scrutiny

## Scrutiny Report of Cardiff's Environmental Scrutiny Committee

# Improving Cardiff's Air Quality



## April 2018

CARDIFF
CAERDYDD

**Cardiff Council**

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# CHAIR'S FOREWORD

**Councillor Ramesh Patel**

**Chairperson – Environmental Scrutiny Committee**

## INQUIRY METHODOLOGY

Cardiff's Environmental Scrutiny Committee reviewed the development of Cardiff's Clean Air Strategy and considered a number of areas that had the most significant impact on air quality in the city. In doing this it explored the key themes that formed the basis of the Cardiff's Clean Air Strategy, for example, the current air quality position; the Welsh Government position; transportation; planning & development; sustainable fuels and clean air zones. In reviewing the information the task group drew upon a number of witness contributions and information sources including:

- Cabinet Members from Cardiff Council;
- Officers from Cardiff Council including representatives from Planning, Transportation, Energy & Sustainability, Highways, Waste Management and Fleet Management;
- Officers from Shared Regulatory Services;
- Public Health Wales;
- Cardiff & Vale Local Public Health Team;
- University of South Wales;
- Society of Motor Manufacturers;
- Representatives from local taxi companies including Premier Taxis, Dragon Taxis and Uber;
- University of the West of England;
- Bus industry representatives including Cardiff Bus, New Adventure Travel, Stagecoach Bus, Bus Users Cymru and Confederation of Passenger Transport;
- Welsh Government;
- Natural Resources Wales;
- Cardiff University;
- For Cardiff (Cardiff BID).

From this body of evidence the Members drew key findings and the 30 recommendations made in this report. The Environmental Scrutiny Committee Task & Finish Exercise will report to the Environmental Scrutiny Committee on the 17th April 2017, and subject to approval of the draft report it will be commend to Cardiff Council's Cabinet for consideration and response.

## INQUIRY TERMS OF REFERENCE

The aim of the inquiry is to provide Members with the opportunity to explore and consider how the Council can help to improve air quality in Cardiff. This will include reviewing:

- **Current Air Quality Position -** to include a report and analysis of the worst affected areas; the major contributing factors to air pollution in Cardiff; resources, monitoring arrangements & statutory responsibilities; the impact on public health; consider any existing air quality action plans for Cardiff; to consider air quality responsibilities placed on the Council.

- **Development of Cardiff's Clean Air Strategy** – to include a report on the aims and objectives of the strategy; associated policies that support the development of the strategy; resources and timescale for delivering the strategy; desired impact of the strategy and the main areas that the strategy will target.

- **Welsh Government Position on Air Quality** – to gain a better understanding of the policy objectives of the Welsh Government in terms of air quality; to understand the applicable timescales and consequences of the Council not meeting these policy objectives; to identify the key areas that Welsh Government believes should be targeted to achieve the best outcomes for air quality.

- **Transportation** – to understand the positive and negative impacts that transport (and transport systems) can have on air quality in Cardiff; to establish a hierarchy of transport pollution sources and evaluate what can be done to better manage the worst polluting sources; to review transport schemes and infrastructure planned for development or in the process of being delivered in Cardiff; to explore the benefits of sustainable fleet management in Cardiff; to consider the impact that changes in technology and public perception can have on air quality.

- **Other Pollution Sources** – to consider a range of pollution sources (excluding transport) and the impact that these have upon air quality in Cardiff; to establish a hierarchy of pollution sources (excluding transport) and evaluate what can be done to better manage the worst polluting sources; to review proposals currently being developed or delivered (excluding transport) to reduce pollution in Cardiff.

- **Planning & Development** – to understand how the planning and development process can be used to improve air pollution in Cardiff; to consider the current planning processes / policies and how these impact upon air pollution; the impact that the growth of the city might have upon air quality.

- **Sustainable Fuels** – to understand the challenges and opportunities that the growth of sustainable fuels can have upon air quality in Cardiff; to consider the role of the Council in terms of helping to establish the local market for sustainable fuels; to consider what the Council and its partners can proactively do to support the move to sustainable fuels.

- **Clean Air Zones** – to understand how Clean Air Zones work; the impact that a Clean Air Zone could have upon air quality in Cardiff and the wider implications for the city; the costs and opportunities of setting up a clean air zone; best practice in delivering Clean Air Zones (to include domestic and international examples).

# RECOMENDATIONS

The recommendations for this report are set out in this section of the document. They based on seven separate areas that the task group believe should be the basis for the development of Cardiff's Clean Air Strategy. The seven areas are set out below:

- Clean Air Strategy – The Next Steps;
- Planning;
- Public Health;
- Transport;
- Sustainable Fuels;
- Council & Public Sector Partner Responsibilities;
- Consultation & Engagement.

The recommendations are based on the evidence received during the task & finish exercise and the key findings that are documented on pages 31 to 156 of this report.

## Clean Air Strategy – The Next Steps

- **Recommendation 1 -** During the task & finish exercise it became apparent that achieving the EU air quality standards by 2022 was virtually impossible by using and / or accelerating existing practice, for example, by improving sustainable transport infrastructure and driving widespread public behaviour change. Not one of the many witnesses we asked was confident that the EU air quality target would be achieved in the short timescale available by carrying on with or accelerating the current approach. It was also clear in the evidence sessions that reaching the challenging target 'in the shortest time possible' would almost certainly involve the creation of some kind of clean air zone or low emission zone.

That said, working out what is best for Cardiff in terms of air quality is an evidence based scientific exercise that will be delivered in the form of a feasibility study. Such a study will review a range of alternative options for achieving the air quality standards and assess which is most likely to achieve the change needed 'in the shortest time possible'. There are many different 'Clean Air Zone' options and variations, for example, congestion charging zones, low emission zones and low emission neighbourhoods. These are further complicated by geographical boundaries, emission levels, vehicle types, financial implications and time / date restrictions. Working out the best option to take is a significant challenge that will require time, expertise, clear guidance and financial resources - unfortunately based on the evidence provided Cardiff appears to be short on all four. With all of this in mind the task group recommends that the Council:

- Continues to work with and lobby the Welsh Government for a clear direction and guidance on the next steps to take in terms of achieving air quality compliance 'in the shortest time possible';
- Ask the Welsh Government to provide financial assistance to undertake the feasibility study and to deliver the option identified to improve air quality in the feasibility study;
- Employ suitably qualified experts to deliver the feasibility study and help implement the option identified in the feasibility study to improve air quality;
- Consider, evaluate and scrutinise the advice before taking a final decision as to the way forward;
- Waste no further time in carrying out the feasibility study – the EU air quality limits need to be addressed by either 2022 or in the soonest time possible. The evidence presented suggests that feasibility studies take about two years to deliver and at the point of writing this report the Council had not started its feasibility study for Cardiff.

- **Recommendation 2 -** All evidence presented to the task group identified nitrogen dioxide produced my motor vehicles to be the single biggest air quality pollutant in Cardiff - with diesel vehicles being the major offender in this category. As we are ultimately looking to reduce air pollution in the city the task group recommends that the new clean air strategy cites the reduction of nitrogen dioxide from diesel vehicles as one of its key aims and that whenever possible actions resulting from the clean air strategy specifically reflect this aim.

- **Recommendation 3 -** The task group believe that Cardiff on its own cannot fully address the air pollution issues facing the city. As has been explained in the report nitrogen dioxide is Cardiff's largest pollutant and privately owned cars, particularly diesel, predominantly produce this. It is estimated that there are 81,800 commuter journeys into Cardiff each day from neighbouring local authorities and this volume of traffic undoubtedly has a negative impact on air quality. The two sections of road that when modelled breach EU emission limits and mandate that action is taken are located on two of the main commuter routes into the city. In addition to this Cardiff is the main commercial hub for the South East Wales region, this means that a significant number of public transport journeys occur from neighbouring local authorities into the city. Understanding this relationship means that we have to work with our neighbours to address the air quality problem, therefore, the task group recommends that we consult and work with neighbouring local authorities to develop the Clean Air Strategy and supporting action plan to improve air quality. It is important to remember that air pollution from motor vehicles does not start on the city boundaries and so any regional transport initiatives that encourage modal shift into Cardiff should in some way feature in any evolving air quality improvement action plan.

- **Recommendation 4 -** It was noted during the task and finish exercise that the introduction of clean air zones, congestion charging zones and low emission zones tended to have a dramatic impact in increasing modal

shift, for example, the London congestion charging scheme increase bus patronage by 14% in a very short period of time. Cardiff has in recent years worked hard to increase modal split and has the proud ambition of achieving a 50:50 modal split by 2026. Should the feasibility study recommend some type of clean air zone, congestion charging zone, or low emission zone as the way forward the Council should not be afraid to implement the decision as it will ultimately help achieve its biggest existing transportation target.

- **Recommendation 5 -** A low emission neighbourhood is an area-based scheme that includes a package of measures delivered within a specific area and is focused on reducing emissions and promoting sustainable living locally. Such schemes have been implemented in five areas across London and have focused on areas with high pollution. They aim to reduce pollution levels through local measures and reducing the number of local journeys undertaken. Key to their success is the partnership and involvement of the local community, businesses and the local authority to jointly identify and deliver a common set of goals. Relevant projects could include working with major landowners to improve emissions from buildings; better management and reduction of freight movement and service vehicles entering the area, for example, the consolidation of deliveries and use of shared supplier scheme; the implementation of emissions based on street parking charges and the introduction of electric vehicle charging infrastructure. The task group recommends that the Council look into the feasibility of creating a low emission neighbourhood in an area of Cardiff with the worst air pollution levels. It could act as a pilot for trialling air quality improvement initiatives and would be a first of its kind for Wales.

- **Recommendation 6** - Evidence provided and research gathered for the task & finish exercise clearly indicated that the cities that made the biggest improvements in terms of air quality also made the largest investment in terms of resources for dealing with the problem. In addition to this, the cities that have been the most successful in reducing air pollution received

significant support from central government – both financial and policy guidance terms. For example, three of the top twelve performing European cities in terms of reducing air pollution were in Germany. Germany is also responsible for 55 of the 225 European low emission zones - in contrast the United Kingdom has only created two low emission zones. On this basis the task group recommends that the Council continues to lobby the Welsh Government for clear direction and financial support, and that invests as much money and effort as drive air quality improvements across the city.

## Planning Recommendations

- **Recommendation 7 -** Cardiff has a well-established planning system that is able to assess, consider and deal with any air quality issues that might arise through the planning process. The Shared Regulatory Service is able to act as a consultee on any specific air quality planning matters and other public sector bodies such as Natural Resources Wales are able to provide specialist expertise on the topic should a complex case arise. However, the numerous factors that impact on our relationship with air quality standards is constantly changing, and means that we continually need to review our planning process to ensure that they keep pace with changing demands. For example, Newport City Council has recently created supplementary planning guidance for dealing with air quality issues, while other local authorities have developed supplementary planning guidance for dealing with emerging issues such as sustainable fuel infrastructure. As a result the task group recommends that the Planning Service reviews its existing supplementary planning guidance in relation to managing air quality and implementing sustainable fuel infrastructure alongside the development of the Clean Air Strategy. If the Planning Service identifies any significant gaps in statutory planning guidance provision then an appropriate document(s) should be commissioned to ensure that such matters are properly addressed.

- **Recommendation 8 -** When assessing planning applications the wider knock on effect on air quality should always be thoroughly considered. For example, the creation of a new housing development might accidentally create a traffic driven pollution problem several miles away that had not been properly considered by the planning process. The task group acknowledges that such assessments are sometimes carried out and that the introduction of the development master planning process has helped, however, this isn't always the case and sometimes the wider local implications are not considered. With this in mind the task group recommends a review into the wider traffic and pollution implications of

new developments. This should include a review of traffic modelling techniques and how planning obligation monies can be applied across a wider area to deal with the impact of traffic and pollution.

- **Recommendation 9 -** In a world of shrinking financial resources it is important for the Council to take advantage of any additional expert support currently available. During the inquiry the Members were told that the Health Protection division of Public Health Wales and Natural Resources Wales were available to offer free expert advice on technical and complex air quality issues. The task group recommends that the Planning Service takes advantage of these expert resources as and when required.

## Public Health Recommendation

- **Recommendation 10** – It is clear that poor air quality is a significant health issue and that it has a negative impact on people living in Cardiff and across the wider region. It is estimated that it contributes to approximately 40,000 premature deaths in the United Kingdom every year and that some doctors believe that this is just the tip of the iceberg. Given the scale of the problem the task group recommends that improving public health should be documented as the primary reason for introducing a Clean Air Strategy in Cardiff. Ultimately nothing should be more important to the Council and its partners than improving public health.

## Transport Recommendations

### ➢ General

- **Recommendation 11** – There was broad agreement that the Council's travel plans for Cardiff were sound and if delivered would have a positive impact in terms of driving modal shift and improving air quality in the city. In addition to this it was acknowledged by several witnesses that we don't currently have the necessary infrastructure to ensure that we meet the EU air quality targets, and that the Metro proposals wouldn't be delivered within 'the soonest time possible'. One notable witness stressed that now was the time to deliver against the plans as we have moved from the position of 'predict & provide' to 'provide & promote'. On this basis the task group recommends that the Council notes the urgency of required change to meet air quality targets and does all that it can to deliver and then promote its existing transport proposals.

- **Recommendation 12** - Delivering the long-term infrastructure that is required to grow sustainable travel and drive modal shift is very important. The Council needs to be involved in helping to bring the large pieces of infrastructure to Cardiff and the wider South East Wales Region, for example, by playing its part in the development of schemes like the Metro. However, it is quite often the case that the Council is just a partner in such schemes and that ultimately it is reliant on the purse strings of other organisations (such as the Welsh Government) to ensure that large infrastructure schemes are delivered. At the same time it is important to remember that the Council has a number of short-term initiatives for influencing travel behaviour that are within its control. For example, the introduction of 20 mph zones; increasing residential parking schemes to 75%; working with and educating the public, local businesses and schools, etc.. The small changes that the Council is able to make can have a huge difference to influencing public behaviour and driving modal shift. On this basis the task group recommends that the Council should increase its

focus on the affordable short-term measures within its control.

- **Recommendation 13** – There are a number of existing and potential traffic / parking control measures that the Council is able to employ to help control the use of the public highway. For example, the Council currently delivers civil parking enforcement and moving traffic offences across the city and in theory could introduce a range of other charging schemes including congestion charging, low emission zones and a work place parking levy. All of these schemes are capable of generating significant levels of income that could be used to underpin the delivery of transport infrastructure improvements. With this in mind the task groups recommends that monies raised from existing or proposed traffic / parking control measures is reinvested directly back into transport infrastructure. This would create a virtuous circle where driver penalties are reinvested to provide clean and sustainable long-term travel alternatives.

