DUBLIN CITY COUNCIL ENERGY REVIEW 2019

codema
Dublin's Energy Agency

Comhairle Cathrach Bhaile Átha Cliath
Dublin City Council

01. INTRODUCTION

Codema has developed the 2019 Energy Review on behalf of Dublin City Council (DCC), which is the largest local authority in Ireland. This is the fourth such report to be completed by Codema. The aim of the Energy Review is to highlight the total amount of energy DCC consumed in the past year, along with the total cost and carbon emissions associated with this energy use. Further details relating to years prior to 2019 may be found in DCC's 2016, 2017 and 2018 Energy Reviews. This Energy Review also aims to clearly demonstrate where energy is used in the Council, what drives its consumption, and where the greatest energy-saving potential is; this will help DCC to identify where it currently is in relation to public sector energy targets, and what areas it needs to prioritise in order to meet new 2030 targets.

As part of this process, Codema has analysed DCC's total energy use and broken this down into seven Significant Energy Users (SEUs), which are explained in detail within this Energy Review. Codema gives an overview of the current energy use associated with each SEU, and provides recommendations on the action DCC must take to reduce energy consumption in each SEU area in order to meet public sector targets.

Additionally, Codema has included a summary of DCC's progress in terms of its carbon emissions. Under the Covenant of Mayors for Climate and Energy initiative, which DCC signed up to in 2009, DCC has voluntarily set a target of reducing its greenhouse gas emissions (GHGs) by 40% by 2030. This target has also been included in DCC's Climate Change Action Plan (CCAP) 2019-2024, and goes beyond the current national target of a 30% reduction in emissions by 2030, which was set by the Government in 2019. This Government target is likely to be increased to 50%, in line with the new EU Green Deal. From 2021 onwards, these new statutory targets will require carbon emissions to be reported annually to the Sustainable Energy Authority of Ireland (SEAI), alongside energy consumption.

PUBLIC LIGHTING

HOUSING

TRANSPORT

SPORTS FACILITIES

OFFICES & DEPOTS

CIVIC OFFICES

FIRE STATIONS

Current Status & Obligations

In 2019, DCC consumed a total of 172 gigawatt hours (GWh) of primary energy; this is the equivalent of 32,247 tonnes of CO_2 and Codema estimates the associated cost of this energy use to be approximately €11.8 million.

This information comes from Codema's database, which incorporates the data from the Monitoring and Reporting (M&R) system developed by SEAI and the Department of the Environment, Climate and Communications (DECC). It is important to note that these figures may vary, as changes to data within the M&R system for previous years are accounted for, such as the addition of missing accounts or the removal of accounts that are no longer linked to DCC. These changes are made throughout the system, from the baseline year to date, and don't affect the baseline or reduction target.

Codema has been entering this yearly data into the M&R system on behalf of DCC since 2011, in order to comply with the reporting requirements of the European Energy Efficiency Directive 2012/27/EU. The directive has been transposed into Irish Law as Statutory Instrument S.I. 426 of 2014, which sets out several obligations on public bodies with respect to their "exemplary role" for energy efficiency by achieving savings of 33% by 2020. This is an average reduction target of 3% per year.

To date, as reported by the M&R system, DCC has improved its energy performance by 36.5%, compared to the baseline year, which is an average of the years 2006-2008. This amounts to an absolute reduction of 75 GWh in primary energy when compared to the baseline, or 17,315 tonnes of CO_2. By the end of 2018, DCC had already exceeded the 33% public sector target, and has improved on this again in 2019.

As mentioned earlier, further 2030 public sector targets have been set, based on the Government's Climate Action Plan 2019 To Tackle Climate Breakdown. New targets of 50% improvement in energy efficiency from the 2006-2008 baseline and a 30% reduction in CO_2 by 2030 have been set. This will require continued and increased focus on the energy performance of DCC's buildings and operations over the coming decade.

DCC Energy Overview 2019

CONSUMED 172 GWH OF PRIMARY ENERGY

32,247 TONNES OF CO_2 EMITTED

€11.8 MILLION ASSOCIATED ENERGY COST

Public Sector Obligations

ACHIEVE SAVINGS OF 33% BY 2020 AND 50% BY 2030

REDUCTION TARGET OF 3% PER YEAR

DCC Progress: Baseline - 2019

IMPROVED ENERGY PERFORMANCE BY 36.5%

17,315 TONNES OF CO_2 SAVED

33% PUBLIC SECTOR TARGET MET, NEED TO LOOK TOWARDS 2030 TARGET

01. INTRODUCTION
(CONTINUED)

It should be noted that a significant factor in the achievement of the 33% target has been a reduction in the primary energy conversion factor used by SEAI for electricity. This reduction is due to the gradual increase in the efficiency of electricity generation and transmission over recent years. Significant decreases were observed in 2018 and 2019, some of which is due to the Moneypoint coal-fired plant operating at reduced capacity due to a fault. Moneypoint has remained operating at a reduced capacity in 2020, so it is unlikely that any reversal in this trend will be observed for the 2020 M&R reporting cycle.

The Energy Oversight Committee was set up in 2017 by Céline Reilly, who is the Executive Manager within DCC's Environment and Transportation Department and is the Council's appointed Energy Performance Officer (EPO). The Committee members continued to meet in 2019 to help progress energy efficiency initiatives in DCC and put a huge amount of time and effort into drafting DCC's Climate Change Action Plan 2019-2024. Codema will continue to work with the Committee to identify further potential energy efficiency and carbon saving projects, based on the findings of this Energy Review and the actions outlined in DCC's CCAP. Significant focus is currently being placed on the development of an internationally-accredited energy management system throughout the whole of DCC as part of this process. DCC is aiming to be accredited with the ISO 50001 standard in 2021.

Methodology

In order to calculate potential energy savings in DCC, it is necessary to analyse changes in other factors that are directly related to the Council's energy use. With this in mind, Codema uses Energy Performance Indicators (EnPIs) to measure DCC's energy performance more accurately. This method determines how efficiently DCC is using energy, as it is normalised to account for changes in the activity level related to the energy use, or the "activity metric", of the local authority. This is a measure of the key activity that has the greatest influence on energy consumption. An EnPI is calculated by dividing the organisation's Total Primary Energy Requirement (TPER) by an activity metric.

When there are multiple variables that drive energy consumption, a composite performance indicator is used. Determining a single performance indicator for complex situations where multiple variables drive consumption can be difficult, because different aspects of the facility consume different amounts of energy and are driven by different variables. In such cases, a composite performance indicator based on more than one variable is used. The scale of each variable's contribution is defined by a weighting scale.

In the case of DCC, the overall performance indicator is based on population served. Therefore, DCC's EnPI is the TPER divided by the population served for that year. Therefore, the performance of DCC is determined not only by its annual energy use, but also by a rise or fall in population in the Dublin City area in the same year. Savings are based on cumulative absolute primary energy and carbon savings from the baseline year to 2019.

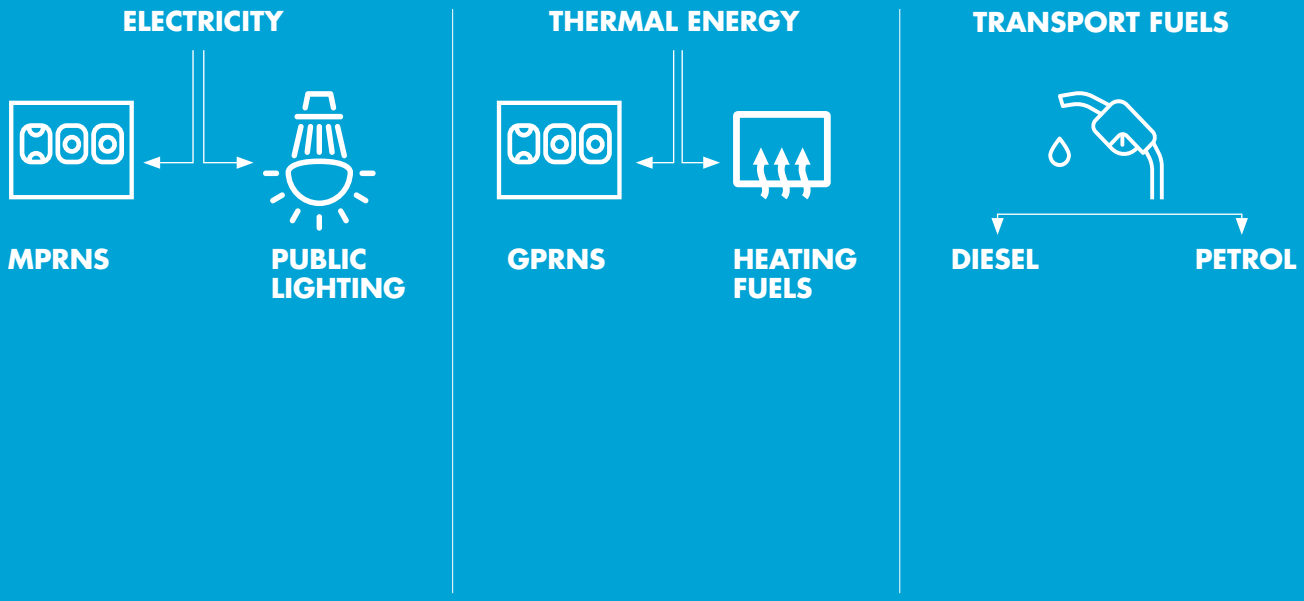
In 2010, the Dublin Local Authorities outsourced waste collection within the region. Also, in 2013, water services within the local authorities were transferred to Irish Water. The M&R system and Codema's database have provisions to account for these changes, and therefore accurately track the actual energy performance of the local authority from the baseline year to 2019, which takes proper account of services that have been outsourced.

Formula for Calculating EnPIs for SEUs

$$\text{ACTIVITY}_0 = \sum_{i=1}^{x} \left[\frac{\text{Subactivity}_i}{\text{Subactivity}_{i,\text{baseline}}} \times \text{Weighting}_i \times 1{,}000 \right]$$

02. DCC ENERGY CONSUMPTION 2019

The energy database shows that DCC consumed 172 GWh of primary energy and produced 32,247 tonnes of CO_2 in 2019. Codema estimates the costs associated with this energy use to be approximately €11.8 million for the year. This is broken down into three principal energy categories; electricity, gas/heating and transport fuels. Electricity consumption comprises of metered electrical accounts (MPRNs) from DCC's buildings and unmetered public lights. Thermal energy consumption consists of metered gas accounts (GPRNs) and heating fuels data from buildings, and transport accounts for all the transport fuels within DCC, i.e. diesel and petrol.



02. DCC ENERGY CONSUMPTION 2019
(CONTINUED)

Figure 1 on the next page shows the breakdown of the consumption categories. The height represents the total estimated cost of that energy type, and each coloured area highlights what percentage of the overall energy use this energy type accounts for. Electricity accounts for the largest share of energy consumed at approximately 55%. The reasons for this are the large number of public lights in the Dublin City area and the vast amount of electricity accounts within DCC's buildings and facilities.

With regards to the energy cost, the analysis is much more complex, as fuel tariffs vary and the various energy accounts have different suppliers. Also, the local authority's targets are measured in energy efficiency, not cost savings. In order to estimate the total cost of energy attributable to the different energy categories, Codema has used average national prices for electricity, heating gas and the different fuel types sourced from SEAI's commercial fuel cost comparison charts.

