CC&G ENERGY MANAGEMENT STRATEGY	6th March 2018
TO: ENVIRONMENTAL SERVICES COMMITTEE	
FOR DECISION	

Linkage to Council Strategy (2015-19)	
Strategic Theme	Protecting and Enhancing Our Environments and Assets
Outcome	Our natural assets will be carefully managed to generate economic and social returns without compromising their sustainability for future generations.
Lead Officer	Head of Capital Works, Energy & Infrastructure
Estimated Cost:	NA

The purpose of this report is to request Council endorsement of attached Energy Management Strategy (EMS) Appendix 1.

Background

The Strategy includes strategic objectives, awareness and an action plan to sign-post the most advantageous projects and energy efficiency activities from both a carbon reduction and costs reduction perspective.

To illustrate the need for the strategy, the following figures (1-4) and diagrams highlight the scale of current consumptions with associated costs and carbon emissions.

Annual Council Energy Related Figures	
Total Energy Consumption, MWh	35,413
Energy Cost, £'s	2,307,655
Carbon Dioxide Emissions, Tonnes	9,262
Renewable Energy Generation, MWh*	98

*includes Solar PV, Solar Thermal and Ground Sourced Heat Pump Energy Generation

Figure 1: Annual Cost of Energy Consumption by Type and % of Total Cost
Figure 2: Annual Consumption, MWh, By Type and % of Total Use
Figure 3: Annual Consumption of Energy by each Council Department
Figure 4: Financial impact of penalty driven legislation

In 2016 the Treasury abolished the Carbon Reduction Commitment (CRC) scheme from the end of the 2018/19 compliance year. Whilst this legislation did not impact upon Council due to legacy organisational sizes, it could have had a significant financial impact on CC&G Council. The Climate Change Levy (CCL), will increase year on year to a £57k increase to £97,565.73 by 2019/20 from the 2015/16 baseline of £41k as described in figure 4 (if consumption remained constant).

Central Governments (within the UK and beyond) are committed to reducing carbon emissions which will increase penalty driven legislation via CCL or by other means (as opposed to the now defunct CRC Scheme) to incentivise local authorities. It is essential to have an incremental approach to reduce the impact of such legislation both from a financial and logistical perspective.

Council have already approved renewable and energy efficient schemes in the period 2015-17, namely Solar PV installations and introducing LED lighting to many facilities across the Borough.

Each one of these provides small real savings for Council by not having to purchase additional energy and therefore reduces the potential for CCL tax or reducing the risk of other penalty driven legislation with reduced energy cost. Having established the statistical information of where and how Council consumes energy the EMS signposts an action plan;

- Promote awareness
- to reduce energy consumption
- to reduce carbon emissions
- highlight the improvements in efficiency.

Note all investment decisions will be brought to Council on an individual basis with the associated business cases for individual project approval.

Recommendation:

It is recommended that Members endorse the attached EMS to allow commencement of a formalised energy management regime.

Figure 1

ANNUAL COST OF ENERGY CONSUMPTION BY TYPE AND % OF TOTAL SPEND

(1 MWh = 1000 kWh)

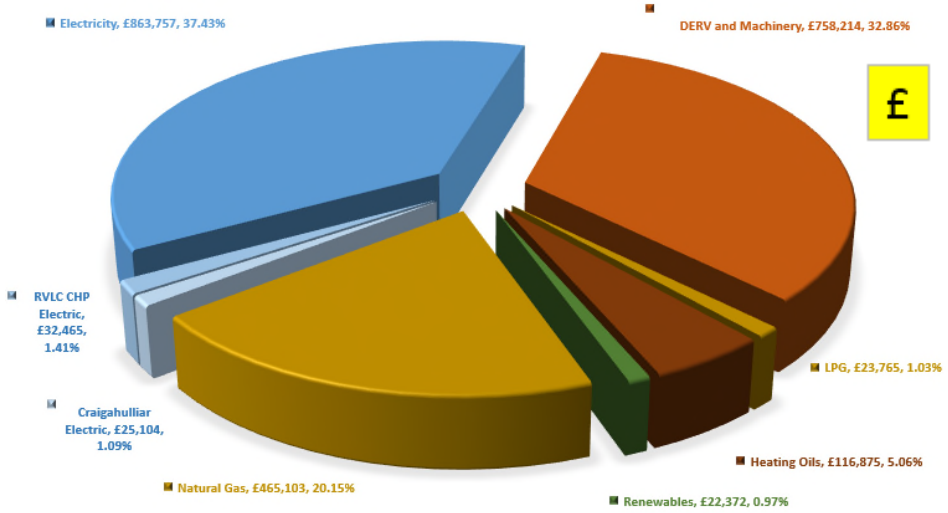
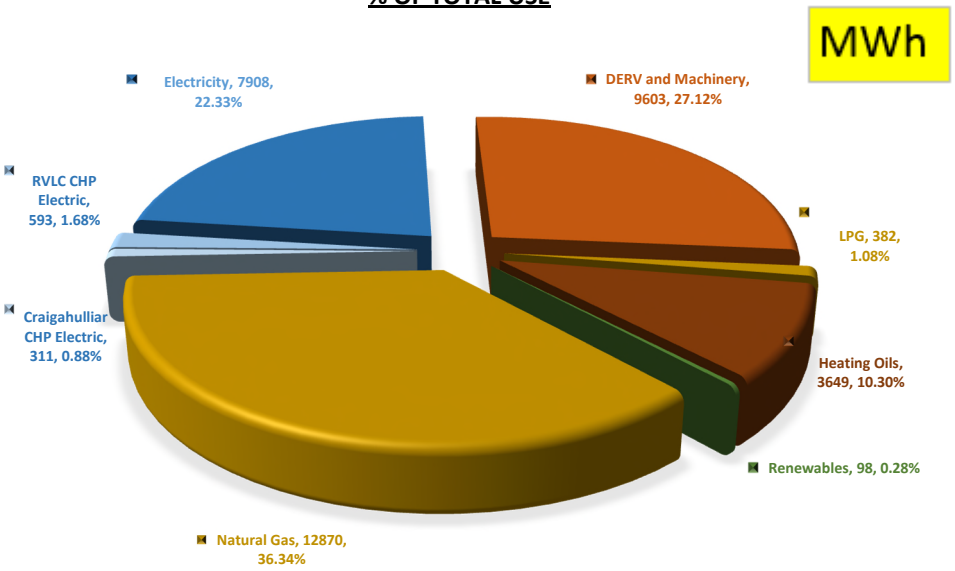


Figure 2

COUNCIL ANNUAL ENERGY CONSUMPTION (MWH) BY TYPE AND % OF TOTAL USE



Annual Energy Cost = £2,307,655

Annual Energy Usage = 35,413 MWh

Figure 3

Percentage Energy Consumption of Total Energy by each Council Department

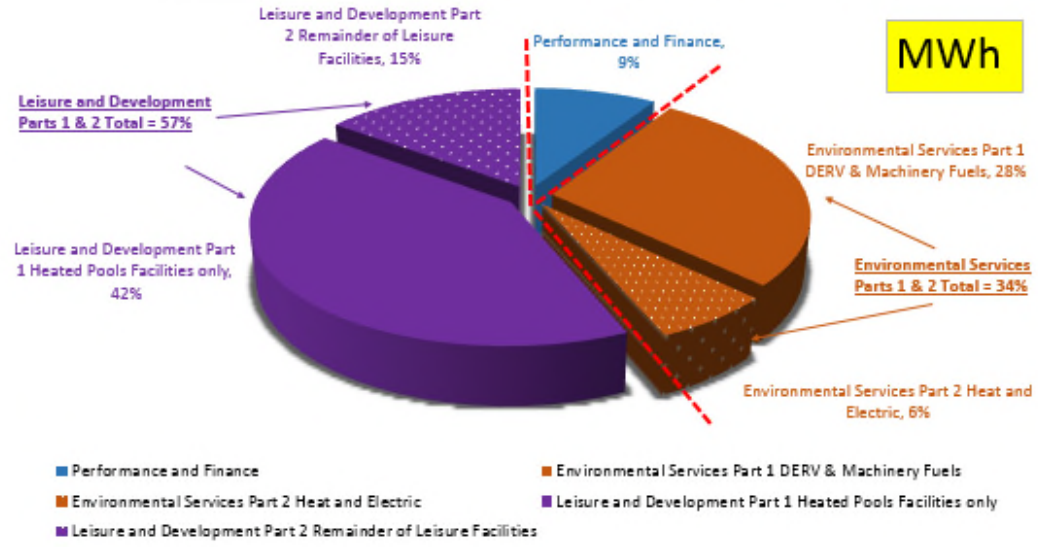
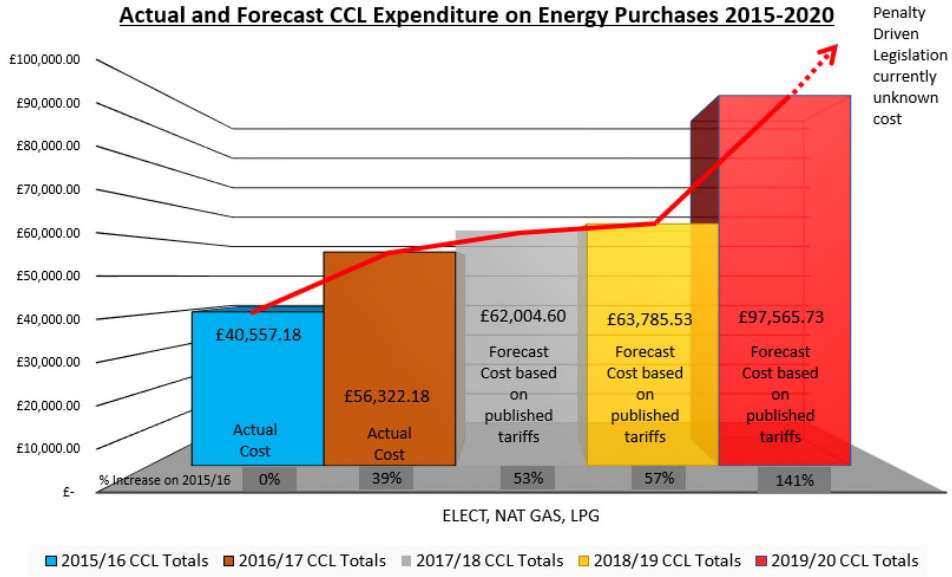


Figure 4

Actual and Forecast CCL Expenditure on Energy Purchases 2015-2020



Energy Management Strategy (EMS)

The need for an EMS for Causeway Coast and Glens Borough Council 2015 - 2025

John Richardson
Head of Capital Works
Energy and Infrastructure

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Causeway Coast & Glens Borough Council