- **Recommendation 14** – During the task & finish exercise Members were informed that the Council is due to publish 'Cardiff's Transport & Clean Air Green Paper' in the spring of 2018. The Environmental Scrutiny Committee would welcome the opportunity to scrutinise this document and recommend that you provide the Committee with an opportunity to scrutinise the document once it becomes available.

## ➢ Public Transport Infrastructure

- **Recommendation 15** - Several witnesses stressed the importance of completing the Cardiff Central Transport Interchange and the positive impact that it will have on increasing the use of public transport. It is felt that the facility will act as the heart of the regional transport network and, therefore, help drive modal shift. The task group agrees with this and urges the Council to work with developers to complete this facility 'in the soonest time possible'. As an interim measure the Council should republish and distribute the map that was made available when the old bus

station was first closed; this will provide a vital navigation tool for new / infrequent users of public transport and visitors to the city.

## ➢ Active Travel (Cycling & Walking)

- **Recommendation 16** – The task group agrees with the Public Health position around accelerating the improvement of infrastructure to support active travel (cycling & walking). Based on the evidence received during the inquiry the task group recommends that:

  - The Council continues with improvements and ongoing development of dedicated walking and cycling infrastructure, for example, by accelerating the development of segregated cycle lanes in Cardiff;

  - The Council continues to improve access to local green spaces by active travel, for example, improving walking and cycling access in Cardiff's parks;

  - The Council actively promotes and encourages the use of its recently introduced 'NEXTBIKE' cycle hire scheme. Members felt that such schemes provide a positive message in terms of sustainable travel and encourage behaviour change;

  - The Council continues with its roll out of 20 mph schemes in the city. Members felt that 20 mph schemes support the growth of active travel (cycling and walking) by reducing average vehicle speed. This in turn creates a safer travel environment and so encourages people to undertake more cycling and walking journeys. Quite a few of the witnesses to the inquiry were very supportive of the continued roll out of 20 mph zones.

- **Recommendation 17 -** The Council, public sector partners, major employers and For Cardiff (the Cardiff BID) should do all it can to encourage their staff to use active travel to get to work and carry out day to day trips whenever possible. The Council should work with these

groups to create a strategy to drive this change and identify practical incentives that can be directed at staff to arrange modal shift. Suggestions could include the expansion of flexible working; increasing the option of home working; travel discounts for using park & ride facilities; involving major employers in the planning of car free days; providing support and direction to employers provide and fund bike stands; providing information on cycle lanes and safe cycle routes; selling the health and well-being benefits of active travel.

## ➢ Parking

- **Recommendation 18** - Consider gradual increases in public car parking charges to fund and accelerate improvements in active travel facilities and public transport;

## ➢ Taxis

- **Recommendation 19** – As a part of the task & finish exercise Members met with representatives from the taxi industry to discuss the air quality challenges facing taxi drivers and companies in the city. It was clear during discussion that there is an understanding of the future challenges facing the industry, for example, some companies have already taken steps to address the problem by procuring low emission vehicles. However, the ongoing Welsh Government Taxi Consultation and a lack of financial assistance for the taxi industry in Wales has created uncertainty and stalled vehicle investment decisions. Other issues discussed during the meeting included existing taxi licensing policy; emissions levels and the use of bus lanes. Based on the evidence gathered, discussion at the meeting and the key findings the task group recommends that:

    - The Council makes a clear statement that sets out the Council's ambitions for taxi emission standards in the city and sets out how this might be achieved, for example, Nottingham has stated that it wants to

significantly reduce taxi emissions in the city by converting all of its taxi fleet to electric by 2025;

- The Council needs to work with Cardiff's taxi companies and drivers to establish and implement a reasonable timescale to set a minimum emissions standard for taxis operating in the city, with the new minimum emissions standard being built into the existing licensing policy. To support this change the Council should work with the taxi companies and drivers to identify potential financial assistance to deliver the change, for example, an approach could be made to Welsh Government asking for support – such transitional support has been provided in cities like Dundee, Derby and Birmingham;

- Taking the Welsh Government Taxi Consultation into consideration the Council should review the use of the 'Exceptional Conditions Policy' and wider 'Taxi Licensing Policy' to make sure that it is fit for purpose and complies with the aim of improving air quality in the city;

- The Council needs to work closely with the taxi companies and drivers to ensure that parking or blocking of bus lanes stops. It should be made clear that drivers who block the bus lanes will be fined and ultimately if they persist have the privilege removed. In return for this support the Council should acknowledge that the number of Hackney Carriage licences greatly exceeds the number of taxi rank spaces and carries out a review of taxi rank facilities in the city centre.

## ➢ Buses

- **Recommendation 20** – As a part of the task & finish exercise Members met with a number of bus company and passenger group representatives. It was clear from discussion that they understood that overall bus emission levels needed to fall to help improve air quality, however, to achieve this substantial and ongoing financial assistance would be required from the public purse. Several references were made to the lack of Welsh

Government funding to support bus services in Wales; this was in contrast to the support offered other parts of the United Kingdom and indeed to the rail network. Other issues discussed during the meeting included emission levels in the city centre; bus company business planning and investment in future vehicles; the introduction of low emission buses; park & ride and bus lane infrastructure and a single ticketing approach. Based on the evidence gathered, discussion at the meeting and the key findings the task group recommends that:

- The City Centre Air Quality Management Area (predominantly based around Westgate Street) has the highest levels of nitrogen dioxide concentrations in Cardiff - this is significantly impacted by approximately 140 bus movements per hour. It is estimated that buses account for 56% of the nitrogen dioxide emissions and that 63% of the bus movements in the Westgate Street area are from vehicles that are Euro 4 or less. To provide some context the Euro 5 standard was established on the 1st September 2009; this means that over half of the bus movements in Cardiff's worst polluted street are from vehicles that are approaching ten years of age or more. This local air pollution problem is compounded by the canyon nature of the street. Members of the task group believe that air quality improvements are urgently required in this very busy area and recommend that the Council should work with local bus companies to explore the feasibility of restricting older buses from the area. Options that should be considered might include the creation of a 'greener bus route' or developing a low emission zone in the area that might exclude buses that fail to meet a specified emissions standard, for example, Euro 6. The Members of the task group acknowledge the challenges that this might present to local bus companies, however, such restrictions have been applied in other parts of the country and have dramatically reduced nitrogen dioxide emissions.

- Bus companies should be asked to work with the Council and provide a business plan to illustrate how they plan to reduce bus emissions for

bus journeys in the Cardiff in the next three years. This would correspond with the timescale for achieving compliance with the EU air quality limits and help provide focus on the role that they have in helping to achieve this target.

- In terms of financial support to reduce bus emissions it is clear that Welsh bus companies are a poor relation when compared to their Scottish and English counterparts. Government funding has been put in place in other parts of the United Kingdom to help support the transition to cleaner buses, while the Welsh Government in comparison has provided very little. The Council should support the local bus companies by lobbying the Welsh Government for financial assistance for bus services in Cardiff and Wales.

- There are no low emission buses operating in Cardiff or indeed Wales. The Council should do what it can to bring a low emission bus to the Capital City, for example, supporting a major bus provider to procure and introduce one or more hydrogen buses would be a very positive step forward.

- The Council should continue with its development and promotion of Park & Ride and bus lane infrastructure across the city. These are essential in driving modal shift and will be a key ingredient in supporting the wider Metro effort. Effective bus lanes help reduce journey time and improve punctuality – this in turn breeds confidence and convenience into the system, important for delivering modal shift. To compound this park & ride journeys should be punctual, quick and direct. Members were aware of park & ride journeys that made multiple stops between the park & ride facility and city centre – this adds time and makes the park & ride journey less attractive compared to using the private car, on this basis the Committee recommends that all park & ride journeys should be direct, i.e. not feature additional stops.

- Bus and train services in Cardiff should work towards a single ticketing

approach in the South East Wales Region. Introducing this in line with the new Metro developments would appear to be a good opportunity and the functionality of the ticket should be similar to that of the London Oyster Card.

## ➢ Other

- **Recommendation 21** - In recent years Cardiff has promoted itself as a cruise liner destination and has managed to attract some interest from visiting cruise liners. The task group were told that when a cruise liner visits a port it emits the equivalent amount of particulate matter as approximately of 100,000 vehicles entering the city – this is greater than the average number of commuter vehicles entering the city on a typical day. While the task group acknowledges the economic benefit created by cruise liners it is also concerned at the level of particulate emissions that they produce and the impact that these emissions might have on public health. With this in mind the committee feels that when the Council is assessing the economic benefits of allowing cruise liners to dock it should also factor the environmental impact that they might create into the overall assessment.

## Sustainable Fuel Recommendations

### ➢ The Wider Picture

- **Recommendation 22** - Recent market trends clearly illustrate that that low emission vehicles are the future of motoring – this is a very positive thing as the technology is much cleaner than traditional crude oil based fuels. The growth of sustainable fuels such as electric and hydrogen will result in air quality improvements, but will not necessarily reduce congestion. This future direction of travel means that Cardiff and Wales cannot afford to be left behind; therefore, the Council and its other public sector partners must do everything they can to embrace and support the change. With this in mind the task group recommends that:

    - The Council continues with the development of its Sustainable Fuel Strategy and supporting list of short, medium and long-term action plans. Clearly documenting the actions that the Council is planning to take is a positive step forward;
    - The Council works with and lobbies Welsh Government to create a sustainable fuel strategy for all of Wales. This is something that countries like Scotland have done and it would send a clear message of intent to all Welsh local authorities, public sector bodies, businesses and the wider public;
    - The Council engages with other local authorities in the South East Wales region to encourage them to create and publish sustainable fuel strategies. When developing the strategies they should be encouraged to publish short, medium and long-term actions that align with those established for Cardiff. It is important to reiterate that air pollution doesn't just start at Cardiff's boundaries and so a regional approach is required;
    - The Council engages with its public sector partners across the South East Wales Region to encourage them to create and publish

sustainable fuel strategies. When developing the strategies they should be encouraged to publish short, medium and long-term actions that align with those established for Cardiff. The Cardiff Public Services Board would seem to be a good place to table the debate on improving air quality and developing suitable sustainable fuel strategies across the public sector;

- The Council should encourage neighbouring local authorities and other public sector partners to issue positive proposals on how and when they intend switching existing fleet to sustainable fuel options. In addition to this, they should also be encouraged to build the use of sustainable fuels (such as electric and hydrogen) into the procurement process for vehicles and the wider supply chain. If suppliers and contractors are keen to win our business then they should support our objective of improving air quality by using cleaner vehicles;
- Cardiff has very little in the way of sustainable fuel infrastructure. Without the necessary charging and refuelling infrastructure it is very difficult to increase the use of electric and hydrogen fuelled vehicles in Cardiff and across the wider area. The Council needs to work with neighbouring local authorities, public sector partners and local businesses to identify what they can do to grow sustainable fuel infrastructure across the South East Wales Region. Welsh Government, neighbouring local authorities, public sector partners and major businesses should be asked to provide information on the sustainable infrastructure that they currently have and intend to provide or support. This information should then be collated to create a 'South East Wales Region Sustainable Fuel Infrastructure Map' that would then be published and circulated to various stakeholder groups to raise awareness of the options available.

- **Recommendation 23** –The task group recommends that the Council should work with local car dealerships to encourage the growth of electric, hybrid or hydrogen vehicle sales. In particular the following information

should be clearly communicated:

- That there is an urgent and legal need to improve air quality in the city – this in part can be addressed through the increased use of electric, hybrid or hydrogen vehicles;
- Details of existing and proposed sustainable fuelling infrastructure in the South East Wales Region;
- The benefits to their customers for owning new electric, hybrid or hydrogen vehicles;
- Any financial assistance available for the purchase of new electric, hybrid or hydrogen vehicles.

- **Recommendation 24** – The Council should work with the motor industry to bring a trade show for electric, hybrid or hydrogen vehicles to Cardiff. To achieve this it should approach an established industry body or motor trade show provider (for example, the Society of Motor Manufacturers & Traders or Green Fleet Urban) and invite them to deliver an event aimed at the motor vehicle industry in Wales. Such an event would help to stimulate further interest in electric, hybrid and hydrogen vehicles and hopefully increase local take up of the vehicles.

## ➢ Electric (EV)

- **Recommendation 25** - Cardiff has no on street electric vehicle-charging infrastructure. Some private companies such as IKEA and ASDA have charging points at their sites but the offer is very limited. This means that electric vehicle charging opportunities are very limited in the city, making it difficult for people to refuel electric or hybrid vehicles. Cities like Manchester, Leeds and Bristol are pushing ahead in creating public on street charging infrastructure and it would be a shame for Cardiff to be left behind. The Council has recently commissioned a report that aims to identify the best way forward for electric charging infrastructure in the city. It aims to explore different charging methods; the challenges of installing

on street charging; the various implementation options and the potential economic opportunities being presented to the Council and private sector. It is important that we understand all of these factors before taking the next step. With this in mind the task group recommends that the Council considers and evaluates the content of the report before deciding on how to roll out electric charging infrastructure to the city. That said the need to make progress is immediate and so the Council should ensure that there are no unnecessary delays in the decision making process for taking this forward. Once a clear picture has been identified then it is essential that the Council does what it can to accelerate the delivery of this much needed infrastructure.

- **Recommendation 26** – The Council currently has only one electric vehicle. From the evidence provided it is clear that electric vehicles are a part of the solution in terms of improving air quality, therefore, we need to procure more of these vehicles. With this in mind the task group recommends that the Council builds the use of sustainable fuels (such as electric) into the vehicle and wider supply chain procurement process to ensure that we invest in this technology going forward.

## ➢ Hydrogen

- **Recommendation 27** - Cardiff has no hydrogen-fuelling infrastructure; the closest refuelling site being found a few miles north of the city in Treforest. In total there are only three hydrogen-refuelling stations in all of Wales. The lack of convenient and accessible hydrogen refuelling infrastructure has been identified as the single biggest barrier to owning and running a hydrogen vehicle in Cardiff; without more infrastructure the market for hydrogen vehicles will simply not grow. The slow take up of hydrogen-fuelled vehicles seems to be a shame for a number of reasons, these include:

    - Producing hydrogen fuel is a relatively simple chemical process that

can be achieved anywhere;

- Water is the only emission produced by hydrogen fuelled cars;
- Refuelling a hydrogen car is a relatively quick process which can take anywhere between one and five minutes – this is comparable to refuelling to a petrol or diesel car and significantly quicker than charging an electric vehicle;
- The drive range on a tank of hydrogen is comparable to most petrol or diesel cars;
- South Wales has significant expertise in the production of hydrogen fuel;
- The hydrogen fuel cell was invented by a Welshman called Sir William Grove in 1839. It seems a shame to have invented the technology in Wales and then to have fallen behind the rest of the world in rolling out its use in motor vehicles;
- South Wales could play a significant role in supporting the supply chain for the production of hydrogen vehicles in the United Kingdom.

