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Foreword

We are very pleased to present the 11th annual survey of car clubs in Scotland for 2017. We would not have dared suggest last year that the sector would have grown by so much in one year - 29% more car club users and 24% more vehicles. The 5% difference shows shared cars being used ever more efficiently and is clear and recognised evidence of the sector maturing.

But this is only important when we understand the impacts of car clubs. **Car club cars are cleaner than private cars, they reduce the number of cars on our roads and on average, users drive less and walk and cycle more.** As a tool for behaviour change, this report further substantiates the role of car clubs in reducing emissions, liberating road space and leading to healthier lifestyles.

98% of Scotland’s car club fleet (100% in cities) are compliant with Scottish Low Emission Zone standards. Only 7% are diesels (compared to 39% in the UK car fleet), and 37% are EVs, petrol hybrid or hydrogen (compared to 1% of the UK fleet). As such, Scotland’s car clubs widen and accelerate access to low emission vehicles.

People using car clubs drive fewer miles in total compared to the national average, and since joining a car club, on average members have reduced their annual mileage by 572 miles. The miles driven in car club vehicles has also saved 300t CO₂ in 2017 due to the newer, more fuel efficient vehicles. On average, each car club car takes 5 private cars off the road – an effective street declutterer.

And where is the sector headed? The fleet is getting cleaner, its expansion is accelerating, young urban professionals are increasingly using car clubs instead of getting locked into car ownership, and more of the expansion and risk is being taken by the operators.

The consistently expanding benefits of car clubs across Scotland are testament to the ongoing effective and trusting partnerships across the public, private and community sectors. The deliberate intervention to accelerate best practice, ensure that the benefits are spread fairly across Scotland’s communities and nurture innovation has led to the envious outcomes documented in this report.

Alistair Kirkbride
Executive Director, Carplus Bikeplus
1 Executive Summary

The Carplus Annual Survey, Scotland 2017/18 was completed by almost 2,000 car club members in Scotland, from a membership of around 14,200. Four national car club operators and three community car club operators submitted information about their membership characteristics and car club usage.

This survey extends the evidence base detailing how car clubs help to:

✓ Improve air quality across Scotland
✓ Reduce carbon emissions from driving
✓ Enable members to drive less
✓ Support more sustainable travel choices
✓ Reduce private car ownership and use

Improve air quality across Scotland and reduce carbon emissions

To help address the air quality and carbon emissions reduction challenges across Scotland, the 411 car club cars are significantly cleaner and more fuel efficient than a typical private car:

• The average carbon emissions of the Scottish car club fleet is 45% lower than the UK average
• 98% of the fleet is compliant with Scottish Low Emission Zone standards, with only a small number of older diesel Euro 5 vehicles
• 97% of vehicles are in the three lowest emission bands (VED 2006 banding)
• Members saved 300 tonnes of CO₂ over the year by using car club cars rather than an average UK car

Enable members to drive less

Car club member travel patterns reduce their average driven mileage:

• Car club members reported an average reduction in miles driven of 572 miles a year after joining a car club
• The average miles driven by a car club member in both car club and private cars is low at 2,879 miles, compared to a national average of 8,479 miles (SHS, 2015)

Support sustainable travel choices

Car club members are less likely to drive their own car and more likely to cycle:

• 32% of members decreased their use of a private car
• 14% of members have cycled more after joining
• 60% of car club members also use a range of other shared transport services, including informal car sharing and cycle hire

Reduce private car ownership and use

Car clubs encourage behaviour change and reduce levels of private car ownership:

• On average, each car club car in Scotland results in members selling or disposing of around five private cars
• Almost a third of members would have bought a private vehicle had they not joined a car club. This equates to 4,392 deferred car purchases
• In the last five years in Scotland, car club members have sold or disposed of over 7,000 cars
• More than half of members said joining a car club has made it less likely that they will purchase a private vehicle over the next few years
• Car clubs reduce the need for car parking, creating space for urban realm improvements
1 Introduction

1.1 This is the eleventh edition of the Carplus Annual Survey for Scotland, and covers the period December 2016 – November 2017. It has been administered by consultants Steer Davies Gleave on behalf of Carplus Bikeplus.

About Carplus

1.2 Carplus Bikeplus is an independent environmental transport charity working to maximise the social and environmental benefits of shared mobility, including car clubs, bike sharing and 2+ car sharing.

1.3 Carplus Bikeplus work to change the way people travel to reduce the environmental impact of transport and improve access to transport for all. The organisation supports and encourages measures that promote shared mobility schemes which complement and extend public transport, cycling and walking to provide attractive packages of affordable and flexible travel that fit into modern lifestyles.

1.4 Carplus provide technical support, best practice guidance and practical advice to community groups, local authorities and transport professionals to assist in establishing car clubs, and help to ensure the benefits of shared transport are achieved.

1.5 Bikeplus is a representative body for bike sharing which aims to optimise the benefits of cycling by supporting the emergence of an effective widespread network of shared bikes.

1.6 Carplus Bikeplus are also a resource centre for 2+ car sharing and the integration of shared mobility schemes.

1.7 For more information, visit the Carplus website: www.carplus.org.uk.

The Carplus Annual Survey

1.8 Carplus is committed to a standardised data collection system to assess the impacts of car clubs and inform development of car clubs in the UK. Since 2007, Carplus has worked with car club operators to collect a range of data from car club members about their travel habits and use of car clubs, through an online survey sent to the majority of members of car clubs.

1.9 There was a members survey and an operators survey this year as in previous years. Topics covered in the members survey this year included:

- **Most recent car club journey**: purpose, number of passengers, reasons for choosing to use car club, alternatives
- **Household circumstances when joining**
- **Car ownership** before and after joining, influence of car club on decisions to buy or sell private cars
- **Private car mileage** and changes since joining
• **Frequency of using travel modes:** change in use of other modes since joining and modes used to travel to work

• **Electric vehicles:** Experiences of using vehicles and charging infrastructure, reasons for using EVs

• Use of other **shared mobility** services

• **Satisfaction** with proximity, quality and availability of vehicles

1.10 In addition to surveys of members, car club operators were requested to provide information about their operations through an operators’ survey. The information collected from operators is summarised below and presented in Chapter 4.

1.11 The operator survey was completed by seven car clubs (Co-wheels, E-Car, Enterprise, LEAP Car Club, Moray Carshare, Wheels4creetown and Zipcar). Questions asked included:

• Number of members
• Gender profile of members
• Age profile of members
• Average distance travelled per hire
• Average length of hire period
• Average hires per active member
• Number of hires per member per year
• Miles travelled per hire
• Split of trips between peak, off-peak and weekend

**Structure of this report**

1.12 Following this introduction, the report is structured as follows:

**Section 2** contains the emissions analysis and profiling of the car club fleet;

**Section 3** contains the results of the members’ survey; and

**Section 4** contains the results of the operators’ survey.
2 Profile of the car club fleet

Introduction

2.1 The following section reports on the car club vehicles in use in Scotland during 2016/17. It is based on a comprehensive set of fleet data that has been collected from Scottish car clubs. The data has been independently verified by Gfleet Services Ltd using the vehicle registration marks (VRM) and published datasets from the DVLA (Driver and Vehicle Licensing Agency), VCA (Vehicle Certification Agency) and vehicle manufacturers which enables the production of more comprehensive and accurate fleet profiling. This section contains the key findings and comparisons with previous years. The full emissions analysis and profiling is contained in Appendix B.

2.2 All Scottish car club operators, national and community, were asked to provide the VRM of all the club vehicles that were operational during the 12 months between the 1st November 2016 and the 31st October 2017 together with the mileage driven during that period, the fuel or energy used and the dates when the vehicles joined or left the fleet. Four national car club operators and three community clubs supplied data.

2.3 The VRM data from all the clubs was submitted to carweb\(^1\) and a full environmental data set was obtained for each vehicle based on the information held by the DVLA and the manufacturer. For most vehicles, the air quality emission data (nitrogen oxides NO\(_x\), particulates PM\(_{10}\), hydrocarbons HC, and carbon monoxide CO) was not available from this data set. The air quality data was obtained by matching, as closely as possible, the DVLA vehicle details with the VCA data set which holds the official emission figures. The vehicle’s safety performance in the European New Car Assessment Programme (NCAP) was established by matching the vehicle to the NCAP data set using DVLA make, model and year of registration.

Scottish National Car Clubs

2.4 The data presented in this section relates to the fleets of the four national car club operators who had vehicles available for use in Scotland during 2016/17.

2.5 The data made available relating to fleet changes meant it was possible to accurately determine the number of vehicles on fleet at the period end. During 2016/17 a total of 499 cars were used by the national Scottish car club fleet and of those 411 were on the fleet and active at the year-end (31st October 2017). This represents a substantial 24% increase from 2015/16 when there were 332 active cars on the fleet at the year-end.

\(^{1}\) carweb, www.carweb.co.uk
Scottish Car Clubs - Car Fleet Profile

Headlines (National Car Clubs)

Large increase in the number of vehicles available to car club members
- In 2016/17 the number of cars available to members increased by 24% to 411.
- The number of vans available more than doubled from 20 to 43.

98% of the car fleet is compliant with Scottish Low Emission Zone standards\(^2\)
- 17% of cars are electric, with a further 19% petrol hybrid.
- Only a small number (2%) of older diesel Euro 5 vehicles are non-compliant.