List of Abbreviations

AD	Anaerobic digestion - is a collection of processes by which micro-organisms break down biodegradable material in the absence of oxygen. The process is used for industrial or domestic purposes to manage waste or to produce fuels.
BEMS	Building Energy Management Systems monitor and control services such as heating, ventilation and air-conditioning, ensuring the building operates at maximum levels of efficiency and removing wasted energy usage and associated costs. The optimal level of efficiency is achieved by continuously maintaining the correct balance between operating requirements, external and internal environmental conditions, and energy usage
Bio-Fuel	Fuel Produced from a biological process such as agriculture or anaerobic digestion as opposed to fuel produced by geological processes in the formation of fossil fuels
CCL	Climate Change Levy
CHP	Combined Heat and Power - cogeneration in the use of a heat engine to generate both electricity and useful heat - heat engine typically fuelled by natural gas or diesel fuel
CNG	Compressed Natural Gas (mainly composed off methane gas compressed and stored at high pressure 2900-3600 pounds per square inch - to less than 1% of the volume it occupies at standard atmospheric pressure)
CO2	Carbon Dioxide Gas
DEC	Display Energy Certificate
DECC	Department of Energy and Climate Change
DERV	Diesel Oil for Road Vehicles (original acronym was Diesel Engined Road Vehicles)
DETI	Department of Enterprise, Trade and Investment
DfE	Department for the Economy
DoF	Department of Finance
EMS	Energy Management Strategy
EU:RED	European Union Renewable Energy Directive 2009
EV	Electric Vehicle
Grey Fleet	Any vehicles that do not belong to the Council, but which are used for business travel. This might include a vehicle purchased via an employee ownership scheme, a privately rented vehicle or a vehicle privately owned by an employee
G59	G59 is the regulation surrounding the connection of any form of generator device to run 'in parallel' or 'synchronised' with the mains electrical utility grid (National Grid). This is relevant for all power generation, including combined heat and power units greater than 16A per phase. For anything below this the Engineering recommendation G83/1-1 applies.

G83	G83 is the regulation surrounding the connection of any form of generator device to run 'in parallel' or 'synchronised' with the mains electrical utility grid (National Grid). The generating unit (or the aggregation of generating units if there are more than one) have a capacity of 16A per phase or less, and is it connected at low voltage. Three phase—generation capacity of 11.04kW or smaller and connected at 400V. Single Phase—generation capacity of 3.68kW or smaller and connected at 230V
J	Joule - Unit of Energy
kg	Kilogram = 1000 grams = 2.2 lbs
kV	Kilovolt = 1000 Volts
kW	Kilo Watt = 1000 Watts - Unit of Power - 1 kW is approx. 1.34 horsepower, a small electric heater with 1 heating element can use 1.0 kilowatt)
kWh	Kilo Watt Hour - Unit of Energy
LED	White light-emitting diode lamp - high electrical efficient lamp (300 lumens per watt of electricity, can last up to 100,000 hours)
LNG	Liquified Natural Gas (natural gas that has been converted and cooled into liquid form @ 1/600th of the volume of natural gas at atmospheric pressure, -162 Deg C, 4 psi)
LPG	Liquified Petroleum Gas (Propane or Butane)
lm	Lumen - measure of luminous flux which is a measure of the total quality of visible light emitted by a source e.g. a LED Lamp
LV	Low Voltage - refers to NI Low Voltage network < 11 kV
m3	Cubic Meter = 1000 litres = 220 gallons
M&E	Mechanical and Electrical
MWh	Mega Watt Hour - 1 MWh = 1000 kWh
NIROCS	Northern Ireland Renewables Obligation Certificates are issued to operators of accredited stations for the electricity they generate in kWhs
NIWMS	Ni Waste Management Strategy
PHEV	Plug-in Hybrid Vehicle
RHI	Renewable Heat Incentive - payment system for the generation of heat from renewable sources
SEF	Strategic Energy Framework
T&M	Target and Monitoring
Tonne (t)	1000 kilograms
Watt	Unit of Power (1 Watt = 1 Joule per second - this is the rate of energy transfer)

Executive Summary and Introduction

As part of the Review of Public Administration (RPA), Moyle, Coleraine, Ballymoney and Limavady Councils amalgamated to form Causeway Coast and Glens Borough Council in 2015.

This new Borough Council annually consumes circa;

35,413 MWhs of energy,

128,076m^3 of water,

And produces 9,262 tonnes of Carbon Dioxide emissions.

The 2015/16 financial year baseline cost for energy, water and sewage is circa £2,453,321.50.

Causeway Coast and Glens Borough Council Energy Management Strategy (EMS) will set direction and sign post energy management best practice within a structured management plan including;

- Highlight Awareness
- Highlight where we consume energy
- The effects this energy and water consumption has on the environment
- How energy consumption impacts each of the different service areas
- Organisational opportunities and challenges convergence has provided from an energy perspective
- The potential impacts for Council with Environmental Legislation and other Obligations
- The potential risks for Energy Security
- Action planning to reduce carbon emissions
- Highlight and sign post technology opportunities
- Highlight and sign post energy efficiency opportunities

Energy management is essential in order to control energy costs, be compliant with legislation and enhance the reputation of the Council. Figure 1 process organigraph summarises why Council needs an Energy Management Strategy.

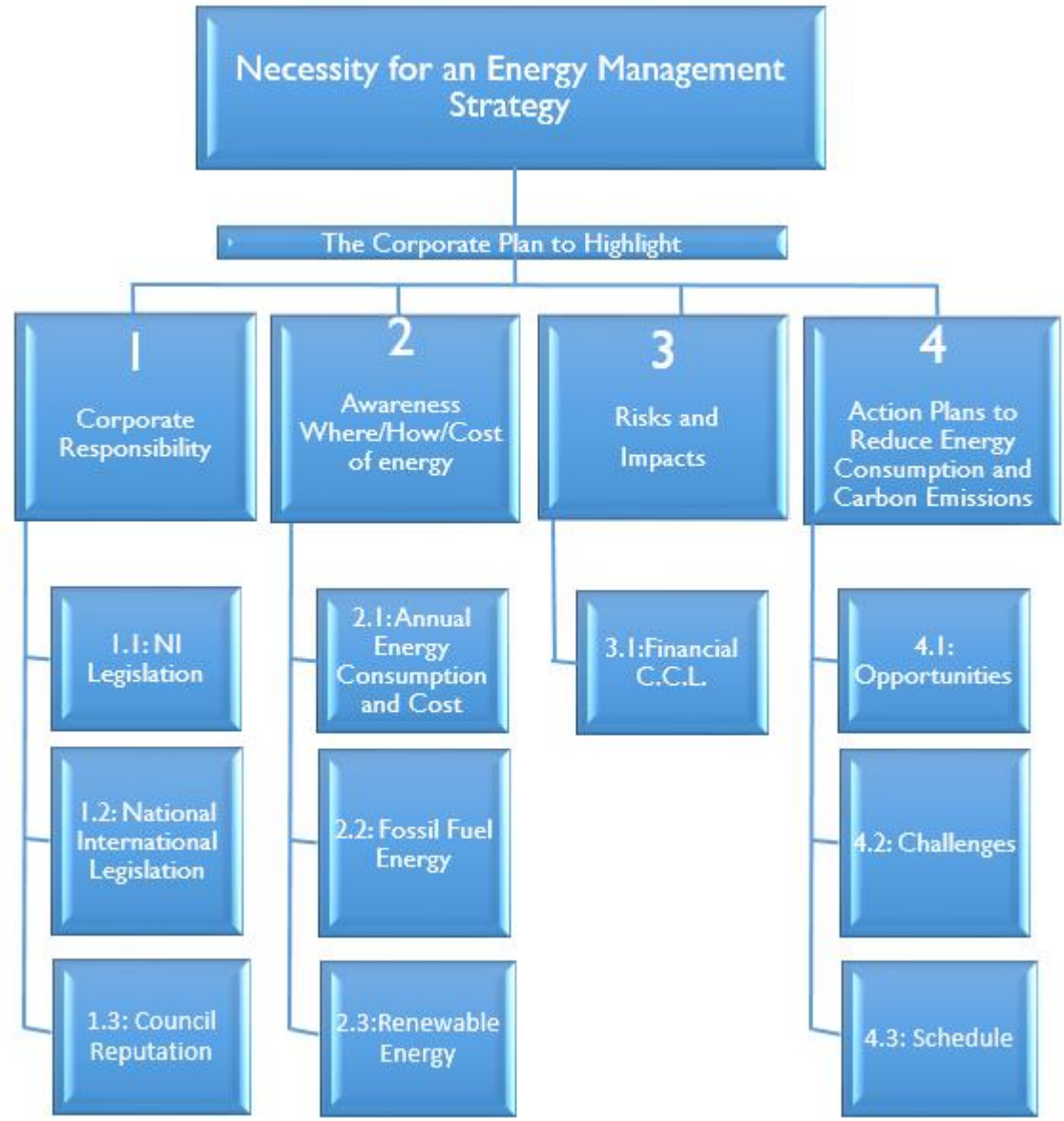


Figure 1 Why Council needs an Energy Management Strategy

1: Corporate Responsibility

Council provides leadership on many sustainable issues across the Community and is a Regulator within Building Control to ensure low energy adherence with new developments and thus it is essential to lead by example.

In addition to having responsibility for Corporate Leadership, legislation with Central Government is significant and can be summarised below in Figure 2 organigraph.

The following three sections summarise these responsibilities.