The energy database shows that DCC improved its energy performance by 36.5% between the baseline year and 2019. This represents an absolute saving of 75 GWh in primary energy when compared to the baseline, or 17,315 tonnes of CO_2 when comparing the baseline year to 2019. This indicates that DCC has already achieved its 2020 efficiency target of 33% ahead of schedule. While this is a very encouraging achievement, it should not be seen as "job done" as regards energy efficiency, particularly with even more challenging 2030 targets just around the corner. Energy savings are not guaranteed from year to year, and effort must be maintained to improve upon these savings through ongoing monitoring and analysis. The new target of 50% improvement in energy efficiency presents a new gap-to-target of 13.5%. This means that DCC must improve its energy performance by a further 13.5% compared to its original baseline between now and 2030. This is estimated to be a reduction of 37 GWh in primary energy. Therefore, an average annual reduction of 3.4 GWh of primary energy between now and 2030 is necessary.

Figure 2 on the next page illustrates DCC's absolute energy consumption. The absolute energy consumption is the energy consumption with no activity metric associated. This is directly looking at the overall reduction in total primary energy from the baseline to 2019. In 2019, there was a large decrease in energy consumption. This was mainly due to improved energy performance in areas such as the Dublin Fire Brigade, Offices, Depots, Public Lighting and Housing.

Figure 3 illustrates DCC's normalised annual energy performance compared to the 50% glidepath to 2030. The glidepath shows the average annual reduction required to reach the 50% target. This takes into account the rise and fall of the activity metrics, and tracks them compared to DCC's TPER of all fuel sources. In 2019, DCC made good progress and is now running ahead of its glidepath target.

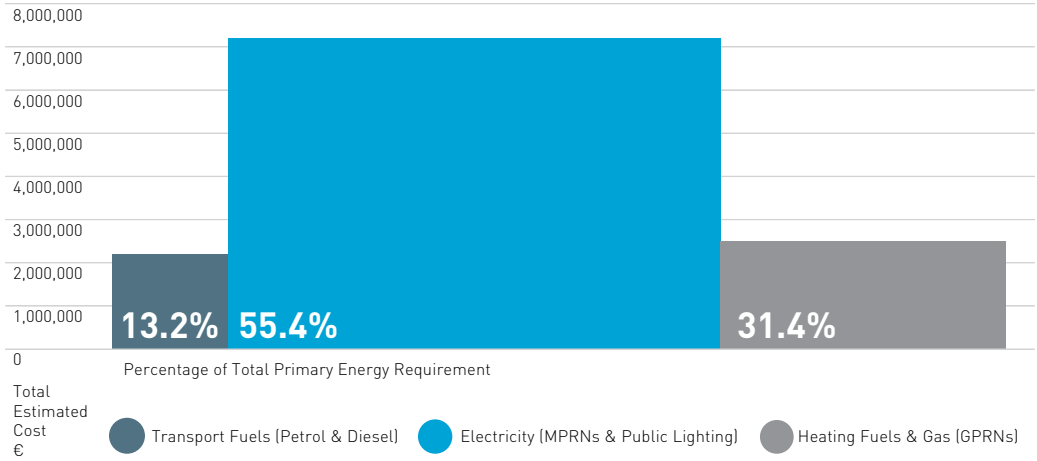


Figure 1: DCC Energy Categories - 2019

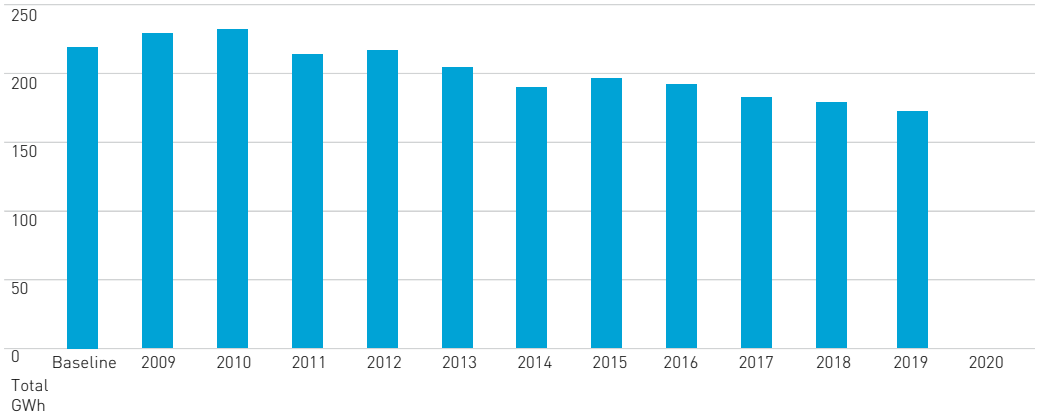


Figure 2: DCC Absolute Annual Energy Consumption

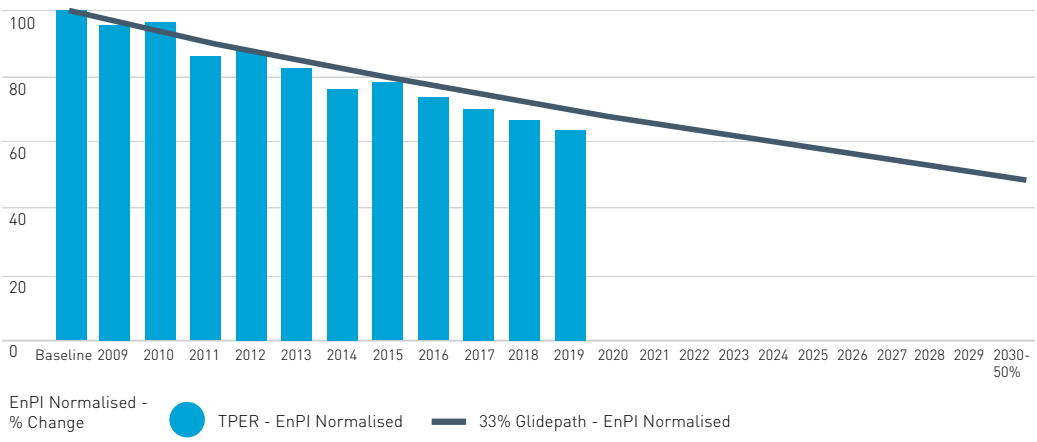


Figure 3: DCC Annual Energy Performance Compared to 50% Glidepath

02. DCC ENERGY CONSUMPTION 2019
(CONTINUED)

CLIMATE CHANGE ACTION PLAN & CARBON EMISSIONS

In 2018 and 2019, Codema helped to prepare DCC's Climate Change Action Plan 2019-2024, in partnership with the Environment Strategic Policy Committee and the Elected Members of Dublin City Council. This plan sets out how the Council will improve energy efficiency and reduce greenhouse gas emissions in its own buildings and operations, while making Dublin a more climate-resilient city with engaged and informed citizens. This will be achieved by a range of ongoing and planned actions in five key areas, which will be continuously monitored, evaluated and updated to 2030 and beyond. The key targets included in this plan are the statutory 33% improvement in the Council's energy efficiency by 2020, as well as a 40% reduction in the Council's greenhouse gas emissions by 2030, as previously set out under the Covenant of Mayors agreement, which DCC signed up to in 2009.

In terms of greenhouse gas emissions, DCC is already making very good progress towards its 40% reduction target and is ahead of its glidepath, as presented in Figure 4 below. Compared to the baseline year, DCC's CO_2 emissions in 2019 had reduced by 38% to 32,247 tonnes. This leaves a gap-to-target of 920 tonnes of CO_2 between now and 2030. As 55% of the Council's energy demand is in the form of electricity, the rapid decarbonisation of the electricity supplied through the national grid over the coming decade will have an increasingly positive impact on the Council's CO_2 emissions over this period. As it is now clear that this target will easily be met, and in anticipation of the expected increase in this target to 50%, the Council has now begun planning for a 50% target for GHG emissions.

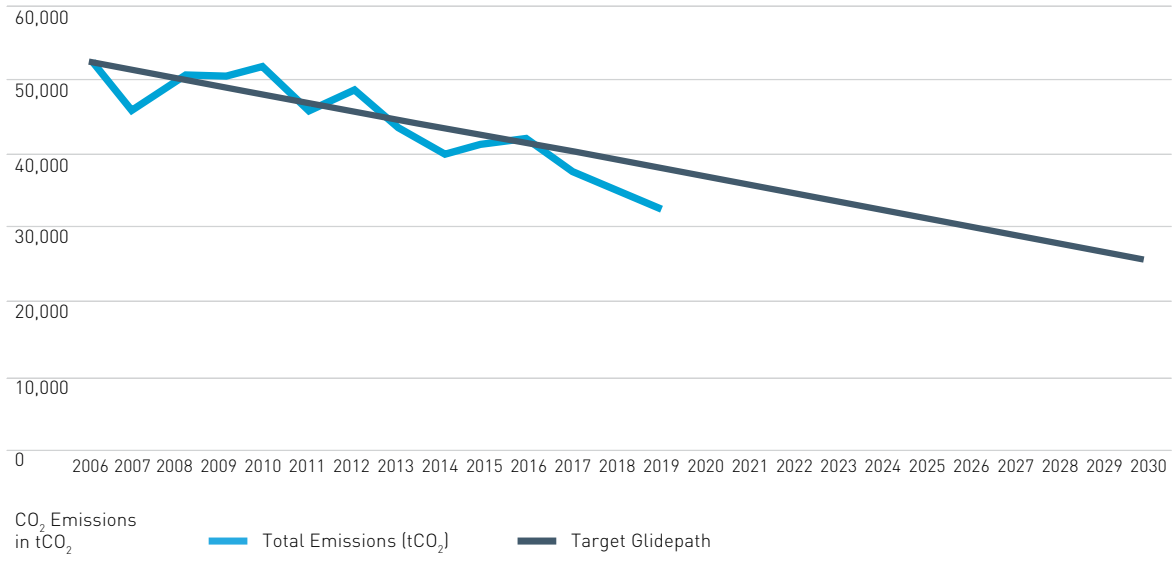


Figure 4: DCC Annual CO_2 Emissions Performance Compared to 50% Glidepath

03. SIGNIFICANT ENERGY USERS

To help better understand DCC's energy use, Codema has broken up the Council's total energy consumption into Significant Energy Users (SEUs). These SEUs help identify the measures that will contribute most effectively to energy savings and will have the most positive impact on energy efficiency targets.

This approach ensures the most efficient use of resources for maintaining and improving energy efficiency in critical areas within DCC. Codema developed these SEUs by creating an energy database, which includes all the data reported in the M&R system, data compiled by Codema through energy audits, and direct contact with DCC staff.

Codema compiled all of the Council's electricity and gas accounts and developed a full list of buildings by marrying electrical and gas accounts for each of these buildings. DCC's Transport Department provided all of the fuels data, and all data on public lighting was compiled through contact with the Public Lighting Department and the Unmetered Registrar (UMR).

The database gives a breakdown of each of DCC's SEUs into Total Primary Energy Requirement (TPER), CO_2, and cost year-on-year, and compares this back to the baseline. Codema also compares this data to an energy performance indicator to track the energy performance of each SEU.