With all of this in mind the task group recommends that the Council needs to review and then do what it can to bring at least one hydrogen refuelling facility to Cardiff. Potential options include supporting a major fuel supplier to install a facility or developing a Council / public sector facility to fuel Council or other public sector vehicles. In particular the Members of the task group would like to see a hydrogen bus and waste truck being introduced to the streets of Cardiff – the introduction of public sector hydrogen vehicles could act as a catalyst to underwrite the development of new refuelling infrastructure. Members understand that hydrogen vehicles are approximately twice the cost of similar petrol or diesel vehicles and so financial support would be required to make the purchase a reality. Contacting the Welsh Government for financial assistance for such a purchase would be a good starting point.

## Council & Public Sector Partner Responsibilities - Recommendations

- **Recommendation 28** – Improving air quality in Cardiff is an issue that affects everyone in the city. This means that a united public sector response is required and so it is vital that the Council and other major public sector partners assume a leadership role in driving this agenda forward. On this basis the task group recommends that the Council works with its public sector partners to:
  - Agree and work towards setting clear and meaningful targets for air quality improvement;
  - Implement air quality strategies and detail / time focused action plans that will help achieve air quality compliance;
  - Communicate and educating the public on air quality issues;
  - Monitoring the progress achieved.

- **Recommendation 29** – The Council and all major public sector organisations should run a programme to encourage their staff to switch to active travel and encourage workplace practices to reduce the number of unnecessary journeys. For example, increasing work from home opportunities where practical; creating partnerships and discounted travel offers with public transport providers; increasing use of conference calls; emphasising the benefits of sustainable travel and implementing flexible start times.

## Consultation & Engagement Recommendations

- **Recommendation 30** – Once the Clean Air Strategy is complete and a clear direction of travel is established the task group recommends that the Council should do all it can to raise the profile of what is being done to improve air quality in Cardiff and explain why it is being done. This should involve a huge communications, consultation and engagement exercise that targets neighbouring local authorities, public sector organisations, major employers and the public. The aims and ambitions of the strategy should be highlighted; specific actions should be detailed and an explanation on the potential benefits provided. As with most change there will be negative feedback, however, evidence suggests that in the medium to long term the popularity of any significant proposals will increase.

# KEY FINDINGS

## 'Improving Cardiff's Air Quality' - Meeting 1 - Wednesday 1st November 2017 - Setting the Background

**Part 1 - A Review of Cardiff's Current Air Quality** – Councillor Michael Michael, Cabinet Member for Clean Streets, Recycling & Environment, Councillor Caro Wild, Cabinet Member for Strategic Planning & Transport and Councillor Susan Elsmore, Cabinet Member for Social Care, Health & Well-being were invited to brief the task group on air quality in Cardiff. In doing this they identified the challenges and opportunities facing Cardiff's air quality as well highlighting the main problem areas in the city. They were supported by officers from Shared Regulatory Services and the City Operations Directorate.

## Key Findings

- Local air quality management is a statutory duty for all local authorities in the United Kingdom. This statutory responsibility is set out under Part IV of the Environment Act 1995 and air quality objectives for specific pollutants are prescribed in air the quality regulations.

- Exposure to air pollution reduces life expectancy by increasing mortality and morbidity risks from heart disease and strokes, respiratory diseases, lung cancer and other illness.

- In the UK, the health burden is substantial. It is estimated that the equivalent of 40,000 deaths occur each year as a result of exposure to outdoor pollution.

- Public Health Wales estimates that there are 225 attributable deaths to PM 2.5 and 220 attributable to nitrogen dioxide per annum in the Cardiff and Vale Health Board area each year.

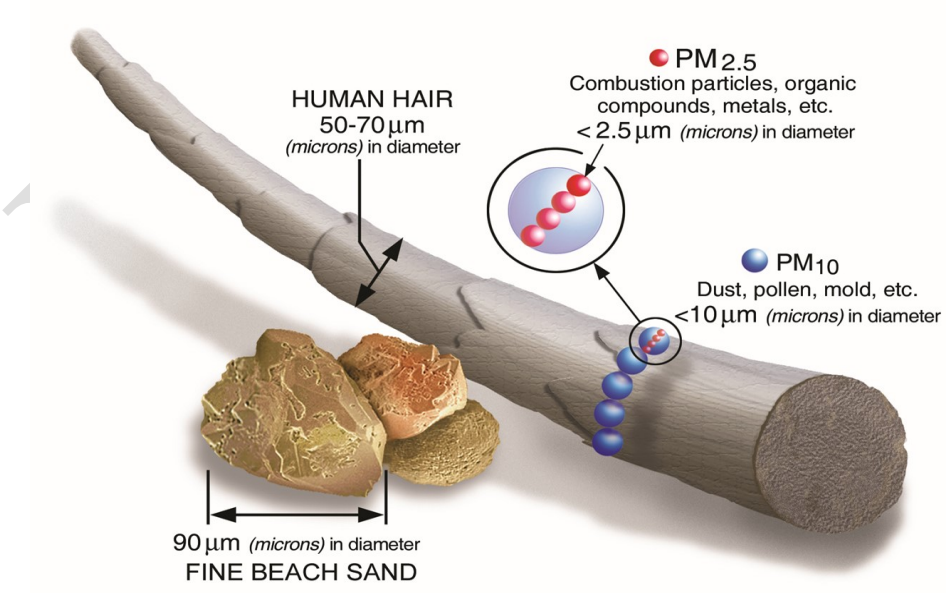
- Particulate Matter (PM) – These are fine particles composed of a wide range of materials and sources. Current regulatory monitoring is focussed on PM10, however, PM2.5 and 'ultrafine' particles are also vitally important in public health terms.

- Particulate matter can be carried deep into lungs. This can cause inflammation and worsen heart / lung diseases. It is also possible for particulate matter to carry surface-absorbed carcinogenic compounds into the lungs.

- The primary man made sources of PM are fuel combustion, transport, quarrying and construction.

- **Diagram 1** illustrates the relative sizes of particulate matter when compared against grains of sand and human hair.

**Diagram 1 – Relative Size of Particulate Matter (PM)**




- Nitrogen dioxide is the most common air pollutant in Cardiff. It is a secondary pollutant that that is mainly produced by vehicle emissions. Nitrogen dioxide is created when Nitric oxide is emitted from vehicles as a

result of the combustion process – on its own it is not harmful to human health. However, nitric oxide then oxidises with atmosphere to form nitrogen dioxide which is harmful to health. Nitrogen dioxide can irritate lungs and lower resistance to respiratory infections.

- Continued or frequent exposure to concentrations higher than those normally found in the ambient air may cause increased incidence of acute respiratory illness in children.

- 2016 Local Air Quality Monitoring in Cardiff – there are 77 diffusion tubes located across Cardiff that are used to monitor nitrogen dioxide on a long term basis to provide annual average concentrations.

- Real time monitoring of ozone, particulate (PM10 & PM 2.5), sulphur dioxide, nitrogen dioxide is undertaken by the AURN on Frederick Street. This provides an overall background reading for the city – the latest results can always be accessed online by visiting:

  http://www.welshairquality.co.uk/current_levels.php?lg=

- Cardiff has four 'Air Quality Management Areas' which have been declared due to elevated nitrogen dioxide concentrations as a result of vehicle emissions. These are:

  - Stephenson Court Air Quality Management Area
  - Ely Bridge Air Quality Management Area
  - Llandaff Air Quality Management Area
  - City Centre Air Quality Management Area

- Maps of Cardiff's four Air Quality Management areas are attached to this report as **Appendix 1**.

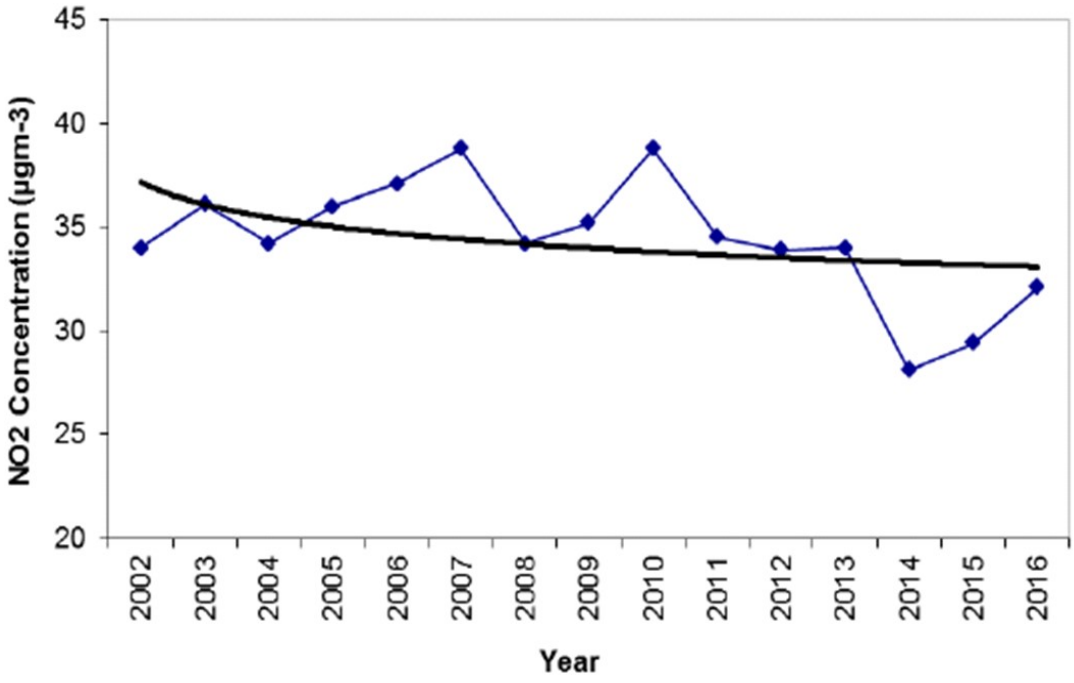
- During 2016 Cardiff had a number of sites with exposure exceeding the 40µg/m3 annual mean objective. In addition to this, it had a number of monitoring sites (11) that exceeded the 40µgm3 annual mean objective for nitrogen dioxide. The exceedences were predominantly contained within

the declared Air Quality Management Areas; however, there were four monitoring locations that were not located within Air Quality Management Areas.

- During 2016 the City Centre Air Quality Management Area experienced an increase of 2µg/m3 in nitrogen dioxide concentrations.

- **Diagram 2** illustrates the results of nitrogen dioxide concentration monitoring for the years 2002 to 2016. Overall there has been a reducing trend during this period, however, since 2014 the nitrogen dioxide concentration levels have increased quite steadily.

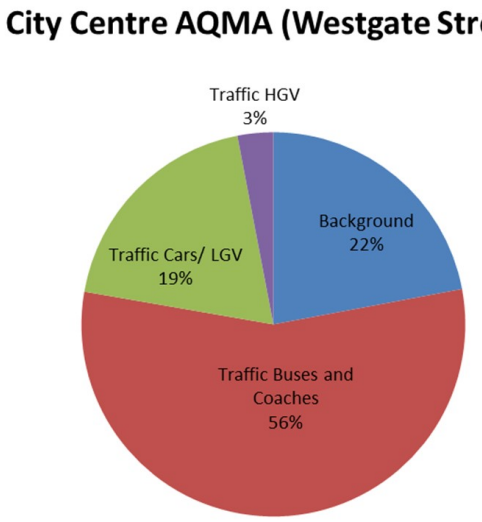
**Diagram 2 – City Centre Air Quality Management Area Nitrogen Dioxide concentration monitoring - 2002 to 2016**




- Road traffic is the primary source of elevated concentrations of nitrogen dioxide for Cardiff. This is mainly caused by cars (predominately diesel), buses and coaches. A breakdown of the nitrogen dioxide source apportionment analysis for each of Cardiff's four Air Quality Management Areas is attached to this report as **Appendix 2**.

- The City Centre Air Quality Management Area (predominantly based around Westgate Street) has the highest levels of nitrogen dioxide concentration in Cardiff. This is significantly impacted by approximately 140 bus movements per hour. A breakdown of the nitrogen dioxide contributions by percentage can be seen in **Diagram 3** below:

**Diagram 3 – City Centre Air Quality Management Area Nitrogen Dioxide Contributions**




- It is important to note that 56% of the Nitrogen Dioxide emissions for this area are caused by buses and coaches. From the 140 buses using this area:
  - 72 (51% of the overall total) have engines that comply with Euro 3 standards;
  - 17 (12% of the overall total) have engines that comply with Euro 4 standards;
  - 15 (11% of the overall total) have engines that comply with Euro 5 standards;
  - 36 (26% of the overall total) have engines that comply with Euro 6 standards.

- The Euro engine emission standards were first established in July 1992 with the launch of the Euro 1 standard. Since then an additional five overall standards have been added with the aim of reducing emissions and improving air quality. The most recent standard to be introduced is the Euro 6. **Appendix 3** that is attached to this report details the six Euro categories that have been created to date.

- Travel Patterns – during the presentation it was explained that 38% of Cardiff's workforce travel to Cardiff from outside the county area. This figure increased by 10% between 2004 - 2014. Figures from the census conducted in 2011 suggest that between 76% - 84% of the commuting workforce travel by car.

- Progress on Action Plans - Cardiff Council has a statutory requirement to produce Air Quality Action Plan(s) for Air Quality Management Areas. Previous experience in implementing singular action plans has not been as successful as has been required. Air Quality Action Plans focus on introducing local measures to individual road links/ areas - this only targets improving air quality within the identified Air Quality Management Area itself. Sometimes localised measures can lead to adverse impacts on air quality in surrounding areas as they don't address the actual root cause of air quality issues.

- The development of a Clean Air Strategy will target the whole of Cardiff to try and improve the overall air quality within the city. In doing this it is hoped that the Clean Air Strategy will help protect and improve public health.

**Part 2 - Development of Cardiff's Clean Air Strategy** - Councillor Michael Michael, Cabinet Member for Clean Streets, Recycling & Environment, Councillor Caro Wild, Cabinet Member for Strategic Planning & Transport and Councillor Susan Elsmore, Cabinet Member for Social Care, Health & Well-being were invited to briefed the task group on the development of Cardiff's Clean Air Strategy.

**Key Findings**

- It was explained that a collaborative approach is being taken in the development of Cardiff's Clean Air Strategy, i.e. the work was being spread across a number of portfolios and that it would involve the harmonising of existing strategies and policies. To help achieve the aims of this important strategy they are working with a number of external bodies, for example, Public Health Wales, Welsh Government and Industry/ Businesses.

- In developing the strategy the collaborative working group were reviewing best practice, NICE Guidance and a number of relevant strategies produced by other local authorities. A key aim of the strategy is to develop a number of strategic measures that would then be implemented through an action plan.

