SOUTH DUBLIN COUNTY COUNCIL ENERGY REVIEW 2016

Codema
Dublin's Energy Agency

Comhairle Contae Átha Cliath Theas
South Dublin County Council

01. INTRODUCTION

Codema has developed this Energy Review on behalf of South Dublin County Council (SDCC), which is one of the largest local authorities in Ireland. The aim of this Energy Review is to highlight the total amount of energy SDCC consumed in 2016, along with the total cost and carbon emissions associated with this energy use.

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 SDCC to identify where it currently is in relation to public sector energy targets, and what areas it needs to prioritise in order to meet these targets between now and 2020.

As part of this process, Codema has analysed SDCC's total energy use and broken this down into four 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 SDCC must take to reduce energy consumption in each SEU area and meet 2020 targets.

PUBLIC LIGHTING

LEISURE CENTRES

TRANSPORT

OFFICES

Current Status & Obligations

In 2016, SDCC consumed a total of 55.8 GWh of primary energy; this is the equivalent of 18,200 tonnes of CO_2 and Codema estimates the associated cost of this energy use to be approximately €3.4 million.

This information comes from Codema's database which incorporates the data from the Monitoring and Reporting (M&R) system developed by the Sustainable Energy Authority of Ireland (SEAI) and the Department of Communications, Climate Action and Environment (DCCAE). Codema has been entering SDCC's yearly data into the M&R system 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, SDCC has improved its energy performance by 24.2% compared to the baseline year of 2009. However, this Energy Review looks at the data reported in the M&R system in more detail, as it takes into account the outsourcing of key water and waste collection services from the local authority energy accounts, and also develops more detailed Energy Performance Indicators (EnPIs) to track performance. With this taken into account, SDCC has actually improved its energy performance by 19.8%, compared to the baseline year of 2009. This amounts to a cumulative absolute saving of 9.3 GWh of primary energy[1] or 3,000 tonnes of CO_2 saved from 2009-2016. This means that SDCC must improve its energy performance by 13.2% in its buildings and operations between now and 2020, in order to meet the 33% public sector target. Through this Energy Review, Codema highlights the areas within the council that are consuming the most energy (i.e. the SEUs), and sets out possible solutions for each of these areas in order to achieve these additional savings.

1. Primary energy (TPER) is an energy form that has not been subjected to any conversion or transformation process. It is energy received as input to a system. Primary energy can be non-renewable or renewable.

SDCC Energy Overview 2016

CONSUMED 55.8 GWH OF PRIMARY ENERGY

18,200 TONNES OF CO_2 EMITTED

€3.4 MILLION ASSOCIATED ENERGY COST

Public Sector Obligations

ACHIEVE SAVINGS OF 33% BY 2020

REDUCTION TARGET OF 3% PER YEAR

SDCC Progress 2009-2016

IMPROVED ENERGY PERFORMANCE BY 19.8%

3,000 TONNES OF CO_2 SAVED

13.2% IMPROVEMENT REQUIRED TO MEET THE 33% PUBLIC SECTOR TARGET

01. INTRODUCTION
(CONTINUED)

Methodology

In order to calculate potential energy savings in SDCC, it is necessary to analyse changes in other factors that are directly related to the council's energy use. To overcome this, Codema uses EnPIs to measure SDCC's energy performance more accurately. This method determines how efficiently SDCC 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 activity that an organisation undertakes. 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. The equation used for calculating the composite performance indicator for the individual SEUs in this report can be seen below:

In the case of SDCC, the overall performance indicator is a composite indicator based on population served and the number of public lights. Therefore, SDCC's EnPI is the TPER divided by the population served for that year, and the number of public lights attributable to the local authority. Therefore, the performance of SDCC is determined not only by its annual energy use, but also by a rise or fall in population and the number of public lights in the South Dublin area in the same year. Savings are based on cumulative absolute primary energy and carbon savings from the baseline year of 2009 to 2016.

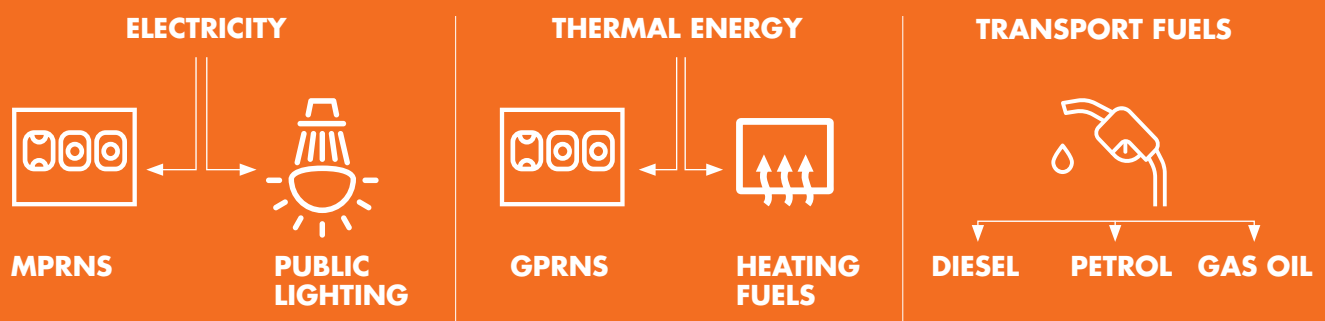
Carrying out this Energy Review raises a number of questions on how the data is reported within the M&R system. In 2010, the Dublin Local Authorities outsourced waste collection within the region. Also, in 2013, water services within the local authorities were transferred to Irish Water (IW). This Energy Review notes how the M&R system does not fully take into account these changes in services to SDCC. Codema's database has provisions to account for these changes, and therefore accurately track the actual energy performance of the local authority from the baseline year of 2009 to 2016, which takes proper account of services that have been outsourced. These provisions will be adjusted to the M&R system during the year, in association with SEAI, as different phases are introduced to make changes to the system to account for IW and other aspects.

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. SDCC ENERGY CONSUMPTION 2016

The energy database shows that SDCC consumed 55.8 GWh of primary energy and produced 18,200 tonnes of CO_2 in 2016. Codema estimates the costs associated with this energy use to be approximately €3.4 million for the year. This is broken down into three principle energy categories; electricity, gas/heating and transport fuels. Electricity consumption comprises of metered electrical accounts (MPRNs) from SDCC's public 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 SDCC, i.e. diesel, petrol and gas oil.