By analysing this data, Codema has identified seven key areas, or SEUs, within the Council. These account for 88% of DCC's total primary energy requirement and can be broken down as follows:

PUBLIC LIGHTING 24%

HOUSING 17%

SPORTS FACILITIES 13%

FIRE STATIONS 10%

OFFICES & DEPOTS 10%

TRANSPORT 8%

CIVIC OFFICES 6%

03. SIGNIFICANT ENERGY USERS
(CONTINUED)

Figure 5 on the opposite page shows the breakdown of DCC's SEUs. Public Lighting is the largest SEU, accounting for 24% of the total load. This is followed by Housing at 17% and Sports Facilities at 13%. The Fire Stations and Offices and Depots both account for 10% of the load, with the Civic Offices making up a further 6%. Transport makes up another 8% of the total. The remainder of the consumption is made up of smaller accounts within DCC, such as libraries, heating fuels and smaller electrical accounts.

The management of energy in these seven SEUs has been critical for DCC in achieving its 33% energy reduction target, and will remain critical in future years to ensure that these savings are maintained and further improved upon. The DCC Energy Oversight Committee continues to target these areas and has identified potential energy saving projects to be implemented in 2020. These projects are highlighted later in the individual SEU chapters of this report.

Figure 6 shows how the SEUs performed in 2019, compared to 2018. Many of the SEUs achieved an improvement in energy performance in 2019, apart from the Civic Offices, Transport and the Sports Facilities.

The Fire Stations saw a large improvement of 10.4% in energy efficiency compared to the previous year. This was largely due to a decrease in bulk fuel consumption but also from significant savings in a number of Fire Stations. The Offices and Depots saw an 8.3% improvement in energy performance. This was due to a reduction in gas consumption in a number of Area Offices and Civic Centres around the city. Public Lighting decreased its energy consumption by 2 GWh or 5.6% in energy efficiency improvement, due to the ongoing upgrading of public lights to LEDs. Housing saw an improvement in energy performance of 3.2% due to a reduced electrical consumption in landlord lighting and small savings in a number of community centres. Transport has achieved significant savings in recent years through its fleet renewal programme, however, a 5.5% decrease in energy performance was seen in 2019. Similarly, the Civic Offices and Sports Facilities both recorded decreased energy performance of 2.5% and 3.8% respectively, compared to 2018.

The energy performance of the SEUs will be discussed in more detail in the SEU sections of this report.

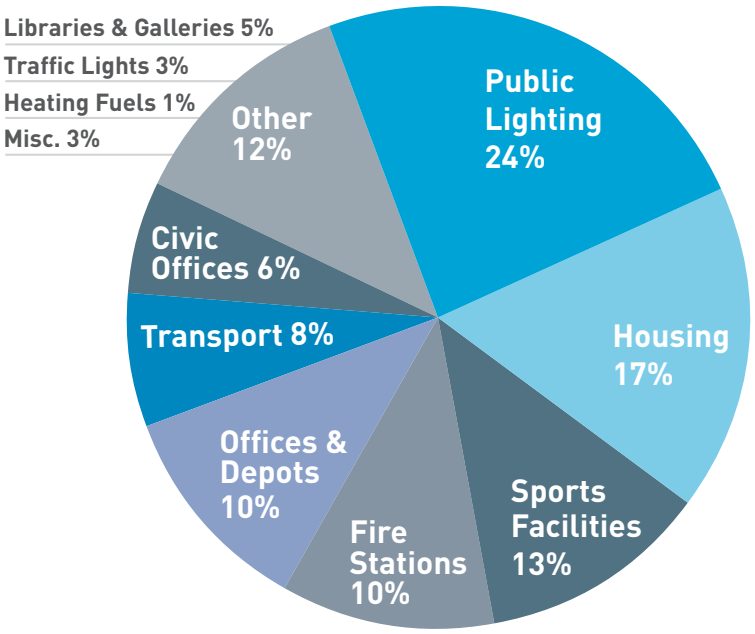


Figure 5: SEU Analysis

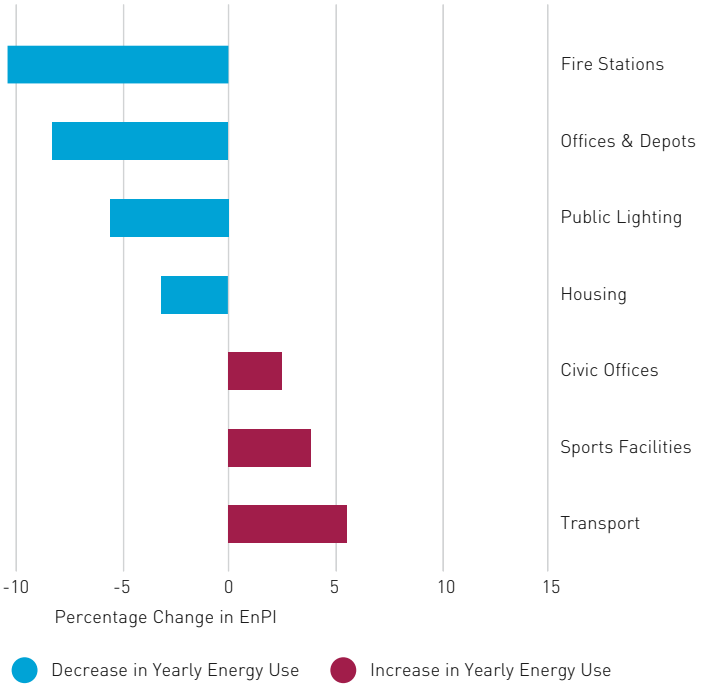


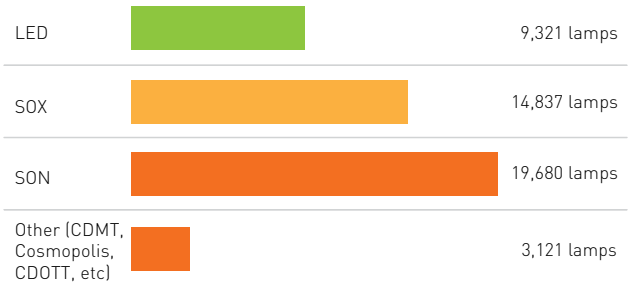
Figure 6: SEU Performance Change Between 2018 & 2019

03. SIGNIFICANT ENERGY USERS
(CONTINUED)

PUBLIC LIGHTING

Public Lighting is the largest SEU within DCC. In 2019, Public Lighting accounted for 24% of DCC's primary energy consumption, which amounted to 41.4 GWh of primary energy and 7,235 tonnes of CO_2. Public Lighting consists of approximately 47,000 street lights. The street lights are broken up into four different light source categories. Listed below is a summary of these main light sources and their associated quantity; they are also listed in order of their efficiency:

- Light Emitting Diode (LED) – 9,321 lights
- Low Pressure Sodium (SOX) – 14,837 lights
- High Pressure Sodium (SON) – 19,680 lights
- Other Light Sources (CDMT, CDOTT, Cosmopolis, etc.) – 3,121 lights



DCC Public Lighting 2019

CONSUMED 41.4 GWH OF PRIMARY ENERGY

7,235 TONNES OF CO_2 EMITTED

IMPROVED ENERGY PERFORMANCE BY 26% SINCE BASELINE

Identification of Relevant Variables for Public Lighting

In relation to Public Lighting, the relevant variables for the development of EnPIs to track the energy performance are very constant. Public Lighting only consumes electricity and has a predictable load. Public Lighting is also charged on a predefined number of burn hours per year, and is largely unmetered. Burn hours are reflected seasonally, and don't change from year to year.

One variable that is not consistent, and drives energy consumption in Public Lighting, is the quantity of lights. As the region grows to support a rise in population, the quantity of lights increases. This is reflected in the data received from the Unmetered Registrar (UMR). Therefore, to accurately track the energy performance, Public Lighting is compared to the number of unmetered public lights for that given year. This

formula can be seen below:

Public Lighting EnPI =
kWh TPER/number of public lights

Traffic lights have been excluded from this EnPI as they are not under the control of the Public Lighting Department.

Energy Performance of Public Lighting

By the end of 2019, DCC's Public Lighting Department had 9,321 LED lights in the city. The energy database shows that Public Lighting has improved its energy performance by 26% since the baseline, based on its EnPI. This is an absolute annual reduction of 11 GWh of primary energy, and 4,887 tonnes of CO_2. This is illustrated in Figure 7.

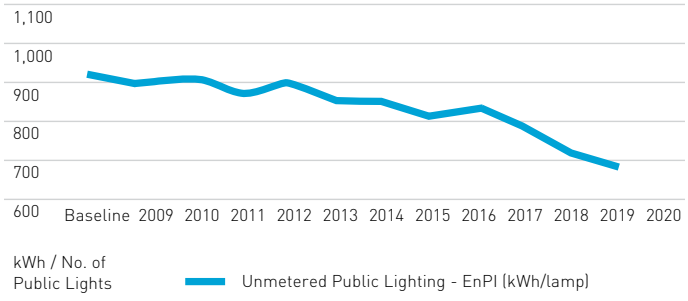
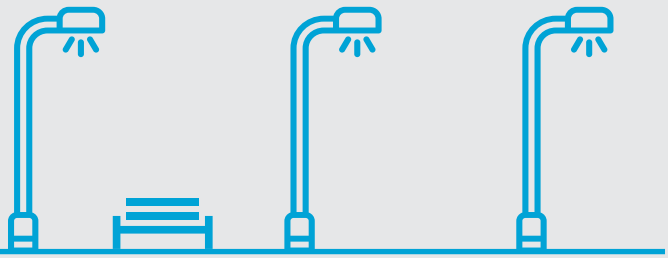


Figure 7: Public Lighting Annual Energy Performance

PUBLIC LIGHTING PLAN TOWARDS 2030



As Public Lighting is the largest of DCC's SEUs, it is vital that the Council commits to further energy reductions in this area and puts a more detailed plan in place for meeting energy efficiency and CO_2 targets for 2030 and beyond. Energy reduction in electricity has more impact on the Council's targets than any other energy type, due to its high primary energy conversion factor.

DCC has committed to replacing the remaining 36,000 street lamps with LEDs, coupled with the roll-out of a central management system to manage street lights remotely, and to facilitate smart cities applications within the capital. The project aims to replace up to 8,000 lamps per year and it is envisioned it will take up to eight years to complete. To facilitate the project, a framework will be set up for 8 years. Stage 1 of the tendering process has been completed and it is hopeful that the project will go out to tender before the end of 2020.

This project will produce savings of 24.1 GWh of TPER and 4,213 tonnes of CO_2. This would have a significant impact on the Council's targets towards 2030.