- The overarching aim of the Clean Air Strategy is to Improve Air Quality in order to protect and improve public health. Officers anticipated that this would be achieved by:

    - Enhancing Local Planning Policy - for example, by adhering to air quality related Local Development Plan policies and by creating relevant supplementary planning guidance to help improve air quality.
    - Enhancing Cardiff's Transport Infrastructure - for example, by delivering a Transport Strategy with the aim of reducing congestion,

increasing car clubs, delivering on 20mph zones and influencing behavioural change.

- Increasing the Uptake of Sustainable & Active Travel – for example, by delivering active travel improvements to increase cycling and walking; by supporting public transport improvements through buses, the Metro, trains, school travel plans and influencing behavioural change.
- Implementing a Renewable Fuel Strategy & Improving OLEV Capacity – for example, by increasing electric charging infrastructure, by supporting alternative fuels (e.g. hydrogen); by delivering green fleet changes (with the Council to take a lead); by supporting industry change and by helping to influence behavioural change in the area of sustainable fuels.
- Increasing Public Information & Behaviour Change Initiatives – for example, by delivering an effective communications strategy; by focusing on the promotion and marketing of the wider health and environmental benefits of tackling air quality.
- Implementing Additional Regulatory Interventions – for example, by creating non-idling zones; through parking permit reform and as a part of a taxi policy review.

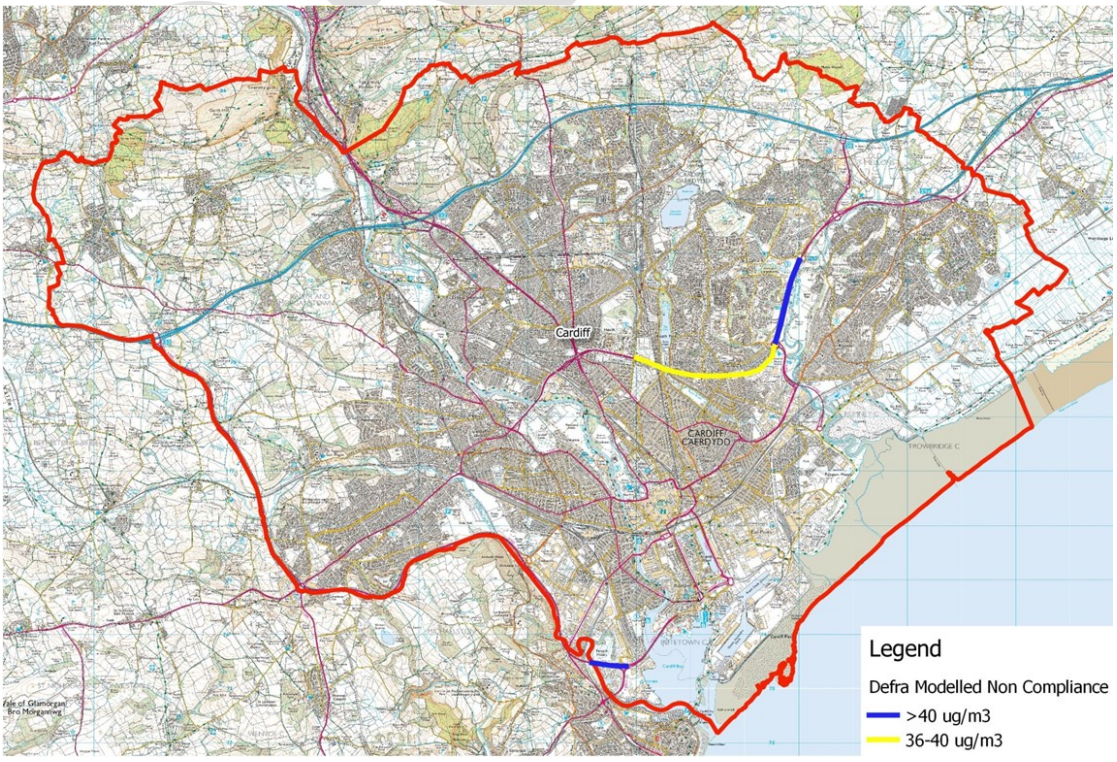
- The Clean Air Strategy will be vital to develop and implement strategic long term measures to improve air quality below and beyond Air Quality Standards across Cardiff, however, the strategy may not be sufficient to enable Welsh Government to meet legal ruling that compliance with the Ambient Air Quality Directive needs to be achieved in 'the shortest time possible' – this was established in a recent court case between Client Earth and the United Kingdom Government.

- In order that legal compliance is achieved the United Kingdom and devolved governments have legal obligations to achieve nitrogen dioxide annual average limit value (40ug/m3 AA) as set out in the EU Ambient Air Quality Directive (2008/50/EC) 'in the shortest possible time, and is likely'.

- The United Kingdom government published its final action plan on the 26th July 2017. The policy paper titled 'Air quality plan for nitrogen dioxide (NO2) in UK (2017)' set out to detail the measures required to bring about compliance in shortest time possible.

- Modelling undertaken by Defra indicates that Cardiff will be non-compliant beyond 2023, and as such will be in breach of the Directive that could result in legal action/ fines being implemented. **Diagram 4** (below) illustrates the results of this modelling and indicates that the two routes highlighted in dark blue on the map would exceed the 40ug/m3 limit and so create non-compliance. The two areas are both along key arterial routes into and out of the city, i.e. the A48 from the centre of the city going east and the A4232 in Grangetown to the west of the city. This theoretical modelling has concluded that the main reason for 40ug/m3 limit breaches in these areas is the volume of diesel fuelled private vehicles using the routes, for example, the use of private diesel fuelled cars in the section of the A48 in breach accounts for 46% of the nitrogen dioxide emissions for the section.

**Diagram 4 – Defra Modelled 40ug/m3 Estimated Limit Breaches in 2023**



- The following statements were included in the United Kingdom Published Action Plan in July 2017:

  - *'The latest modelling undertaken by Defra identified areas across the UK that may need to implement a Clean Air Zone to achieve compliance in the shortest time. One area identified in Wales, for which, based on current projections, a zonal approach would accelerate compliance, is in Cardiff'.*

  - *'Welsh Government anticipates a Clean Air Zone, with vehicle access restrictions, could be implemented in Cardiff during 2021 or earlier if possible, thereby achieving compliance by 2022 or sooner'.*

- If a local authority can identify measures other than charging zones that are at least as effective at reducing nitrogen dioxide, those measures should be preferred as long as the local authority can demonstrate that this will deliver compliance as quickly as a charging Clean Air Zone. If Cardiff cannot demonstrate compliance and doesn't introduce a charging Clean Air Zone then Welsh Government can mandate the Council to implement a Clean Air Zone under Section 87 (2(j)) of the Environment Act 1995.

- Client Earth have stated that local authorities should ensure their plans meet the legal test set out in the High Court by:

  - Explaining exactly how the limit values can be met;
  - Taking the route that reduces people's exposure as quickly as possible;
  - Ensuring that compliance is not just 'possible', but 'likely'.

- Five cities in England were directed to implement Clean Air Zones in 2016. These were Leeds, Derby, Nottingham, Birmingham and Southampton. The 2017 Plan details additional local authorities in England that have been required to undertake action to achieve statutory nitrogen dioxide limit values within shortest time. These local authorities

have to produce draft action plans by March 2018, with final plans approved December 2018. The United Kingdom Government will assess these plans – if they are not able to demonstrate compliance in shortest time possible then they will be forced to implement a clean air zone.

- A £255m implementation fund has been created to support local authorities in preparing their plans and to deliver targeted action to improve air quality - £40m of this fund is immediately available. At the time of receiving this evidence, the Welsh Government had not indicated if Cardiff could apply for this funding or requested that such plans were put in place. Ongoing discussion was taking place on the issue.

- A Clean Air Zone is an area where targeted action is taken to improve air quality and resources are prioritised and coordinated in a way that delivers improved health benefits and supports economic growth. There are two types of Clean Air Zones, non charging and charging.

    - Non Charging Zones are defined geographic areas used as a focus for action to improve air quality.

    - Charging Zones are areas vehicle owners are required to pay a charge to enter, or move within, a zone if they are driving a vehicle that does not meet the particular emission standard for their vehicle type in that zone.

- Before any decisions are taken on the best option(s) for a Cardiff clean air zone a feasibility study will need to take place. At the time of the meeting it was hoped that a feasibility study would start in Quarter 1 2018 and that this could be delivered within a year. The Council had not identified a funding source to pay for a feasibility study and were negotiating with Welsh Government to attempt to secure monies to deliver the work. They acknowledged that the timescale for delivering a feasibility study was short – other local authorities (for example Bristol) had taken at least two years. The hope was that the Council would learn from the mistakes of the other local authorities and deliver the piece of work in a year. It was anticipated

that much of the work for the feasibility study would involve traffic modelling across the city.

- It was hoped that the results of the feasibility study would go out for consultation in early 2019 with a final plan being delivered by the end of 2019.
- At the time of the meeting the Welsh Government had yet to define the strategic measures to be applied in the development of the feasibility study. English local authorities have received guidance on the strategic measures to be used in feasibility studies from DEFRA.
- Members felt that clear guidance and funding was needed from the Welsh Government to help drive the whole process forward.

**Part 3 – Welsh Government Statement -** The task group to received an air quality update statement from the Welsh Government. The statement set out the current Welsh Government position on managing air quality in Wales and the Cardiff local authority area.

**Key Findings**

Representatives from the Welsh Government were unable to attend the meeting and so provided a statement to set out the Welsh Government position titled 'Air Quality in Wales – the National Context'. The statement is attached to this report as **Appendix 4**. Extract containing the main points from **Appendix 4** are set out below:

- *Taking further action to improve air quality in Wales is a key priority in the Welsh Government's National Strategy, Prosperity for All. In 2018, the Welsh Government will develop and consult on a new Clean Air Plan for Wales, including a Clean Air Zone framework.*

- *The United Kingdom currently meets the legal limits for almost all pollutants but faces significant challenges in reducing levels of nitrogen dioxide.*

- *Non-compliance with EU legal limits for nitrogen dioxide across the United Kingdom and Europe is associated principally with high vehicle emissions in urban areas. This is due both to the significant growth in vehicle numbers and to European vehicle emission standards not delivering the expected reductions in emissions of nitrogen oxides from diesel vehicles.*

- *In the event of exceedances of EU legal limits, air quality plans produced by Member State governments are required to set out appropriate measures to attain compliance in the soonest time.*

- *New evidence received from Defra in early 2017 showed compliance with EU legal limits for nitrogen dioxide in Wales will take longer than the 2015*

*UK Air Quality Plan had previously predicted. Defra's modelling now predicts non-compliance in Cardiff until 2023.*

- *The Welsh Government therefore set out further remedial measures to accelerate the pace of compliance in Wales. These were published in July 2017, within a new UK Air Quality Plan:*

  https://www.gov.uk/government/publications/air-quality-plan-for-nitrogen-dioxide-no2-in-uk-2017.

- *We need all levels of measure, local and national, to deliver compliance in the soonest time possible, requiring close joint working with Local Authorities and others.*

- *The need for urgent action is not just about compliance with law; the essential reason for action is the health of our citizens.*

- *The Welsh Government is working with Cardiff Council to help the Council bring its area within the legal limits in the soonest possible time and to protect the health of people over a wider geographical area.*

- *The Welsh Government is also working with Local Authorities to strengthen air quality provisions in Planning Policy Wales to prevent new problems from arising.*

**Clean Air Zones**

- *The latest modelling undertaken by Defra identified areas across the United Kingdom that may need to implement a Clean Air Zone to achieve compliance in the shortest time. One area identified in Wales, for which, based on current projections, a zonal approach would accelerate compliance, is in Cardiff. The Welsh Government anticipates a Clean Air Zone, with vehicle access restrictions, could be implemented in Cardiff during 2021 or earlier if possible, thereby achieving compliance by 2022 or sooner.*

- *Implementation of a Clean Air Zone will need to be subject to further assessment and ongoing work with Cardiff Council to understand whether alternative local measures could achieve compliance more quickly. Where alternative local measures are suggested, to be effective they must be capable of achieving compliance within the same amount of time, or sooner, than a Clean Air Zone with access restrictions. This further assessment will need to be based on local as well as national data modelling relating to both air quality and transport. The modelling will be followed by a thorough options assessment, local consultation, planning and implementation. The actions up to the point of implementation should complete during 2019.*

- *The Welsh Government intends to consult on a Clean Air Zone framework for Wales as soon as possible and in any event no later than the end of April 2018.*

**Legislation**

- *Under domestic legislation, specifically the Environment Act 1995 and associated regulations, the local air quality management (LAQM) regime requires Local Authorities to review and assess air quality in their areas against objectives and standards for a range of averaging periods for a number of air pollutants. Assessment of air quality is focused on locations where members of the public are regularly present and where there is exposure to the pollutant in question over the timescale for which the air quality objective is defined. Under LAQM, Cardiff Council has declared four air quality management areas for non-compliance with the annual average air quality objective for nitrogen dioxide. The Council has produced an action plan for only one of these areas to date, but has advised the Welsh Government that the Council's new Clean Air Strategy and Action Plan, expected in draft by the end of March 2018, will incorporate actions covering all four air quality management areas as well as the city as a whole.*

- *The Well-being of Future Generations (Wales) Act 2015 ("the WFG Act") requires public bodies in Wales, including the Welsh Government and Local Authorities, to carry out sustainable development. This is the process of improving the economic, social, environmental and cultural well-being of Wales by taking action, in accordance with the sustainable development principle, aimed at achieving the seven national well-being goals. Specifically, public bodies in Wales must act in a manner which seeks to ensure the needs of the present are met without compromising the ability of future generations to meet their own needs.*

- *One of the national well-being indicators under the WFG Act is average population exposure to nitrogen dioxide. (https://statswales.gov.wales/catalogue/environment-and-countryside/air-quality). This has been calculated at a Local Authority as well as a national level, and indicates that Cardiff Council has the highest average concentration of nitrogen dioxide where people live of any Welsh Local Authority, Statutory guidance issued by the Welsh Government in June 2017 (http://gov.wales/topics/environmentcountryside/epq/airqualitypollution/airquality/guidance/policy-guidance/?lang=en) joined up these two domestic regimes by requiring Local Authorities in Wales to follow the ways of working set out in the WFG Act when carrying out LAQM. The Welsh Government also made regulations in 2017 requiring Public Services Boards to consider Local Authorities' LAQM progress reports when carrying out assessments of local well-being.*

- *National improvements in air quality have also been driven by European Directives, including those that set limits on:*

    - *Concentrations of pollutants in ambient air (for example, the Ambient Air Quality Directive which sets EU limit values for air quality in Member States, similar to the national air quality objectives under LAQM);*

    - *Annual pollutant emission totals for each Member State, helping to tackle trans-boundary pollution (for example, the National Emission*

*Ceilings Directive, which implements the UNECE Gothenburg Protocol); and,*

- *Concentrations of pollutants from specific sources (for example, the Industrial Emissions Directive which, together with domestic environmental permitting legislation, controls emissions to air from industrial sites regulated by Natural Resources Wales and Local Authorities, and EU legislation covering car and lorry exhaust pipe emissions).*

- *Under European legislation, the Ambient Air Quality Directive (2008/50/EC) requires the Welsh Ministers to secure compliance as soon as possible with EU air quality limit values at locations where the public has access. The work of Local Authorities in relation to LAQM makes an important contribution to actions being implemented by the Welsh Government to achieve compliance with EU legal limits.*

- *The Cabinet Secretary for Environment and Rural Affairs wrote to the Leaders of all Welsh Local Authorities in July 2017, emphasising the importance of their public protection, planning and transport departments taking joint ownership of the LAQM work programme, and, in Cardiff's case, of having regard to the non-compliance with EU air quality limit values highlighted in the UK air quality assessment.*

## Improving Cardiff's Air Quality' - Meeting 2 – Public Health - Wednesday 8th November 2017

**Impact of Air Quality on Health – Public Health View** – Dr Huw Brunt and Dr Tom Porter were invited to provide the Public Health Wales view on the impact of air quality on health in Cardiff. Councillor Susan Elsmore, Cabinet Member for Social Care, Health & Well-being was also invited to attend to provide context on the work that the Council is delivering in this area.