NI Legislation, summarised in process organigraph Figure 2,

National/European Legislation, summarised in process organigraph Figure 5

Council Reputation, summarised in process organigraph Figure 6

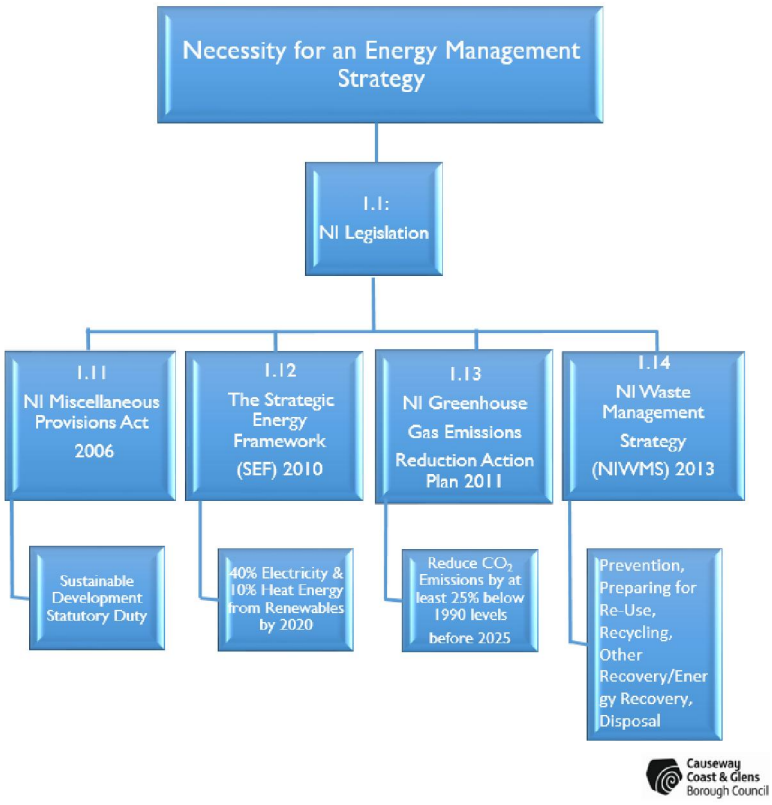


Figure 2 NI Legislation Organigraph

1.1 NI Legislation

The following local legislation impacts on NI Central Government targets for NI as a whole unless specified for Council.

1.11 The Northern Ireland (Miscellaneous Provisions) Act 2006.

A "Sustainable Development Statutory Duty" came into effect for Councils in N. Ireland as a result of this legislation. The Act states that:

"A public authority must, in exercising its functions, act in a way it considers best calculated to contribute to the achievement of sustainable development in N. Ireland"

The Northern Ireland Assembly has responsibility for Energy Policy. Department for the Economy (DfE) and Department of Agriculture, Environment & Rural Affairs (DAERA) – DfE (DETI) works alongside the DAERA (DOE) to achieve a cohesive plan for Energy, CO_2 and Waste management through the legislation summarised below:

Renewable Energy/Decarbonisation/Waste Management Legislation

1.12 The Strategic Energy Framework (SEF) was endorsed by the Assembly in 2010.

Figure 3 illustrates the DETI NI agreed targets for 40% of Electricity and 10% of Heat Energy in N. Ireland as a whole to be provided from Renewable sources by 2020. This is not a statutory requirement.

1.13 NI Greenhouse Gas Emissions Reduction Action Plan

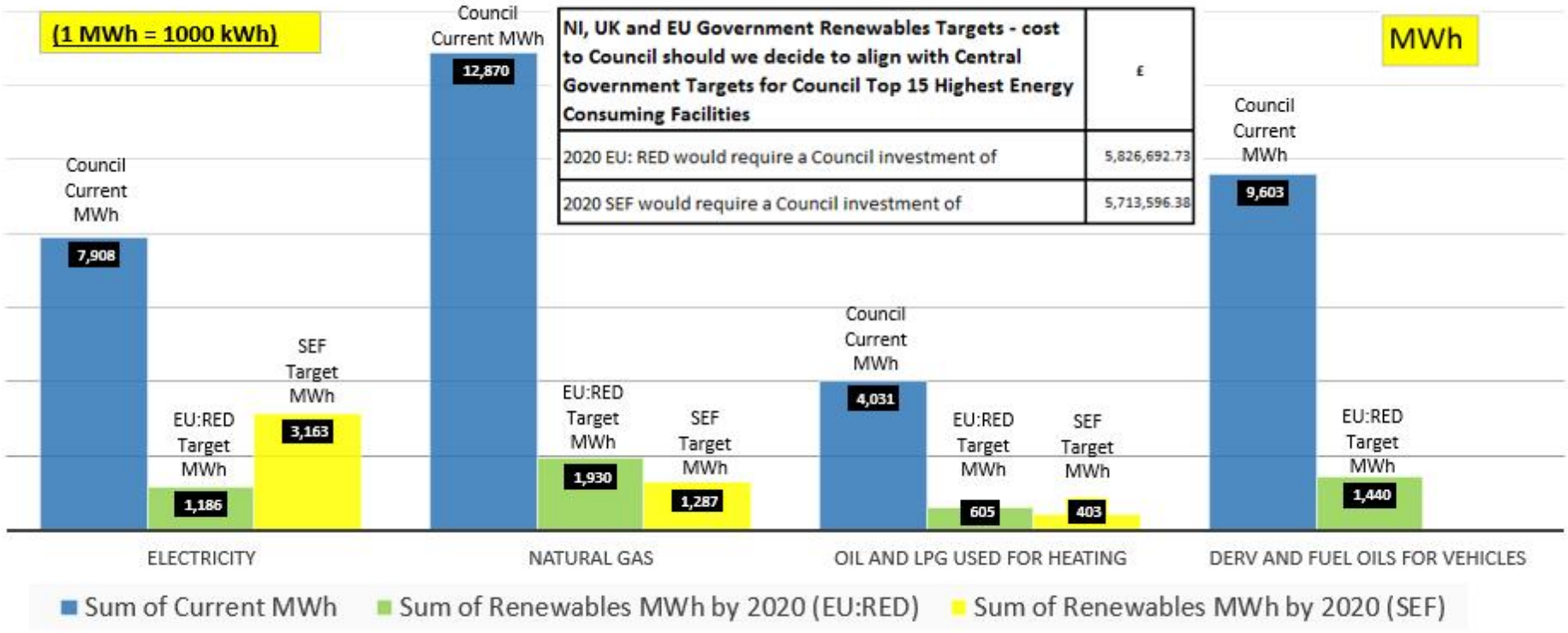
Figure 3 also illustrates the NI Greenhouse Gas Emissions Reduction Action Plan endorsed by the Assembly in Feb 2011 which set a target to reduce CO_2 Emissions by at least 25% below 1990 levels before 2025.

1.14 The NI Waste Management Strategy 2013 (NIWMS)

This is the most recent DAREA (DOE) policy lists "Preparing for re-use" above Recycling in a new waste management hierarchy which reads as: Prevention, Preparing for re-use, Recycling, Other recovery/Energy recovery, Disposal.

Causeway Coast & Glens Borough Council

Central Government Renewable Energy Targets for NI, SEF 2020 and EU:RED 2020 superimposed on Council Baseline Energy Consumption for each Energy Type



The EU Renewable Energy Directive 2009 (RED) set a target for 15% of all energy used across the UK to come from renewable sources by 2020.

The Strategic Energy Framework (SEF) was endorsed by the Assembly in 2010. DETI set targets for 40% of Electricity and 10% of Heat Energy in N. Ireland to be provided from Renewable sources by 2020.

Figure 3 DfE (DETI) NI Heat and Electricity Targets superimposed on Targets for Council Renewable Energy Consumption

1.2: National/International Legislation

The following section describes the National and European/International Legislation impacts on NI Central Government targets for NI as a whole unless where specified a target for Council compliance.

1.21The Climate Change Act 2008 commits UK Government to Reducing Carbon Dioxide (CO_2) emissions by 80% from 1990 levels before 2050 Fig 5. The annual tonnes of CO_2 that Council currently emits is aligned against the Northern Ireland emission targets (Section 1.13).

1.22 The EU Renewable Energy Directive 2009 (EU: RED) set a target for 15% of all energy used across the UK to come from renewable sources by 2020. This alignment against Council current consumption of all energy types is also illustrated in Fig 3.

Central Government at Westminster has agreed a number of ambitious targets for the UK as a whole with the EU Parliament and at International Climate Change Summits. The Department of Energy and Climate Change (DECC) became part of Department for Business, Energy and Industrial Strategy on 14th July 2016 and is responsible for Legislating to ensure these are met.

Figure 4 summarises in a process organigraph the National/European Legislation. Figure 5 describes the NI CO_2 Targets superimposed on a non-enforceable target for Council CO_2 Emissions. The summary table included in Figure 5 describes the theoretical cost of Council implementing the Central Government commitments / targets for CO_2 and renewables for the Council top 15 highest energy consumption facilities.

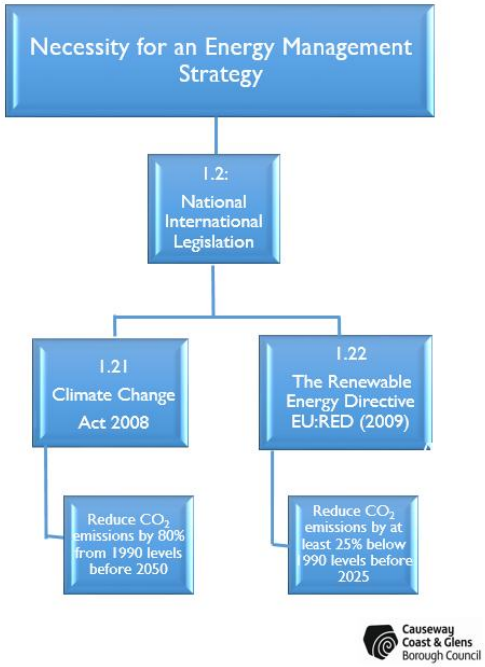
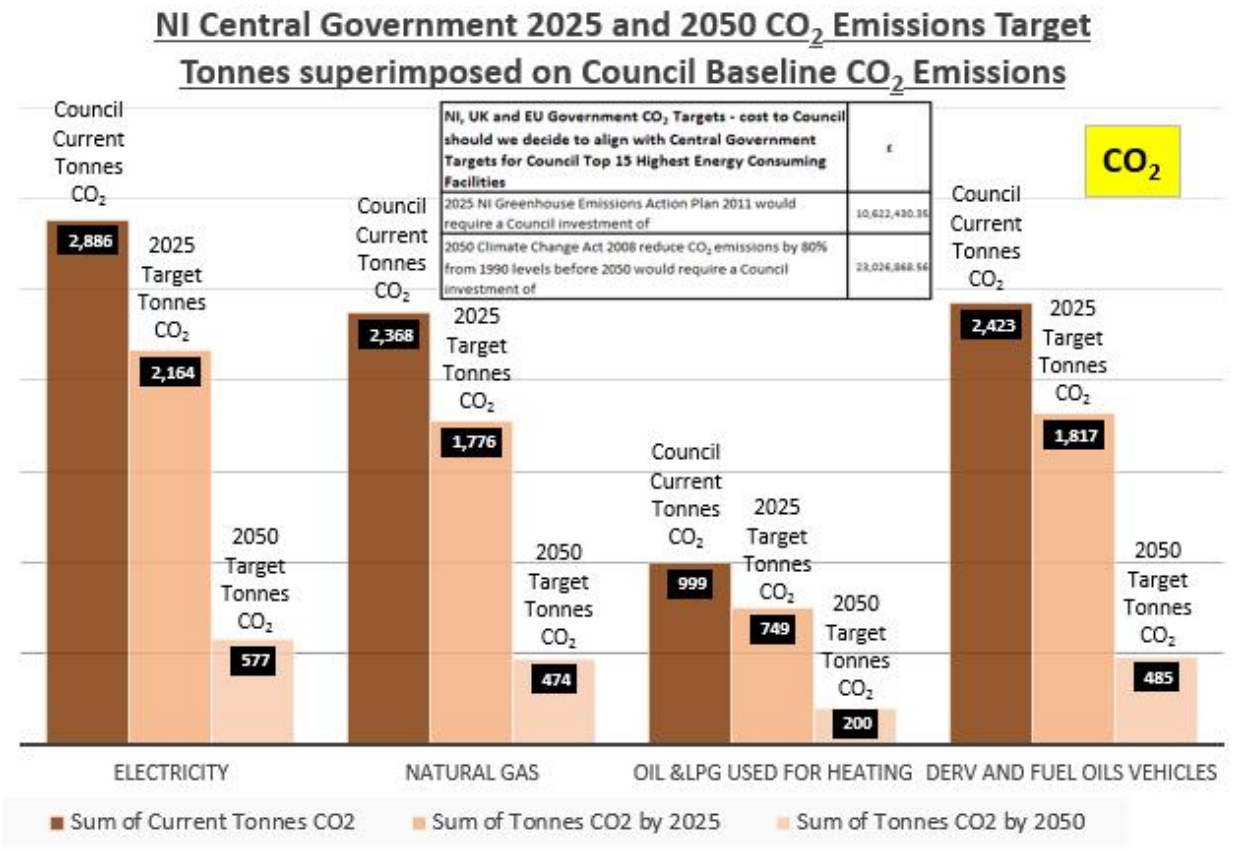