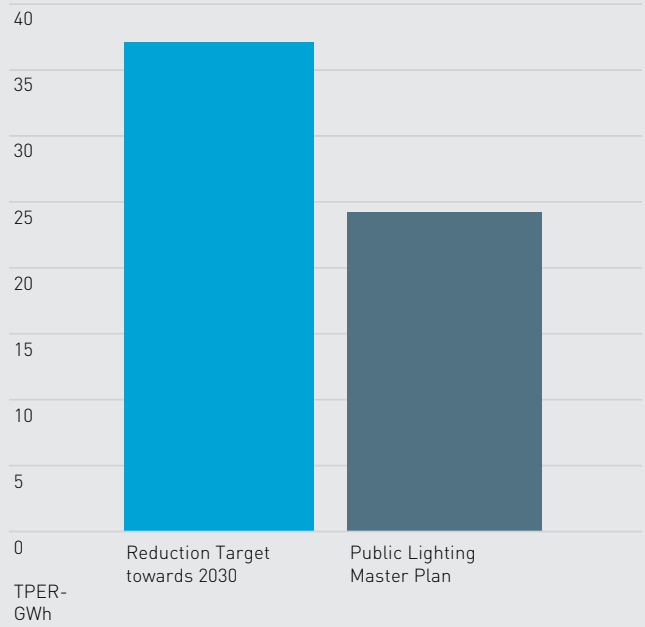


Figure 8: Public Lighting Plan towards 2030

03. SIGNIFICANT ENERGY USERS
(CONTINUED)

HOUSING

Housing is now the second largest SEU within DCC. In 2019, Housing accounted for 17% of DCC's primary energy consumption, which amounted to 29.9 GWh of primary energy consumption, 4,967 tonnes of CO_2 and almost €1.5 million in energy costs. Housing is responsible for 24,503 properties within Dublin City, which are broken up into apartments, houses, senior citizen units, etc. The Housing Department is not responsible for the majority of the energy bills for these properties, but is responsible for areas such as landlord lighting and heating, landlord supplies, water pumping, community centres and the electrical and mechanical systems connected with these properties.

Identification of Relevant Variables for Housing

In relation to Housing, there are two main energy types: electricity and gas. Once again, when there are various factors that influence energy consumption, a combined performance indicator is used.

As is the case with many of the other SEU areas, Housing has many different factors that drives its overall energy consumption. Gas consumption is mainly dependent on the external temperature. Therefore, the composite performance indicator used to measure Housing's energy performance is the energy consumed (kWh TPER), divided by a weighting scale of Heating Degree Days (HDD) and the number of units in the housing stock. This formula can be seen below:

Housing EnPI = kWh TPER/(HDD)(STOCK)

DCC Housing 2019

CONSUMED 29.9 GWH OF PRIMARY ENERGY

4,967 TONNES OF CO_2 EMITTED

€1.5M ASSOCIATED ENERGY COST

IMPROVED ENERGY PERFORMANCE BY 33.2% SINCE BASELINE

Energy Performance of Housing

The database shows that Housing has improved its energy performance by 33.2% since the baseline. This is an absolute reduction of 11.2 GWh of primary energy and 3,463 tonnes of CO_2. Much of this saving is attributable to the Managed Energy Services Agreement (MESA) and Better Energy Communities (BEC) projects undertaken over the past number of years. In 2019, a small improvement in energy performance was observed, compared to 2018. This is due to decreases in consumption across all areas of this SEU, including large savings in landlord lighting and community centre accounts. These areas have been the target of the Mechanical and Energy Efficiency Section BEC applications and Electrical Services landlord upgrades.

The Electrical Services Section upgraded landlord lighting in various sites with the intent of reducing energy consumption and thereby promoting the environmental ethos of Dublin City Council. Conventional lamps were replaced with more efficient LEDs, to increase the level of control and the quality of light within these sites. In all, over 90 sites were upgraded in the recent past.

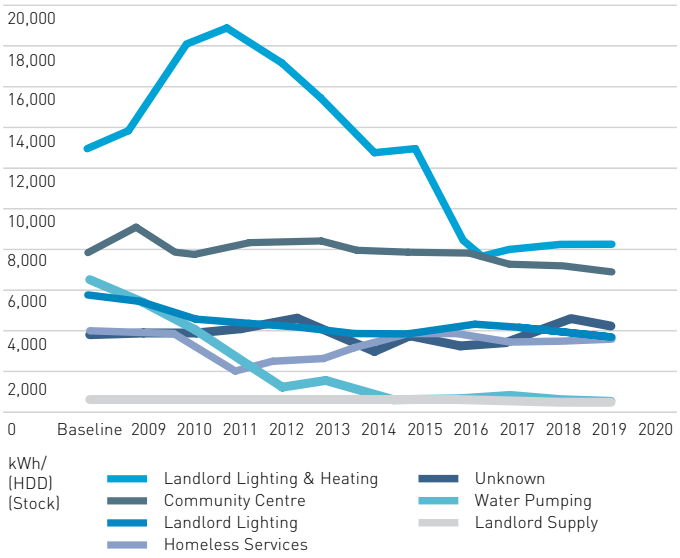
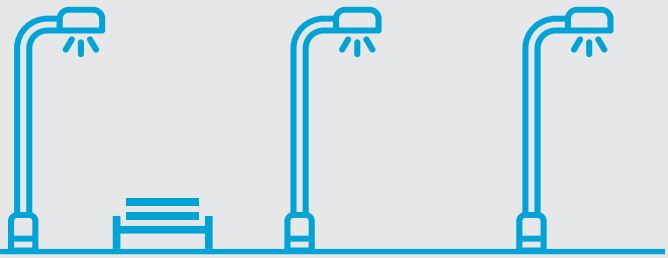


Figure 9: Housing Annual Energy Performance

HOUSING PLAN TOWARDS 2030



Housing is another area that is key to DCC achieving its targets to 2030 and beyond. Figure 9 shows that the areas within Housing with the most potential for energy savings are Community Centres, Landlord Lighting and Heating and the Homeless Services. The Mechanical and Energy Efficiency Section has undertaken a BEC application that targeted the senior and homeless service facilities around the city. The project is expected to deliver a reduction of 1.9 GWh of TPER and 365 tonnes of CO_2. Verification of the actual savings achieved will only be possible once a full year's data is available at the end of 2020.

The Electrical Services Section has been continually upgrading landlord lighting in various social housing complexes around the city with the intent of reducing energy consumption and improving the quality of light provided. In addition to this, Electrical Services continues to replace failed lighting with LEDs.

The Housing Department aims to save 2 GWh of primary energy and 379 tonnes of CO_2 from both the BEC application and landlord lighting project.

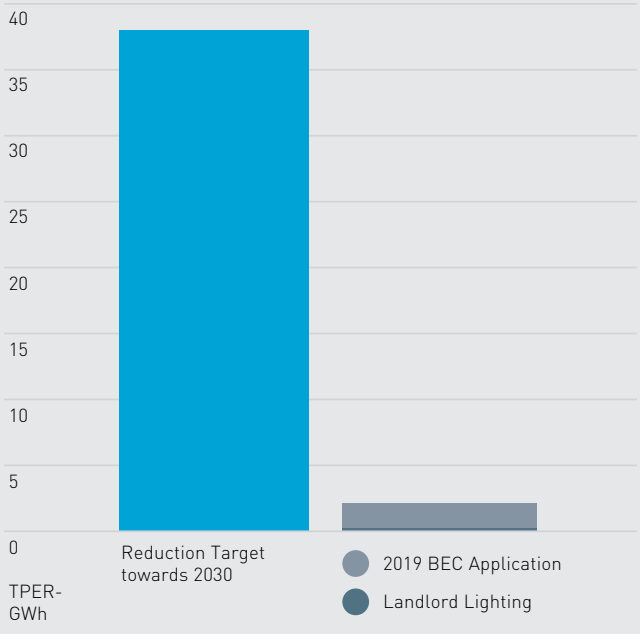


Figure 10: Housing Plan towards 2030

03. SIGNIFICANT ENERGY USERS
(CONTINUED)

SPORTS FACILITIES

Sports Facilities are the third largest energy consumer within DCC. DCC currently operates five large leisure centres, four smaller swimming pools and 24 dry sports centres. In 2019, these facilities accounted for 13% of the local authority's primary energy requirement. This represents a consumption of 21.9 GWh of primary energy, 4,002 tonnes of CO_2 and an estimated €1.1 million in energy spend.

Identification of Relevant Variables for the Sports Facilities

In relation to the Sports Facilities, electricity and gas are the two main energy types. With multiple variables driving energy consumption, a composite performance indicator is used to determine the overall energy performance. Factors such as footfall, opening hours and floor area are the significant variables influencing overall energy consumption. Consequently, a composite metric is appropriate, dividing energy consumed (kWh TPER) by a weighted scale of total floor area (m^2) and Heating Degree Days (HDD). This is shown in the formula below:

Sports Facilities EnPI = kWh TPER/(m^2)(HDD)

DCC Sports Facilities 2019

CONSUMED 21.9 GWH OF PRIMARY ENERGY

4,002 TONNES OF CO_2 EMITTED

€1.1M ASSOCIATED ENERGY COST

IMPROVED ENERGY PERFORMANCE BY 22.8% SINCE BASELINE

Energy Performance of the Sports Facilities

The energy database shows that the Sports Facilities have improved their energy performance by 22.8% since the baseline, compared to the EnPI. Despite a significant increase in services provided, most notably the opening of the Swan Leisure facility in 2011, the absolute primary energy consumption for Sports Facilities has decreased by 1.3 GWh since the baseline. Carbon emissions have also fallen by 233 tonnes of CO_2, mostly due to the reduced carbon intensity of electricity generation on the grid.

In 2016, Codema helped Dublin City Council to implement its first Energy Performance Contract (EPC) for the upgrade of Ballymun, Finglas and Markievicz Sports and Fitness Centres. Works included new LED lighting, improved building control systems and a new CHP system in Ballymun. Codema is assisting DCC with the ongoing Measurement and Verification (M&V) of this

project; in the first three years, DCC has achieved energy savings of 32% and saved almost €515,000 in energy costs. Maintenance costs have also been significantly reduced as a result of this project.

After the completion of the first EPC project, it became clear that the original CHP unit in Finglas Sports and Fitness Centre was now oversized and underperforming due to the reduced loading on it. In 2018, this CHP system was reconfigured to additionally supply electricity to the adjacent Finglas Area Office. This increased the loading on the CHP unit once more, allowing it to operate at its most efficient and reliable output level. This resulted in an increase in gas consumption in the Finglas Sports and Fitness Centre, which can be seen in Figure 11. While this has resulted in a slight increase in gas consumption, it has led to lower electricity costs for both Finglas Sports and Fitness Centre and the Area Office, while also reducing CHP downtime.