Mileage in zero tailpipe emission electric vehicles increased by 59% to 497,000 miles

Comparison of Scottish national car clubs fuel profile with the UK car fleet

<table>
<thead>
<tr>
<th>Fleet Type</th>
<th>Electric</th>
<th>Hydrogen Fuel Cell</th>
<th>Petrol Hybrid</th>
<th>Petrol</th>
<th>Diesel</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK Fleet</td>
<td>60%</td>
<td></td>
<td></td>
<td></td>
<td>39%</td>
</tr>
<tr>
<td>Scotland Car Clubs</td>
<td>17%</td>
<td>&lt;1%</td>
<td>19%</td>
<td>56%</td>
<td>7%</td>
</tr>
</tbody>
</table>

The large proportion of electric, petrol hybrid and petrol vehicles accounts for the high level of low emission zone compliance. Most of the new vehicles added in 2016/17 were petrol-electric hybrids or petrol cars which tend to have higher carbon emissions than equivalent diesel cars but lower emissions of nitrogen oxides and particulates, so they are better for air quality and public health.

No significant increase in the number of ultra low emission vehicles (ULEV)

Growth in the fleet during 2016/17 was mostly petrol and petrol hybrid vehicles
- There was only one ULEV (emissions under 75 g/km) added to the fleet in 2016/17.
- Most new vehicles were petrol or petrol hybrids with emissions of 75 g/km or more.
- There has been a small increase in the number of diesel vehicles on the fleet, reflecting the growth in vans provided.

Carbon emissions

Headlines

Carbon savings up from 236 tonnes in 2015/16 to 300 tonnes in 2016/17

- The average carbon emission of the Scottish car club fleet was 45% lower than the 2016/17 UK average car but 8% higher than the Scottish car club average for 2015/16.
- In 2016/17 the fleet drove over 2.85 million miles and produced 529 tonnes of carbon dioxide. This has been calculated from the published g/km emissions using an age-related uplift in line with the Defra greenhouse gas (GHG) reporting methodology.
- If the same mileage had been driven in the average UK car (Defra figure) it would have produced 829 tonnes of CO₂. This shows a saving of 300 tonnes in 2016/17 (36% reduction).

Electric vehicles make an increased contribution to tailpipe carbon reductions.

- Although the EV fleet has not increased significantly in size its annual mileage has grown from 312,000 miles to over 497,000 miles—an increase of just over 59%.
- As a result, the electric vehicle fleet has achieved a reduction in tailpipe carbon emissions of 137.3 tonnes per annum when compared to an average UK car.

Carbon profile of the Scottish car club fleet based on VED 2006 banding scheme

80% of the car club fleet is in Band A (0-100 g/km) compared to only 5% of the UK car fleet.

Trends

Average Emissions of Scottish Car Clubs 2011 to 2017 (g/km).

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Scottish Car Clubs</td>
<td>129.6</td>
<td>113.9</td>
<td>112.2</td>
<td>99.0</td>
<td>79.0</td>
<td>74.8</td>
<td>80.8</td>
</tr>
<tr>
<td>UK Car Fleet</td>
<td>162.8</td>
<td>160.1</td>
<td>157.0</td>
<td>153.9</td>
<td>150.6</td>
<td>147.3</td>
<td>No Data</td>
</tr>
</tbody>
</table>

3 Includes “zero emission” vehicles as 0 g/km
Safety

Headlines

Car club cars meet the highest safety standards

- 98% of the Scottish car club fleet has achieved the NCAP 5+ or 4+ Star safety standard.

Safety of the Scottish car club fleet based on Euro NCAP star rating

**NCAP profile of the Scottish car club fleet**

<table>
<thead>
<tr>
<th>Star Rating</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>5+ Star</td>
<td>70%</td>
</tr>
<tr>
<td>4+ Star</td>
<td>28%</td>
</tr>
<tr>
<td>3+ Star</td>
<td>0%</td>
</tr>
<tr>
<td>2 Star</td>
<td>0%</td>
</tr>
<tr>
<td>1 Star</td>
<td>0%</td>
</tr>
<tr>
<td>Not Tested</td>
<td>0%</td>
</tr>
<tr>
<td>Not Eligible</td>
<td>0%</td>
</tr>
<tr>
<td>No Data</td>
<td>0%</td>
</tr>
</tbody>
</table>

Trends

The fleet’s safety rating has again improved and the opportunity for further improvement is now limited to the replacement of two 3+ Star vehicles and four 4 Star vehicles in a fleet of 411 car club cars.
3 Member Survey

Introduction

3.1 This section provides the results of the surveys completed by 1,912 individual round-trip car club members in Scotland. The majority of respondents were from Edinburgh (29%), Glasgow (24%) and Aberdeen (14%) with a particular rise in members from Midlothian (10%) and East Lothian (6%) since last year’s survey.

3.2 The survey was completed by 1,233 existing members and 679 new members of car clubs who joined since April 2017. A full set of survey questions are available on request from Carplus.

3.3 Appendix A contains all of the data collected as part of the survey. This section contains the key findings, including headline results and key trends (showing comparisons with previous annual surveys) for the following topics:

• Profile of car club users
• Impact of car clubs on car ownership
• Impact of car clubs on car purchasing
• Impact of car clubs on miles travelled
• Mileage prior to joining a car club
• Travel behaviour of longer-term members
• Use of other shared mobility
• How car club vehicles are used
• Why car club vehicles are used
• Circumstances when joining a car club
• The experience of joining a car club and satisfaction with car clubs
• Experiences of using electric vehicles
• Attitudes towards electric vehicles

3.4 Unless otherwise stated, all data presented are for 2017/18, although the Scottish Household Survey data are taken from 2015/16 as these are the most recent data available.

3.5 To ensure respondents of the survey are representative of all members in Scotland, we worked with operators to profile their member base using Mosaic and compared this profile to the survey respondents and, as necessary, weighted the survey data to the total member population profile.
Profile of car club users

Key findings

Car club members include a diverse range of people

Based on analysis of member postcodes using Mosaic\(^4\), the characteristics of Scotland car club members are shown in the table below and include:

- Young renters living in the city centre (Central Pulse - 32%).
- High status households living in the inner suburbs (Uptown Elite - 11%).
- Older residents living in the inner suburbs (Ageing Access – 9%).
- Other Mosaic types include young professionals in their 20s and 30s (Metro High-Flyers - 6%), singletons renting away from central amenities (Bus Route Renters - 5%) and students living in student accommodation (Student Scene - 5%).

Table: Mosaic profile of Scotland car club members: key types

<table>
<thead>
<tr>
<th>Type</th>
<th>% of Scottish members</th>
<th>% of Scottish population</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Pulse</td>
<td>32%</td>
<td>3%</td>
<td>Entertainment-seeking youngsters renting city centre flats in vibrant locations close to jobs and night life.</td>
</tr>
<tr>
<td>Uptown Elite</td>
<td>11%</td>
<td>1%</td>
<td>High status households owning elegant homes in accessible inner suburbs where they enjoy city life in comfort.</td>
</tr>
<tr>
<td>Ageing Access</td>
<td>9%</td>
<td>1%</td>
<td>Older residents owning small inner suburban properties with good access to amenities.</td>
</tr>
<tr>
<td>Metro High-Flyers</td>
<td>6%</td>
<td>4%</td>
<td>Ambitious 20 and 30-somethings renting expensive apartments in highly commutable areas of major cities.</td>
</tr>
<tr>
<td>Bus Route Renters</td>
<td>5%</td>
<td>0.3%</td>
<td>Singles renting affordable private flats away from central amenities and often on main roads.</td>
</tr>
<tr>
<td>Student Scene</td>
<td>5%</td>
<td>0.5%</td>
<td>Students living in high density accommodation close to universities and educational centres.</td>
</tr>
<tr>
<td>Cafes &amp; Catchments</td>
<td>2%</td>
<td>6.4%</td>
<td>Affluent families with growing children living in upmarket housing in city environments.</td>
</tr>
<tr>
<td>Streetwise Singles</td>
<td>2%</td>
<td>1%</td>
<td>Well-qualified older singles with incomes from successful professional careers in good quality housing.</td>
</tr>
<tr>
<td>Learners &amp; Earners</td>
<td>2%</td>
<td>0.1%</td>
<td>Inhabitants of the university fringe where students and older residents mix in cosmopolitan locations.</td>
</tr>
</tbody>
</table>

Trends

Profile of car club members remains diverse

Compared to the Mosaic profile of members in 2015/16 and 2016/17, the top six groups remain the same; however, the greatest increases proportionally can be seen in the Central Pulse and Uptown Elite groups which have grown from 23% and 8% respectively.

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\(^4\) Mosaic is a geodemographic profiling tool which classified residential postcodes into one of 66 Types, based on demographics, attitudes and a wide range of other data from commercial and public statistics.
Circumstances when joining a car club

Key findings

Members join car clubs to gain additional personal freedom and occasional access to cars
- The chart below shows that the most popular reason for joining was to gain additional personal freedom (31%) for those who didn’t already own a car.
- 24% of members joined instead of purchasing or replacing a car and 11% sold or disposed of a car on joining. These members require access to cars occasionally but find it preferable to have access to a car club vehicle rather than keep their own.
- Other reasons provided in free-text responses included members who joined as a cheaper alternative to owning a car, those that wanted access to a van and those that wanted to try electric vehicles.

Chart: Household circumstances at the time of joining

Trends

Increased personal freedom remains important
Gaining personal freedom (30%) was also the most frequently cited reasons for joining a car club in 2016/17. The proportion of members joining instead of purchasing or replacing a car has also remained fairly stable at 24% (23% in 2016/17).
Impact of car clubs on car ownership

Key findings

Car ownership amongst new members falls after joining

- 47% of new members owned at least one car before joining, falling to 34% afterwards, as shown in the graph below. Car ownership increased among just 2% of new members after joining the car club.

Car ownership remains low amongst longer term members

- Longer-term members have similar changes in levels of car ownership. 51% of longer-term members owned at least one car before joining, falling to just 35% afterwards. Longer-term members are those who have been members for at least six months – many have been members for a number of years.
- 15% of all members stated that they had sold or disposed of a car in the 12 months prior to completing the survey (25% of new members and 9% of longer-term members). Of these, 19% stated that their car club membership was either the main reason or a major factor in their decision to sell or dispose of their car.
- For each car club car, approximately 5 private cars are sold or disposed of, and not replaced by members. This equates to 2,080 vehicles in the last 12 months.