### Key Findings

- It was identified that the linkages between air pollution and health were:
    - Air pollution has been identified as the single most significant environmental determinant of health;
    - Exposure to air pollution is associated with increased mortality and morbidity risks;
    - It has created a substantial health burden in the United Kingdom, for example, PM2.5 - equivalent of 29,000 annual deaths (or 307,000 lost life-years); Nitrogen Dioxide - equivalent of 23,500 annual deaths (or 277,000 lost life-years). Overall it is estimated that it contributes to 40,000 premature deaths in the United Kingdom every year – some doctors actually believe that this is just the tip of the iceberg.
    - On average it is estimated that it contributes to a reduction in life expectancy of seven or eight months.
- It was explained that the national-level burden estimates masked local variations in air quality. Some people are more at risk than others, this can be driven by 'differential exposure vulnerability', for example, exposure to high air pollution concentrations and 'differential susceptibilities' for example, intrinsic factors such as age, sex, genetics, ethnicity and acquired factors such as chronic illness, lifestyles and behaviours and

multiple deprivation. This is further complicated by interaction with a wider range of other health determinants.

- ‘Triple jeopardy’ in Wales – research has been carried out to explore the relationships between linked air pollution, deprivation and health data. The research identified that the air pollution concentrations are highest in the ‘most deprived’ areas where population most is susceptible.

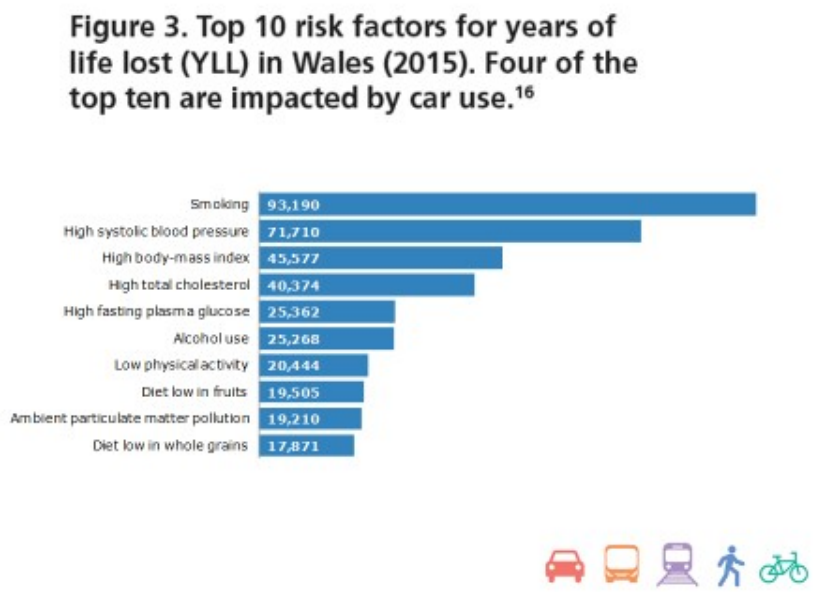
- Public Health was described as a key stakeholder in dealing with air quality management. As a part of its role it aims to:

    - Support others to assess air pollution in the context of public health risks;
    - Support others to mitigate risks;
    - Advise and support planners and regulators;
    - Provide information to the public to reduce risks and drive behaviour change;
    - Manage public health risks associated with acute and chronic incidents;
    - Influence and support action to improve corporate environmental sustainability;
    - Lead evidence-based change through effective advocacy and informed policy development.

- It was explained that the main legislative drivers for change were Environment Act 1995 (LAQM); Environment (Wales) Act 2016; Active Travel (Wales) Act 2013; Climate Change Act 2008; Planning (Wales) Act 2016 and the Public Health (Wales) Act 2017. These in turn feed into the Wellbeing of Future Generations (Wales) Act 2015 which is underpinned by seven well-being priorities, i.e. a globally responsible Wales, a prosperous Wales, a resilient Wales, a healthier Wales, a more equal Wales, a Wales of cohesive communities and a Wales of vibrant culture and thriving Welsh language.

- The health impacts of air pollution are associated with cardiovascular and respiratory disease, stroke, cancer, diabetes, low birth weight and dementia. In addition it was explained that:
    - One fifth of cases of low birth weight are due to traffic related air pollution;
    - An estimated 5% of deaths in Cardiff and Vale are due to particulate matter air pollution;
    - Levels of nitrogen dioxide in Cardiff and Vale residential areas are the highest in Wales.
- In terms of the broader public health context it was illustrated that the way in which we travel has significantly changed over time, for example:
    - 1952 - 42% of journeys were by bus, this reduced to 5% by 2016;
    - 1952 - 11% of journeys were by bike, this reduced to 1% by 2016;
    - 1952 - 27% of journeys were by car, this increased to 83% by 2016;
    - 2015 - total motor vehicle traffic in Great Britain reached a new record level;
    - 1928 - 42 million journeys were taken by tram in Cardiff in 1928 (that is the equivalent of 150 return journeys in the city per person per annum;
    - 1950 - The Cardiff tram system closed in 1950. Most housing and commercial developments over the last 50 years have been shaped by cars, not people.
- **Diagram 5** sets out the top 10 risk factors for years of life lost in Wales in 2015. Four of the top ten are impacted by car use (high systolic blood pressure, high body mass index, low physical activity, ambient particulate matter pollution).

**Diagram 5 – Top 10 Risk Factors for Years of Life Lost in Wales 2015**




- The car has seven general effects on health and well-being in Wales, these were air pollution; road traffic injuries and deaths; reduction in green space; climate change; physcal inactivity and sedentary lifestyles; increase in lonliness and social isolation and exacerbating health inequalities. The effects on health and well-being are expanded upon below:
    - **Physcal Inactivity & Sedentary Lifestyles** – over half (54%) of adults in Cardiff and Vale are overweight or obese; sedentary lifestyles are associated with 91% increase in the risk of type 2 diabetes; people are much less likely to undertake active travel if they have a car.
    - **Road Traffic Injuries & Deaths** – there are 20 road accidents causing death or serious injury each week in Wales; the most common cause of death for chldren aged 5 to 14 years is being hit by a vehicle; half of car drivers in 30mph zones routinely exceed the speed limt.
    - **Increase in Lonliness & Social Isolation –** Nearly 1 in 4 vulnerable people in Cardiff and Vale report being lonely some or all of the time. Reducing car use and increasing access to public transport support healthy ageing in urban environments and is attributed to increasing social interaction.

- **Reduction in Green Space** – Green spaces are associated with improved social interactions, increased physical activity and cardiovascular health and reduced mortality.

- **Exacerbating Health Inequalities** – Cars are owned and used more by the least deprived, but adverse impacts are felt most by the most deprived. Children in more deprived wards are four times more likely to be hit by a car compared with the least deprived wards.

- **Climate Change** – Global temperatures are expected to increase by 4 degrees celsius by 2100 if current trends continue, with some areas experiencing 10 degrees Celsius increases. Flood related displacement of communities has been found in the United Kingdom to cause significant and enduring mental health issues; one quarter of domestic greenhouse gas emissions are due to car transport.

- **Air Pollution Health Impacts** – cars are associated with cardiovascular and respiratory disease, stroke, cancer, diabetes, low birth rate and dementia.

- Public Health Wales believes that addressing the causes of transport-derived air pollution will have broad public health benefit. In doing this we need to:

  - **Support active travel and public transport** – Daytime journeys of less than 2km should be walkable for individuals aged 5 to 74; for many people the trigger to take up active travel is a significant life event; to achieve change we need to provide high quality, flexible public transport. The National Institute for Health & Care Excellence found that off-road cycle routes were good value for money, with every £1 investment in off road routes returning around £14 in benefits.

  - **Reduce Air Pollution & Carbon Emissions** – NICE (National Institute for Health & Care Excellence) recommends the introduction of Clean Air Zones which support low emission travel. The NHS should set the benchmark for clean air and safe workplaces.

- **Follow the recommendations from NICE guidelines on improving air quality** - Support active travel - there should be a choice of cycle routes, including routes avoiding highly polluted areas; support car sharing schemes and car clubs; provide electric vehicle charging points in workplaces, commercial developments and residential areas; consider introducing a clean air zone that introduces restrictions or charges on certain classes of vehicle, and supports zero and low emission travel (including active travel); where traffic congestion is contributing to poor air quality, consider incorporating a congestion charging zone within the clean air zone; introduce bylaws to support 'no idling' areas where vulnerable groups congregate such as outside schools, hospitals and care homes; specify emission standards for private hire and other licensed vehicles; address emissions from public sector transport and introduce 20 mph zones without physical measures, to avoid unnecessary accelerations and decelerations which contribute to air pollution.

- **Design well-connected and attractive communities, plus protect and enhance our green space** - Reducing traffic speed with 20mph limits make streets more inviting for walking, socialising and cycling; people who walk and cycle in a neighbourhood are more likely to spend money in local shops.

- **Provide Leadership** - the London congestion charge resulted in an 80% increase in cycling.

- Public Health Wales believes that public services (for example, Local Authorities and the National Health Service) need to work together to properly address the air quality issues that impact on Cardiff. It feels that it is important to accelerate improvements to infrastructure to support active travel and low emission transport in the following ways:

  - Continue improvements and ongoing development of dedicated walking and cycling infrastructure, prioritising deprived areas first;

  - Provide access to local green spaces by active travel;

- Maximise opportunities presented by the Metro programme;
- Introduce bike hire schemes (including e-bikes);
- Consider the widespread introduction of 20mph zones;
- Increase electric vehicle charging infrastructure, particularly for areas without off-street parking;
- Reject planning proposals which have an adverse impact on walking or cycling;
- Support local renewable energy generation.

- Public Health felt that it was important to support staff to choose active travel options and suggested that the Council should work with employers to help them:
  - Encourage all staff to travel actively, to reduce sickness absence and productivity;
  - Provide visible senior leadership and role modelling;
  - Assess opportunities at times of workplace moves;
  - Support employees preparing for retirement.

- Public Health Wales felt that it was important to engage with the local community and businesses on the benefits of active travel and to discourage unhealthy and polluting travel, suggestions on how to do this included:
  - Agree consistent communication across local public sector;
  - Emphasise increased customer spend in walkable areas;
  - Organise and promote co-ordinated car free days across the region;
  - Introducing ‘no idling’ zones outside all schools;

- Consider gradual increases in public car parking charges to fund and accelerate improvements in active travel facilities and public transport;
- Scope the introduction of a low emission zone in Cardiff, with any charges levied used to fund active travel and public travel transport improvements;
- Introduce low emission pool cars for major sites where they are not already in place.

- The Health Protection Division of Public Health Wales has supported Newport Council in the development of supplementary planning guidance for air quality. They are also able to deal with challenging issues around public health that relate to planning applications. The team has the skills to undertake complex health risk assessments that perhaps local authorities are not able to support. They are happy to offer their support in dealing with the more complicated health risk assessments.

- Ocean liners emit an enormous amount of particulate matter when visiting a port. It is estimated that when one ocean liner visits a port it is the equivalent of 100,000 vehicles entering the city – this is greater than the average number of commuter vehicles entering the city on a typical day and the associated level of pollution that they produce. In 2017, Venice announced that from 2021 ships of over 55,000 tonnes in weight would no longer be allowed to enter the city harbour and would have to instead dock at a mainland port.

- The main culprit for air quality emissions in Cardiff is road traffic with diesel fuelled vehicles being the biggest emitter (it contributes to 65% of emissions). Industry is the second largest emitter in Cardiff. As Cardiff has a working port it is also subject to emissions from shipping (again mostly nitrogen dioxide).

- It was suggested by Public Health Wales that the Council and other public sector partners have a collective corporate responsibility for air quality and

so they should do what they can to reduce emissions, for example, through fleet management and responsible procurement practices.

- Public Health Wales explained that there appeared to be a challenge in terms of working on air quality issues across more than one local authority area. They also stressed that in order to deal with air quality issues it was often essential to take a cross boundary approach and so work with neighbouring authorities. For example, large volumes of traffic come from neighbouring authorities such as Rhondda Cynnon Taff and the Vale of Glamorgan. This traffic contributes significantly towards air pollution in Cardiff.

- Public Health Wales feels that as a society we have the responsibility to drive forward long term, sustainable transport solutions. To emphasise this they highlighted a number of messages including:

    - In 1928, 42 million journeys were taken by tram in Cardiff – that equates to 150 tram journeys per person per annum. The tram service closed in 1950;
    - Car ownership is now the default transport position;
    - National Institute for Health & Care Excellence found that off road cycle routes were good value for money. Every £1 spent on off road routes generated benefits equal to £14;
    - Cardiff Metro is a long term vision that needs to become a reality;
    - The London congestion charge resulted in an 80% increase in cycling;
    - Run a car free event in conjunction with another event;
    - Car clubs and car share schemes are encouraged by Public Health Wales;
    - Public Health Wales stated that feasibility studies are long costly exercises that generally require financial support for local authorities to deliver.

## ‘Improving Cardiff’s Air Quality’ - Meeting 3 – Transportation (1) - Wednesday 15th November 2017

**Part 1 - A Review of Cardiff’s Current Air Quality** – Councillor Caro Wild, Cabinet Member for Strategic Planning & Transport briefed the task group on the transport management work being delivered by the Council and how this will contribute to improving Cardiff’s air quality. In doing this he identified the challenges and opportunities around using transport initiatives to improve air quality. He was supported by officers from the City Operations Directorate.