02. SDCC ENERGY CONSUMPTION 2016
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Figure 1: SDCC Consumption Categories - 2016

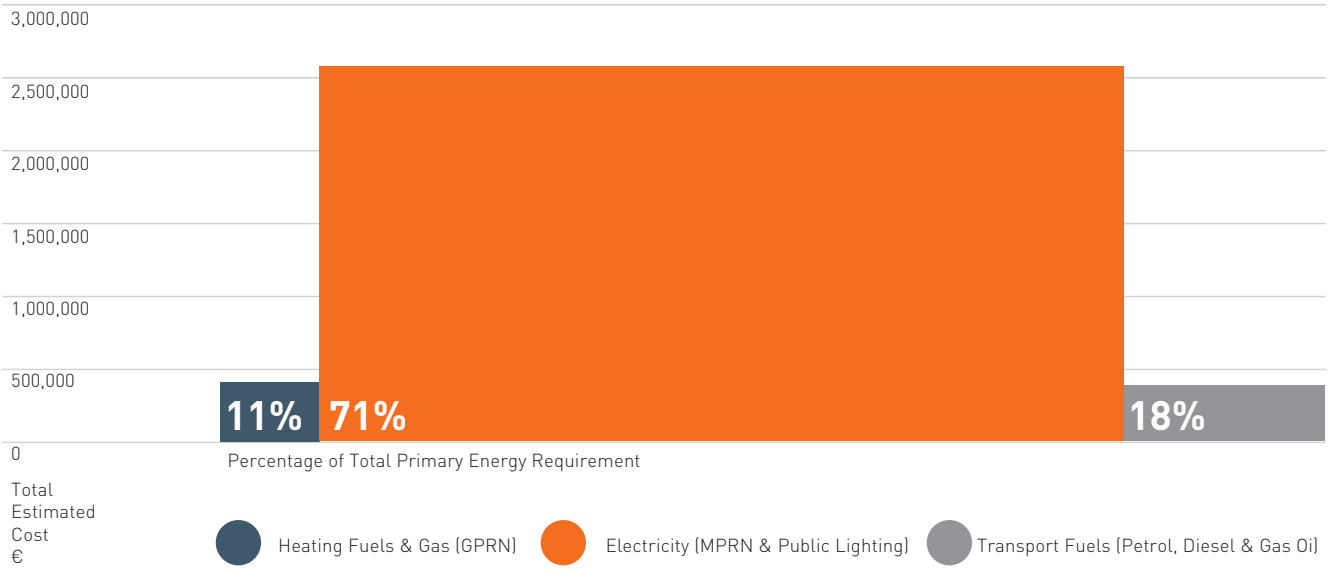


Figure 1 shows the breakdown of the consumption categories. The height represents the total estimated cost of that energy type, and each coloured area highlights what percentage of the overall energy use this energy type accounts for.

Electricity accounts for the largest share of energy consumed at approximately 71%. The reasons for this are the large number of public lights in the South Dublin area, and the high conversion factor of electricity from Total Final Consumption (TFC) to Total Primary Energy Requirement (TPER). This is because of the way that Ireland generates and supplies electricity. The reason for the high conversion factor is to account for the high losses on the transmission system in Ireland and the carbon intensive method in which Ireland generates electricity.

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 SDCC improved its energy performance by 19.8% between 2009 (baseline year) and 2016. This represents a cumulative absolute saving of 9.3 GWh of primary energy or 3,000 tonnes of CO_2 from 2009-2016. This highlights a gap-to-target of 13.2%, meaning that SDCC must improve its energy performance by 13.2% between now and 2020, in order to meet its 33% target. This is estimated to be a cumulative absolute saving of 8.7 GWh[2] in primary energy.

Figure 2 on the next page illustrates SDCC's absolute energy consumption compared to the baseline. Figure 3 illustrates SDCC's normalised annual energy performance compared to the baseline. This takes into account the rise and fall of the activity metrics, and tracks them compared to SDCC's TPER of all fuel sources.

Figures 2 and 3 also show a significant decrease in the energy consumption between 2010 to 2011. This is mostly due to a steady decrease in the vehicle fuels during these years, due to the effect of the recession on the local authority during this time.

2. Codema calculated this figure using SEAI's gap-to-target tool, which takes into account the potential changes in the conversion factors and percentage increases of the activity metrics up until 2020.