Chart: Car ownership before and after joining a car club

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Longer-term</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>New members</td>
<td>3%</td>
<td>3%</td>
</tr>
</tbody>
</table>

Trends

Car clubs continue to reduce car ownership

Cumulative number of cars sold or disposed of by car club members in the last 5 years
Impact of car clubs on car purchasing

Key findings

Car clubs reduce the need to purchase a private car
- Members were asked whether they would have bought a new car had they not joined a car club. 31% of all members reported that they would have done, equating to around 4,392 deferred car purchases.
- As shown in the chart below, over half of members are now less likely to buy a private car in the next few years, after joining a car club.

Chart: Effect of car club on decision to buy a private car

More likely, 5%
Don’t know, 7%
No effect, 31%
Less likely, 56%

Trends

Car clubs help to defer future car purchase by members
As shown in the table below, results from the 2017/18 survey indicate that car clubs continue to have an impact on the likelihood of purchasing a car. This may reflect the general move away from car ownership in cities (particularly amongst the under 30s) – increasingly people do not see car ownership as necessary or desirable.

<table>
<thead>
<tr>
<th>Year</th>
<th>Members (overall) for whom joining a car club has made it less likely that they will buy a car in the next few years</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013/14</td>
<td>66%</td>
</tr>
<tr>
<td>2014/15</td>
<td>68%</td>
</tr>
<tr>
<td>2015/16</td>
<td>56%</td>
</tr>
<tr>
<td>2016/17</td>
<td>51%</td>
</tr>
<tr>
<td>2017/18</td>
<td>56%</td>
</tr>
</tbody>
</table>
Impact of car clubs on miles travelled

Key findings

Joining a car club is associated with a reduction in annual car mileage

- The average change in annual household car mileage (for all cars in the household and car club cars) reported by long term members after joining was a decrease of 572 miles.
- This average change is derived from estimated changes in mileage provided by the 25% of long-term members who reported a decrease in their mileage after joining a car club, the 29% who reported an increase and those members who reported no change (37%). Members who increase mileage may have joined in order to make trips by car that they could not otherwise be able to make, hence an increase in mileage. Many respondents will not have accurate records of their mileage so the figures are estimates. Although the percentage of long-term members increasing their mileage is higher than those reducing, most only increased by minimal amounts whereas decreases were generally larger, meaning the average change was a decrease of 572 miles annually.
- The distribution of change is shown below; the average increase in annual mileage was 908 miles whilst the average decrease was 3,105 miles.
- 25% of member households that didn’t use a private car travelled 500 miles or fewer in car club vehicles in the 12 months prior to completing the survey.
- Based on data provided by operators, the average annual mileage in car club cars per member in Scotland was 490 miles, just under the survey member average estimate of 509 miles.
- The estimated average annual mileage travelled by members (in their primary household car) is 2,370 miles. When added to the estimated miles travelled in car club cars, the annual average is 2,879 miles. The average mileage driven by households in Scotland is 8,479 miles (SHS, 2015) indicating that car club members drive far less than the average Scottish resident.

Chart: Average change in long-term member annual mileage following joining a car club

Trends

Average annual mileage in car club vehicles per member

<table>
<thead>
<tr>
<th>Year</th>
<th>2014/15</th>
<th>2015/16</th>
<th>2016/17</th>
<th>2017/18</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual mileage</td>
<td>940</td>
<td>560</td>
<td>508</td>
<td>509</td>
</tr>
</tbody>
</table>
Travel behaviour after joining

Key findings

Car club members make frequent use of sustainable travel modes

- Members were asked about how their usage of different modes changed after joining a car club.
  - 32% drive a private vehicle less than before joining;
  - 14% of members reporting cycling more and 6% reporting walking more, while 4% reported both cycling and walking less;
  - Fairly equal proportions of members increased and decreased their bus and underground usage, with 17% and 15% using them more often compared to 16% and 11% decreasing respectively.
  - Train use saw an overall decrease, with 6% using trains more and 20% using them less often.

Chart: Change in mode use after joining a car club

<table>
<thead>
<tr>
<th>Mode</th>
<th>Decreased</th>
<th>No change</th>
<th>Increased</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car driver (private car)</td>
<td>32%</td>
<td>64%</td>
<td>4%</td>
</tr>
<tr>
<td>Train</td>
<td>20%</td>
<td>74%</td>
<td>6%</td>
</tr>
<tr>
<td>Other taxi</td>
<td>17%</td>
<td>76%</td>
<td>7%</td>
</tr>
<tr>
<td>Bus</td>
<td>16%</td>
<td>67%</td>
<td>17%</td>
</tr>
<tr>
<td>Underground/ tram</td>
<td>11%</td>
<td>74%</td>
<td>15%</td>
</tr>
<tr>
<td>On-demand taxi</td>
<td>10%</td>
<td>80%</td>
<td>9%</td>
</tr>
<tr>
<td>Car passenger</td>
<td>8%</td>
<td>89%</td>
<td>3%</td>
</tr>
<tr>
<td>Bicycle</td>
<td>4%</td>
<td>82%</td>
<td>14%</td>
</tr>
<tr>
<td>Walking</td>
<td>4%</td>
<td>89%</td>
<td>6%</td>
</tr>
</tbody>
</table>

Trends

This question was asked in this format for the first time this year.
Use of other shared mobility

Key findings

Car club members also use other shared mobility services

- 60% of members use another shared mobility service alongside their car club.
- Aside from car clubs, half of members have used traditional car rental in the last year (mileage was not asked in this survey, we suggest adding this question next year), 17% have informally car shared and 11% have used cycle hire. Less than 5% have used peer-to-peer car clubs and ride sharing services in the last year.
- Only 1% of members were also members of a flexible car club while none responded that they were members of another round-trip club. This shows that members generally pick one car club to be a member of at a time.

Chart: Joining other shared mobility services before or after joining car club (all members)

<table>
<thead>
<tr>
<th>Service</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional car rental</td>
<td>50%</td>
</tr>
<tr>
<td>Informal car sharing</td>
<td>17%</td>
</tr>
<tr>
<td>Cycle hire scheme</td>
<td>11%</td>
</tr>
<tr>
<td>Ride sharing service</td>
<td>3%</td>
</tr>
<tr>
<td>Peer-to-peer car club</td>
<td>1%</td>
</tr>
<tr>
<td>Flexible car club</td>
<td>1%</td>
</tr>
</tbody>
</table>

Trends

Use of shared mobility use remains consistent

The proportion of members using shared mobility has increased slightly on previous years with 55% using other forms of shared mobility in 2016/17 and 60% this year. Members using traditional car rental has stayed fairly consistent, with 46% of members using traditional car rental in 2016/17.
How car club vehicles are used

Key findings

Car club cars in Scotland have a higher occupancy than private cars

- Car club cars have an average occupancy of 2.15 people (based on the last car club journey made) compared to 1.5 for private cars (SHS, 2014/15). This may be a reflection of the different journey types as detailed below.

Car clubs are mostly used for personal and leisure purposes

- As shown in the chart below, personal business (34%), leisure (33%) and shopping (28%) are the most popular car club journey purposes. Respondents could choose more than one journey purpose for this question. These are the same top purposes as in 2016/17.

Chart: Comparison of journey purposes

<table>
<thead>
<tr>
<th>Journey Purpose</th>
<th>Annual survey</th>
<th>SHS 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal business</td>
<td>6%</td>
<td>34%</td>
</tr>
<tr>
<td>Leisure</td>
<td>9%</td>
<td>33%</td>
</tr>
<tr>
<td>Shopping</td>
<td>23%</td>
<td>28%</td>
</tr>
<tr>
<td>Visiting friends/family</td>
<td>18%</td>
<td>11%</td>
</tr>
<tr>
<td>Business</td>
<td>12%</td>
<td>2%</td>
</tr>
<tr>
<td>Commuting</td>
<td>23%</td>
<td>3%</td>
</tr>
<tr>
<td>Education</td>
<td>7%</td>
<td>2%</td>
</tr>
<tr>
<td>Other</td>
<td>19%</td>
<td></td>
</tr>
</tbody>
</table>

Trends

Average occupancy of car club vehicles compared to Scotland average for private cars

- Car clubs and SHS (Survey of Health and Social Trends) data show a consistent trend of higher occupancy for car club vehicles compared to private cars, with the highest occupancy recorded in 2013/14 at 2.15 people per journey. The trend indicates a consistent increase over the years, with the latest data in 2017/18 showing an occupancy of 2.10 people per journey.
How car club members commute

Key findings

Car clubs are not generally used for commuting

- When asked which mode of transport they use to commute to work or educational establishments, most members responded that they used sustainable modes. The top answers were walking (32%), bus (16%) and cycling (16%). Respondents could choose more than one option.
- Only 13% commuted by car; 11% used a private car, 2% travelled as a passenger in a private car and less than 1% drove or were a passenger in a car club car.
- Compared to modes used to commute reported in the Scottish Household Survey, fewer car club journeys are made for commuting and education purposes (>1% of car club journeys compares to 30% of journeys by car in the SHS). It is generally not cost-effective for members to use round-trip car clubs for commuting - members pay by the hour and would therefore be paying for the whole period of hire including the time spent at work/education when the car is not in use.