Figure 4 National and International Legislation Organigraph

Causeway Coast & Glens Borough Council



The NI Greenhouse Gas Emissions Reduction Action Plan endorsed by the Assembly in Feb 2011 set a target to reduce CO2 Emissions by at least 25% below 1990 levels before 2025*.

The Climate Change Act 2008 commits UK Government to Reducing Carbon Dioxide (CO2) emissions by 80% from 1990 levels before 2050*.

Figure 5 NI CO_2 Targets superimposed on Target for Council CO_2 Emissions

1.3: Council Reputation

Figure 6 below summarises the processes that directly impact on the Reputation of Council.

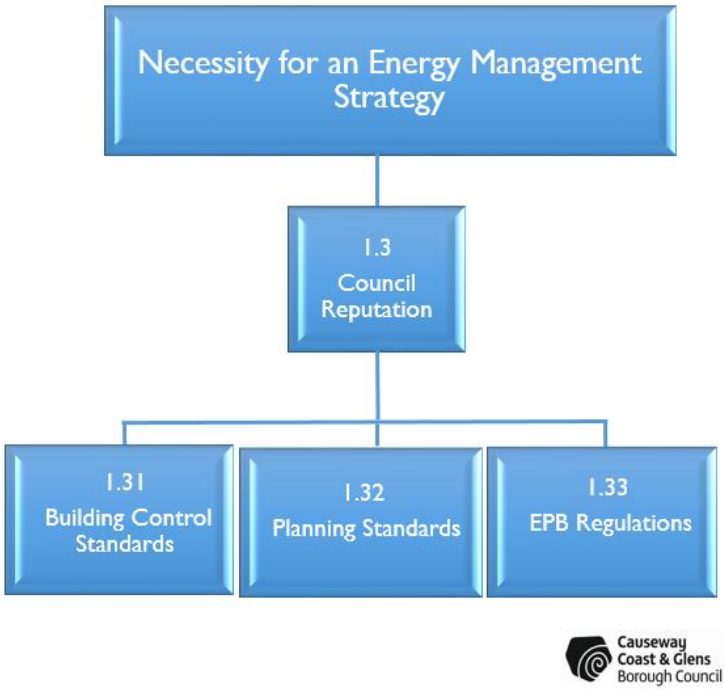


Figure 6 Processes that impact on Council Reputation

1.31: Building Control Standards

The core functions of the Council Building Control Service are to:

- Ensure the Health, Safety, Welfare and Convenience of people in and around buildings
- Further the conservation of Fuel and Power
- Protect and enhance the Environment
- Promote sustainable development

This is currently achieved by consistent administration and enforcement of the Building Regulations (NI) 2012 (specifically Part F, Regulations 38 – 47, guidance contained in Technical Booklets F1 and F2) and allied legislation such as the Energy Performance of Buildings (Certificates & Inspections) Regulations (Northern Ireland) 2008, amended 2009 and 2013. Part F implements Articles 3 to 6 of Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002 on the Energy Performance of Buildings Directive.

1.32: Planning Standards

The Council Planning Department makes sure the right things are built in the right places, be it houses, shops, parks, community centres or energy plants. In addition, Planning shapes and improves the character, look and feel of the places where we all live, work or visit.

The Planning Department also has responsibility for preparing planning policy on renewable energy development including, among other types of development, wind turbines and solar farms.

1.33: Energy Performance of Building Regulations (NI) 2014 (EPB Regulations)

The Energy Performance of Building' (Certificate and Inspections) (Amendment) Regulations (Northern Ireland) 2014 were made on 24th February 2014 to respond to outstanding requirements of the (recast) Directive on the Energy Performance of Buildings 2012/31/EU.

The Department of Finance (DoF) is responsible for measures in Northern Ireland to improve the energy efficiency of buildings, including requiring:

- energy performance certificates for properties which provide A-G efficiency ratings and recommendations for improvement
- public buildings to display energy certificates for properties which provide A-G efficiency ratings and recommendations for improvement
- inspections for air conditioning systems

Large public buildings must also display an energy performance certificate, known as Display Energy Certificates (DEC).

Display Energy Certificates (DECs) show the actual energy usage of public buildings (the Operational Rating) and allow the public to see the energy efficiency of a building. This is based on the energy consumption of the building as recorded by gas, electricity and other meters. The DEC should be displayed at all times in a prominent place clearly visible to the public.

DECs are only required for buildings that have a total useful floor area of more than 250m^2 that are occupied by a public authority or an institution providing a public service to a large number of people, and are frequently visited by members of the public. DECs are valid for one year. The accompanying Advisory Report is valid for 7 years.

Where a building is partly occupied by a public authority or a relevant institution, the authority or institution is responsible for displaying a DEC and having a valid Advisory Report. Other private organisations occupying the building, irrespective of the size they occupy, do not need to display a DEC.

2: Where we consume energy?

2
Awareness
Where/How/Cost
of energy

2.1 Annual Energy Consumption and Cost

Council consumes energy of various types and from different sources. Figure 7 describes the percentage of energy consumed by each Council Department and the subsequent breakdown of where the majority of that energy is consumed within each Department.

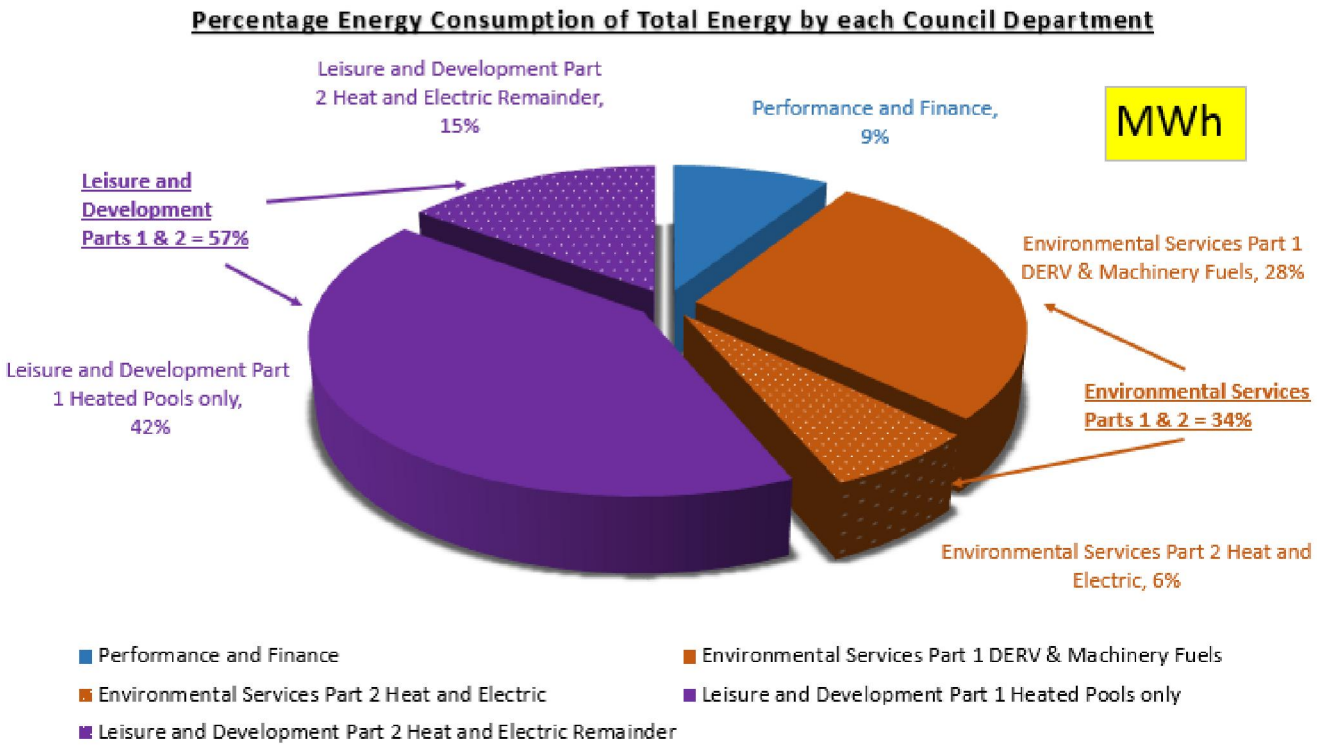


Figure 7 The percentage of energy consumed by each Council Department

This energy consumption can be further broken down into 8 main energy groupings as shown in Fig. 8 below. The annual cost of each of these energy grouping is shown individually in Fig. 9.

All the various forms of Energy have been converted into a common energy unit, Megawatt Hours, MWh. (Unit of energy equivalent to one kilowatt (1kW) of power expended for one hour (1h) of time = 1 kWh. 1,000kWh = 1MWh.)