Figure 2: SDCC Absolute Annual Energy Consumption

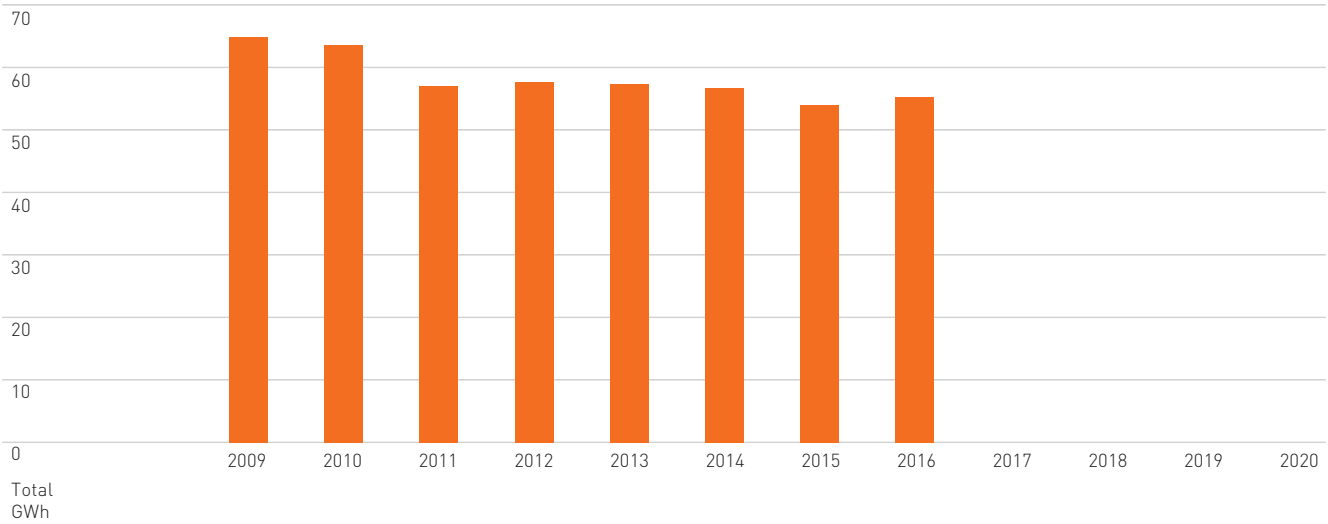
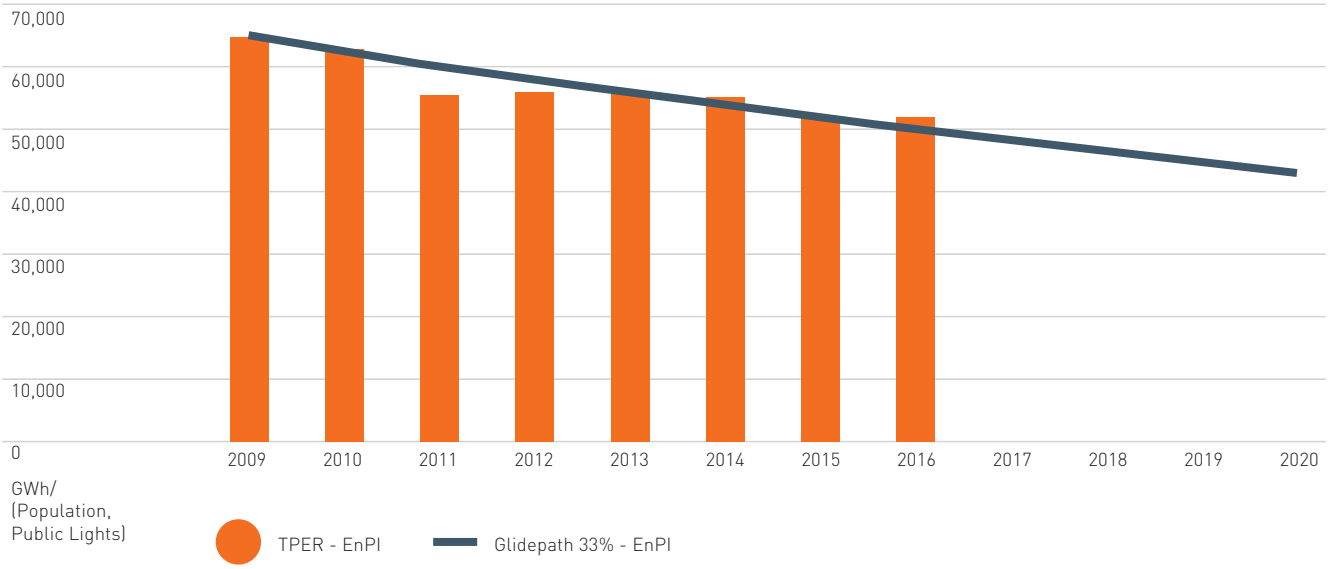


Figure 3: SDCC Annual Energy Performance



03. SIGNIFICANT ENERGY USERS

To help better understand SDCC'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 SDCC. Codema developed these SEUs by creating an energy database, which includes all the data reported in the M&R system back to 2009, data compiled by Codema through energy audits, and direct contact with SDCC 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. SDCC's Transport Department provided all of the transport 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 SDCC's SEUs into Total Primary Energy Requirement (TPER), CO_2, and cost year-on-year, and compares this back to the 2009 baseline. Codema also compares this data to an energy performance indicator to track the energy performance of each SEU.

Through analysis of this data, Codema has identified four key areas, or SEUs, which account for 80% of SDCC's total primary energy requirement. These SEUs are:

PUBLIC LIGHTING 45%

LEISURE CENTRES 13%

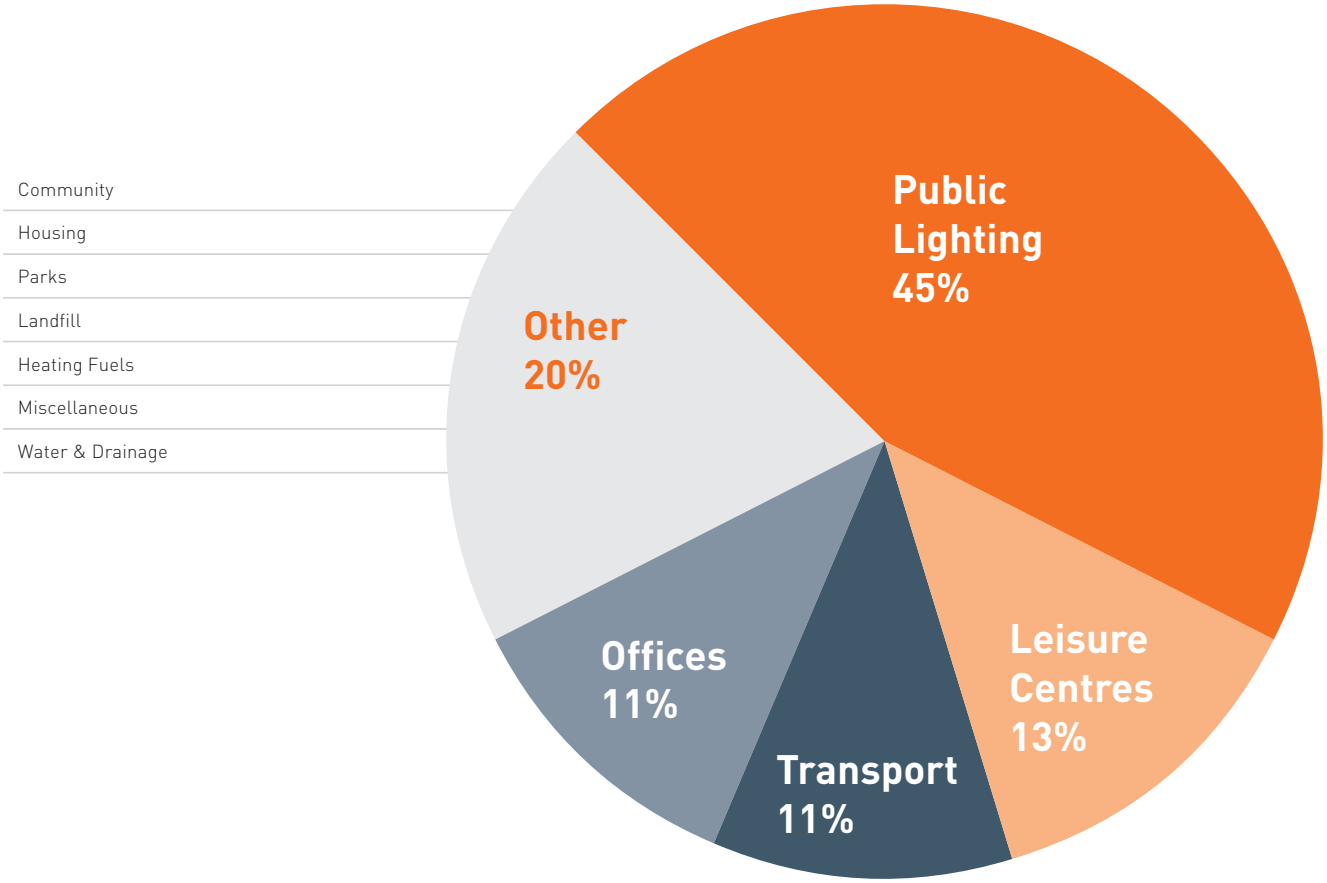
TRANSPORT 11%

OFFICES 11%

Figure 4 shows the breakdown of SDCC's SEUs. Public Lighting is the largest SEU, accounting for 45% of the total load. This is followed by Leisure Centres at 13%, while Transport accounts for 11% of the total load. Offices, which comprise of County Hall in Tallaght and the Civic Offices in Clondalkin, also account for 11%. The remainder of the consumption is made up of smaller accounts within SDCC, such as community centres, libraries, arts and civic centres, housing, depots, and heating fuels.

The management of energy in these four SEUs is critical for SDCC to achieve its 33% energy reduction target. Small energy reductions in these areas have a much greater effect on overall consumption than seemingly large reductions in the less significant areas. Codema therefore recommends that SDCC uses a structured approach at senior management level in order to carefully plan and execute energy reduction projects. This targeted, holistic approach to these SEUs will help maximise their impact and will go beyond the typical energy-saving projects that are usually reactionary or part of routine maintenance.

Figure 4 SEU Analysis



03. SIGNIFICANT ENERGY USERS
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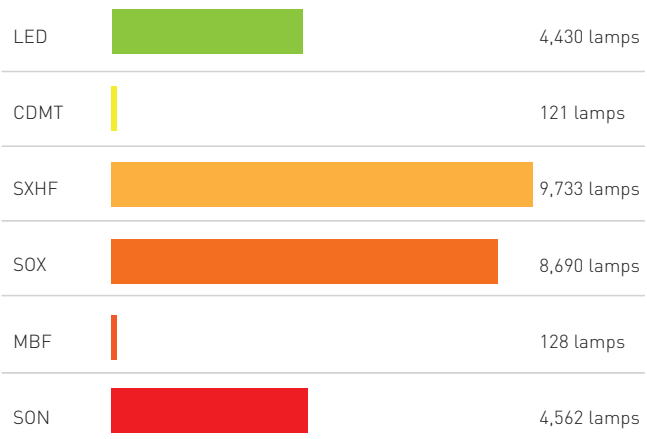
PUBLIC LIGHTING

Public Lighting is the largest SEU within SDCC. In 2016, public lighting accounted for 45% of SDCC's primary energy consumption, which amounted to 25.6 GWh of primary energy consumption, 11,800 tonnes of CO_2 and an estimated €1.4 million in energy costs. Public Lighting consists of 28,000 lamps, which are broken up into six different light sources. Listed below are the light sources and their associated quantity; these are also listed in order of their efficiency:

- Light Emitting Diode (LED) – 4,430 lamps
- Metal Halide (CDMT) – 121 lamps
- Low Pressure Sodium with High Frequency Gear (SXHF) – 9,733 lamps
- Low Pressure Sodium (SOX) – 8,690 lamps
- Mercury Vapour (MBF) – 128 lamps
- High Pressure Sodium (SON) – 4,562 lamps



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 charged on a pre-defined 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 a constant 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:

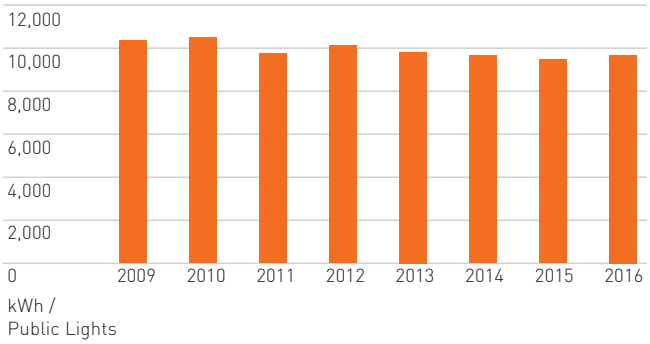
Public Lighting EnPI =
kWh TPER /number of public lights

PUBLIC LIGHTING IMPROVED ENERGY PERFOMANCE BY 6% SINCE 2009

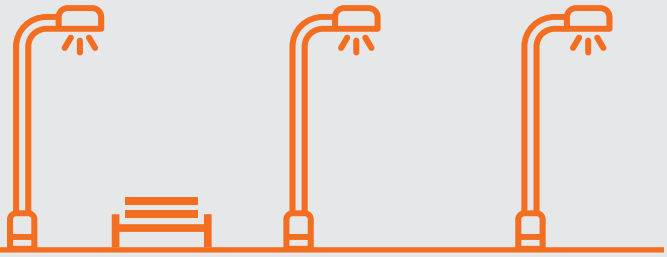
Energy Performance of Public Lighting

To date, SDCC's Public Lighting Department has already retrofitted 4,430 lights with LEDs. The Energy Database shows that Public Lighting has improved its energy performance by 6% since 2009, based on its EnPI. This is an absolute reduction of 2.7 GWh of primary energy and 1,200 tonnes of CO_2. This is illustrated in Figure 5.