### Key Findings

- It is anticipated that much of the transport information covered in the presentation would feature in the ‘Transport Green Paper’ which is due to go out for consultation in April 2018. It was felt that the ‘Transport Green Paper’ would be a key document in terms of improving air quality in Cardiff.

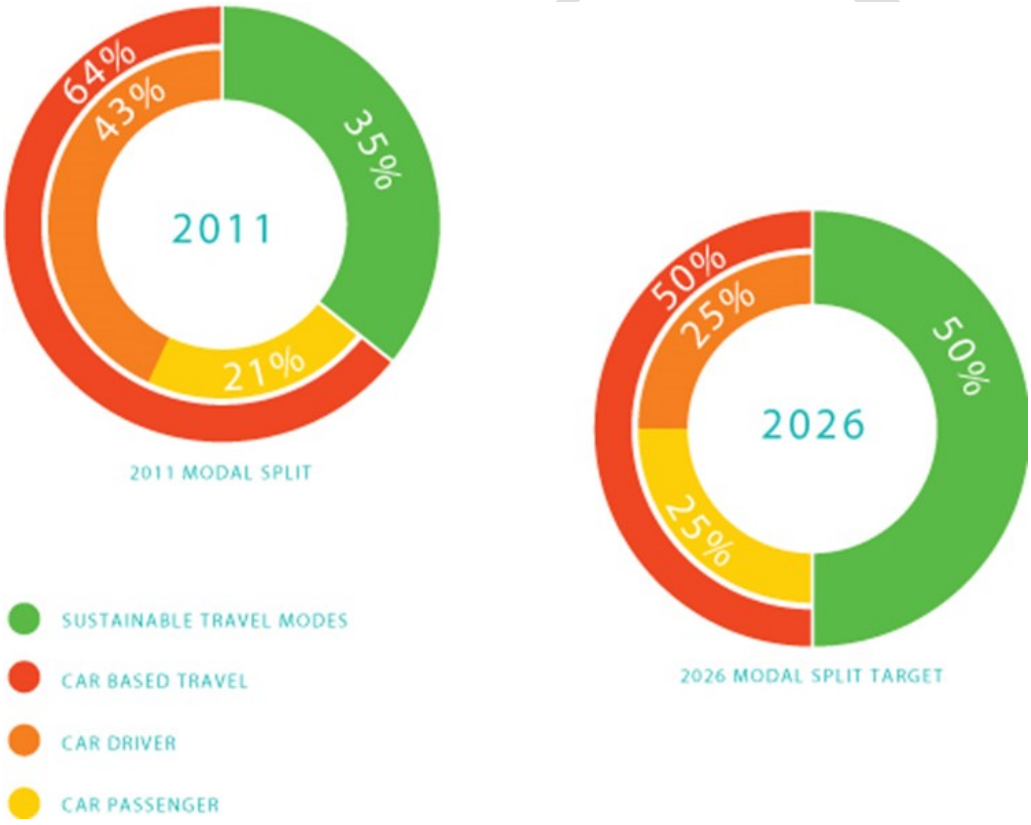
- It was explained during the presentation that Cardiff’s Transport Strategy priorities were:

  - Widening travel choices making it practical for most daily trips to be made by alternatives to the car, for example, public transport, walking and cycling;
  - Demand management to reduce the demand for travel overall, and particularly by car;
  - Network management using technology to make best use of the existing highway network, rather than building new roads that would generate more traffic.

- The Local Development Plan 2006 – 2026 aims to achieve a 50:50 modal split by 2026. To put this into context it aims to take the 65:35 figure achieved in 2011 and make a 1% improvement for every year over a 15 year period.

- Achieving modal shift is viewed as being vital to deal with the rapid growth of the city – it is anticipated that 41,000 new homes and up to 40,000 new jobs will be added to Cardiff by 2026. This means that transport alternatives will be required beyond using the existing network and that peak traffic periods might be extended. It is estimated that if nothing happens then this could lead to a 32% (net) increase in traffic by 2026 - finding extra capacity on the highway network cannot be achieved. **Diagram 6** illustrates the planned change in modal split between 2011 and 2020.

**Diagram 6 – Cardiff's Planned Modal Split between 2011 & 2026**




- There are 80,000 plus traffic movements in and out of the city every day, and that managing this isn't completely within the control of the Council. Some Councillors felt that the Council needed to spend more time dealing with transport issues within its control and focus less effort on delivering the larger schemes. While the larger schemes were important there was

the tendency for the Council to focus on these instead of changing public behaviour through initiatives like 20 mph zones and 75% residential parking schemes. He felt that delivering short term measures was a tried and tested approach which worked well in places like London; they force people out of cars and into alternative means of transport. This suggestion was generally accepted, however, it was noted that Cardiff did not offer the same level of transport alternatives, for example, bus and train services were nowhere near as extensive as the options provided in London.

- A Council officer made a comment that the range of bus services and supporting infrastructure needed to be improved. This was supported by Professor Cole who felt that Cardiff's rail provision was reasonable, however, additional capacity needed to be added.

- Council officers identified the current transport issues, challenges and barriers facing Cardiff as congestion; through traffic; poor bus priority; a lack of cycling lanes; pedestrian safety issues; poor air quality; links with Cardiff Bay and a dated transport system.

- There have been some good strides in terms of developing Park & Ride in Cardiff in recent years, for example, Cardiff East Park & Ride, Cardiff City Park & Ride and the Junction 33 Park & Ride scheme now has planning permission. It is estimated that the Junction 33 site will have between 1200 and 1500 spaces. In addition to this there is some discussion around creating a new Park & Ride scheme in the Vale of Glamorgan which could access the city via the Cardiff Bay Barrage. Work is ongoing on identifying a suitable Park & Ride site for the A470 – sites at Nant Garw and Taff's Well have been suggested. An A470 scheme would need to be supported by bus priority measures (bus lanes) along the A470 into Cardiff.

- A comment was made that services from the Cardiff East Park & Ride into Cardiff City Centre were not direct enough, i.e. they stop at every junction on Newport Road and the journey takes approximately 30 minutes. It was felt that for the service to succeed (and act as a good alternative to the car) it needed to be convenient, quick and direct. The Park & Ride

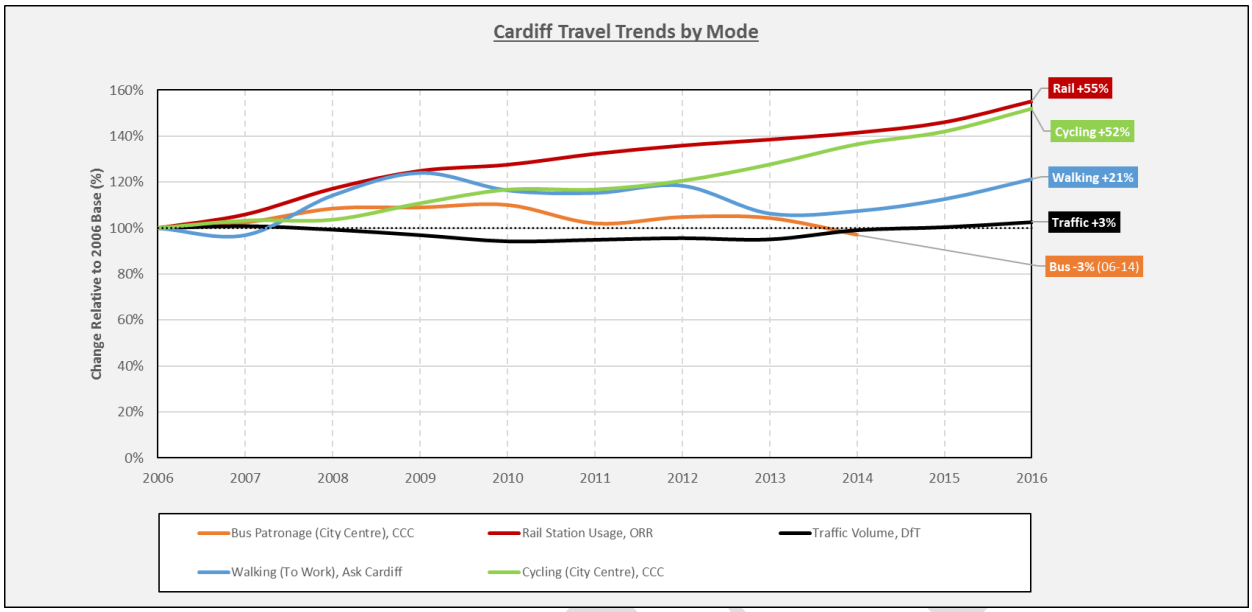
contract for this site is due for renewal soon and with the large scale housing developments being built in that section of the city it could be possible to get new subsidies to support the upgrade of the bus routes, for example, through planning obligations associated to the development.

- It was explained that there was still a lot of work to do but that the Council has taken some important steps forward in recent years. The results of these include a 28% increase in cycling; the implementation of new measures on key transport strategic corridors and a 26% reduction in daily through traffic in the city centre between 2004 and 2014.

- An officer felt that enforcement was a 'big stick' to get things moving, but that ultimately better infrastructure provides the required reliability. Public transport services need to be quick, reliable and convenient.

- **Diagram 7** sets out the percentage change relative to Cardiff travel trends by mode set against a baseline figure of 2006. During the 10 year period of this chart rail travel and cycling increased by 55% and 52% respectively. Walking increased by 21% while overall traffic levels only increased by 3%. The only negative result was that bus patronage fell by 3% across the 10-year period. A comment was made that the closure of the bus station had contributed to the reduction of bus patronage – Cardiff badly needs a good functioning bus station / transport hub to help reverse the current bus patronage trend, i.e. getting a new bus station / transport hub has to be a priority.

**Diagram 7 – Percentage Change for Cardiff Travel Trends 2006 to 2016**




- During the presentation officers provided the following 'Headline Statistics' to set out the current picture of travelling into and around Cardiff on a typical day in 2016:

  - 107,800 vehicles entered and exited the city centre during a typical twelve hour period during 2016;
  - There were 55,300 city centre bus passengers (on a two-way journey) across a twelve hour period in 2014;
  - Each year the city centre attracts a footfall of approximately 40 million people in the pedestrianised retail area;
  - It is estimated that Cardiff's population will grow by 23% between 2016 and 2039;
  - In 2016 39% of Cardiff's workforce travel into the city from outside the local authority area;
  - Approximately 5,300 cyclists passed through the city centre during a typical twelve hour working day in 2016.

- A Member asked what the Council is doing to better manage residential parking. He felt that by using good planning and other parking mechanisms it was possible to drive behavioural change which in turn

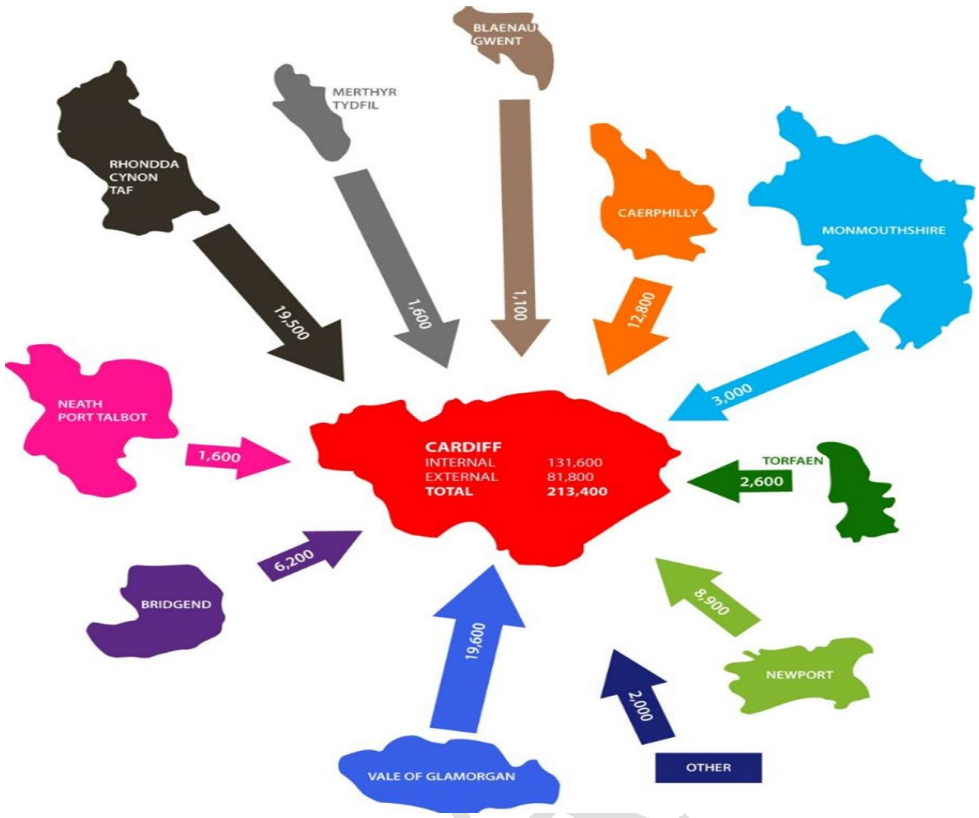
would reduce congestion and air quality issues. Examples of where this might work well would include increasing residential parking to 75% limits and the continued roll out of 20 mph zones. An officer felt that this approach was working and that public parking capacity was slowly being squeezed out from the city centre through a mixture of policy and enforcement. A Council officer emphasised that more could be done to drive behaviour change by increased working with neighbouring local authorities.

- **Diagram 8** illustrates the commuter journeys into and out of the Cardiff local authority area during a typical twelve-hour working day in 2016. The data identifies that a total of 78,900 journeys were made into Cardiff each day (Vale of Glamorgan 19,600; Newport 8,900; Torfaen 2,600; Monmouthshire 3,000; Caerphilly 12,800; Blaenau Gwent 1,100; Merthyr Tydfil 1,600; Rhondda Cynon Taf 19,500; Neath / Port Talbot 1,600; Bridgend 6,200 and other 2,000). This is in addition to the 131,600 internal journeys.

- It was felt that Cardiff is now a 24/7 society and Cardiff Bus needs to think more proactively about the night time economy and how it services demand in this area. A Council officer explained that there is a plan to create a park & ride facility with a bus gate at Junction onto the A4232 and a rapid bus route into the city.

- Swansea City Council has created a Park & Ride facility next to the Amazon Fulfilment Centre on Fabian Way. It directs bus journeys into the city centre and uses a bus light activator to clear sections of the route so that buses can run to time, this has proved to be an efficient approach and has made services more reliable.