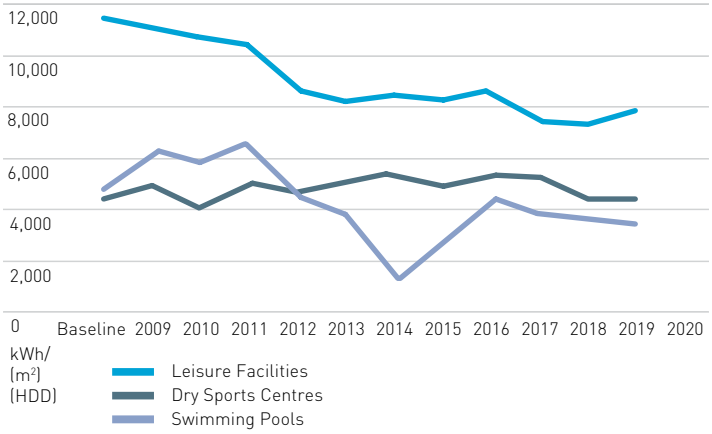


Figure 11: Sports Facilities' Annual Energy Performance

SPORTS FACILITIES' PLAN TOWARDS 2030

Due to the success of the pilot EPC project, Codema also helped DCC to procure a contractor for a second EPC (EPC II). This project involves upgrades to the existing lighting, heating and ventilation systems across seven Council buildings: Ballyfermot Sports and Fitness Centre, St Catherine's Community Sports Centre, Ballybough Youth and Community Centre, Cabra Parkside, Irishtown Sports and Fitness Centre, Bluebell Community Sports Centre and Poppintree Community Sports Centre. The works phase of this project was completed in early 2020. An analysis of the energy consumption within these sports facilities indicates that the EPC II project will deliver further savings of 2.1 GWh of primary energy and 321 tonnes of CO_2 in 2020. This should be reflected in next year's reporting cycle.

A significant upgrade to Crumlin Swimming Pool has been completed as part of the 2019 BEC application. This included the installation of PV panels and LED lighting, as well as the addition of wall insulation. A heat pump had also been due for installation; however, the design of this system was not completed in time for the 2019 grant drawdown. With the heat pump installed, total energy savings of 0.4 GWh in primary energy and 82 tonnes of CO_2 are forecast from these works. When both of these projects are complete and in service, combined primary energy savings of 2.5 GWh and CO_2 savings of 403 tonnes are expected to be achieved.

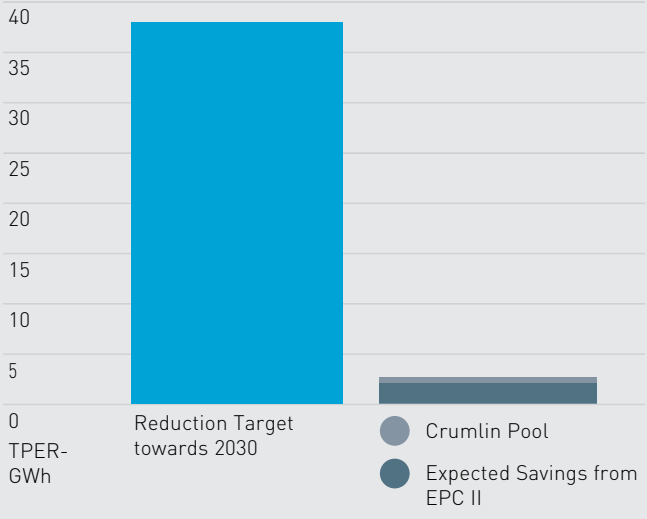


Figure 12: Sports Facilities' Plan towards 2030

03. SIGNIFICANT ENERGY USERS
(CONTINUED)

FIRE STATIONS

Fire Stations are the fourth largest energy consumer within DCC. The Dublin Fire Brigade currently consists of the Fire Brigade HQ and Control Centre in Tara Street, the O'Brien Institute on the Malahide Road, Stanley Street Garage and 14 fire stations across the entire Dublin region. These fire stations are responsible for 49 fire engines and 19 ambulances, which consumed 677,463 litres of diesel in 2019.

Within Fire Stations, diesel consumption accounts for 41% of the total primary energy consumption, gas accounts for 33% and the remaining 26% is electricity. A breakdown of fuel consumption by type is shown in Figure 13. In 2019, the Fire Stations accounted for 10% of the local authority's primary energy requirement. This represents a consumption of 18 GWh of primary energy, 3,738 tonnes of CO_2, and almost €1.5 million in energy spend.

Identification of Relevant Variables for the Fire Stations

In relation to the Fire Stations, electricity, gas and diesel consumption are the main energy types. There is very little data available on the consumption of diesel as it is delivered in bulk to the different stations, therefore a detailed EnPI could not be established in relation to the diesel consumption. As mentioned in some of the previous SEU sections, it is difficult to define a single driver for the energy consumption in relation to gas and electricity, as there are multiple factors that determine this, such as floor area, opening hours, etc.

Population served is also viable given that the energy consumption of the Fire Brigade's fleet is also driven by the area that it serves. Therefore, as the population of DCC grows, so do the areas that the Fire Brigade must respond

DCC Fire Stations 2019

CONSUMED 18 GWH OF PRIMARY ENERGY

3,738 TONNES OF CO_2 EMITTED

€1.5M ASSOCIATED ENERGY COST

IMPROVED ENERGY PERFORMANCE BY 5% SINCE BASELINE

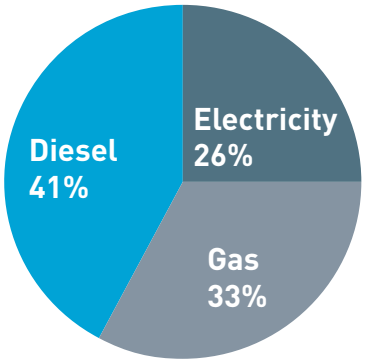


Figure 13: Fire Stations 2019 Energy Consumption Breakdown

to. Gas consumption is mainly dependent on the external temperature. Therefore, the composite performance indicator used to measure the Fire Stations' energy performance is the energy consumed (kWh TPER) divided by a weighting scale of total floor area (m^2) and Heating Degree Days (HDD) and the population served, derived from the formula given in the methodology:

Fire Stations EnPI = kWh TPER/(m^2)(HDD) (Population Served)

Energy Performance of the Fire Stations

The energy database shows that the Fire Stations have improved their energy performance by 5% since the baseline, compared to the EnPI. This is an absolute reduction of 2.3 GWh of primary energy and 783 tonnes of CO_2.

In 2019, the energy performance of the Fire Stations increased by 10.4% compared to 2018. This was due to a 12% decrease in the bulk fuel consumption for this year. A number of the fire stations also saw a large decrease in energy consumption in 2019, most notably Stanley Street with a 42% decrease, with Donnybrook, Tallaght, Phibsboro and Kilbarrack all achieving decreases in energy consumption ranging from 10%-16%.

Of the larger facilities,Tara Street has the greatest energy consumption. Since the baseline, it has reduced its annual consumption by 1.3 GWh, which translates to an improvement in performance of 34%. However, in 2019 the facility saw an increase in energy consumption, which resulted in the energy performance of the facility falling from 35% to 34%. A similar scenario was observed in the O'Brien Institute, another large facility. This facility has achieved savings of 31% since the baseline, but saw a slight increase in energy consumption of 1% in 2019 compared to 2018.

Figure 15 shows that a number of the smaller stations have seen significant decreases in energy consumption in 2019. These savings can be attributable to facilities management continuing to roll out their LED lighting replacement programme in the fire stations. Facilities management have also put in place a maintenance programme that is highly-focused on preventative maintenance rather than reactive. Also, in consultation with facilities management, many of the facilities' staff members have been asking what they can do to reduce energy consumption within the facilities. This shows an increase in overall energy awareness among staff members of the DFB, which, along with the LED lighting replacement programme and the preventive maintenance programme, has led to the savings observed in Figure 15.

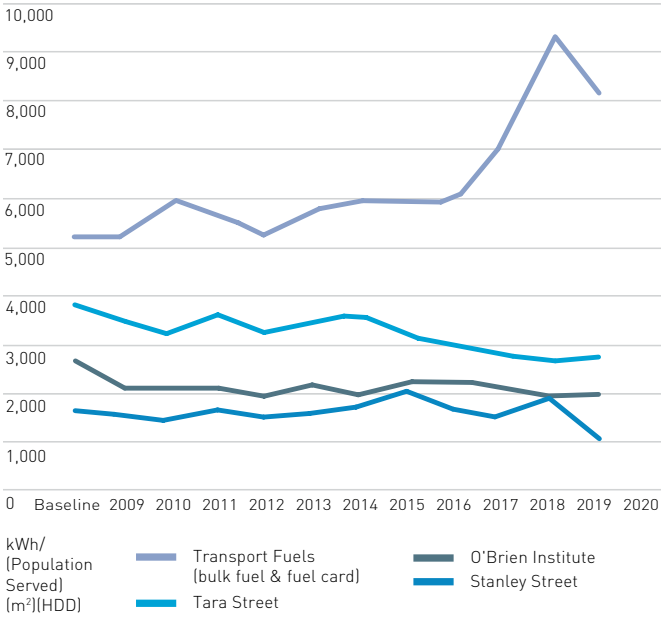


Figure 14: Annual Energy Performance of the Larger Fire Stations

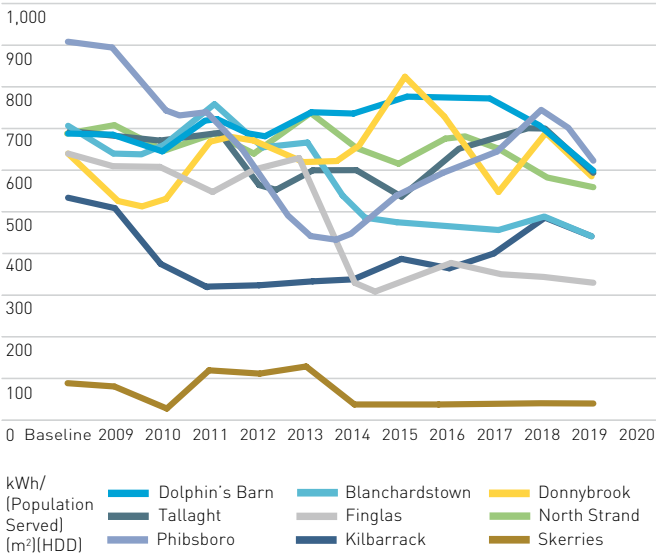


Figure 15: Annual Energy Performance of the Smaller Fire Stations

FIRE STATIONS' PLAN TOWARDS 2030

Codema was approached by the Dublin Fire Brigade property maintenance manager to identify the best options for the replacement of the boilers within the O'Brien Institute, which are coming to the end of their lifespan. It was decided that an Energy Performance Related Payment (EPRP) contract would be undertaken for the boiler replacement programme, which will incentivise the contractor to remain involved with the project until pre-agreed energy savings are established, thereby reducing the risk to the Council.

Codema prepared the tender documents for this project in consultation with the Council and the tender was awarded to Jones Engineering. Works are scheduled to commence in early 2021.

The Stanley Street station, which has achieved the smallest reduction in energy consumption of all the facilities, has recently been earmarked for demolition to make way for a housing development. This vehicle maintenance workshop is expected to be relocated to either the Tallaght or North Strand station sometime in the near future.

Two significant redevelopments are planned for the Dolphin's Barn and North Strand Stations. These facilities will be redeveloped in line with nearly Zero Energy Building (nZEB) design guidelines, and will achieve significant energy savings as a result.

The DFB in 2019 developed a new maintenance programme that categorises its facilities according to size, consumption and age profile. The DFB also commenced retrofitting its lighting stock to LEDs. A new policy within their maintenance contracts was established that states that any failed fittings should be replaced with LEDs. These LEDs will also comply with local government procurement rules and will be on the SEAI Triple E register.

If the DFB aims to replace the boilers in the O'Brien Institute in early 2021 and also continues its LED lighting retrofit and maintenance practices, it could result in a saving of 198 MWh of TPER and 37 tonnes of CO_2.