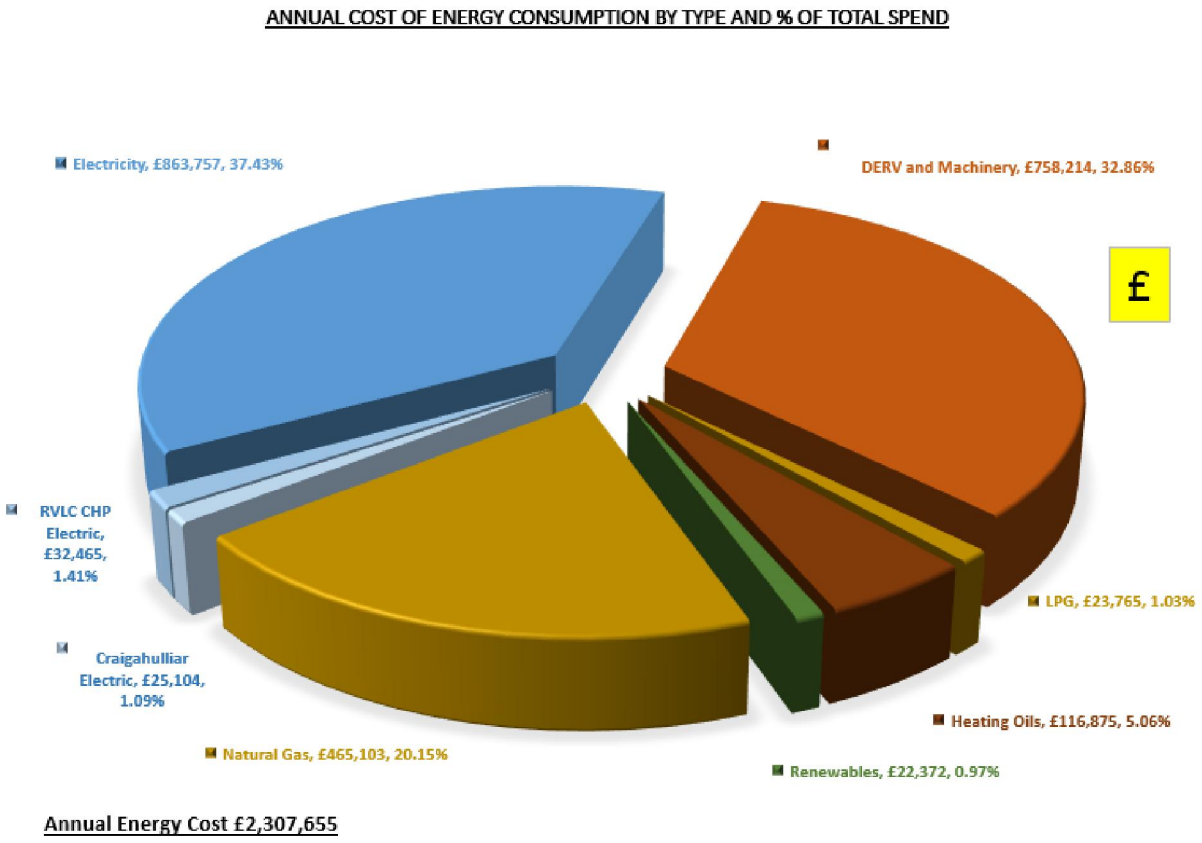


Figure 8 Council Annual Cost of Energy Consumption – Type and % of Total

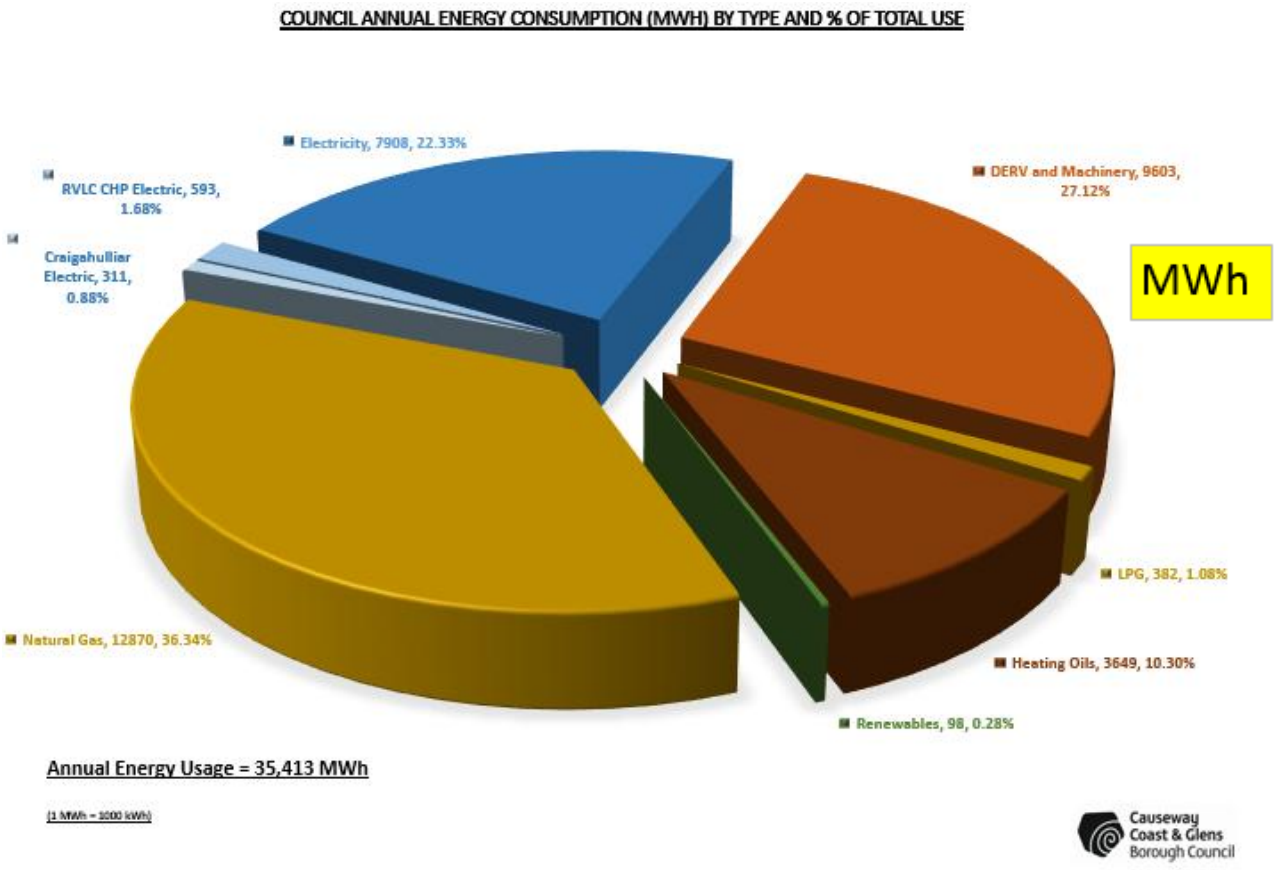


Figure 9 Annual Cost of the 8 main Energy Consumption Types

2.2 Fossil Fuel Energy

The main energy types and sources that Council consume are described as follows;

Electricity – Imported from Energy Company

Heating – Natural Gas, Kerosene, Gas Oil (red diesel), Liquefied Petroleum Gas (LPG)

Electricity and Heat from Combined Heat and Power (CHP) Systems – 2 no. systems, 1 no. natural gas fired and 1 no. Gas Oil fired

Electricity from Landfill Gas – Joint venture between Council and Craigahulliar Energy Limited

Transport – Diesel Oil for Council Road Vehicles (DERV) and Gas Oil for Council Machinery

Grey Fleet – Fuel for vehicles that do not belong to the Council, but which are used for business travel.

2.3 Renewable Energy Types and Sources

The main renewable energy sources that Council currently use are summarised as follows;

Renewable Electricity from Solar PV Generators – 17 no. roof mounted solar PV generators installed across Borough

Renewable Heat from Ground Sourced Heat Pump – 1 no.

Renewable Heat from Solar Thermal Systems – 4 no. roof mounted systems installed

Figure 10 and Figure 11 provide a summary of the Purchased Annual Energy consumed by type and cost for each Council Department.

Conclusions from Figures 7, 8 & 9

It is important to note from the previous figures the following observations:

- That 68%, 11,428 MWhs, of the Total Leisure and Development Directorate Energy purchased is consumed by the 5 centres with pools, (RVLC, CLC, JDLC, Benone Tourist Complex & Waterworld)
- This equates to a cost of £646,226, which represents 59% of the Total L&D Energy Consumption Cost Total of £1,094,896.00
- That 74% of the Environmental Services Energy used is due to transport DERV consumption
- This equates to a cost of £734,613, which represents 83% of the Total ES Energy Consumption Cost Total of £887,797.00

Conclusions from Figures 10 & 11

It is important to note from the following figures the following observations:

- The Grey Fleet adds significant energy consumption (658MWh) and expenditure (£251k) on fossil fuel used by Council in addition to the fossil fuel used by Council Owned Vehicles and Machinery
- The Grey Fleet Fossil Fuel Energy Consumption is equivalent to the annual electrical energy used to operate one of Council's Leisure centres with a pool
- The Grey Fleet Mileage Payments exceed the annual cost of all energy (£200-220K) to operate one of Council's Leisure centres with a pool for both the heat and electric

Section 4 describes objectives and considerations relating to Transport which include options for reducing cost and improving the efficiency of the Grey Fleet