Figure 5: Public Lighting Energy Performance



PUBLIC LIGHTING PLAN TO 2020

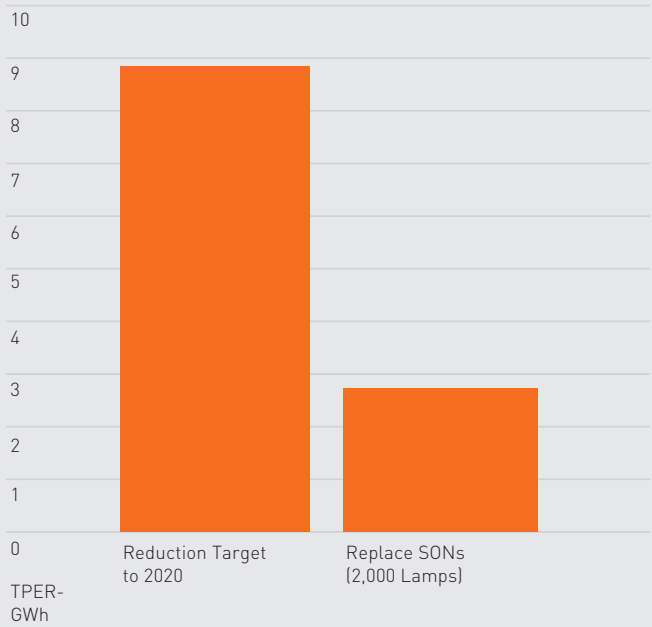


As Public Lighting is key to SDCC achieving its energy efficiency target, the council must commit to further energy reductions in this area between now and 2020. Energy reduction in electricity has more impact on the council's targets than any other energy type, due to the poor primary energy conversion factor.

SDCC is currently developing a procurement process for the upgrade of 10 regional roads in 2018. This will include the upgrade of 2,122 high wattage lamps to LEDs. The council has also applied for funding to upgrade the N81 between the Old Bawn Road junction in Tallaght and the Outer Ring Road junction. This work will include the reduction of the quantity of lights from 150 to 112, and these will be upgraded to LEDs. This work will be procured in 2018, and carried out in 2019.

Within SDCC's stock of public lighting, the SON lamps are the least efficient and have the largest billable watt. As mentioned previously, SDCC has retrofitted 4,430 of its 28,000 street lights to LEDs. If SDCC replaces 2,000 of the remaining 4,562 SON lamps by 2020, this could produce savings of 2.8 GWh and 1,500 tonnes of CO_2. This would have a significant impact on the council's 2020 targets.

Figure 6: Public Lighting Plan to 2020



03. SIGNIFICANT ENERGY USERS
(CONTINUED)

LEISURE CENTRES

Leisure Centres are the second largest energy consumer within SDCC. SDCC currently operates two large leisure centres, namely Tallaght and Clondalkin Leisure Centres. In 2016, these leisure centres accounted for 13.4% of the local authority's primary energy requirement. This is a consumption of 7.5 GWh of primary energy, 1,447 tonnes of CO_2, and an estimated €348,200 in energy spend.

Identification of relevant variables for the Leisure Centres

In relation to the Leisure Centres, electricity and gas are the two main energy types. When there are multiple variables that drive energy consumption, a composite performance indicator is used, as mentioned 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 which determine this, such as footfall, opening hours, floor area, etc. Gas consumption is mainly dependent on the external temperature. Therefore, the composite performance indicator used to measure the Leisure Centres' energy performance is the energy consumed (kWh TPER) divided by a weighting scale of the total floor area (m^2) and heating degree days (HDD), derived from the formula given in the methodology:

Leisure Centre EnPI = kWh TPER/ (m^2)(HDD)

SDCC Leisure Centres 2016

CONSUMED 7.5 GWH OF PRIMARY ENERGY

1,447 TONNES OF CO_2 EMITTED

€348,200 ASSOCIATED ENERGY COST

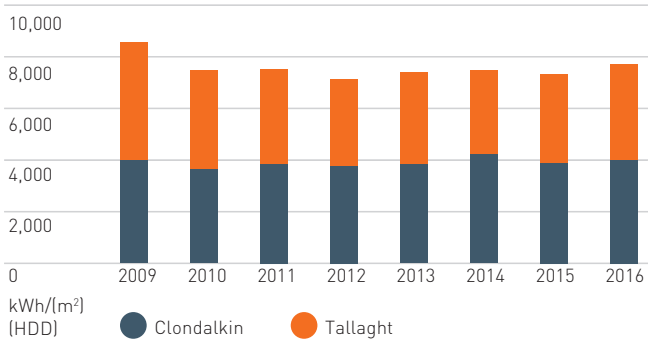
INCREASED ENERGY PERFORMANCE BY 10% SINCE 2009

Energy Performance of Leisure Centres

The Energy Database shows that the Leisure Centres have improved their energy performance by 10% since 2009, compared to the EnPI. This is an absolute reduction of 995 MWh of primary energy, and 196 tonnes of CO_2.

In 2010, there was a decrease in energy consumption. In analysing the electrical and gas consumption from both facilities to help identify this reduction, there was a similar reduction across both facilities. This reduction could be the result of the effect of the recession on the activity levels of the facilities. Since 2010, the energy consumption of the Leisure Centres has increased by 2.6%.This can be seen in Figure 7 on this page.

Figure 7: Leisure Centres' Energy Performance



LEISURE CENTRES' PLAN TO 2020

Codema strongly recommends that SDCC considers an Energy Performance Contract (EPC) to upgrade Tallaght and Clondalkin Leisure Centres, as these types of buildings are particularly suited to the EPC model, and vast energy savings can be achieved.