Chart: Members’ journeys to work or education

<table>
<thead>
<tr>
<th>Mode</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walk</td>
<td>32%</td>
</tr>
<tr>
<td>Bus</td>
<td>16%</td>
</tr>
<tr>
<td>Bicycle</td>
<td>16%</td>
</tr>
<tr>
<td>Car driver (private car)</td>
<td>11%</td>
</tr>
<tr>
<td>Not applicable</td>
<td>10%</td>
</tr>
<tr>
<td>Rail</td>
<td>8%</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>2%</td>
</tr>
<tr>
<td>Underground, tram or other light rail</td>
<td>2%</td>
</tr>
<tr>
<td>Car passenger (private car)</td>
<td>2%</td>
</tr>
<tr>
<td>Taxi/minicab</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Motorcycle/moped</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Car driver (car club car)</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Car passenger (car club car)</td>
<td>&lt;1%</td>
</tr>
</tbody>
</table>

Trends

Car club members continue to commute using sustainable modes

Journey purposes were similar in the 2016/17 survey with members again choosing to travel to work or education by sustainable options (32% walking, 15% by bus and 14% by bicycle). Last year, 2% commuted in a car club car either as a passenger or driver, a figure which has dropped to less than 1% this year. This may be due to a car sharing model based in Anstruther, which facilitated commuting between the village and employment in St Andrews and Dundee, ceasing operations.
Frequency of car club use

Key findings

Half of all members have made a car club journey in the last month
- The table below shows that 51% of car club members have made a car club journey within the last month and a further 20% in the last three months.

Members use car clubs for convenience
- When asked why they chose to use a car club most recently, the most popular was that respondents were carrying luggage or bulky items (38%) which made driving the most convenient option. Similarly, the second and third most popular answers both focussed on a reduced journey time.
- Respondents could choose more than one reason for their most recent journey.

Chart: Most recent car club journey

<table>
<thead>
<tr>
<th>Last journey</th>
<th>% of members</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the last month</td>
<td>51%</td>
</tr>
<tr>
<td>In the last three months</td>
<td>20%</td>
</tr>
<tr>
<td>Between three and six months ago</td>
<td>9%</td>
</tr>
<tr>
<td>More than six months ago</td>
<td>9%</td>
</tr>
<tr>
<td>Have not yet made a journey</td>
<td>10%</td>
</tr>
</tbody>
</table>

Reason for using a car club for your most recent car club journey

- I was carrying luggage / bulky items: 38%
- Public transport would have taken too long: 34%
- For a shorter journey time: 25%
- No suitable public transport option: 24%
- I was going to more than one place: 23%
- It was the cheapest option: 18%
- My own car was not available / suitable: 16%
- Travelling with others: 15%
- Other: 12%
- To experience driving an electric car: 8%
- No suitable cycle routes: 3%

Trends

Members continue to use car clubs for convenience
In 2016/17, the top two reasons for using a car club were the same as in 2017/18. The proportion of respondents using car club vehicles to transport luggage has risen from 32% in 2016/17 to 38% this year.
Experiences of using electric vehicles (EV)

Key findings

A third of respondents have tried an electric vehicle
- 34% of all respondents have used a car club electric vehicle. As shown in the chart below, 84% rated the experience of driving the vehicle ‘good’ or ‘very good’. Members were less happy with the experience of using EV charging points, with 61% rating the experience ‘good’ or ‘very good’ though satisfaction with both has increased since 2016/17. Those who rated the charging points ‘poor’ or ‘very poor’ found difficulties with unlocking the socket, problems getting the car to charge and limited charging points.

Members are curious to try electric vehicles and use them for environmental reasons
- ‘I was curious to try an electric vehicle’ was the most popular reason for choosing an EV (59% of members). 49% of members reported they used EVs because they are environmentally friendly and 41% because it was the closest vehicle. 27% of members chose an EV as they prefer driving them while 19% chose an EV because of the size or type of vehicle available. For 14% it was the only option available.

Chart: Experience of using electric vehicles and charging points

Trends

Experiences of charging points have improved over time
The graph below shows the proportion of members who found driving the vehicle and using charging points ‘good’ or ‘very good’.

![Graph showing trends in driving and charging experiences](chart_url)
4 Operator Survey

Introduction

4.1 This section contains the information provided by car club operators about their service. Each car club operator provided details of their membership numbers, characteristics of members and data regarding use of car clubs by their members such as mileage travelled. Data were collected by means of a self-completion questionnaire.

4.2 Data were provided by seven car clubs (Co-wheels, E-car, Enterprise, LEAP Car Club, Moray Carshare, Wheels4creeetown and Zipcar). Not all operators provided data for each question.

4.3 Data about NOx, CO2 and PM10 emissions of car club fleets were collected separately through the emissions analysis and profiling process and is reported in section 2.
Characteristics of car club members

Headlines

Car clubs attract a young profile of members
- The graph below shows that 71% of Scotland car club members are younger than 49, compared to 52% of UK driving licence holders (DVLA, 2015). The market for car clubs is predominantly amongst the 25-49 age group.

More women are members of car clubs than men
- In contrast to previous years and to other regions of the UK, data from operators showed that 54% of car club members are women. Three of the larger car clubs did not have data on gender.

Chart: Age of members compared to age of national licence holders

<table>
<thead>
<tr>
<th>Scotland Members</th>
<th>5%</th>
<th>11%</th>
<th>14%</th>
<th>15%</th>
<th>12%</th>
<th>13%</th>
<th>11%</th>
<th>9%</th>
<th>9%</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK Licence Holders (DVLA)</td>
<td>5%</td>
<td>7%</td>
<td>8%</td>
<td>8%</td>
<td>10%</td>
<td>11%</td>
<td>11%</td>
<td>9%</td>
<td>28%</td>
</tr>
</tbody>
</table>

Legend:
- Under 21
- 21 to 24
- 25 to 29
- 30 to 34
- 35 to 39
- 40 to 44
- 45 to 49
- 50 to 54
- 55 to 59
- 60 or over
When car clubs are used

Headlines

**Most club journeys are made off-peak**
- 68% of round-trip bookings start outside of peak hours. Only 20% of trips start between 07:00 and 08:00 on a weekday with 11% starting between 16:00 and 19:00 on a weekday.
- 21% of bookings start at the weekend as shown in the chart below. Peak times are shown in green and off-peak times in blue.

Chart: Round-trip booking start times

- **Weekdays 07:00 to 10:00**: 10%
- **Weekdays 16:00 – 19:00**: 20%
- **Weekdays other times**: 46%
- **Saturdays**: 11%
- **Sundays**: 11%
Utilisation of car clubs

Headlines

Members in Scotland use car clubs infrequently and for varying journey lengths

- 56% of round-trip members use a car club vehicle fewer than six times a year, though 12% of members make more than 20 car club trips a year.
- The average number of hires per active member is 14 per year.
- 54% of hires are for trips of 20 miles or less, however, 8% of trips are over 51 miles, which means that the average trip length is 35 miles.
- The average duration of hire for is 5 hours 28 minutes and the average distance travelled per hire 35 miles, as shown in the table at the bottom of the page. One car club reported average distance travelled as 142 miles and average hire length as 31 hours 11 minutes.
- Average duration hire is similar to 2016/17 when it was 5 hours 23 minutes.

Chart: Number of hires per member per year

![Bar Chart]

Table: Trip duration, distance and number of hires in Scotland

<table>
<thead>
<tr>
<th>Measure</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average duration of hire</td>
<td>5 hours 28 minutes</td>
</tr>
<tr>
<td>Average distance per hire</td>
<td>35 miles</td>
</tr>
<tr>
<td>Average number of annual hires per active member</td>
<td>14</td>
</tr>
<tr>
<td>Implied miles per member per year</td>
<td>490 miles</td>
</tr>
</tbody>
</table>

5 Calculated as average number of hires multiplied by average distance per hire (figures have been rounded).
A  Detailed Tables and Figures
Impact of car clubs on car ownership

Figure 4.1: Car ownership before and after joining a car club: all members

![Bar chart showing car ownership before and after joining a car club for longer-term members and new members.]

Figure 4.2: Sold or disposed of a car in the last twelve months: long term members

![Pie chart showing percentage of long term members who sold or disposed of a car in the last twelve months.]
Impact of car clubs on car purchasing

Figure 4.3: Would have bought a private car if hadn’t joined a car club: all members

Figure 4.4: Likelihood of buying a private car in the future: all members
Figure 4.5: Probability of buying a private car if car club was no longer an option: all members

- Less likely, 56%
- No effect, 31%
- More likely, 5%
- Don’t know, 7%
Impact of car clubs on miles travelled

Figure 4.6: Estimated household mileage by primary household car and car club cars: longer-term members

Figure 4.7: Change in household mileage since joining the car club: longer-term members
Figure 4.8: Average change in annual mileage since joining the car club: longer-term members

Figure 4.9: Estimated household mileage by primary household car in 12 months prior to joining: new members
## Mode use

**Figure 4.10: Change in mode use since joining**

<table>
<thead>
<tr>
<th>Mode</th>
<th>Decreased</th>
<th>No change</th>
<th>Increased</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car driver (private car)</td>
<td>32%</td>
<td>64%</td>
<td>4%</td>
</tr>
<tr>
<td>Train</td>
<td>20%</td>
<td>74%</td>
<td>6%</td>
</tr>
<tr>
<td>Other taxi</td>
<td>17%</td>
<td>76%</td>
<td>7%</td>
</tr>
<tr>
<td>Bus</td>
<td>16%</td>
<td>67%</td>
<td>17%</td>
</tr>
<tr>
<td>Underground/ tram</td>
<td>11%</td>
<td>74%</td>
<td>15%</td>
</tr>
<tr>
<td>On-demand taxi</td>
<td>10%</td>
<td>80%</td>
<td>9%</td>
</tr>
<tr>
<td>Car passenger</td>
<td>8%</td>
<td>89%</td>
<td>3%</td>
</tr>
<tr>
<td>Bicycle</td>
<td>4%</td>
<td>82%</td>
<td>14%</td>
</tr>
<tr>
<td>Walking</td>
<td>4%</td>
<td>89%</td>
<td>6%</td>
</tr>
</tbody>
</table>