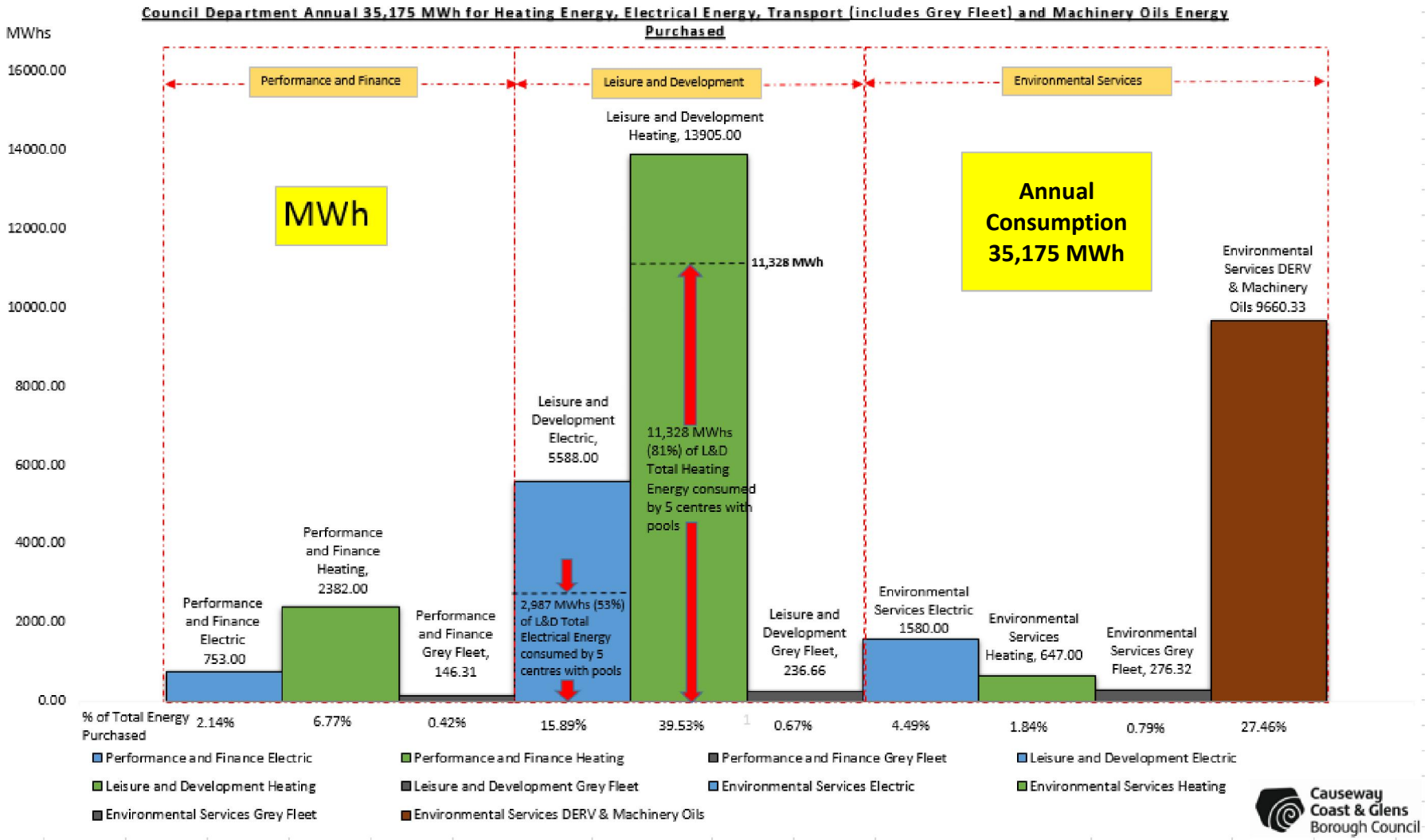


Figure 10 Department Annual MWh, Heating Energy, Electrical Energy, Transport (includes Grey Fleet) and Machinery Oils Energy Purchased

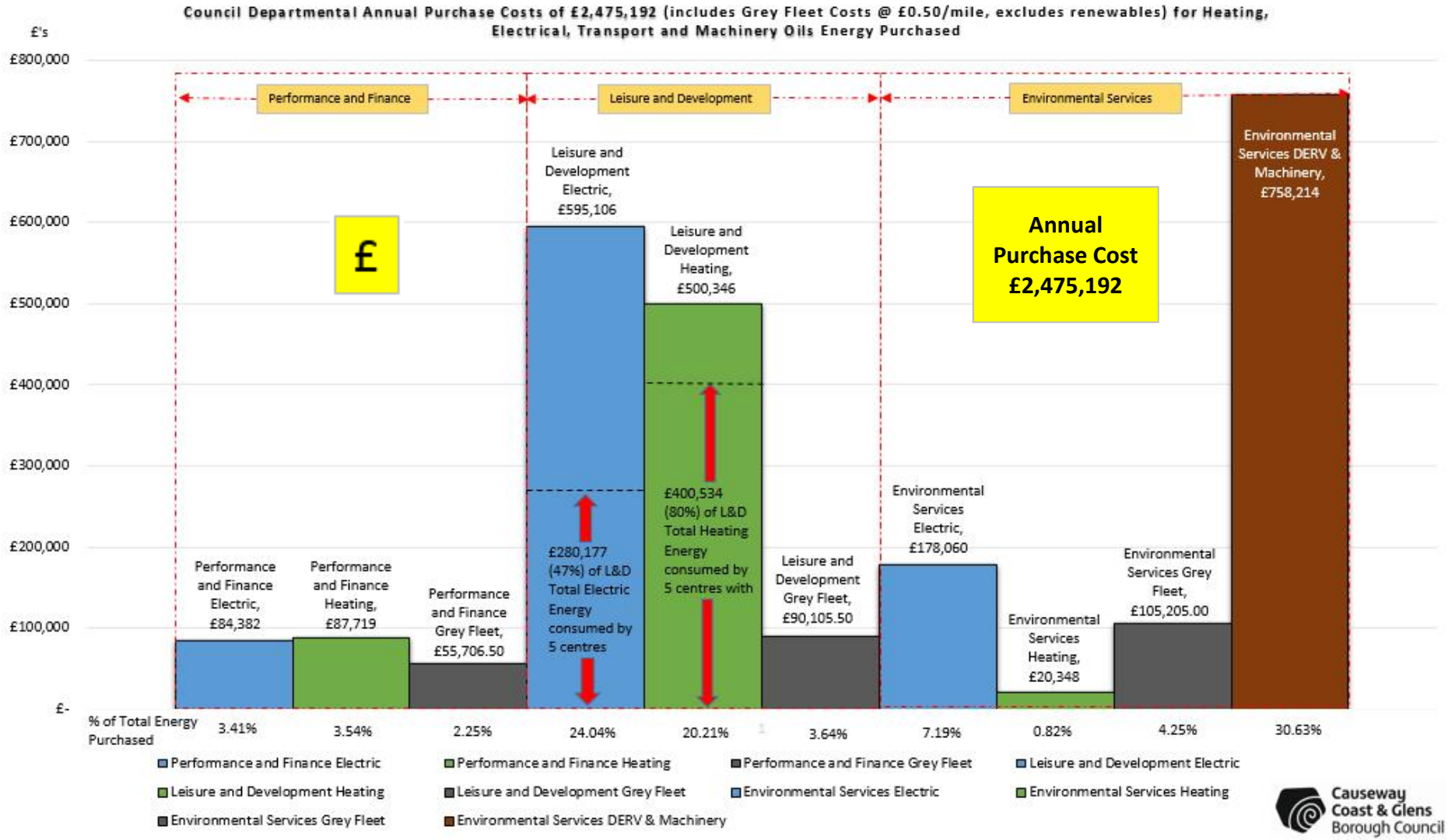


Figure 11 Department Annual Costs for Heating, Electrical, Transport and Machinery Oils

3: Risks and Impacts

Council has many external risks and impacts which it cannot directly control, such as;

- The risk of instability in the cost of Energy impacting operating costs
- The risk of security for Energy Supplies
- Impact of Brexit on domestic Energy Policy, supplies cost risks, UK becoming a taker of energy policy rather than setting energy policy
- Existing and new Energy Interconnectors between UK and Europe
- Climate change and pollution targets double lock will disappear with EU Legislation
- The effects of the sharp decline in "cheap" Fossil Fuel sources
- Future Energy Security due to a lack of "home grown" Renewable Energy sources
- Sustainability/Protection of the Environment for future generations
- The local effects of Climate Change/Global Warming and Conference of the Parties (COP21) update on energy efficiency and Greenhouse Gas (GHG) emission targets
- Penalty driven legislation

One of the external risks that Council can have a direct impact on is the financial impact of the Climate Change Levy on the purchase of energy. This section describes the current financial impact this levy has on energy purchases and how targeting selected renewable and tax exempt technologies for providing energy can reduce this risk.

3.1 Financial - Climate Change Levy (CCL)

This Levy (tax) was introduced some years ago, 1st April 2001, to incentivise Energy Efficiency by "end users" and drive industrial innovation towards Renewable Power generation or Heating technologies such as Wind/Solar Power Generation, Low Energy Lighting and Condensing Oil/Gas Boilers.

CCL is a direct tax paid by an "Energy Supplier" to HMRC. It is added to any bills for Energy that has not come from a Renewable Source. At present Council pays CCL on the Electricity and Natural Gas supply contracts and on some of its LPG sites*. This tax cost Council £40,557.18 in 2015/16, see below. (*with storage tanks greater than 4000 litres)

HMRC CCL Guidance in May 2016 advised that the main rates for CCL will continue to increase year on year. By financial year 2019, Electric CCL will be 0.847p/kWh, which represents a 53% increase. Natural Gas CCL will be 0.339p/kWh, which represents a 75.65% increase.

Climate Change Levy (CCL) Exemptions for electricity generated from a renewable source and approved cogeneration schemes ceased in the 8th July 2015 budget with effect from 1st August 2015. In 2015/16 CCL rates were as follows; (1/4/15 to 31/3/16)

Electricity	0.554p/kWh
Gas	0.193p/kWh
LPG	1.24p/kg

In 2015/16 CC&G expenditure in CCL charges amounted to a total off £40,557.18 divided into the following qualifying categories

Electricity	£23,179.00
Gas	£17,323.83
LPG	£54.34

In 2016/17 CCL rates increased and were as follows;

Electricity	0.559p/kWh
Gas	0.195p/kWh
LPG	1.304p/kg

In 2016/17 CC&G expenditure in CCL charges increased to a total off £56,322.18 divided into the following categories

Electricity	£37,357.07
Gas	£18,929.78
LPG	£35.33 (less LPG deliveries in excess of 4000 Litres purchased in financial year)

Based on the published main rates of CCL and assuming energy consumption remaining constant by 2019/20 financial year the CC&G Council expenditure on CCL is forecasted at £97,565.73 per annum. This figure represents a significant incentive to improve energy efficiency in Estates Properties for both heating and power. Figure 12 illustrates the actual and forecast annual CCL expenditures, 2015-2020.