**Diagram 8 – Cardiff Local Authority Commuter Journeys 2016**




- The importance of using a common ticket on the new Metro system was stressed, i.e. a ticket that can be used across different companies and modes of transport (for example, bus and train).

- Places like the Netherlands franchise out bus and train routes, when in the United Kingdom journeys are commercially driven operations. In effect Wales runs a market driven approach where bus operators are able to develop their own core operation.

- A Member was of the view that Park & Ride will only ultimately work when it becomes very difficult to park in Cardiff City Centre.

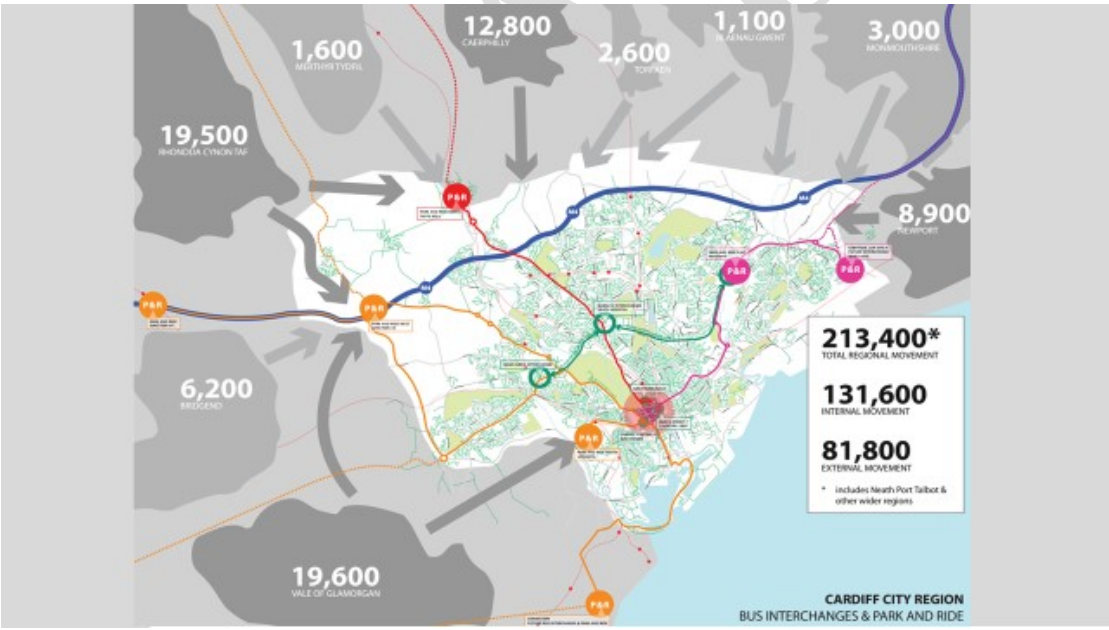
- A Council officer stated the importance of developing every radial route around the city.

- A comment was made that competition on bus routes could be a good thing with companies successfully creating a series of new routes. Some operators are currently looking at developing cross city movements. Such thinking and healthy competition is good for the development of transport options in the city.

- It was explained that if we could get bus patronage to where it was 10 years ago we would quickly move to the 50:50 modal split position. The biggest issue that we have in Cardiff is the transport funding deficit.

- **Diagram 9** illustrates the current and proposed Park & Ride facilities relevant to the daily internal commuter journeys into Cardiff. It also identifies the potential future bus interchanges planned for the city.

**Diagram 9 - Current / Proposed Park & Ride Facilities Relevant to the Daily Internal Commuter Journeys**




- The Council transport presentation reiterated that:

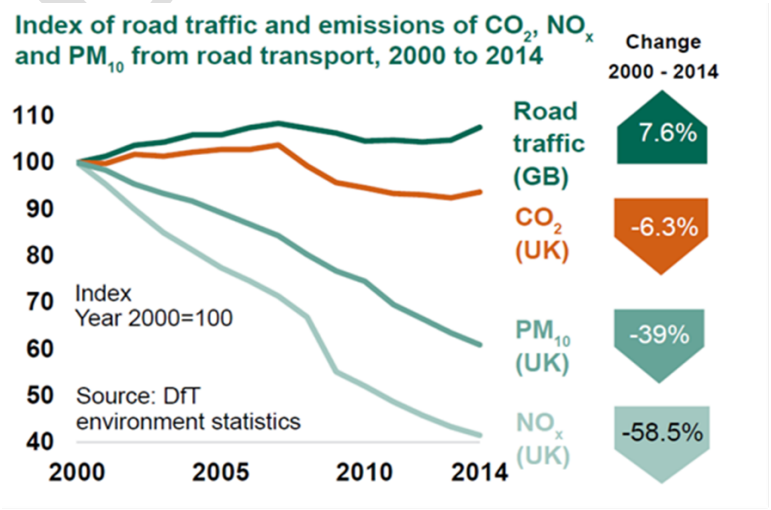
  - Road traffic emissions, in particular particulate matter and nitrogen dioxide, are the primary contributing factor to poor air quality in Cardiff;
  - Emerging scientific evidence shows air pollution exposure reduces life expectancy by increasing mortality and morbidity risk from heart

disease, and strokes, respiratory diseases, lung cancer and other conditions;

- Public Health Wales state: "…local-level health risks and impacts will vary considerably, not only influenced by differential air pollution exposures but also by individual and population-level susceptibilities. These factors may be 'intrinsic' (e.g. age, sex, genetics) and/or 'acquired' (e.g. income, education, housing, employment, service access, lifestyle/behaviour-related chronic illnesses). The triple jeopardy of air pollution, impaired health and social deprivation is said to compound problems by creating disproportionate and amplified disease burdens between and within regions."

- The presentation provided evidence from the Department for Transport that illustrated that emissions had fallen in recent years, however, for particulate air pollution and nitrogen dioxide there is no safe level of exposure. Any initiatives to reduce air pollution will have positive health benefits. **Diagram 10** illustrates the index of road traffic and emissions of carbon dioxide, nitrogen dioxide and particulate matter from road transport for the period 2004 to 2014. This illustrates that nitrogen dioxide and particulate matter have reduced significantly (58.5% and 39% respectively), while carbon dioxide emissions have only fallen by 6.3%. During the same period road traffic increased by 7.6%.

**Diagram 10 - Index of Road Traffic and Emissions from Road Transport for the Period 2004 to 2014**



- Officers explained that Cardiff's Local Transport Plan was approved by the Welsh Government in May 2015. Cardiff's Local Transport Plan sets out its main transport infrastructure proposals which will support this significant modal shift and recognises the need to improve air quality. Its programme prioritises:

    - The development of active travel networks to increase walking and cycling for local journeys;
    - The provision of cycling infrastructure;
    - The bus network;
    - Reduced speed limits;
    - Reducing congestion;
    - Improving transport efficiency and reliability;
    - Bus based park and ride.

- The presentation detailed a list of measures submitted to DEFRA for the United Kingdom Air Quality Plan for tackling roadside nitrogen dioxide concentrations in the Cardiff urban area (July 2017). These are taken from key plans and strategies, including the Local Development Plan, Local Transport Plan and the Cycling Strategy. These were summarised in the presentation.

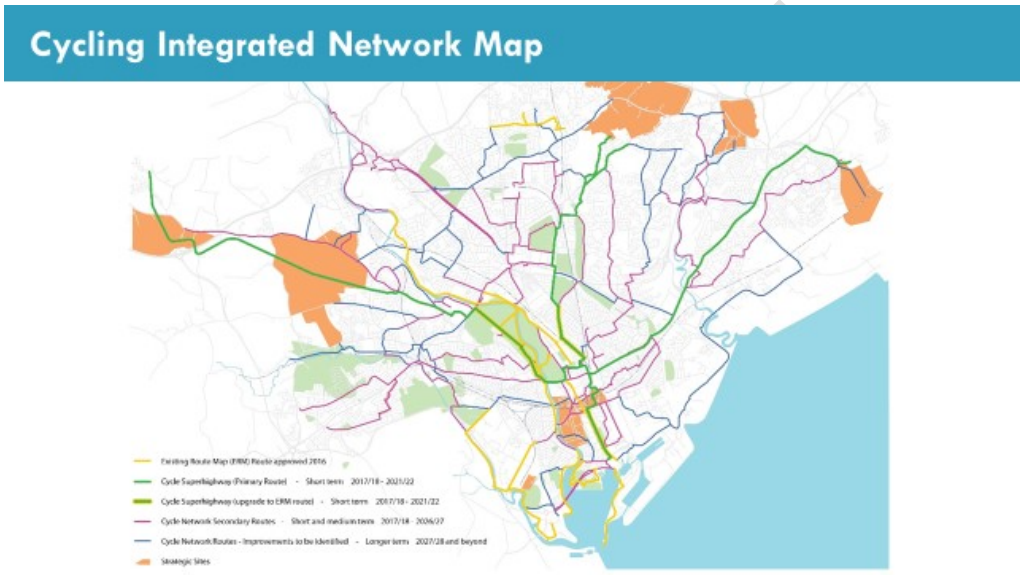
- **Cycling Strategy & Integrated Network Map** – This is an ambitious vision to double the number of cycling trips by 2026, from a 9.2% modal share in 2015 to 18.4% in 2026. It includes:

    - The development of a comprehensive network of cycling infrastructure which is suitable for use by people of all ages and abilities;
    - Working with key partners from employers, retail and schools to ensure that appropriate cycling facilities are provided at destinations and to promote cycling;
    - The development of the Integrated Network Map which is a requirement of the Active Travel (Wales) Act 2013. This document plans and prioritises infrastructure improvements for walking and cycling;

- Proposals for two new cycle superhighways which will provide high quality cycle routes, segregated from pedestrians and motor vehicles on busy roads, connecting residential and employment sites.

- **Diagram 11** (below) sets out the plan for the Cycling Integrated Network Map for Cardiff

**Diagram 11 – Cycling Integrated Network Map**




- The presentation explained that Cardiff City Centre attracts hundreds of thousands of commuters and visitors each day from across the Cardiff City Region and further afield. Traffic flows on main routes to and through the city centre generate peak time congestion which causes delays to bus services and can make the area less attractive for pedestrians and cyclists. Increasing sustainable travel to and through the city centre are crucial to achieving improvements in air quality.

- Bus travel has an important role to play in reducing the number of journeys made by car. Developing bus priority measures on strategic bus corridors is essential in reducing bus journey times, improving journey time reliability and making bus travel a more attractive alternative to the car for a greater range of journeys. 400m of bus lane can give each bus a time advantage of five minutes or more over general traffic on the approach to junctions

and improve the ability of bus drivers to meet timetables (Cardiff 2014 Regional Bus Lane surveys). Lanes have been installed on a number of main roads into the city including the A470, A4119 and A48.

- While all contributions to the inquiry agreed that growing the existing cycle infrastructure was important it was stressed that creating good quality modern cycle lanes was very expensive, i.e. they cost £1 million per kilometre to build.

- A report was published in 2016 which stated Wales would need to spend £60 million per annum each year for the next 10 years to match the standard and relative scale of cycle lanes in the Netherlands. As previously stated developing a comprehensive cycle network is not a cheap option, achieving cycle lane parity with countries like the Netherlands would require huge central government subsidies and many years to deliver.

- A Councillor noted that we were a long way behind countries like the Netherlands and asked why this was the case? He was told that it was because they started working on the infrastructure in the 1970's and in relative terms we are at the start of our journey. The Dutch started to invest in cycling infrastructure in the 1970's because they had a very high cycling death rate for young children.

**City Centre Transport Improvement Projects**

- Cardiff City Centre attracts hundreds of thousands of commuters and visitors each day from across the Cardiff City Region and further afield. Traffic flows on the main routes to and through the city centre generate peak time congestion which causes delays to bus services and can make the area less attractive for pedestrians and cyclists. Increasing sustainable travel to and through the city centre will be crucial to achieving improvements in air quality. Key measures will focus on sustainable transport improvements that will encourage mode shift and contribute to improving air quality levels.

- Trains in the Netherlands are half the price of the United Kingdom thanks to the rail subsidy – this is funded by central government.

- The Council presentation delivered to the task & finish exercise set out a number of priorities for bus travel in Cardiff, these included:

    - Developing a new bus interchange as part of the major redevelopment of Central Square;
    - Working with bus operators to identify and develop an expanded city bus network, including new cross-city and local routes;
    - Work with operators to increase the number of buses where bicycles can be taken on board, to encourage mixed active travel to be used as part of longer journeys;
    - Developing new bus park and ride facilities at M4 Junction 33 and other appropriate locations in Cardiff and neighbouring areas to reduce the number of cars driving into the city;
    - Making bus services faster and more reliable by providing bus priority measures on strategic bus corridors to help reduce bus journey times, improve journey time reliability and make bus travel a more attractive alternative to the car for a greater range of journeys;
    - Investigating opportunities for the development of a green technologies bus fleet.

- **Greener Bus Fleets** - Cardiff Council and Cardiff Bus have submitted an application to UK Government for £1.5million funding to retrofit buses within the Cardiff Bus fleet to reduce their emissions to Euro 6 compliance. The Council will continue to work with Cardiff Bus and other regional bus operators to continue making improvements in the composition of the bus fleets operating on the Cardiff road network. They will explore the use of greener bus types, such as hybrids, full electric and hydrogen. There has been discussion with Welsh Government officers around making new monies available for the development of greener bus fleets.

- It was suggested that the flow of bus lanes wasn't great and needed to be smoother to avoid causing a traffic backlog. Key routes need to have continuous bus lanes like the ones coming in from the Cardiff East Park & Ride.

- A Member stated that bus patronage across the United Kingdom was down and asked how we could reverse this trend? A suggestion to address this issue was the introduction an integrated ticket approach, something similar to the Oyster Card in London. To achieve this in Wales a regional approach would be needed and a network of transport partners would need to take a part in the initiative.

- A Cardiff Capital Region Metro has been proposed by the Welsh Government. It is expected to be a combination of rail-based and bus-based rapid transit routes linked through interchanges and using the same network brand and integrated ticketing system.

- 6% of journeys to work by Cardiff residents are made by rail. Passenger numbers across the city and the wider region have grown significantly in recent years. The Council works closely with key partners, including Welsh Government, rail operators and Network Rail, towards improving and developing the rail network. The new Wales and Borders rail franchise should deliver new rolling stock, increased capacity and frequencies to the meet rising demand and allow for further modal shift to rail based journeys.

- It is hoped that cutting congestion by reducing the number of journeys made by car will bring air quality improvements as well as reducing costs and journey times for individuals and businesses. It also makes journeys made by sustainable and active modes of travel easier, for example, by making bus journey times more reliable and providing a more attractive environment for walking and cycling. By managing Cardiff's highway network more effectively, the Council hopes to make the best use of the existing highway in a way which promotes access by sustainable modes of travel.

