in the TWBC estate figures.

Secondary Actions - the investment amount and carbon reduction impact will update automatically based on the Strategic Actions set above"

The investment and impact of these actions are dependent to the strategic actions

Install solar on roofs of TWBC buildings

Move 60% of Gas heating to Heat Pumps, insulate those buildings for 20% reduction in heat loss 60%

Roll out LED lighting in all TWBC buildings where practicable (assumed 40% of estate) 40%

Offset remaining emissions from 2030 onwards through an offset scheme

Cashflow Model caveats - The cashflow model is intended to estimate the total investment required and financial savings/earnings received, it does not account for:

Which organisation make the investment or receives the benefit

Depreciation, capitalisation, interest charges

Future energy prices

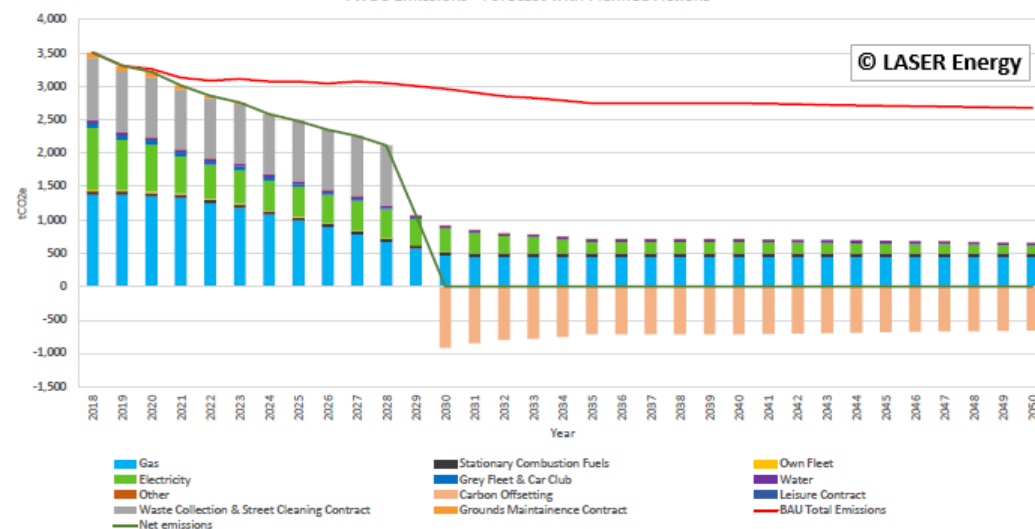
Availability of government grants or interest free loans

Availability of external investment

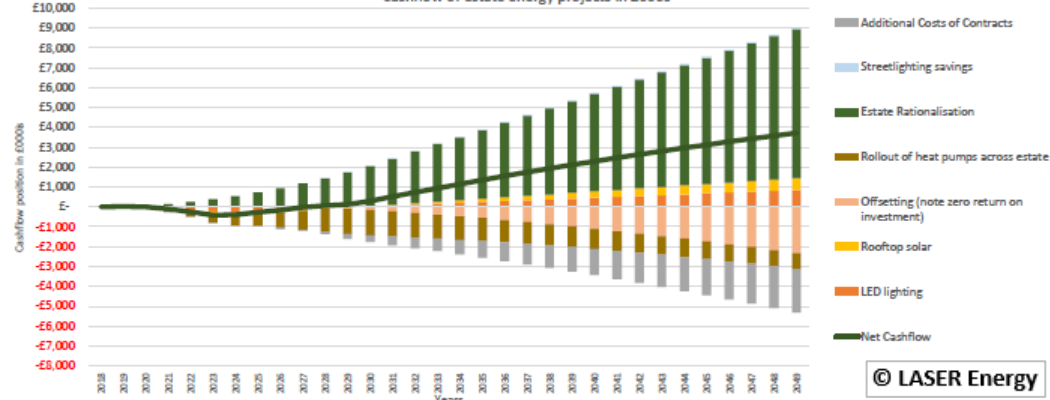
Financial impacts not energy/carbon related e.g. rent savings by reducing buildings estate

Costs or savings from switching to Electric Vehicles

TWBC Emissions - Forecast with Planned Actions



Cashflow of estate energy projects in £000s



With Solar Park (owned or 3rd party)

Key Points

Investment required (£millions)	8.93
Cumulative net financial benefit to 2050 (£ millions)	1.50
Breakeven year	2047
Year to start Carbon Offsetting	2030
Carbon Offsetting required (Tonnes CO2e) 2030	0

A requirement to offset will be required from 2030 onwards. Either through an offset scheme or new technology.