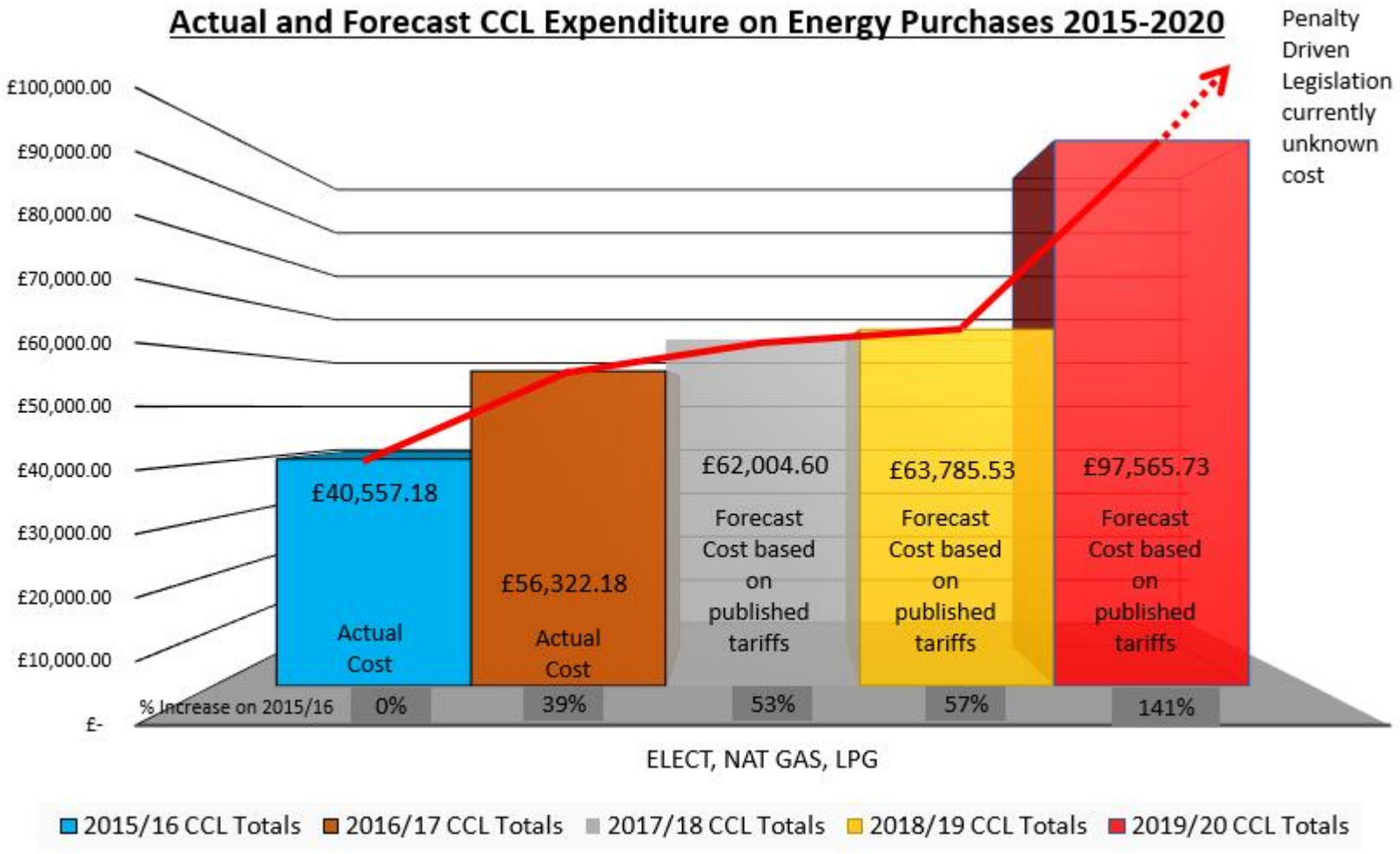


Figure 12 Actual and Forecast CCL Expenditure on Energy Purchases 2015-2020

In 2016 the Treasury abolished the Carbon Reduction Commitment (CRC) scheme from the end of the 2018/19 compliance year. Whilst this legislation did not impact upon Council due to legacy organisational sizes, it could have had a significant financial impact on CC&G Council. However, the Climate Change Levy (CCL), will increase year on year to a £57k increase by 2019/20 from the 2015/16 baseline of £41k as previously described in attached figure 12.

Central Governments (within the UK and beyond) are committed to reducing carbon emissions which will inevitably increase penalty driven legislation via CCL or by other means (as opposed to the now defunct CRC Scheme) to incentivise local authorities. It is essential to have an incremental approach to reduce the impact of such legislation both from a financial and logistical perspective.

As previously mentioned, Council have already approved renewable and energy efficient schemes in the period 2015-17, namely Solar PV installations and introducing LED lighting to many facilities across the Borough.

Each one of these provides small real savings for Council by not having to purchase additional energy and therefore reduces the potential for CCL tax or reducing the risk of other penalty driven legislation with reduced energy cost. It is important that this incremental approach continues to alleviate large adverse costs later.

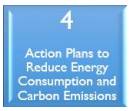
Having established the statistical information of where and how Council consumes energy the EMS signposts an action plan;

Increases awareness and incentives

- to reduce energy consumption
- to reduce carbon emissions
- highlight the improvements in efficiency.

Note all investment decisions will be brought to Council on an individual basis with the associated business cases for individual project approval.

4: Action Plans



Action plans represent to the main focus of this strategy with the main objectives of elevating and communicating awareness of the importance of energy management. This section describes the opportunities and challenges that are current and actionable moving forward. Where practicable and within local Council control, these will be addressed in the Energy Management Strategy Action Planning Phase and are summarised as follows;

CC&G EMS Action Plan Matrix for Estate (Jan 18)			
Action No.	**Actions Description**	**Challenges impacting on action plans**	**Estimated Timeline**
1	Energy Awareness Workshops - Provide targeting and monitoring (T&M) to inform, support and promote positive behaviour leading to efficiency changes - T&M Positive Energy Behaviour Programme	Design and Develop program in line with BEMS Condition Assessment and Upgrading. Age of Council energy infrastructure plant and equipment risks obsolescence and inefficiencies - Estates Asset Management plan to link with Energy Management Strategy for ensuring required investment is in place ahead off refurbishment, replacement and upgrading within the EMS Action Plan	2018-2019
2	New Building Performance Specification	See figure 13 for excerpt demonstrating application of a specification for an existing/new Leisure Centre Facility - Annual Energy Consumption, Fabric Enhancements (design and technology), Systems Enhancements (life cycle technology and sustainability), Housekeeping Enhancements (sustainable behaviour change)	2018/19
3	Provide robust data sets to enable deliverable strategy recommendations;	Managing Legacy Contracts and Utility Lease Issues, historical based data collection from monthly and quarterly invoices	New Energy Data Spreadsheet Operational April 18
4	Produce League Table to rank Council Estates using benchmarking with CIBSE Standards and DEC's (Buildings > 250m^2)	Completion of next round of DEC's and then analysis and review	Completed by Sept 2018
5	Develop strategic relationships with Key Energy and Water suppliers to ensure Council Energy/Water	Water Efficiency Pilot Program Opportunity with NIW	2018-2019

	Infrastructure needs are being met within the current contracts		
6	Energy Efficiency Target & Monitoring – targeting most advantageous capital projects both from carbon reduction and business payback cost perspective	Linked with BEMS Condition Assessment and Robust data Collection	2018-2019-2020
7	Produce Low Carbon and Energy Management **Guidelines** and **In House Technical Support** for New Buildings/Systems to be included at Business Case, Feasibility, Design right through to Practical Completion Stages	Design and Develop Enhanced Energy Guidelines for CC&G Model Buildings derived from CIBSE, BSRIA, EI, BS benchmarking and standards	2018-2019-2020
8	Development of Low Carbon Performance **Specifications** based on Energy Management Guidelines for New Buildings and Existing Building Upgrades - to be included at Feasibility and Design Stage and continuous support through to Practical Completion of Project	Design and Develop CC&G Models of Excellence based on Guidelines	2018-2019-2020
9	Improving Energy Security – feasibility of back-up generators/CHP's and connections for Key Locations and Dedicated Refuge Centres	Design and Develop CC&G Generator connections that are future proofed for further CHP/Renewable Generators connections	2018-2019-2020
10	Competitive open Energy Tendering providing competitive fixed price over appropriate time frames for Gas and Electric Energy Consumption	Updating and Improving data for next 2 year round of 2016 Gas and Electric Framework for purchasing Energy - ISEM may impact positively on costs. BREXIT – Future impact on energy costs and energy security unknown, liquid fuels, natural gas and LPG costs could all escalate	2018-2020

11	Competitive Tendering for Oils that delivers competition on pricing and quality	Current Oils Purchase Framework costs additional excess off £25k pa -new oils contract required that encourages local competition. BREXIT – Future impact on energy costs and energy security unknown, liquid fuels, natural gas and LPG costs could all escalate. Still a high dependency on fossil fuel oils for heating, machinery and transport – 39% of total energy consumed by CC&G	2018-2019
12	In-House Project Team with expertise & capability to develop fit for purpose energy solutions	Design and Develop CC&G Models of Excellence based on Guidelines	2018-2019-2020
13	In-House Energy and Water Financial Management Project Support for Business Cases	Design and Develop CC&G Models of Excellence based on Guidelines	2018-2019-2020
14	Collaboration with other Councils and Local Universities for future delivery options for Innovative Energy Schemes (EMF, QUB and UOU, EMEC)	Establish clear Terms of Reference for Energy Management Forum	2018
15	Research and develop opportunities for Energy from Waste Projects (Micro AD Plants for Heat and Electric) for CC&G Largest Estates Energy Consumers	Restricted Connection (G59) from NIENetworks impacts on Business case	2018-2019-2020
16	Research and develop opportunities for Energy from Waste Projects to feasibility stage e.g. large scale AD	Restricted Connection (G59) from NIENetworks impacts on Business case	2018-2019-2020
17	Research and develop Business Case opportunities for Energy Storage from CC&G Renewable Energy Generators	Rapid Development in Storage Technology will impact on cost reduction per kW storage (VA) - rapidly changing market place keep reviewing	2018-2019-2020
18	Reduction in Energy Purchases via installation of renewable generation technology	Installation of renewable generation technology, now severely limited by no Heat or NIROCS support or funding - investigate other funding opportunities for research and development and funded pilot schemes. Develop innovative energy projects for renewable energy sources for both heat and electric - e.g. utilise our harbours and marinas for water sourced heat	2015-2020

		pumps, water turbines, tidal/wave generators	
19	Reduction in Energy Consumption via technology changes - e.g. LED lighting upgrades	Feasibility studies underway, investment and installation underway	2017-2018
20	Condition and Life Cycle Assessment of all CC&G 25 no. Building Energy Management Systems (BEMS)	4 no. suppliers of current 25 no. BEMS systems with closed comms protocols, condition assessment underway	2017-2018
21	Investigate feasibility of remote access for all 25 BEMS locations	Alignment with Item 16 and subsequent collaboration of review with IT Team to determine most economic, practical and secure option	2018-2019-2020
22	Investigate feasibility of a remote single dashboard display for all BEMS locations	Alignment with Item 16 and subsequent collaboration of review with IT Team to determine most economic, practical and secure option	2018-2019-2020
23	Reduction in Energy Consumption via remote T&M of 25 no. BEMS.	Alignment with Item 16 and subsequent collaboration of review with IT Team to determine most economic, practical and secure option	2018-2019-2020
24	Investigate feasibility of Private Wire (Island Schemes) for Leisure Centres re Gas and Electricity, CHP, Solar Thermal and Solar PV for Leisure Centres	Securing partners in local willing to share cost of infrastructure development	2018-2019-2020
25	Continued development of Coleraine Micro-grid including progressing to feasibility stage	Alignment with UOU et al and investment in feasibility stage	2018-2019-2020
26	On-going Traditional Lamp Replacement with LED on a Defect/Repairs basis	In addition to Item 15 when traditional lamps become defective consider cost benefit of LED replacements	2018-2019-2020
27	Key Council sites @ Riada House and Cloonavin, approved investment for emergency standby generator facilities connection	Design and Develop CC&G Generator connections that are future proofed for further CHP/Renewable Generators connections	2018-2019-2020