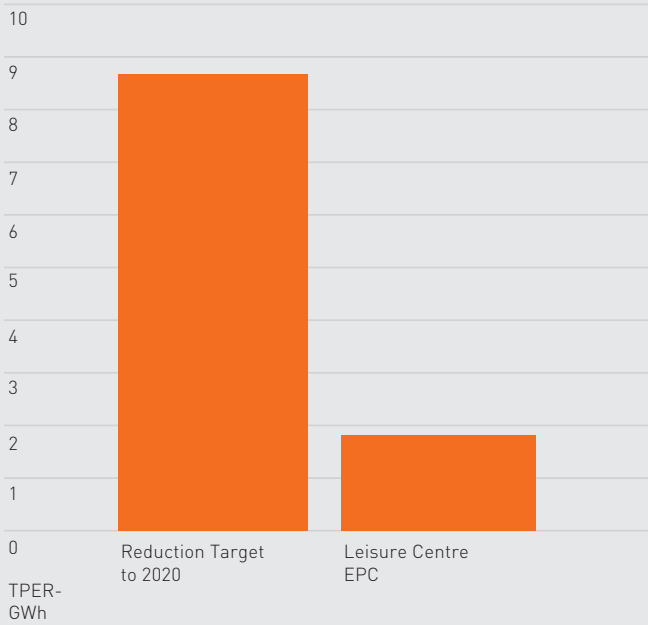
In 2016, Codema helped Dublin City Council to implement the first local authority EPC for three of its leisure centres. The project is set to save the council over €100,000 on its energy and maintenance costs per year, and will achieve average energy savings of more than 30 per cent per year, through a range of energy-efficiency upgrades. These include:

- New LED lighting
- New combined heat and power systems to efficiently heat the swimming pools
- Improved building control systems which will help manage all of the equipment in the centres to ensure that they are working together effectively

The EPC model puts the responsibility onto the contractor to guarantee energy savings over the lifetime of the contract. Energy savings are verified by a Measurement and Verification (M&V) process developed by both the Energy Services Company (ESCo) and the client.

From analysis of the energy consumption within SDCC's Leisure Centres, a potential 1.8 GWh of primary energy and 355 tonnes of CO_2 could be saved by 2020 by implementing an EPC.

Figure 8: Potential for EPC in SDCC Leisure Centres



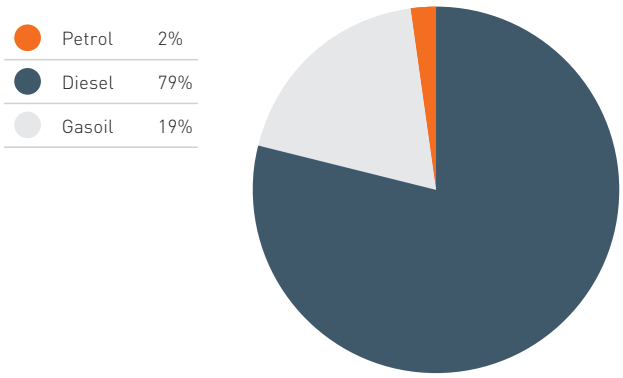
03. SIGNIFICANT ENERGY USERS
(CONTINUED)

TRANSPORT

Transport is the third largest SEU within SDCC. The Transport SEU comprises of the fuels used by council vehicles (including light and heavy vehicles), and fuels used by the park services. In 2016, Transport accounted for 11.1% of SDCC's primary energy consumption. This amounts to 5 GWh of primary energy, 1,200 tonnes of CO_2, or an estimated €410,000 in energy costs.

Within the transport fuels, diesel accounts for almost 80% of the total primary energy consumption, while gas oil accounts for nearly 20%. Petrol accounts for just 2%, as it is only used to fuel small equipment. A breakdown of the fuel types attributable to Transport can be seen in Figure 9 below.

Figure 9: SDCC Transport Fuels Consumption 2016



Identification of relevant variables for Transport

There are many variables that drive energy consumption within this department, such as miles travelled, efficiency of the fleet, number of vehicles, etc. When developing a performance indicator to track the performance of the fleet, it was very easy to identify the variables. However, these variables were not monitored, and so there was no data available.

With very little data available to develop an EnPI for Transport, Codema decided to use the population served instead. This is viable given that the energy consumption of the fleet is also driven by the area which it serves. Therefore, as the population of SDCC grows, so do the areas which the fleet serves. Therefore, the EnPI for fleet is the kWh consumption of primary energy divided by the population of the area, taken from the latest 2016 census information. This is derived from the formula given in the methodology, as shown below:

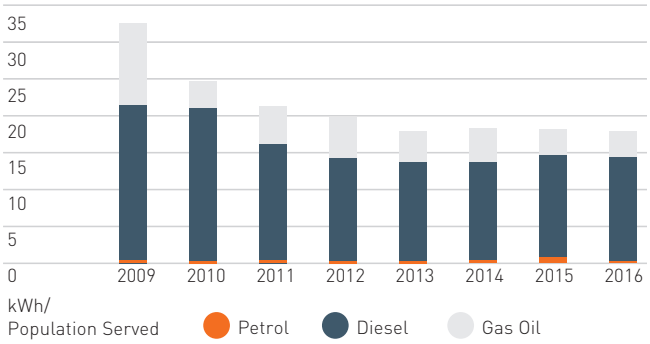
Fleet EnPI =
kWh TPER / Population Served

TRANSPORT IMPROVED ENERGY PERFORMANCE BY 44% SINCE 2009

Energy Performance of Transport

The database shows that Transport has improved its energy performance by 44% since 2009. This is an absolute reduction of 3.4 GWh[3] of primary energy and 800 tonnes of CO_2. Figure 10 shows that between 2009 and 2011, there was a significant reduction in energy consumption. This is due to the reduction in the litres of diesel and gas oil consumed by the council's fleet. From consulting with Fleet Management, Codema believes this to be due to the reduction in the fleet's workload as a result of the recession.

Figure 10: Transport Energy Performance



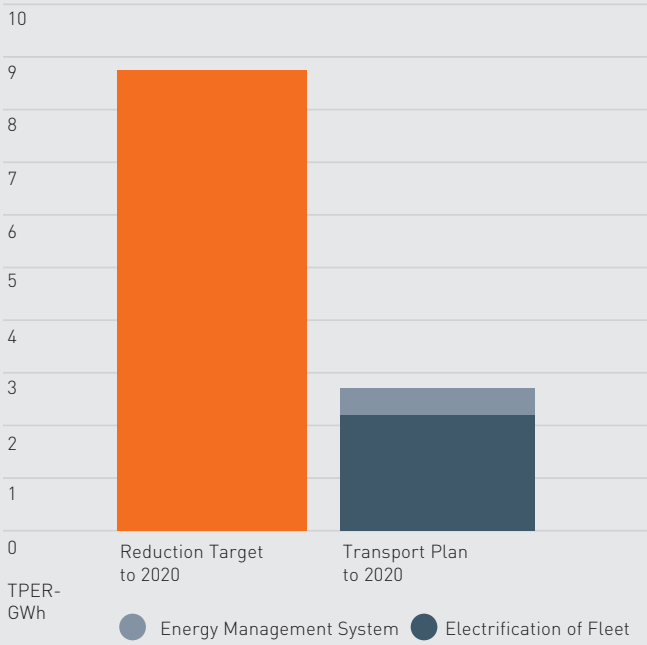
TRANSPORT PLAN TO 2020

As mentioned earlier, Figure 10 shows a significant decrease in SDCC's consumption of transport fuels between 2009-2011. Figure 10 also shows an increase in energy consumption from 2013-2016. This is due to the fluctuations in the number of fleet vehicles within SDCC.