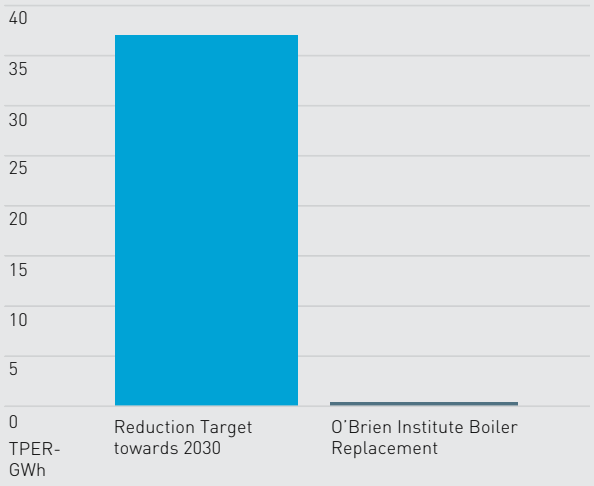


Figure 16: Fire Stations' Plan towards 2030

03. SIGNIFICANT ENERGY USERS
(CONTINUED)

OFFICES & DEPOTS

DCC has 108 offices and depots around the city. Due to its size, the Civic Offices on Wood Quay is not included in this section and has been separated out as a standalone SEU. Of the remaining 107 facilities, 37 are local area offices. There are also 70 depots around the city, which comprise of workshops, waste management depots and roads depots.

In 2019, these facilities accounted for 10% of DCC's primary energy consumption. This represents a consumption of 17.8 GWh of primary energy, 3,203 tonnes of CO_2 and an estimated €1.2 million in energy spend.

Identification of Relevant Variables for the Offices & Depots

In relation to the office and depot facilities, there are two main energy types: electricity and gas. When there are multiple variables that drive energy consumption, a composite performance indicator is used, as described in the methodology section.

In terms of the electrical consumption, it is difficult to find a single significant driving factor for the energy consumption, as there are many variables that determine this, such as the number of employees, opening hours, floor area, etc. Gas consumption is mainly dependent on the external temperature. Therefore, the composite performance indicator used to measure the Offices and Depots' energy performance is the energy consumed (kWh TPER), divided by a weighting scale of Heating Degree Days (HDD) and the number of full time employees (FTE). This is derived from the formula given in the methodology, as shown below:

Offices & Depots EnPI = kWh TPER/(HDD)(FTE)

DCC Offices & Depots 2019

CONSUMED 17.8 GWH OF PRIMARY ENERGY

3,203 TONNES OF CO_2 EMITTED

€1.2M ASSOCIATED ENERGY COST

IMPROVED ENERGY PERFORMANCE BY 17.8% SINCE BASELINE

Energy Performance of the Offices and Depots

The database shows that the Offices and Depots have improved their energy performance by 17.8% since the baseline year. This is an absolute reduction of 5.8 GWh of primary energy and 1,974 tonnes of CO_2, when comparing 2019 against the baseline year. The savings achieved to date are clearly illustrated in Figure 17. In previous years, the significant savings achieved in the Civic Offices had been masking the lack of performance in the remainder of the offices and depots. It can now be seen that the efficiency gains in this SEU grouping have been quite modest, with great potential for further efficiency improvements.

In 2019, the Area Offices and Civic Centres saw an 11% improvement in energy performance, resulting in a reduction of 1.4 GWh of primary energy and 344 tonnes of CO_2 when comparing 2019 against 2018. These savings are mostly attributable to energy savings in gas consumption in both Eblana House and the Area Office in Kilmainham.

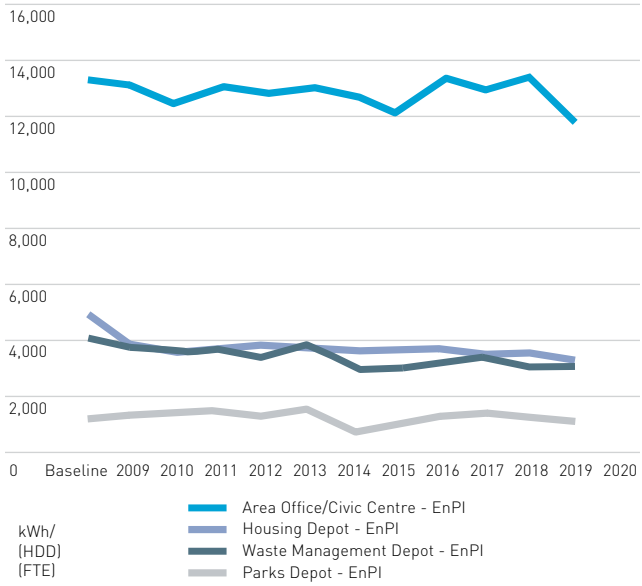


Figure 17: Offices & Depots' Annual Energy Performance

OFFICES & DEPOTS' PLAN TOWARDS 2030

As part of this Energy Review, Codema has identified large energy consumers within each SEU to establish possible energy saving solutions for these specific areas. Within the Offices and Depots, Eblana House, the Joinery Workshop, the Motor Tax Office in Smithfield and the Ballymun Civic Offices accounted for almost 70% of the total energy consumption within this area. While investigating this further, Codema found that DCC only leases out a portion of the buildings containing the Motor Tax Office and the Ballymun Civic Offices, so there is limited scope for energy savings within these facilities.

The Transformation Unit in Dublin City Council is working with all of the operational areas in developing a consolidated depot model, which will culminate in the construction of two large-scale depot facilities, one on the northside of the city, and the other on the southside.

The northside depot was granted planning permission in February 2017 and will be located along St Margaret's Road in Ballymun. Fourteen depots from across a variety of divisions such as waste management, road maintenance, housing maintenance and electrical services will be based in this proposed new facility, which will include an office and welfare building, workshop facilities and a central store.

This large-scale depot will be designed and constructed to nZEB standard and the move could result in savings of 2.1 GWh of primary energy, 673 tonnes of CO_2 and a reduction in gas and electricity costs of €211,000.

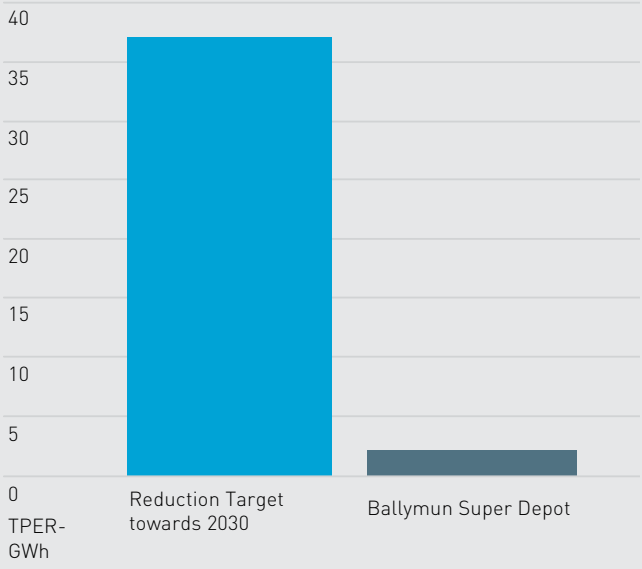


Figure 18: Offices & Depots' Plan towards 2030

03. SIGNIFICANT ENERGY USERS
(CONTINUED)

TRANSPORT

Transport is the sixth largest SEU within DCC, and comprises of fuels used for Council vehicles[1] (including light and heavy vehicles), and fuels used by the park services. In 2019, Transport accounted for 8% of DCC's primary energy consumption. This amounts to 13.9 GWh of primary energy, 3,348 tonnes of CO_2, or an estimated €1.6 million in energy costs. Within Transport, diesel accounts for over 97% of the total primary energy consumption. Petrol accounts for less than 2.5%, as it is only used to fuel small equipment. A breakdown of fuel consumption by type is shown in Figure 19.

Transport consists of 810 vehicles (including tractors and ride-on lawn mowers), which are broken up into 22 different vehicle types. Below is a summary of the main vehicle types and their associated quantity:

- Medium sized vans – 272
- Small vans – 192
- Tractors – 62
- Road sweepers – 54
- Lorries > 7.5 kgs – 38

Identification of Relevant Variables for Transport

Due to a lack of robust data relating to kilometres driven or efficiency of the fleet, Codema has used the number of vehicles to develop a performance indicator for Transport. This gives a more true depiction of the energy consumed by the Transport Department than the previous performance indicator of population served. Therefore, the EnPI for Transport is the kWh consumption of primary energy divided by the total number of vehicles. This formula is:

Transport EnPI = kWh TPER/total number of vehicles

DCC Transport 2019

CONSUMED 13.9 GWH OF PRIMARY ENERGY

3,348 TONNES OF CO_2 EMITTED

€1.6M ASSOCIATED ENERGY COST

IMPROVED ENERGY PERFORMANCE BY 24% SINCE BASELINE

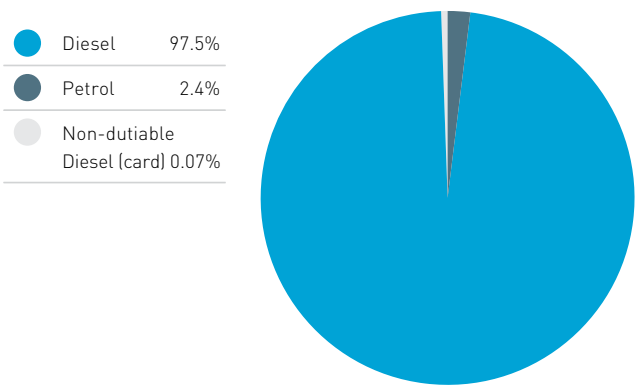


Figure 19: DCC Transport Fuels TPER - 2019

1. The fuel figures do not include the Dublin Fire Brigade or the SLA Divisions working for Irish Water

Energy Performance of Transport

Based on the new performance indicator, the database shows that the energy performance of Transport has improved by 24% since the baseline. This is an absolute reduction of 4.4 GWh[2] of primary energy and 1,713 tonnes of CO_2. In 2019, the energy performance of Transport decreased by 5.5% compared to 2018, due to increased diesel consumption.

Diesel engines have been getting progressively more efficient over this period, so the fleet has therefore gradually become more efficient as older vehicles are phased out and replaced. Petrol consumption, although only a minor part of the Transport picture, has been steadily decreasing since 2010, although a small increase was seen in 2019.

2. The energy database has provisions incorporated to account for the outsourcing of waste collection, and also to take into account the use of Irish Water within the local authority fleet.

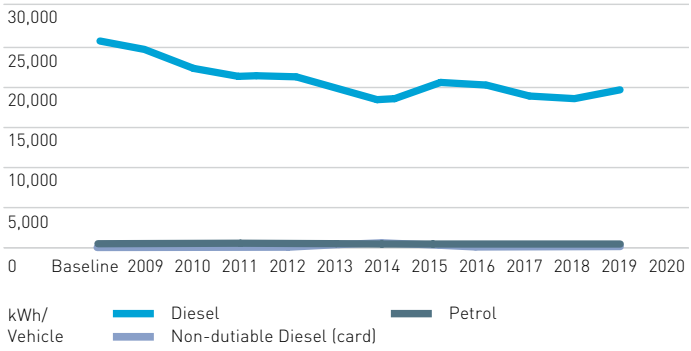


Figure 20: Transport Annual Energy Performance

TRANSPORT PLAN TOWARDS 2030

The plan is to continue to replace older vehicles with new, more fuel-efficient vehicles (including electric vehicles where feasible) as vehicles fall due for replacement.