Strategic Actions

Transport Actions

	Target	By	Start	Shape	Cap
Reduce own fleet miles travelled by x% by xx date	50%	2030	2020	Shaped	Yes
% of own fleet miles to be via electric vehicle by xx date	90%	2030	2020	Shaped	Yes
Reduce grey fleet miles travelled by x% by xx date	70%	2030	2021	Linear	Yes
% of grey fleet miles to be via electric vehicle by xx date	70%	2030	2025	Shaped	No
Include example solar farm	Yes				

Estate Rationalisation Action

Rationalisation to reduce TWBC buildings estate energy use by xx% by 2030	5%	2030	2020	Linear	Yes
Streetlighting - switch offs or further trimming and dimming to reduce energy use by 2030	10%	2030	2020	Linear	Yes

Outsourced Contracts

Grounds Maintenance	100%	2026	2021	Linear	Yes
Waste Collection & Street Cleaning	100%	2029	2029	Linear	Yes

As all Leisure Contract emissions reported are from buildings and responsibility for these emissions going forward is unclear, they have been included in the TWBC estate figures.

Secondary Actions - the investment amount and carbon reduction impact will update automatically based on the Strategic Actions set above"

The investment and impact of these actions are dependent to the strategic actions

Install solar on roofs of TWBC buildings

Move 60% of Gas heating to Heat Pumps, insulate those buildings for 20% reduction in heat loss 60%

Roll out LED lighting in all TWBC buildings where practicable (assumed 40% of estate) 40%

Offset remaining emissions from 2030 onwards through an offset scheme

Cashflow Model caveats - The cashflow model is intended to estimate the total investment required and financial savings/earnings received, it does not account for:

Which organisation make the investment or receives the benefit

Depreciation, capitalisation, interest charges

Future energy prices

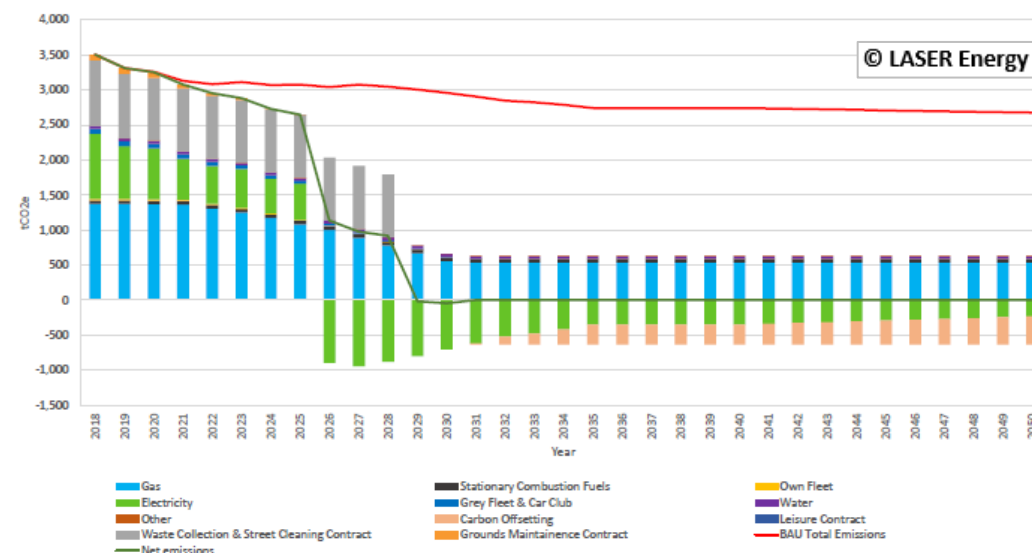
Availability of government grants or interest free loans

Availability of external investment

Financial impacts not energy/carbon related e.g. rent savings by reducing buildings estate

Costs or savings from switching to Electric Vehicles

TWBC Emissions - Forecast with Planned Actions



Cashflow of estate energy projects in £000s