**Figure 4.11: Mode used to get to work/educational establishment: all members**

- Walk: 32%
- Bus: 16%
- Bicycle: 16%
- Car driver (private car): 11%
- Not applicable: 10%
- Rail: 8%
- Other (please specify): 2%
- Underground, tram or other light rail: 2%
- Car passenger (private car): 2%
- Taxi/minicab: 1%
- Motorcycle/moped: 1%
- Car driver (car club car): 1%
- Car passenger (car club car): 1%
Use of other shared mobility

Figure 4.12: Use of other shared mobility modes: all members

- Traditional car rental: 50%
- Informal car sharing: 17%
- Cycle hire scheme: 11%
- Ride sharing service: 3%
- Peer-to-peer car club: 1%
- Flexible car club: 1%

How car club vehicles are used

Figure 4.13: Journey purposes: all members

- Personal business: 34%
- Leisure: 33%
- Shopping: 28%
- Visiting friends/family: 18%
- Business: 12%
- Commuting: 3%
- Education: 2%
Figure 4.14: When did you last use a car club vehicle: all members

- In the last month, 51%
- In the last three months, 20%
- Between three and six months ago, 9%
- More than six months ago, 9%
- Have not yet made a journey, 10%
- Did not use a car club vehicle, 9%

Figure 4.15: Reasons for using car club on your most recent car club journey: all members

- I was carrying luggage / bulky items: 38%
- Public transport would have taken too long: 34%
- For a shorter journey time: 25%
- No suitable public transport option: 24%
- I was going to more than one place: 23%
- It was the cheapest option: 18%
- My own car was not available / suitable: 16%
- Travelling with others: 15%
- Other: 12%
- To experience driving an electric car: 8%
- No suitable cycle routes: 3%
Figure 4.16: Satisfaction with car club: all members

Experiences of using electric vehicles

Figure 4.17: Rating of driving an electric vehicle: all members
Figure 4.18: Reason for choosing an electric vehicle: all members

- I was curious to try an electric vehicle: 59%
- It is more environmentally friendly: 49%
- It was the closest vehicle available to me: 41%
- I prefer driving electric vehicles: 27%
- The size/type of the vehicle: 19%
- It was the only option: 14%
- Other: 9%
- I did not realise it was an electric vehicle when booking: 2%
B  Emissions Analysis and Profiling
Introduction

The following section reports on the car club vehicles in use in Scotland during 2016/17. It is based on a comprehensive set of fleet data that has been collected from Scottish car clubs. The data has been independently verified by Gfleet Services Ltd using the vehicle registration marks (VRM) and published datasets from the DVLA (Driver and Vehicle Licensing Agency), VCA (Vehicle Certification Agency) and vehicle manufacturers which enables the production of more comprehensive and accurate fleet profiling.

All Scottish car club operators, national and community, were asked to provide the vehicle registration marks (VRM) of all the club vehicles that were operational during the 12 months between the 1st November 2016 and the 31st October 2017 together with the mileage driven during that period, the fuel or energy used and the dates when the vehicles joined or left the fleet. Four national car club operators and three community clubs supplied data.

The VRM data from all the clubs was submitted to carweb and a full environmental data set was obtained for each vehicle based on the information held by the DVLA and the manufacturer. For most vehicles, the air quality emission data (nitrogen oxides NOx, particulates PM10, hydrocarbons HC, and carbon monoxide CO) was not available from this data set. The air quality data was obtained by matching, as closely as possible, the DVLA vehicle details with the VCA data set which holds the official emission figures. The vehicle’s safety performance in the European New Car Assessment Programme (NCAP) was established by matching the vehicle to the NCAP data set using DVLA make, model and year of registration.

Scottish National Car Clubs

The data presented in this section relates to the fleets of the four national car club operators who had vehicles available for use in Scotland during 2016/17. The names of the car club operators have been replaced by numbers (e.g. Club 01) which correspond to those used in reports produced in previous years.

The data made available relating to fleet changes meant it was possible to accurately determine the number of vehicles on fleet at the period end. During 2016/17 a total of 499 cars were used by the national Scottish car club fleet and of those 411 were on the fleet and active at the year-end (31st October 2017). This represents a substantial 24% increase from 2015/16 when there were 332 active cars on the fleet at the year-end; most of the new cars have been added by Club 05.

Carbon Dioxide Emission Profile - Cars

When a car is registered with the DVLA its carbon dioxide emissions (usually shortened to carbon emissions) measured in grams of carbon dioxide per kilometre (gCO2/km and usually shortened to g/km) must be submitted to the DVLA. The data is supplied by the original equipment manufacturer (OEM), is produced using laboratory tests paid for by the manufacturer, and is related to the specification of the vehicle.

Since April 2001 the carbon emissions of a car (g/km) has been used by HM Treasury to determine the Vehicle Excise Duty (VED) payable. With a small change in 2006 the system remained essentially the same from April 2001 until April 2017 when new bands were introduced by HM Treasury. The 2006 Band A (0-100 g/km) was sub-divided into five new

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6 http://www.carweb.co.uk/
bands (Band A to Band E) while the bands above 100 g/km were merged or modified so that the total number of bands (13) did not change. As the new scheme does not directly relate to the old scheme and the UK Department for Transport (DfT) continues to report all new UK car purchases using only 2006 emission bands there is currently no national data available that relates to the 2017 scheme.

Table 4-1 shows the number and proportion of Scottish car club cars in each VED emission band at the end of October 2017 using both the 2006 scheme and the 2017 scheme. The shaded area maps the impact of changes in Band A. The 328 cars in Band A\_2006 falls to only 73 in Band A\_2017 with most of the fleet being recategorized as Band E\_2017.

Table 4-1 Vehicle Excise Duty emission band profile comparison (2006 Scheme v 2017 Scheme)

<table>
<thead>
<tr>
<th>Band</th>
<th>2006 Scheme</th>
<th>Number</th>
<th>%</th>
<th>2017 Scheme</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Band A</td>
<td>0-100</td>
<td>328</td>
<td>79.8%</td>
<td>0</td>
<td>73</td>
<td>17.8%</td>
</tr>
<tr>
<td>Band B</td>
<td>101-110</td>
<td>19</td>
<td>4.6%</td>
<td>1-50</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Band C</td>
<td>111-120</td>
<td>49</td>
<td>11.9%</td>
<td>51-75</td>
<td>29</td>
<td>7.1%</td>
</tr>
<tr>
<td>Band D</td>
<td>121-130</td>
<td>9</td>
<td>2.2%</td>
<td>76-90</td>
<td>54</td>
<td>13.1%</td>
</tr>
<tr>
<td>Band E</td>
<td>131-140</td>
<td>4</td>
<td>1.0%</td>
<td>91-100</td>
<td>172</td>
<td>41.8%</td>
</tr>
<tr>
<td>Band F</td>
<td>141-150</td>
<td>1</td>
<td>0.2%</td>
<td>101-110</td>
<td>19</td>
<td>4.6%</td>
</tr>
<tr>
<td>Band G</td>
<td>151-165</td>
<td></td>
<td></td>
<td>111-130</td>
<td>58</td>
<td>14.1%</td>
</tr>
<tr>
<td>Band H</td>
<td>166-175</td>
<td></td>
<td></td>
<td>131-150</td>
<td>5</td>
<td>1.2%</td>
</tr>
<tr>
<td>Band I</td>
<td>176-185</td>
<td>1</td>
<td>0.2%</td>
<td>151-170</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Band J</td>
<td>186-200</td>
<td></td>
<td></td>
<td>171-190</td>
<td>1</td>
<td>0.2%</td>
</tr>
<tr>
<td>Band K</td>
<td>201-225</td>
<td></td>
<td></td>
<td>191-225</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Band L</td>
<td>226-255</td>
<td>226</td>
<td></td>
<td>226-255</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Band M</td>
<td>256+</td>
<td>256+</td>
<td></td>
<td>256+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No data available</td>
<td></td>
<td></td>
<td></td>
<td>Total</td>
<td>411</td>
<td>411</td>
</tr>
</tbody>
</table>

Figure 4-19 (below) shows the VED\_2006 carbon emission profile of the Scottish car club fleet in relation to 2016/17 UK national car fleet data\(^7\) (the 2017/18 UK data will not be available until mid-April 2018). Clearly most Scottish car club vehicles (97%) were in the lowest three emission Bands A, B and C, with four fifths of the cars (80%) in Band A (0-100 g/km). This compares with only 25% of the national fleet in Bands A to C and just 6% in Band A.

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\(^7\) DfT Statistics: Table VEH0206. Licensed cars by CO\(_2\) emission band, Great Britain, April 2017. Next Update April 2018.
Figure 4-19 Comparison of national Scottish car clubs’ VED (2006) emission band profile with the UK Fleet

![Comparison of national Scottish car clubs' VED (2006) emission band profile with the UK Fleet](image)

Figure 4-20 (below) shows the 2006 Band A vehicles reassigned to the new 2017 Band A to E boundaries. Of note is the large proportion (52%) in Band E (91-100 g/km). These are all conventionally powered petrol and diesel vehicles. Most of the vehicles in Band D (16%) are petrol hybrids but there are also a small number of diesel cars with emissions of 90 g/km. The vehicles in Band C (9%) are all petrol hybrids and there are no Band B (1-50 g/km) vehicles in the fleet (these would normally be plug in hybrid electric vehicles - PHEV). The vehicles in zero emission Band A (22%) are almost all battery electric (there are two hydrogen fuel cell cars). Club 01 has no vehicles with emissions of 100 g/km or less, Club 14 has only Band A and Band D vehicles.