The City Council has 28 small electric vans in its fleet, which is 15% of the small van fleet. An additional eight small electric vans are due for delivery in 2020. On receipt of these vehicles, 19% of the small van fleet will be electric. DCC also has an LDV EV80 electric side loader with a 56 kWh battery on trial in Waste Management Services. This vehicle has performed well and as a result, DCC will be bringing two of these vehicles into its fleet on long term lease hire in 2020.

DCC is also conducting a survey of the electrical infrastructure of its depots with a view to establishing which depots may have spare capacity to accommodate electric vehicle charging hubs.

As vehicles fall due for replacement and are replaced with more fuel-efficient vehicles, including electric vehicles, this should result in Transport energy consumption continuing to reduce to 2020 and beyond. Resulting from the procurement of electric vans and side loaders as described above, Transport could see further savings of 63 MWh of TPER and 19 tonnes of CO_2 in 2020.

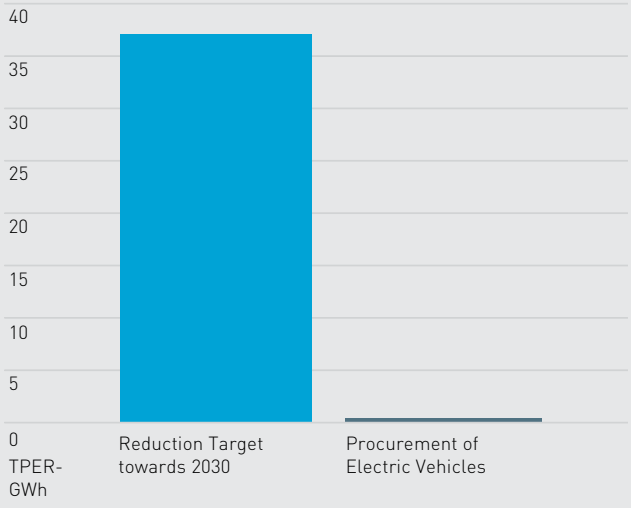
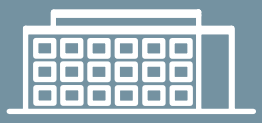


Figure 21: Transport Plan towards 2030

03. SIGNIFICANT ENERGY USERS
(CONTINUED)



CIVIC OFFICES

The Civic Offices on Wood Quay has been separated out from the Offices and Depots SEU due to its own individual significance in terms of overall energy consumption in DCC. In 2019, the Civic Offices accounted for 6% of the total energy consumed by DCC. This amounted to 10.8 GWh of primary energy consumption, 1,928 tonnes of CO_2 and almost €558,600 in energy costs.

Identification of Relevant Variables for the Civic Offices

There are two main energy types consumed in the Civic Offices: electricity and gas. A composite metric is therefore required due to the multiple variables driving the energy use. It is difficult to find a single significant driving factor for the electrical consumption, as there are many variables that determine this, such as the number of employees, opening hours, floor area, etc. Gas consumption is mainly dependent on the external temperature. The composite performance indicator used to measure the Civic Offices' energy performance is the energy consumed (kWh TPER), divided by a weighting scale of Heating Degree Days (HDD) and the number of full time employees (FTE). This is derived from the formula given in the methodology, as shown below:

Offices & Depots' EnPI = kWh TPER/ (HDD)(FTE)

DCC Civic Offices 2019

CONSUMED 10.8 GWH OF PRIMARY ENERGY

1,928 TONNES OF CO_2 EMITTED

€0.5M ASSOCIATED ENERGY COST

IMPROVED ENERGY PERFORMANCE BY 35.2% SINCE BASELINE

Energy Performance of the Civic Offices

The Civic Offices has improved its energy performance by 35.2% since the baseline year. This is an absolute reduction of 6.3 GWh of primary energy and 1,679 tonnes of CO_2.

There has been a considerable amount of work carried out in the Civic Offices since the baseline year, including continuous retrofitting of lighting to LEDs, the replacement of old, inefficient boilers to a new condensing energy efficient system, and the upgrading of pumps and the heating control system. The Civic Offices was also the first facility within the organisation to implement an energy management system and become ISO 50001 compliant, with huge effort from the facilities management team. A decrease in energy performance has been noted in 2019, as shown in Figure 22, with the EnPI for 2019 almost 2.5% higher than that for 2018. This reflects increases in both the electrical and gas consumption in the facility over the previous year.

In 2018, Dublin City Council commenced a Capital Works Programme, which has seen a significant investment over the past three years to upgrade the HVAC systems and controls within the Civic Offices. The works included:

- Upgrading of old, site-wide BMS system
- Upgrading of old local air conditioning units with improved efficiency a/c units using low GWP refrigerant
- Feasibility study completed investigating the upgrade of the site hot water system
- Installation of new high-efficiency pumping system to supply heat to Christ Church Cathedral via underground pipework system from the Civic Offices
- Removal of old gas boiler serving the Wood Quay Venue and transition of the venue onto the main Civic Offices heating system via a new heat exchanger system
- Leak sealing of Blocks 1 and 2 ventilation ductwork system completed, 89% reduction in leakage with associated reduction in operating costs and carbon emissions
- Transition of controls from 40 year old pneumatics to modern high efficiency electric motors
- Submission of future proposed works identifying further possible energy efficiency upgrades.

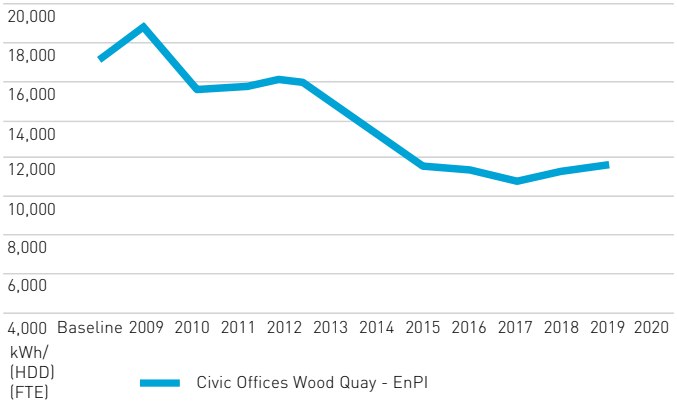
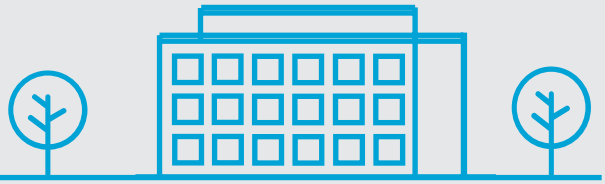


Figure 22: Civic Offices' Annual Energy Performance

CIVIC OFFICES' PLAN TOWARDS 2030



DCC is investigating the potential to install a combined heat and power (CHP) unit in its Civic Offices to provide electricity to the building and backup power in the case of a blackout. This project aims to save 80 MWh of primary energy and 30 tonnes of CO_2. As described above, a three-year Capital Works Programme for the HVAC system commenced in 2018. These works are due to be completed before the end of 2020.

In addition to this, a full detailed energy audit was completed in 2019 to identify any further energy saving potential in the facility. Initial indications suggest that through the implementation of all the recommendations in this report, as well as the CHP and Capital Works Programme, savings of up to 2.8 GWh of primary energy and 407 tonnes of CO_2 may be achieved. The effect of these upgrades towards DCC's energy reduction target can be seen in Figure 23.

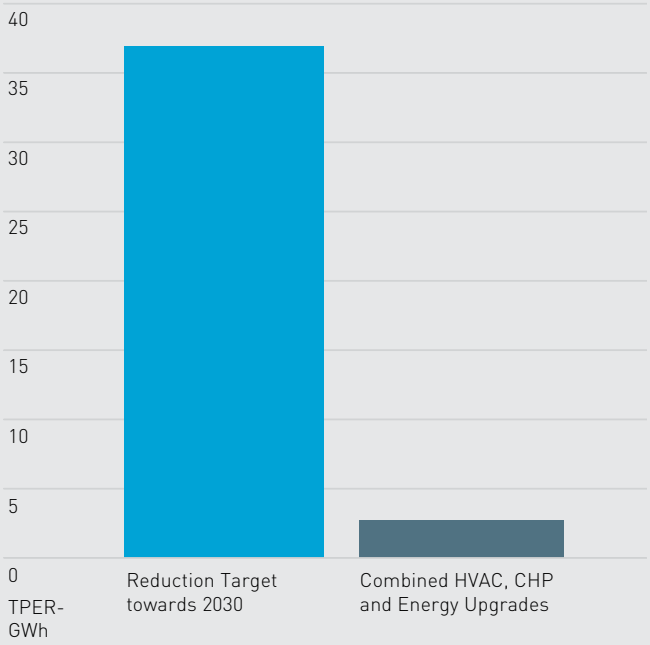


Figure 23: Civic Offices' Plan towards 2030

04. NON-SEU PROJECTS

NON-SEU PROJECTS

In early 2020, Codema conducted an analysis to determine the potential for the installation of solar PV on Council buildings. From a shortlist of 97 DCC buildings, 30 were deemed as potentially suitable. Before considering renewables, improvements in energy efficiency should always be targeted first. With this in mind, LED lighting upgrades would be recommended as a key component of any PV project. The full cost of such a project might be in the region of €1.6 million. If all the available roof space on these facilities was utilised, the total combined electricity generation from these 30 sites could amount to 0.6 GWh per year. LED retrofits could save a further 0.6 GWh in primary energy. This could potentially reduce DCC's carbon emissions by 346 tonnes of CO_2 per year.

Codema has carried out similar assessments for all four Dublin Local Authorities (DLAs), and in March 2020 submitted an expression of interest for funding for a combined project under the 2020 Climate Action Fund.

The Climate Action Plan 2019 to Tackle Climate Breakdown set out a requirement for all public buildings to achieve a minimum Building Energy Rating (BER) of B by 2030.

A study was recently completed by Codema to determine what this will require of DCC, and the effect it may have on the Council's energy efficiency and emissions targets. The study was limited to just the 44 buildings that had up-to-date Display Energy Certificates (DECs) in 2019. If these buildings were upgraded to achieve the B BER standard, a theoretical reduction in CO_2 emissions of 3,071 tonnes is predicted, at a total cost of €10.9 million. In reality, the actual savings would probably be closer to 2,316 tonnes of CO_2 per year, due to overestimations inherent in the BER calculation methodology.

05. CONCLUSION

DCC has achieved energy savings of 36.5% between the baseline year and 2019. This means that DCC has now met its statutory 2020 energy efficiency targets ahead of the deadline. It is clear that while huge gains have been made in certain areas, others have seen very little improvement since the baseline year. The Council is now looking towards 2030 and the new 50% energy efficiency target, as well as the expected increase to 50% in the GHG reduction target. These targets will require the Council to achieve a further 13.5% improvement in energy efficiency. Additionally, the required 50% improvement in building energy performance and minimum BER B standard for public buildings set out in the Government's Climate Action Plan 2019 will require significant planning and investment in a building retrofit strategy.