An energy management system is due to be implemented to cut down on unauthorised consumption of SDCC's fuel, as well as to accurately monitor the overall consumption, and develop energy performance indicators to track energy performance. The council could potentially achieve savings of approximately 10% (or 500 MWh) by implementing such an energy management system.

Also, SDCC's Transport Department is interested in the potential for a complete electrification of the fleet. From our analysis of the fleet fuels, SDCC could save 2.2 GWh of TPER and 600 tonnes of CO_2 with the reduction of the fuel consumption, compared to the energy needed to charge the vehicles. This is a very rough estimate, and SDCC and Codema plan to carry out a detailed feasibility study on this later in 2017.

Figure 11: Transport Plan to 2020



3. 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.

03. SIGNIFICANT ENERGY USERS
(CONTINUED)

OFFICES

SDCC has two large public office buildings, namely County Hall in Tallaght and Civic Offices in Clondalkin. In 2016, these offices accounted for 11% of SDCC's primary energy consumption. This is a consumption of 6.2 GWh of primary energy, 1,288 tonnes of CO_2, and an estimated €381,000 in energy spend. While County Hall and Civic Offices have a lower energy consumption than SDCC's Leisure Centres, these buildings consume more electricity, and therefore have higher energy costs as a result.

Identification of relevant variables for the Offices

In relation to the office 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 mentioned 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 which 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 office facilities' energy performance is the energy consumed (kWh TPER), divided by a weighting scale of total floor area (m^2), heating degree days (HDD) and full time employees (FTE). This is derived from the formula given in the methodology, as shown below:

Offices EnPI =
kWh TPER/ (m^2)(HDD)(FTE)

SDCC Offices 2016

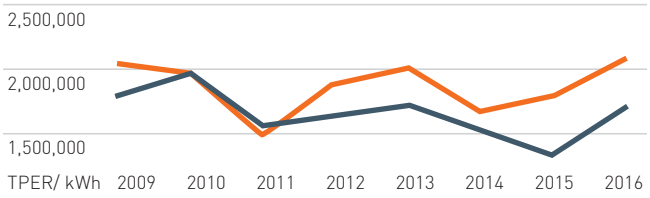
CONSUMED 6.2 GWH OF PRIMARY ENERGY

1,288 TONNES OF CO_2 EMITTED

€381,000 ASSOCIATED ENERGY COST

IMPROVED ENERGY PERFORMANCE BY 9.7% SINCE 2009

Figure 12: Offices' Gas Consumption

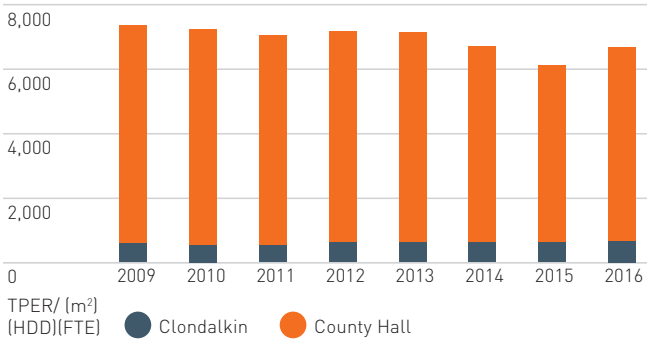


Energy Performance of the Offices

The database shows that the Offices have improved their energy performance by 9.7% since 2009. This is an absolute reduction of 1.1 GWh of primary energy and 280 tonnes of CO_2.

Within the Offices' facilities, there was an improvement between 2014 and 2015; energy performance then decreased in 2016. In analysing the electrical and gas consumption from both facilities, these variations in energy performance came from fluctuations in the gas consumption over these years. This can be seen in Figures 12 and 13 on this page. This could be due to a number of factors such as heating control issues in both facilities, or changes in the occupancy hours of the facilities.

Figure 13: Office Facilities' Energy Performance



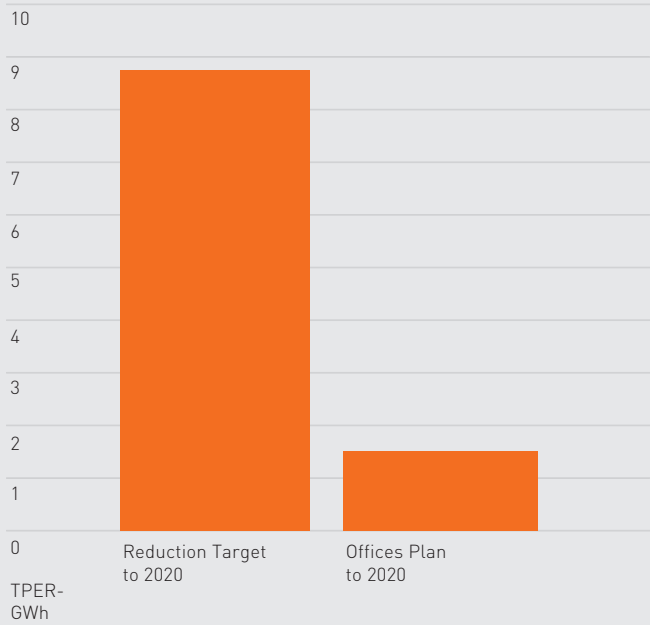
OFFICES' PLAN TO 2020

Codema has met with the new facilities manager within SDCC, who intends to conduct detailed energy audits of County Hall and the Civic Offices in Clondalkin during the summer. There is potential for energy savings with the retrofit of LED lighting and controls, heating system and control upgrades, and the installation of photovoltaic systems, amongst others. The energy audits will help identify these measures, which can then be prioritised in terms of highest potential for savings.