Figure 4-20 Analysis of the 2006 Band A (0-100g/km) fleet using 2017 Band A to Band E boundaries

![Analysis of the 2006 Band A (0-100g/km) fleet using 2017 Band A to Band E boundaries](image)
At the end of October 2017, the average carbon emission of the Scottish car club fleet (Table 4-2) was 45% lower than the 2016 UK average car but 8% higher than the average Scottish car club car in 2016. This increase, the first since we have been producing this report, is due to the shift from diesel to petrol and the growth in the size of the fleet. Most of the new cars introduced to the car club fleet in 2017 were petrol powered with emissions in the range 90 g/km to 110 g/km; good for petrol cars but not as low as the equivalent diesels or petrol hybrids. This data is all based on the manufacturers’ published emission factors, it has not been corrected for real-world use.

Table 4-2 Average carbon emissions of Scottish car clubs (g/km) – Manufacturer’s Data

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Scottish Car Clubs</td>
<td>129.6</td>
<td>113.9</td>
<td>112.2</td>
<td>99.0</td>
<td>79.0</td>
<td>74.8</td>
<td>80.8</td>
</tr>
<tr>
<td>UK Car Fleet</td>
<td>162.8</td>
<td>160.1</td>
<td>157.0</td>
<td>153.9</td>
<td>150.6</td>
<td>147.3</td>
<td></td>
</tr>
</tbody>
</table>

Table 4-3 Minimum, average and maximum carbon emissions (g/km) of Scottish car clubs

<table>
<thead>
<tr>
<th>Fleet</th>
<th>Min g/km</th>
<th>Av g/km</th>
<th>Max g/km</th>
</tr>
</thead>
<tbody>
<tr>
<td>Club 01</td>
<td>119</td>
<td>119</td>
<td>119</td>
</tr>
<tr>
<td>Club 04</td>
<td>0</td>
<td>71</td>
<td>179</td>
</tr>
<tr>
<td>Club 05</td>
<td>0</td>
<td>90</td>
<td>139</td>
</tr>
<tr>
<td>Club 14</td>
<td>0</td>
<td>44</td>
<td>118</td>
</tr>
</tbody>
</table>

In 2015/16 Club 14 had a 100% battery electric fleet but it has now introduced petrol-electric hybrids. Two other clubs (04 and 05) also operated zero emission vehicles. Club 01 had a very small number of vehicles on fleet in Scotland at the end of October 2017 and they were the same model. As last year Club 04 has both zero emission EVs and the vehicle with the highest carbon emissions in the Scottish car club fleet (179 g/km).

**Ultra Low Emission Vehicles**

When reporting on the number of ULEVs registered in the UK (Table VEH0150) the Department for Transport (DfT) uses the definition of all fuel types with tailpipe emissions below 75 g/km

In 2015/16 we used 75g/km or less as the criteria and in 2017 there were 102 cars (25%) on the Scottish car club fleet in that category. For this report we are using the DfT definition of “all propulsion types less than 75 g/km” and there are 73 vehicles (17.5%) that meet this revised criterion (Table 4-4); they are all zero emission vehicles.

---

8 Average includes “zero emission” electric vehicles as 0 g/km.
10 Number of newly registered ultra low emissions vehicles, DfT business plan, DfT and OLEV, Updated July 2015.
Table 4-4: Ultra Low Emission Vehicles (all fuel types less than 75g/km).

<table>
<thead>
<tr>
<th>ULEV Type</th>
<th>Number</th>
<th>% Fleet</th>
<th>Model(s) in Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petrol-Electric Hybrid</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plug-In Petrol-Electric</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electric</td>
<td>71</td>
<td>17%</td>
<td>Nissan Leaf (29), Renault Zoe (41). e-NV200 (1)</td>
</tr>
<tr>
<td>Hydrogen Fuel Cell</td>
<td>2</td>
<td>0.5%</td>
<td>Hyundai IX35</td>
</tr>
<tr>
<td>Total ULEV</td>
<td>73</td>
<td>17.5%</td>
<td></td>
</tr>
</tbody>
</table>

Fuel Profile - Cars

In terms of the fuels used (Figure 4-21), clubs in Scotland have adopted petrol as the preferred fuel type and only 7% of the fleet was diesel powered at the period end, this is an increase of 1% from last year, but still significantly less than the 39% of the UK car fleet. Petrol hybrids, battery electric and hydrogen fuel cell vehicles, which make up less than 0.5% of all cars in the UK, comprise 36% of the Scottish car club fleet, down from 44% last year but this is explained by the large number of new vehicles made available to club members most of which were petrol powered Internal Combustion Engines (ICE).

Figure 4-21: Scottish national car clubs’ fuel profile

Battery electric vehicles (BEVs) are rated as zero emission (0 g/km) by the DVLA and VCA but their actual greenhouse gas (GHG) impact will depend on the source of the electrical energy used to charge the vehicle. The VCA records electric vehicle energy efficiency in miles/kWh and Wh/km. BEV performance in the car club fleet ranges from 3.8 miles/kWh (2014 Nissan eNV-200 people carrier and van) to 4.3 miles/kWh (Renault Zoe). For comparison, a diesel vehicle with carbon emissions of 100 g/km will be achieving 1.5 miles/kWh (there is about 10.6 kWh of energy in a litre of diesel).
The Defra\textsuperscript{11} GHG emission reporting factor for the UK grid in 2016/17 was 352 g/kWh and by using this factor together with the VCA miles/kWh data the GHG emissions of BEVs charged from the grid can be determined. In 2013/14 the Defra GHG factor for the UK grid was 494 gCO$_2$e/kWh so in three years it has fallen by 142 gCO$_2$e/kWh (29%) and the carbon emissions of electric cars charged from the grid will have fallen by the same proportion. The Defra GHG reporting factor is based on generation data that is two years out of date due to the verification process used and actual grid emissions in 2016/17 were much lower at an estimated 248 g/kWh. There is no official GHG reporting figure for the Scottish grid carbon intensity although the “Low Carbon Scotland”\textsuperscript{12} report set a 2030 decarbonisation target of 50 g/kWh for the electricity supply in Scotland. It is not clear if this is being monitored.

Even if the energy consumption of an EV is known determination of the actual GHG emissions associated with its use is not simple because the carbon intensity of the grid varies throughout the day and the year as different types of generating capacity are brought on-line to meet demand. The availability of zero-carbon wind and solar power also varies throughout the day and the year.

Two hydrogen powered fuel cell cars were added to the fleet in 2015/16 and were still in use in 2016/17. Both Hyundai ix35, they have a 100kW fuel cell, a 152 litre hydrogen tank and an OEM range of 186 miles. Defra does not publish any carbon factors for hydrogen generation due to the wide variation in production methods and no information was supplied regarding the hydrogen supply for these cars. Both vehicles drove less than 2,000 miles during 2016/17 so the impact on the overall car club carbon footprint will be small.

**Air Quality - Cars**

As well as carbon dioxide emissions, ICE also produce a range of other gases, many of which are toxic, and these impact on ambient air quality and public health. These toxic emissions are meant to be regulated by the Euro emission standards scheme. The current standard is Euro 6, which became mandatory for all newly registered cars from September 2015 and for vans from September 2016. The DVLA classifies battery electric and hydrogen fuel cell cars as Euro 6, which does not reflect the fact that they have zero tailpipe emissions so for clarity all electric and hydrogen cars have been categorised in this report as ZE (Zero Emission). As can be seen in Figure 4-22 the all the Scottish national car club fleet is Euro 5 or higher, with 83% Euro 6 or Zero Emission. 18% of the Scottish car club fleet is Zero Emission compared to less than 0.5% of the UK fleet.

\textsuperscript{11} Department for environment, food and rural affairs.

Figure 4-22 Euro Emission profile of Scottish national car club fleets

Table 4-5 shows the impact of fuel type on air quality emissions. Fleets with a low proportion of diesel vehicles (or none) and a high proportion of zero emission vehicles have the lowest nitrogen oxide and particulate emissions.

Table 4-5: Fuel type and air quality emissions

<table>
<thead>
<tr>
<th>Car Club</th>
<th>Electric</th>
<th>Hydrogen</th>
<th>Hybrid</th>
<th>Petrol</th>
<th>Diesel</th>
<th>Average NOx mg/km</th>
<th>Maximum NOx mg/km</th>
<th>Average PM10 mg/km</th>
<th>Maximum PM10 mg/km</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Clubs</td>
<td>17%</td>
<td>0%</td>
<td>19%</td>
<td>56%</td>
<td>7%</td>
<td>20</td>
<td>167</td>
<td>0.03</td>
<td>3.10</td>
</tr>
<tr>
<td>Club 01</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
<td>35</td>
<td>35</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Club 04</td>
<td>10%</td>
<td>0%</td>
<td>15%</td>
<td>68%</td>
<td>7%</td>
<td>19</td>
<td>167</td>
<td>0.04</td>
<td>1.00</td>
</tr>
<tr>
<td>Club 05</td>
<td>10%</td>
<td>0%</td>
<td>15%</td>
<td>68%</td>
<td>7%</td>
<td>19</td>
<td>167</td>
<td>0.04</td>
<td>1.00</td>
</tr>
</tbody>
</table>

The principal pollutants of concern in large urban areas across Scotland are NOx (nitrogen oxides, especially nitrogen dioxide, NO2) and PM10 (particulates 10 microns in diameter or less) and their output by vehicles is measured in milligrams per kilometre (mg/km). There are 34 Air Quality Management Areas (AQMAs) in Scotland and most of these are associated with high nitrogen dioxide levels, with some of the highest levels reported in Glasgow and Edinburgh.

Low Emission Zone Compliance

The first Scottish Low Emission Zone (equivalent to a Clean Air Zone in England and Wales) will be established in Glasgow in 2018 and charge-free access standards will be phased in over four years starting with the regulation of buses. Other Scottish cities that will also have Low Emission Zones by 2020 are Edinburgh, Aberdeen and Dundee while the longer-term plan is for all Scottish Air Quality Management Areas (AQMAs) to have a Low Emission Zone by

13 www.scottishairquality.co.uk/laqm/
The Scottish Government consultation on Low Emission Zones finished on 28th November 2017\(^\text{15}\) and at the time of writing the outcome of this process is awaited.