28	Post Project Evaluation of Capital Projects against agreed energy performance - measure and report on the delivery of actual energy efficiencies and reasons for any variances deviating from expected Project Design Targets	Completion of Items 7 & 8	2018-2019-2020
29	Remote monitoring and enhanced BEMS incorporate into building designs to provide energy consumption data to integrate with T&M Positive Behaviour Change Programme – Council large sites agreed baseline for Energy/Water Efficient Consumption	BEMS Condition Assessment and review precludes	2018-2019-2020
30	Investigate feasibility of Bio-Fuel/BioGas Opportunities for Leisure Centre CHP's and other high energy users	Slow progress on NI/Ireland Bio-Fuel/Bio-Gas Market and Infrastructure Development by Central Governments	2018-2019-2020
31	Review Increased waste inflows for improvements in energy recovery from Craigahulliar Landfill Site - determine if there is an associated increase in landfill biogas availability and energy from CHP Plant. Forecasting of future income through Annual Royalty Payments out to 2032	Independent Gas Assessment for Craigahulliar Landfill Site required	Report received Aug 17, review on-going wrt to CELtd proving impact of future Royalty Incomes
32	Strict Business Case and Commercial Financial Assessment required for any future renewables schemes after abolition of NIROCs support 31st March 2016 for NI Heat and 31st March for everything else	Installation of renewable generation technology, now severely limited by no Heat or NIROCS support or funding - investigate other funding opportunities for research and development and funded pilot schemes. Develop innovative energy projects for renewable energy sources for both heat and electric - e.g. utilise our harbours and marinas for water sourced heat pumps, water turbines, tidal/wave generators. Inevitable Carbon Tax threat in the future - will increased CCL	2018-2019-2020

		charges be applicable to more energy supplies on a baseline scale in future?	
33	Dedicated Emergency Rescue Centres have emergency electrical/heat generation equipment, generators and connections available	Investment for Emergency Generator Approved and Connections to key sites	2018-19
34	Publish Estates DEC's results on Council Web page with quarterly updates on Energy Consumption for Energy Awareness Campaign	Design and Develop Web Page and Energy Campaign	2018-19
35	Update Capital Programme and bring awareness to secure integration within Capital Programme on Energy Projects	Provide Outline Business Case	2018-19-20
36	Collaborate with Funding Manager to identify, source and secure funding within the UK and Europe	Collaborate with Funding Team for energy awareness	2018-19
37	Integrate and harmonise awareness of strategic direction with Fleet	Collaborate with Fleet Manager on transport objectives for energy awareness	Review annually

Action Plan Matrix for Facilities

To signpost and enable forward planning an action plan matrix is provided which includes a list for all Council Estates Properties ranked highest to lowest consumption and the possible numerous improvements that can be achieved. Figure 13 is an excerpt which illustrates how the action plan matrix would be applied under the general headings and sub-headings. The full matrix will have 246 facilities.

General headings are;

1. Fabric Enhancements (design and technology lead e.g. air tightness and insulation)
2. Systems Enhancements (life cycle technology and sustainability)
3. Housekeeping Enhancements (sustainable behaviour change)

Causeway Coast & Glens Borough Council

Excerpt of Council Action Plan Matrix for Estates in EMS

Causeway Coast and Glens Borough Council - Energy Management Strategy - Action Plan Matrix

Facility/Supply	Annual Energy Consumption					Annual Energy Cost			Colour Code
	kWh Electric	Fuel Type	Fuel Quantity Litres	kWh Heat	Total kWh	Electric £	Heat £	Total Cost	
Joey Dunlop Leisure Centre	728,758	Nat GAS	3,921,646	3,921,646	4,650,404	£ 77,808.33	£ 139,132.28	£216,940.61	

Facility/Supply	Fabric Enhancements (design and technology)									
	Baseline Performance Specification	Low Energy Lighting	Baseline Fabric Surveys	Fabric Insulation (walls, roofs, lofts and floors)	Windows and Glazing	Doors and Draught Lobbies	Air Tightness	Thermal Surveys	Baseline Energy Consumption Survey	Demand Led Ventilation (fit CO_2 sensors)
Joey Dunlop Leisure Centre	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Facility/Supply	Systems Enhancements (life cycle technology and sustainability)											
	Performance Specification	Solar Thermal	M&E Systems Schematics Review	Solar PV	Nat Gas (Biogas) CHP	High Efficiency Nat Gas (Biogas) Boilers	Lighting Controls	Heating Controls	Ventilation Controls	BEMS	Emergency Electrical Generation Supplies	Electrical System Surveys (Phase Imbalances, Power Factor Correction, Thermal Imaging)
Joey Dunlop Leisure Centre	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Facility/Supply	Systems Enhancements (life cycle technology and sustainability)												
	Mechanical Systems Surveys (efficiency testing, thermal imaging, leakage)	Biogas Fuelling	Smart Grid	Heat Network	Large Scale Solar Thermal	Localised Energy Security (Private Wire)	Thermal Storage	Ground / Water / Air Sourced Heat Pumps	Variable Speed Drives	Obsolesence Upgrade	Remote BEMS Access	Remote BEMS Connection	Anerobic Digester Plants
Joey Dunlop Leisure Centre	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Facility/Supply	Housekeeping Enhancements (sustainable behaviour change)															
	Competitive Energy Tendering	Energy Awareness Workshops	New Staff Inductions	Council Energy Quarterly Web Updates	Energy Funding for Innovation Projects	Publish DEC Data on Council Web	Monitor Energy Consumption	Monitor Water Consumption	Monitor Building Usage	Direct Feedfack (smart meters)	Indirect Feedback (billing info)	Energy Audits	Energy Champions	Energy / Water Use Feedback	Bench Marking	Goal Setting	Motivating Change Through Comparative Consumption
Joey Dunlop Leisure Centre	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Figure 13 Excerpt of Council Action Plan Matrix for Estates in EMS

Transport/Fleet Considerations and Objectives

Council Fleet currently has 213 no. road vehicles and 700 items of plant and machinery that are mainly fuelled by DERV.

The current Transport Fleet is broken up into several categories as described below in Table 1 each with strategic objectives to explore for reducing energy cost and emissions for Council.

Vehicle Category (includes mowing machines)	Vehicle Category	Vehicle Category	Vehicle Category
Motor cars, light vans or mowers up to 3500kg	Vehicles between 3500kg and 7500kg	Vehicles over 3500kg	Tractors
B	C1	C	F
			
40 no.	69 no.	87 no.	17 no.
Strategic Objectives			
Explore the feasibility for leasing "Pool" plug-in hybrid electric (PHEV) vehicles to replace an economic portion of the current Grey Fleet and small vans (Grey Fleet - Council Staff using their own vehicles for Council business purposes). This offers the opportunity to achieve savings and reduce carbon emissions for Council	Explore the feasibility for purchasing plug-in hybrid electric (PHEV) vehicles where their use is localised to within 100 transit miles per day	Explore the feasibility for retro-fitting alternative fuel kits to existing vehicles fuel systems to improve efficiency and reduce emissions e.g. Hydrogen Generator output direct into existing fuel inlet manifold	Explore the feasibility of utilising Sustainable Energy Supply for Agricultural Machinery e.g. the John Deere (SESAM) prototype tractor or equivalent

Table 1: Council Fleet summarised in licence categories.

The following objectives signpost direction for 2018 with regard to the assessment of existing and future powering of the various categories of vehicles within the fleet and to update Members on the conclusions.

The Transport Strategy (delivered by the Fleet and Operations Team within Environmental Services) will review the following objectives with the various technologies and assess overall business case in terms of capability, cost and emission reductions and then report advantages of their reviews to Council. This is carried out in collaboration with the Energy Officer.

Table 2 summarises the objectives and considerations.

2018 Transport Strategy Objectives, Considerations and Conclusions		
Objective	**Consideration**	**Annually Reviewed**
1: Assess current business case options to determine any advantage for Council with electric, hybrid or renewable technologies to power the various categories on the basis of meeting service delivery needs	Although there has been rapid development of hybrid and electric vehicle technology, these new technologies are not yet a fully economic alternative or practical to apply for each vehicle category without significant funding and infrastructure improvements ahead of any future penalty driven legislation	Collaboration and Annual Review
	The feasibility of replacing existing fleet vehicles with new low or zero carbon technologies will be continuously reviewed in each category class.	
	Still a high dependency on fossil fuel oils for heating, machinery and transport – 39% of total energy consumed by Council	
2: Determine business case options such as comparing Grey Fleet Mileage Costs against Commercial Hybrid Vehicle Hire Costs for pool vehicles to determine any possible advantage/savings for Council	The life span of current battery technology for electric vehicles is approximately 5 years after which range and performance will reduce.	
	Assess business case ahead of any future penalty driven legislation	
	The replacement cost for vehicle batteries is high.	
	The disposal cost for electric vehicles at end of life is high due to the chemicals used in the batteries.	

	Although road tax is lower for electric and hybrid vehicles Insurance costs are high due the cost of battery replacement should they become damaged.	
	The typical distance range of a small electric vehicle between charges is typically now at only 70 miles.	
	Hybrid and electric vehicles demand a different driving style compared to fossil fuelled vehicles to maximise range. Staff driving these types of Council Vehicles will require adequate training to implement these new driving techniques to ensure economical driving style to assist achieving maximum driving range between charges.	
3: Determine if funding is available for innovative approach to alternative energy for heavy energy use vehicles such as pool cars or refuse collection vehicles	An electric powered refuse collection vehicle, greater than 26 tonnes, would be 60% greater cost than its DERV alternative to purchase.	
4: Align fleet business case timings with Central Government Infrastructure Investment timings for electric/hybrid vehicle investment	A new Compressed Natural Gas Network for lower carbon vehicle fuelling is planned to be installed for NI/ROI Infrastructure reaching from Dublin to Ballymena - monitor network expansion to support Council Area.	

Table 2: 2018 Transport Strategy Objectives and Considerations