The savings that have been achieved since the last Energy Review can be attributed to the continued investment of DCC's staff and resources towards the achievement of their 2020 energy efficiency targets. This has been aided through the appointment of the Council's Energy Performance Officer (EPO) and the ongoing work of the Inter-Departmental Energy Oversight Committee. This Energy Oversight Committee has been working towards achieving an accredited energy management system for the whole organisation, and will continue to identify and cost potential projects in areas such as Public Lighting, Offices and Depots, Civic Offices, Housing, Fire Stations, Sports Facilities and Transport. This will help the Council stay on track towards its 2030 energy efficiency and GHG reduction targets.

Figures 24 and 25 illustrate DCC's gap-to-target model towards 2030 in terms of both energy efficiency and CO_2 emissions. As stated earlier in this report, DCC has provisionally achieved its 33% energy efficiency target ahead of the deadline of 2020 and is also ahead of its glide path towards achieving both its 50% energy efficiency and 40% carbon reduction targets by 2030. If all the SEU projects set out in this Energy Review are completed by 2030, they could result in a total saving of 33.8 GWh of TPER and 6,130 tonnes of CO_2. This energy reduction figure would very closely match the Council's energy gap-to-target to 2030. It should be noted, however, that the methodology for assessing public bodies in relation to the new 2030 targets has yet to be finalised, and the Council's status in relation to these targets is therefore liable to change.

As it is the cumulative effect of GHGs in the atmosphere which determines the extent of global heating, and given the urgency of the climate emergency, these actions must be prioritised over the earlier part of the coming decade. The introduction of binding national five-year carbon budgets, as proposed in the forthcoming Climate Action and Low Carbon Development Bill, may also add further impetus to the need for early action on the new public sector targets. It is now clear that the 40% GHG reduction target set by the Council will comfortably be met well in advance of 2030. In anticipation of the expected increase of the public sector target by the Government, the Council is now setting its sights on a 50% GHG reduction target.

05. CONCLUSION
(CONTINUED)

SEU AREA	ACTION	ESTIMATED SAVINGS
PUBLIC LIGHTING	CITY-WIDE MASTER PLAN	24.1 GWH
HOUSING	LANDLORD LIGHTING AND BEC APPLICATION	2.0 GWH
SPORTS FACILITIES	EPC II - UPGRADES TO LIGHTING, HEATING & VENTILATION SYSTEMS ACROSS 7 COUNCIL SPORTS FACILITIES / CRUMLIN POOL HEAT PUMP	2.5 GWH
FIRE STATIONS	REPLACEMENT OF BOILERS AT THE O'BRIEN INSTITUTE	0.2 GWH
OFFICES & DEPOTS	DEVELOPMENT OF BALLYMUN SUPER DEPOT	2.1 GWH
TRANSPORT	PROCUREMENT OF NEW ENERGY-EFFICIENT VEHICLES	0.06 GWH
CIVIC OFFICES	CHP INSTALLATION / HVAC UPGRADES	2.8 GWH

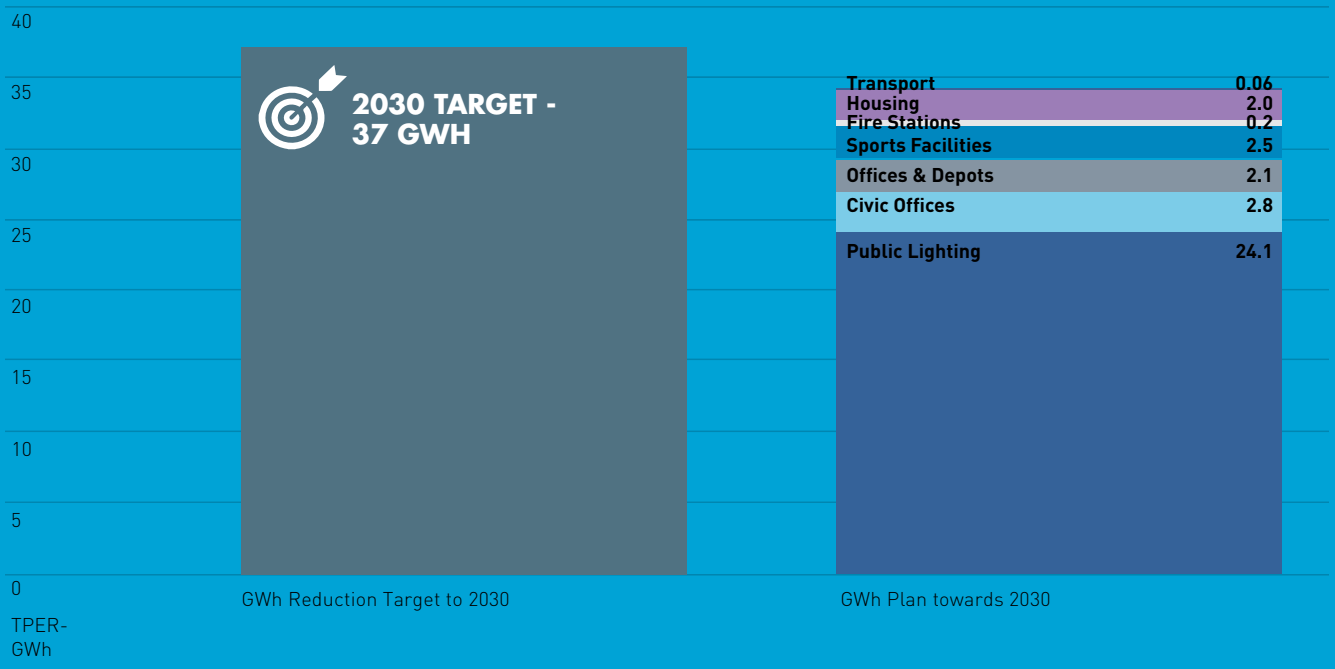


Figure 24: DCC Energy Efficiency Plan towards 2030

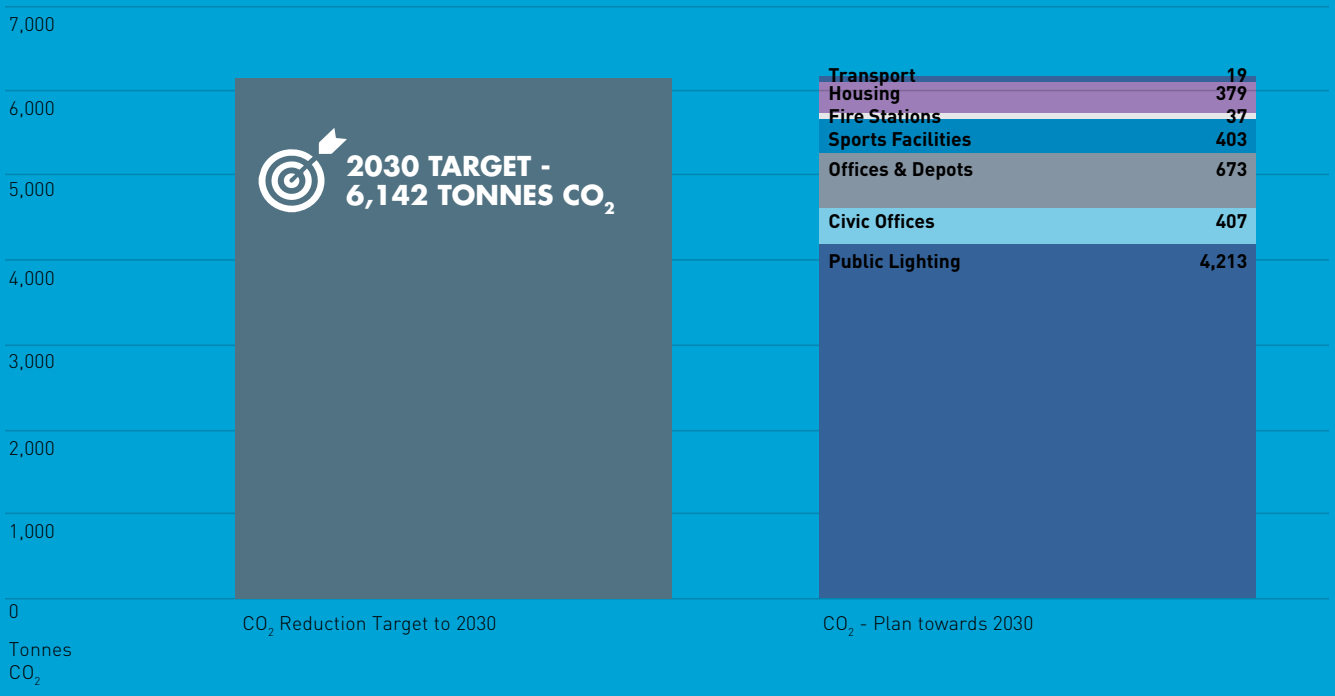


Figure 25: DCC Carbon Reduction Plan towards 2030 50% Target

06. APPENDICES

SEU Summary

Table 1 SEU Summary

SEU	TPER - GWh	Tonnes CO_2	Cost	% +/- since baseline
Public Lighting	41.4	7,235	€2,675,033	-26%
Housing	29.9	4,967	€1,507,205	-33.2%
Sports Facilities	21.9	4,002	€1,109,389	-22.8%
Fire Stations	18.0	3,738	€1,462,321	-5%
Offices & Depots	17.8	3,203	€1,223,861	-17.8%
Transport	13.9	3,348	€1,564,382	-24%
Civic Offices	10.8	1,928	€558,600	-35.2%
Total	153.7	28,421	€10,100,791	

Project Plan to 2030 Summary

Table 2 Project Plan Summary

SEU	TPER - GWh	Tonnes CO_2
Public Lighting	24.1	4,213
Housing	2.0	379
Sports Facilities	2.5	403
Fire Stations	0.2	37
Offices & Depots	2.1	673
Transport	0.06	19
Civic Offices	2.8	407
Total	33.8	6,130

Table of Figures

Table of Tables

Abbreviations

BER	Building Energy Rating
CO_2	Carbon Dioxide
DECC	Department of the Environment, Climate and Communications
DEC	Display Energy Certificate
DLAs	Dublin Local Authorities
EnMS	Energy Management System
EnPIs	Energy Performance Indicators
EPC	Energy Performance Contract
DCC	Dublin City Council
FTE	Full Time Employees
GHG	Greenhouse gas
GPRNs	Metered Gas Accounts
GWh	Gigawatt hour
HDD	Heating Degree Days
kWh	Kilowatt hour
LED	Light Emitting Diode
m^2	Metres Squared
M&R	Monitoring and Reporting
M&V	Measurement and Verification
MPRNs	Metered Electrical Accounts
MWh	Megawatt hour
PV	Photovoltaic
SEAI	Sustainable Energy Authority of Ireland
SEUs	Significant Energy Users
SON	High Pressure Sodium
SOX	Low Pressure Sodium
TPER	Total Primary Energy Requirement
UMR	Unmetered Registrar

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