### Table 4-6: Standards for charge-free access to UK Low Emission and Clean Air Zones

<table>
<thead>
<tr>
<th>Fuel</th>
<th>Vehicle Type</th>
<th>Minimum Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diesel</td>
<td>All types</td>
<td>Euro 6</td>
</tr>
<tr>
<td>Petrol</td>
<td>Cars, Vans, HCVs, Buses</td>
<td>Euro 4</td>
</tr>
<tr>
<td>Petrol</td>
<td>Motorcycles</td>
<td>Euro 3</td>
</tr>
<tr>
<td>Electric</td>
<td>All types</td>
<td>All Charge Free</td>
</tr>
</tbody>
</table>

These standards have been summarized from Table 2 (page 20) of the Scottish Government Low Emission Zone consultation paper. The same standards are proposed for the Clean Air Zones in England and Wales.

By applying the standards in Table 4-6 to the Scottish car club fleets it is possible to identify the proportion of vehicles that are already compliant, and this is shown in Figure 4-23.

**Figure 4-23: Car club fleet compliance with Scottish Low Emission Zone standards**

The very low proportion of diesel powered vehicles in the Scottish car club fleet is reflected in this chart as the only non-compliant vehicles are ten 2012 Euro 5 diesels in Club 04.

### Mileage & Carbon Emissions

The mileage of all the cars that were on fleet in the year 2016/17 was used in conjunction with the published carbon dioxide emissions of the vehicles (g/km) to estimate the total carbon dioxide emissions from Scottish car club cars. Although the companies provided fuel/energy use data most did this by calculating the figure using an average mpg so it was not based on actual consumption and would be no more accurate than using the published emission figures. Given the importance of fuel use it was surprising that more accurate data was not readily available.

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In the 2014/15 greenhouse gas (GHG) reporting methodology Defra moved to using an age-related uplift of the manufacturers’ published data to reflect the fact that in 2001 the average difference between the manufacturers’ carbon emission data and real-world performance was only 7.5% but by 2015/16 it had risen to 41.5%\(^\text{16}\). A 2016 car with published emissions of 99 g/km will be expected to achieve 140 g/km in real world usage. As we have the date of first registration for the whole fleet the age-related uplift methodology has been used and the results can be compared with the same methodology from the 2015/16 data set.

**Table 4-7: Carbon Dioxide (CO\(_2\)e) emissions of the Scottish car club fleet 2015/16.**

<table>
<thead>
<tr>
<th>Car Club</th>
<th>Vehicles on Fleet in Year</th>
<th>Total Annual Mileage</th>
<th>Annual kg CO(_2)e (Age Related Uplift)</th>
<th>Annual kg CO(_2)e (Age Related Uplift)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Club 01</td>
<td>4</td>
<td>17,637</td>
<td>4,937</td>
<td>7,553</td>
</tr>
<tr>
<td>Club 04</td>
<td>117</td>
<td>757,215</td>
<td>122,002</td>
<td>104,951</td>
</tr>
<tr>
<td>Club 05</td>
<td>330</td>
<td>1,860,205</td>
<td>380,082</td>
<td>262,258</td>
</tr>
<tr>
<td>Club 14</td>
<td>48</td>
<td>210,301</td>
<td>21,783</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>499</td>
<td>2,845,358</td>
<td>528,803</td>
<td>374,762</td>
</tr>
<tr>
<td>Average UK Car</td>
<td>829,263</td>
<td>610,455</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbon Saving</td>
<td>300,460</td>
<td>235,693</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If the 2.85 million miles driven by the car club fleet had been driven by the average 2016/17 UK car which had emissions (including age-related uplift) of 181 g/km the total CO\(_2\)e emissions would have been 829 tonnes so there was a carbon saving of 300 tonnes or 36%. This is less than the 39% saving made in 2015/16 but reflects the move away from diesel to petrol and the big increase in the number of new petrol cars in the fleet. These reductions in carbon emissions do not include the additional carbon savings arising from other modal changes made by car club members.

**Safety Assessment**

Advances in vehicle safety are in part responsible for the reduction in the number of car driver and passenger fatalities on UK roads which have been falling year-on-year. Passive safety features such as seat belts and air bags assist in the survivability of collisions while active features such as Electronic Traction Control help drivers avoid the accident.

All new cars must meet minimum construction standards but the actual behaviour of a car in a collision is dependent on how well those mandatory standards have been integrated. The European New Car Assessment Programme (NCAP) was introduced in 1996 and has been independently testing cars to assess how well they perform in collisions designed to represent the more frequent real-world events: head-on, side impact, pole impact and rear impact.

Since February 2009 all new Euro NCAP test results have been reported as a single overall rating that covers Adult Occupant Protection, Child Occupant Protection, Pedestrian Protection and Safety Assist technology. The post-2009 assessment added Rear Impact (Whiplash) tests as well as separately considering all safety technology on the car as standard. From 2016 two ratings may be given by NCAP for new cars; one with the standard equipment and one with all safety options fitted.

\(^{16}\) 2017 Government GHG Conversion Factors for Company Reporting, Methodology Paper, Table 14, Page 39.
Figure 4-24 shows the NCAP safety profile of the Scottish national car club fleet; it assumes a standard safety specification. Where a vehicle has achieved a rating since 2009 it is indicated with a “+” sign; e.g. 5+ Star. In 2016/17 98% of the Scottish car club fleet met the NCAP 5+ Star or 4+ Star standards.

**Figure 4-24: Safety Profile (NCAP rating) of the Scottish national car club fleet**

The 3+ Star vehicles in Club 04 were a Nissan e-NV200 Combi and a Peugeot Teepee while the 4 Star vehicles were older 2012 models; these will hopefully come off-fleet in 2018.

**Carbon Emission Profile - Vans**

There is no carbon banding scheme in place for vans and the car banding scheme is not applicable as it does not reflect the wide range in size and load carrying capability of vans. Published carbon emission data (g/km) is available for most vans registered since 2009 but was not obligatory until 2010. Large vans can typically exceed 250 g/km but the van fleet available to car club members is lower emission and includes some zero emission electric vehicles.

During 2015/16 there were 43 vans available to car club members in Scotland as shown in Table 4-8; this is a significant increase from 2016/17 when only 20 vans were available.

**Table 4-8: Scottish car club van fleet**

<table>
<thead>
<tr>
<th>Model</th>
<th>Fuel</th>
<th>Quantity</th>
<th>g/km</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiat Doblo Cargo</td>
<td>Diesel</td>
<td>2</td>
<td>126</td>
</tr>
<tr>
<td>Vauxhall Vivaro 2900</td>
<td>Diesel</td>
<td>1</td>
<td>170</td>
</tr>
<tr>
<td>Toyota Proace HDI</td>
<td>Diesel</td>
<td>2</td>
<td>177</td>
</tr>
<tr>
<td>Ford Transit Custom 270</td>
<td>Diesel</td>
<td>2</td>
<td>163</td>
</tr>
<tr>
<td>Ford Transit Custom 290</td>
<td>Diesel</td>
<td>28</td>
<td>170</td>
</tr>
<tr>
<td>Ford Transit 350</td>
<td>Diesel</td>
<td>1</td>
<td>193</td>
</tr>
<tr>
<td>Nissan e-NV200 E Accenta</td>
<td>Electric</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Renault Kangoo Maxi ZE</td>
<td>Electric</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>
Air Quality - Vans

In 2015/16 all the 13 diesel car club vans on the fleet at the end of October 2016 met the recently superseded Euro 5 air quality emission standard and did not comply with the Euro 6 standard required for charge-free access to a Low Emission Zone.

This year 24 new vans have been added to the fleet and they are all Euro 6/Low Emission Zone compliant while one of the old diesel vans has been removed from the fleet so there are now only 12 non-compliant Euro 5 diesel vans on the fleet. The seven electric vans on the fleet are all zero emission at the point of use and would have free access to a low emission zone.

Manufacturers are not obliged to publish air quality emissions data (NO\textsubscript{X} and PM\textsubscript{10}) for vans and with no vehicle specific data no further analysis of van emissions can be carried out.

Safety (NCAP) - Vans

Safety testing of vans is relatively new having been introduced into the NCAP scheme in 2012, although some people-carrier variants of vans had been tested before that. The Transit Custom and the Toyota Proace are both NCAP 5+ Star vehicles but the Nissan E-NV200 is only a 3+ Star vehicle and the Renault Kangoo has not been tested since 2008 when a people-carrier version obtained 4 Stars under the old (pre-2009) test regime.
Community Car Clubs

Three Scottish community car clubs provided data about their fleets; this is down from four reporting in 2015/16, seven reporting in 2014/15 and eleven in 2013/14. The three clubs made 22 vehicles available to their members at the end of October 2016 and 19 (86%) were in the VED 2006 scheme carbon emission Bands A, B and C (see Section ‘Carbon Dioxide Emission Profile – Cars’ for a detailed explanation of the VED 2006 and 2017 schemes). Four of the Band A2006 vehicles were zero emission electric cars (three Nissan Leaf and a Renault Zoe) and there were also two petrol-electric hybrid cars on the fleet. The fleet has been categorised using both the 2006 and the 2017 VED Banding Scheme (Table 4-9).