Codema recommends that SDCC develops a framework of contractors for the implementation of any energy saving measures within the Offices. This framework will incorporate the maintenance and upgrade of energy related systems, with a focus on performance guarantees where suitable. Codema can support SDCC with the development of such a framework.

If SDCC aims to reduce the overall consumption of these facilities by 20% over the next four years, there is potential to save 1.5 GWh of TPER and 310 tonnes of CO_2. SDCC and Codema are also involved in the HeatNet NWE project, which is helping the council to develop its first district heating network connecting County Hall and Tallaght Hospital, and this could potentially result in further energy savings in this area.

Figure 14: Offices' Plan to 2020



04. CONCLUSION

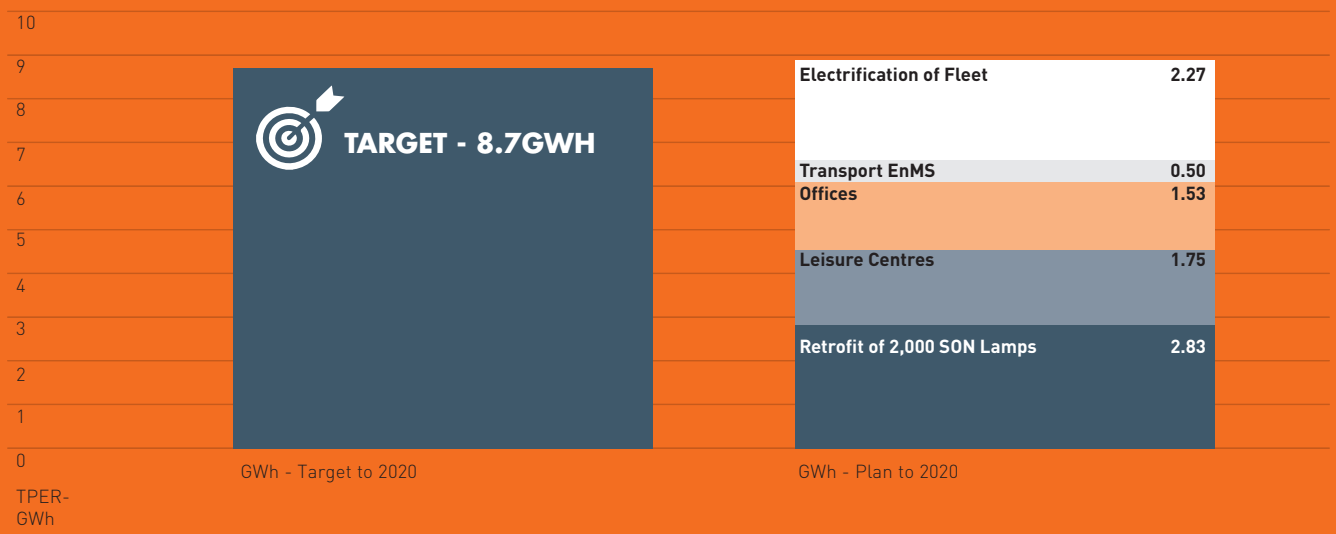
SDCC has achieved energy savings of 19.8% between the baseline year of 2009 and 2016. While these savings are substantial, the council still needs to save a further 13.2% to achieve the 33% energy saving target by 2020. The next four years will be crucial, and will require the most innovative and challenging projects to date, in order to achieve SDCC's targets by the 2020 deadline.

Small energy reductions in these areas will have a much greater effect on overall consumption than seemingly large reductions in the less significant areas. Codema therefore recommends that SDCC uses a structured approach at senior management level in order to carefully plan and execute energy reduction projects. This targeted, holistic approach to these SEUs will help maximise their impact and will go beyond the typical energy-saving projects that are usually reactionary or part of routine maintenance.

In terms of the smaller accounts, which are not highlighted in this report, it is recommended that SDCC develops a framework of contractors for the implementation of any energy saving measures within these facilities. This framework will incorporate the maintenance and upgrade of energy related systems, with a focus on performance guarantees where suitable. Codema will help SDCC develop this framework, which will focus on the smaller energy consumers within the local authority. This is important as it highlights the "exemplary role" to the public, as set out in S.I. 426 of 2014.

Figure 15 illustrates SDCC's gap-to-target model for the next four years. If all the projects set out in this Energy Review are completed by 2020, SDCC can reach the target reduction of 8.7 GWh, or 33%, by 2020.

Figure 15: SDCC Plan to 2020



05. APPENDICES
(CONTINUED)

SEU Summary

Table 1 SEU Summary

SEU	TPER - GWh	Tonnes CO_2	Cost	% +/- since baseline
Public Lighting	25.65	11,839.10	€1,386,530	-6.18%
Leisure Centres	7.48	1,477.04	€348,286	-9.83
Transport	5.04	1,208.11	€410,285	-44.47
Offices	6.23	1,288.40	€381,184	-9.73
Total	44.41	15,812.65	€2,526,285	

Project Plan to 2020 Summary

Table 2 Project Plan Summary

SEU	TPER - GWh	Tonnes CO_2
Public Lighting	2.83	1,500
Leisure Centres	1.75	355
Transport	2.77	600
Offices	1.53	310
Total	8.88	2,765

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05. APPENDICES
(CONTINUED)

Abbreviations

SDCC	South Dublin County Council
SEUs	Significant Energy Users
M&R	Monitoring and Reporting
DCCAE	Department of Communications, Climate Action and Environment
EnPIs	Energy Performance Indicators
TPER	Total Primary Energy Requirement
TFC	Total Final Consumption
MPRNs	Metered Electrical Accounts
GPRNs	Metered Gas Accounts
CO_2	Carbon Dioxide
kWh	Kilowatt hour
MWh	Megawatt hour
GWh	Gigawatt hour
LED	Light Emitting Diode
HDD	Heating Degree Days
EPC	Energy Performance Contract
M&V	Measurement and Verification
ESCo	Energy Services Company
PV	Photovoltaic
IW	Irish Water
SON	High Pressure Sodium
SOX	Low Pressure Sodium
SXHF	Low Pressure Sodiums with High Frequency Gear
CDMT	Metal Halide
MBF	Mercury Vapour
FTE	Full Time Employees
SEAI	The Sustainable Energy Authority of Ireland
m^2	Metres Squared
UMR	Unmetered Registrar

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