Table 4-9 Vehicle Excise Duty emission band profile (2006 and 2017 schemes) – Scottish community clubs

<table>
<thead>
<tr>
<th>Band</th>
<th>2006 Scheme</th>
<th>Number</th>
<th>%</th>
<th>2017 Scheme</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Band A</td>
<td>0-100</td>
<td>14</td>
<td>63.6%</td>
<td>0</td>
<td>4</td>
<td>18.2%</td>
</tr>
<tr>
<td>Band B</td>
<td>101-110</td>
<td>1</td>
<td>4.5%</td>
<td>1-50</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Band C</td>
<td>111-120</td>
<td>4</td>
<td>18.2%</td>
<td>51-75</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Band D</td>
<td>121-130</td>
<td>1</td>
<td>4.5%</td>
<td>76-90</td>
<td>2</td>
<td>9.1%</td>
</tr>
<tr>
<td>Band E</td>
<td>131-140</td>
<td>1</td>
<td>4.5%</td>
<td>91-100</td>
<td>8</td>
<td>36.4%</td>
</tr>
<tr>
<td>Band F</td>
<td>141-150</td>
<td>1</td>
<td>4.5%</td>
<td>101-110</td>
<td>1</td>
<td>4.5%</td>
</tr>
<tr>
<td>Band G</td>
<td>151-165</td>
<td>1</td>
<td>4.5%</td>
<td>111-130</td>
<td>5</td>
<td>22.7%</td>
</tr>
<tr>
<td>Band H</td>
<td>166-175</td>
<td>1</td>
<td>4.5%</td>
<td>131-150</td>
<td>2</td>
<td>9.1%</td>
</tr>
<tr>
<td>Band I</td>
<td>176-185</td>
<td>1</td>
<td>4.5%</td>
<td>151-170</td>
<td>1</td>
<td>4.5%</td>
</tr>
<tr>
<td>Band J</td>
<td>186-200</td>
<td>1</td>
<td>4.5%</td>
<td>171-190</td>
<td>1</td>
<td>4.5%</td>
</tr>
<tr>
<td>Band K</td>
<td>201-225</td>
<td>1</td>
<td>4.5%</td>
<td>191-225</td>
<td>2</td>
<td>9.1%</td>
</tr>
<tr>
<td>Band L</td>
<td>226-255</td>
<td>1</td>
<td>4.5%</td>
<td>226-255</td>
<td>2</td>
<td>9.1%</td>
</tr>
<tr>
<td>Band M</td>
<td>256+</td>
<td>1</td>
<td>4.5%</td>
<td>256+</td>
<td>1</td>
<td>4.5%</td>
</tr>
<tr>
<td>No data available</td>
<td></td>
<td></td>
<td></td>
<td>Total</td>
<td>22</td>
<td>22</td>
</tr>
</tbody>
</table>

Figure 4-25 Comparison of Scottish community car clubs’ 2006 VED band profile

Most of the fleet is in Bands A, B and C. The high emission vehicles are people carrier variants.
Table 4-10 Average carbon emissions of Scottish community car clubs (g/km)

<table>
<thead>
<tr>
<th>Year</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014a</th>
<th>2015a</th>
<th>2016a</th>
<th>2017a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scottish Community Car Clubs</td>
<td>127.5</td>
<td>129.0</td>
<td>107.6</td>
<td>87.7</td>
<td>79.2</td>
<td>86.9</td>
<td></td>
</tr>
<tr>
<td>UK Car Fleet</td>
<td>162.8</td>
<td>160.1</td>
<td>157.0</td>
<td>153.9</td>
<td>150.6</td>
<td>147.3</td>
<td></td>
</tr>
</tbody>
</table>

The average Scottish community car club car has carbon emissions 41% below the UK average car and the fleet average has fallen significantly from 2013 when there were no electric vehicles (EVs) on the fleet. The increase in the car club fleet from 79.2 g/km in 2016 to 86.9 g/km in 2017 is in part due to a different group of community car clubs responding.

Community Cars – Fuel Profile

Figure 4-26: Scottish community car club fuel type

The higher proportion of diesels in the community car club fleets reflects the fact that the community fleets are older, subject to less frequent replacement cycles, and are used in rural areas where air quality is not such an issue and the range limitations of electric vehicles can make them a less attractive option.

Community Cars – Air Quality

Figure 4-27 Euro emission profile of the Scottish community car club fleet

The age of the fleet is reflected in the Euro emission profile with a substantial number of Euro 5 vehicles available to members, however most of these vehicles are petrol powered so the emissions of nitrogen oxides and particulates are substantially less than from a similar Euro 5...
fleet with a high proportion of diesel vehicles. Euro 4 is the minimum standard for a petrol car to benefit from charge-free Low Emission Zone access.

**Table 4-11: Fuel type and air quality emissions**

<table>
<thead>
<tr>
<th>Car Club</th>
<th>Electric</th>
<th>Hybrid</th>
<th>Petrol</th>
<th>Diesel</th>
<th>Average NOx mg/km</th>
<th>Maximum NOx mg/km</th>
<th>Average PM10 mg/km</th>
<th>Maximum PM10 mg/km</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Clubs</td>
<td>18%</td>
<td>9%</td>
<td>45%</td>
<td>27%</td>
<td>55</td>
<td>231</td>
<td>2.28</td>
<td>24.00</td>
</tr>
<tr>
<td>Club 09</td>
<td>33%</td>
<td>33%</td>
<td>0%</td>
<td>33%</td>
<td>53</td>
<td>152</td>
<td>0.27</td>
<td>0.80</td>
</tr>
<tr>
<td>Club 12</td>
<td>33%</td>
<td>0%</td>
<td>0%</td>
<td>67%</td>
<td>154</td>
<td>231</td>
<td>14.00</td>
<td>24.00</td>
</tr>
<tr>
<td>Club 18</td>
<td>13%</td>
<td>6%</td>
<td>63%</td>
<td>19%</td>
<td>37</td>
<td>201</td>
<td>0.19</td>
<td>1.10</td>
</tr>
</tbody>
</table>

Club 12 has two Euro 4 diesels and that is why NOx and PM10 emissions are high. Both vehicles were acquired in 2010.

**Clean Air Zone Compliance**

**Figure 4-28 Scottish community car club fleet compliance with anticipated Scottish Low Emission Zone standards**

Most of the fleet is Low Emission Zone compliant and there are still several years before the 27% that isn’t will become an issue for members wishing to use a community car club vehicle to enter a LEZ in one of Scotland’s cities. Although there are plans to introduce Scotland’s first Low Emission Zone in 2018 in Glasgow it will be several years before this impacts on cars.

**Community Cars - Mileage & Carbon Emissions**

The carbon emissions of the community fleets were determined using the same methodology as the national fleets. (see Section Milage & Carbon Emissions)

**Table 4-12: Carbon Dioxide (CO2e) emissions of the Scottish community car club fleet**

<table>
<thead>
<tr>
<th></th>
<th>Number</th>
<th>Annual Mileage</th>
<th>Annual kg CO2e (Age Related Uplift)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Clubs</td>
<td>22</td>
<td>214,489</td>
<td>41,445</td>
</tr>
<tr>
<td>UK Average</td>
<td></td>
<td></td>
<td>62,512</td>
</tr>
<tr>
<td>Saving</td>
<td></td>
<td></td>
<td>21,067</td>
</tr>
</tbody>
</table>

Driving the same mileage, the average UK car (181 g/km) would have produced 62 tonnes of carbon dioxide, so the Scottish Community Car Club fleet saved an estimated 21 tonnes of carbon dioxide in 2016/17, a reduction of 34%.
Community Cars – Safety Assessment

Figure 4-29: Safety profile (NCAP rating) of the Scottish community car clubs

![Safety profile chart]

The community clubs have a high proportion of 5+ and 4+ Star vehicles and the vehicles that do not meet these standards do meet the older (pre-2009) 5 Star and 4 Star standards.

Community Vans

There was one van made available by a community club in 2016/17. It was a VW Caddy; Euro 5 with carbon emissions of 134 g/km and an NCAP rating of 4 Star.
Summary of Findings
Overall the car club fleets in Scotland offer members vehicles that are low carbon and most meet Euro 6 emission standards, are Low Emission Zone compliant and offer a very high level of safety (NCAP rating).

There is a large fleet of electric vehicles with zero tailpipe emissions. The 75 electric vehicles in Scottish car clubs (both national and community operators) drove a total of 497,143 miles in 2016/17 (up from 311,871 miles in 2015/16). Had this mileage been driven in the average UK car which has real-world emissions of 181 g/km it would have produced 145 tonnes of carbon dioxide.

1. During 2015/16 the national car clubs in Scotland are estimated to have saved 300 tonnes of carbon dioxide and community clubs a further 21 tonnes. These savings are on driven mileage alone without considering any additional savings arising from modal change by club members (changes in the number of journeys made and changes in the levels of walking, cycling and use of public transport).

2. 145 tonnes of that saving can be attributed to the fleet of electric vehicles.

3. 96% of national car club cars and 87% of community club cars are in the lowest three VED (2006) carbon emission Bands A, B and C. Just under 80% of Scottish national club cars are in Band A with emissions in the range 0-100 g/km, 25% are Ultra Low Emission Vehicles (ULEV) with emissions of 75 g/km or less (including the 17% which are pure electric vehicles).

4. The average OEM carbon emissions of the national car club fleets in Scotland in 2016 is 45% lower than the UK average car (2016) and 8% higher than the average reported in 2015 due to the introduction of more petrol-powered vehicles instead of diesels or petrol-hybrids. Community club cars carbon emissions are 41% below the national average but 10% higher than in 2015 due mainly to a change in the clubs reporting.

5. At the end of October 2017 there were 75 electric cars (17%), and two hydrogen fuel cell vehicles (0.5%) conforming to the UK DfT ULEV standard (less than 75 g/km) on the Scottish car club fleet (National and Community). Seven electric vans (16%) were also available. There were 33 diesel cars (7.5%) in use in Scottish car clubs.

6. Overall the picture is very good, with both national and community clubs selecting vehicles that combine zero or low carbon dioxide emissions, low toxic (air quality) emissions and a high safety standard.