- A 20 miles per hour limit was piloted in Cathays /Plasnewydd in March 2014. This was deemed successful and a wider future rollout of 20mph limits is underway in residential streets in areas around the city centre. The consensus is that lower speed limits in residential areas can:

    - Improve air quality in terms of particulate matter exposure;
    - Improve the liveability of the city by reducing car use for local trips;
    - Make it easier to cross roads and access local facilities – especially for children and the elderly;
    - Help to improve the environment for walking and cycling resulting in greater levels of physical activity;
    - The installation of 20 mph limits will complement the ongoing programme of school safety zones through Safe Routes to School and Safe Routes in Communities. These improvements at the local level support active and sustainable travel;
    - Air quality around schools, as well as the impact of driver behaviour and inconsiderate parking on schools and their local communities, are matters of concern. The Council (and other key stakeholders) all have a role to play in tackling these issues.

- Electric Vehicle Infrastructure & Car Clubs – The presentation identified that electric vehicle infrastructure and car clubs had a role to play in improving Cardiff's air quality. In particular it made the following points about this evolving technology:

    - It moves toward a shift from traditional fossil fuels for motorised transport to more sustainable forms of clean, renewable energy;
    - The United Kingdom government has a commitment to ending sales of new petrol and diesel cars from 2040;
    - The transition is largely private sector led through vehicle manufacturing markets, however, there is also a clear role for the Council in facilitating, championing and preparing for this transition;

- The Council is running a feasibility study which will review best practice, the market and funding streams which will inform a decision on the best option for the city;
- Use of more environmentally friendly modes of transport including Low Emission Vehicles will be supported through provision of electric vehicle charging and the rollout of additional car club vehicles;
- A pilot electric vehicle charging system is expected to be launched in Cardiff during 2017/2018;
- Car clubs offer a flexible alternative to car ownership and can play an important role in an integrated transport network;
- Car club provision in Cardiff is set to grow in the short term, helping to reduce the number of journeys made by car and giving access to new, low emission vehicles.

- During the session it was explained that the Council fleet needed to be continually upgraded to ensure that we have clean / low emitting vehicles. This responsibility should also be embraced by the other public sector partners (for example, Health Service, Police, Universities, etc…) and other major employers in the city.

**Part 2 - A Review of Cardiff's Current Air Quality** - Stuart Cole, Professor of Transport at the University of South Wales provided a view on the transport initiatives being proposed and delivered by the Council. In particular, he commented on how the proposals could contribute towards key policy objectives such as modal shift and sustainable travel.

**Key Findings**

- Professor Cole agreed with all of the objectives set out in the Cardiff Council Transport Presentation, but emphasised that the important area to focus on now was delivery, for example, the it was important that the Council focused on the delivery of the new integrated transport hub.

- It was again explained that the major cause of urban pollution was the motor car – this was consistent with what all other witnesses had said. There is a specific problem at peak periods of the day or during major events.

- We need more bus lanes on strategic bus routes into and out of the city. These are needed to support a prompt reliable service which is ultimately what the public want. The key bus priority characteristics that will influence modal shift are reduced journey times and reliability of journey time.

- Bikes on buses are a good intention but are almost impossible to achieve. Lots of time was spent some time on Trans Cymru trying to achieve this, and it has been attempted on three occasions in England. Only the Nottingham service has partially worked as the approach causes delays on loading and unloading; the drivers and trade unions are not keen on the idea and there is a lack of space on the bus.

- The task group was warned that the amount of investment that was being proposed for the Metro was probably only sufficient for train line upgrade at the moment, however, the rail upgrade would result in the electrification

of heavy rail and this would quickly increase capacity. The introduction of trams was considered to be a practical option for densely populated areas of the city that have no rail service, for example, Ely, Heath; Caerphilly road; Newport road and parts of Cardiff Bay.

- To be successful we have to follow examples of places like the Netherlands and we have to create separate spaces for travel modes, for example, walking, cycling, bus / tram and motor vehicles.

- Professor Cole suggested that public transport access to Cardiff Airport needed to be improved if Cardiff is serious about its ambitions to be a major event city.

- Different parts of Wales have differing transport challenges, for example, urban areas are prone to congested roads, while accessibility is an issue in rural areas.

- The Welsh Assembly has brought many business to Cardiff making it an attractive city to live and work in – this success brings increased transport considerations with it which we have to address.

- There is plenty of private parking in the city centre and in recent years several very large car parks have been built. How do you deal with a large car park company?

- Previously the phrase 'predict and provide' has been used to describe what needs to be done to address transport issues. We are now at the stage where this needs to change to 'provide and promote', i.e. we don't need to predict as we understand the issues.

- Little details are important, for example, Cardiff Bus doesn't give change. All other providers do. Cardiff Bus insists on the correct fare, no one else does this.

- Having a single travel card which can be purchased by one transaction is important to improve public transport in Cardiff and the South East Wales

Region. A card that could be used across several different transport providers to cover the whole journey – it would make things easier and push large volumes of people onto our public transport systems. Something similar to the Oyster Card.

- Park & ride works well if done properly. The trick here is to ensure that there are always buses on hand and that services are punctual. For example, the Park & Ride scheme in Oxford has been a success as they have made sure that there is always a bus waiting at the facility at peak periods. When drivers arrive at the Park & Ride site they are greeted with a bus waiting to take them to their destination – this makes them content and more likely to use the facility in future. They also run to time and are supported by good bus lanes. Cardiff has started introducing bus lanes on strategic routes – more of this needs to happen.

- The key Swansea bus routes use a transponder to trigger lights on key routes – this speeds up journeys. An example of this can be seen on Fabien Way between the new University campus and the city centre.

- Transport for London takes parking in bus lanes very seriously. Cameras are placed on the front of buses and the details of any vehicles blocking these lanes are recorded and a fine is immediately issued. This has had a dramatic effect on driver behaviour change. Average journey times have come down, services are reliable and the cost is the same or less than the corresponding car journey.

- Trans Cymru offer free travel access across Wales. Average patronage on these services is about 70% and these are mostly leisure journeys.

- The number of over 60's that have moved to public transport in Wales has increased by between 40% and 50%. This is mainly due to the fact that they have free bus travel.

- Train journeys in Wales are 52% cheaper in Wales than in other parts of the United Kingdom.

- The importance of creating interchanges that are able to attract people from more outlying areas was stressed.

- Cardiff's Integrated Transport Interchange – Cardiff very badly needs this to be completed. Why is it so late? This has cost the city in terms of growing the use of public transport.

- Initially when the old bus station was closed the Council issued maps to help people find their way around. These were invaluable, particularly for people visiting the city. Why aren't these issued any more? Could the Council reprint and start giving these away again. It is important to get better transport information to public transport (and potential) users. A Member stated that the Council tends to distribute information well at the start of a scheme, however, this then drops away after a while and our communication becomes poor.

- The task group were told that £12 million was a fairly accurate cost for an average size station – they need a large land development to support them which tends to increase costs.

- Cycle parking – to ensure that cycling take up improves we need to put in place lots of cycle parking facilities. In Copenhagen every hotel hires bikes and has bike parking facilities.

- It was felt that it is important to establish safe routes to stations – this could be paid for out of parts of the City Deal bid. Important to ensure that routes are safe to encourage people to use them.

- Once again there was more support for a single ticket option for the Cardiff and wider South East Wales transport network. The information collected from the use of a single ticket approach can be used to collect huge amounts of data for travel planning.

- Professor Cole explained that Utrecht and Cardiff are similar in size. Utrecht has 16 train platforms while Cardiff has eight. He stated that we need more platforms than we currently have.

## ‘Improving Cardiff’s Air Quality’ - Meeting 4 – Transportation (2) - Tuesday 21st November 2017 – 4:00pm to 7:00pm

**Air Pollution & Cardiff’s Bus Services –** A round table discussion with Cardiff based bus services and associated stakeholders to consider the impact that bus services have upon Cardiff’s air quality. This discussion included, but was not limited to the current level of emissions produced by bus services in Cardiff; the state of Cardiff’s current bus fleet; current and proposed work to improve / upgrade Cardiff’s bus fleet; the impact that a clean air zone could potentially have on Cardiff’s bus services.



**Key Findings**

- It is important that bus companies put forward a business plan about the positive contribution that they make towards reducing congestion and taking cars off the road. The bus providers emphasised that it is difficult for them to upgrade vehicles voluntarily and at a speed required as the financial assistance isn’t available. Introducing new vehicles needs to be supported by a benefit to the business. This could involve fitted telematics, safer fuel initiatives as well as replacing vehicles.

- The bus providers explained that to just replace all older vehicles simply isn’t viable. The Green Bus Fund which operates in England is currently in its 7th tranche, however, despite lobbying there is no equivalent fund in Wales.

- Cardiff Bus has applied for OLAF funding, but to date this has not been successful – the fund has been oversubscribed by over five times.

- A witness suggested that society is hung up on stopping people from coming in by bus and that the car is king. He added that we do need to look at far more financial assistance but we need to tackle day to day sustainable transport issues first. We need to make buses look more

attractive, we need to make it unpopular for people to use the car. A full bus can take 75 cars off the road.

- A witness explained that using a bus to get into Cardiff City Centre was a huge challenge if you were a wheelchair user. She also added that there are over 3,000 parking spaces in Cardiff City Centre, this number needs to be reduced – the parking spaces on Westgate Street are a particular problem. Other witnesses agreed with this and reiterated the importance of taking some of the car parks out of Cardiff City Centre.

- A witness explained that she lived in London and did not own a car; however, through a car club she had access to a car. She explained that the shift needed to be sustainable and reflect the needs for modern living.

- A witness explained that London has the infrastructure to support such an urban shift while many other parts of the United Kingdom did not. Improving route reliability is key – if journeys are quick and reliable then customers will make the shift.

- A bus provider representative explained that lots of funding has been taken out of bus services. The funding model has changed, buses now run as a business and are driven by the volume of where people actually want to go.

- A witness explained that making the bus services more popular would probably mean having to increase the prices of car parking and the potential introduction of a congestion charging zone.

- A witness stated that the quality of buses is increasing rapidly in Wales with £140 million being invested into new buses since 2010.

- It was explained that the cost to convert a Euro 5 bus into a Euro 6 was typically between £10,000 to £15,000 per conversion.

- It was suggested by a bus service representative that the creation of a clean air zone in Cardiff would result in the delivery of fewer bus services.

- A witness explained that the subsidy on rail in Wales is £6 per journey, while bus services only receive £1 per journey.

- A bus service representative suggested that Wales needed a policy to support a good fleet replacement cycle, i.e. ensuring that bus companies always buy the latest and best. This would go a long way towards reducing emissions. Such a policy would also need to be supported by a package of financial assistance.

- It was explained that other things being equal Cardiff Bus is potentially able to replace ten old vehicles with new ones every year. A subsidy is needed to increase the percentage of fleet running on new technology.

- A witness asked if Cardiff Council could help with funding as the Welsh Government had decided against a green bus fund in Wales. He suggested that DEFRA had made funding available in England - £30 million has already been allocated to local authorities and a further £100 million is available for new investment. Denbighshire was awarded some funding for electric buses in 2017 from the government's 'Low emission bus scheme'. Electric buses typically cost 2.5 times the cost of regular petrol or diesel buses.

- In the last financial year London received £1.1 billion for investment in bus services, while the rest of England received a further £2 billion. Wales received £92 million (split into amounts of £67 million and £25 million). In bus investment terms Wales is the poor relation.

**Air Pollution & Cardiff's Taxi Services –** A round table discussion with Cardiff based taxi services and associated stakeholders to consider the impact that taxi services have upon Cardiff's air quality. This discussion included, but was not be limited to the current level of emissions produced by taxi services in Cardiff; the state of Cardiff's current taxi fleet; current and proposed work to improve / upgrade Cardiff's taxi fleet; the impact that a clean air zone could potentially have on Cardiff's taxi services.

**Key Findings**

- An Uber representative explained that there are pressing and important challenges facing areas in the United Kingdom in terms of air quality. Cardiff is one city that has been identified on the list where action needs to happen. Council's are having to implement clean air zones – this is a trend that we are seeing across the country. Uber has made the following clean air pledge:

    - *By the end of 2019 every car available on uberX in London will be 100% hybrid or fully electric with no diesel vehicles on the app;*

    - *They are starting in London but aim to meet the same standard (100% hybrid or fully electric cars on uberX with no diesels on the app) across the UK by the end of 2022;*

    - *More than half the miles on uberX journeys in London are already in hybrid or fully electric cars, but we want to go much further with a goal for every vehicle using the app in London to be electric in 2025;*

    - *They are also launching a diesel scrappage scheme aimed at removing 1,000 of the most polluting cars from London's roads. The first 1,000 people in London to scrap a pre-Euro 4 diesel vehicle and provide an official scrappage certificate will receive up to £1,500 of credit to spend on Uber or uberPOOL rides as they encourage Londoners to get into a shared car to connect with public transport. Londoners can register*

*their interest here and will be able to apply through the scheme from October 2017.*

**Setting up a Clean Air Fund**

- *In order to achieve these ambitious goals Uber will create a dedicated Clean Air Fund to allow licensed drivers who use their app across the UK to access up to £5,000 towards the cost of upgrading their car to a hybrid or fully electric vehicle.*

- *Over the life of the fund, it is expected that drivers will claim more than £150m to help transition to a greener car. Uber is currently in discussions with potential third-party administrators of the fund.*

- *Uber kickstarted the fund in October 2017with a £2m investment. 35p will be added to every ride taken through the app in London – every penny of which will be donated to the dedicated and ring-fenced fund. An amount will also be added to rides in other UK cities over the next year.*

- *uberPOOL trips will be excluded from the 35p addition as passengers are already opting to share their journey with someone else heading the same way. In London more than 400,000 people regularly use uberPOOL to travel from A to B.*

- *Uber-branded rapid chargers have also be installed in central London which will initially be dedicated for use by drivers of electric vehicles who use the Uber app.*

- 65% of miles driven on the Uber app are on petrol or LV. The biggest challenge facing most United Kingdom cities to address the air quality issue is putting new infrastructure in place, for example, public charging points. Uber ran a trial in one United Kingdom city with 50 Nissan Leaf cars and 90% of the drivers identified the biggest challenge as not having enough off-street parking where they could charge the vehicles.

- Uber is chasing OLAF funding for its fleet in major cities across the UK, for example, Glasgow and Edinburgh are keen to drive this agenda forward – such schemes make vehicles cheap to buy or rent, i.e. the new technology is viable with grants.

- Infrastructure – taxi firms are really looking for support and certainty to drive forward with the purchase of low emission vehicles. The ideas and technology are available, they just need help in rolling these out.

- It was stressed that in order to increase the uptake of new low emission vehicles a carrot and stick approach would need to be taken. You need a grant to make the vehicles financially viable as they are very expensive at the moment.

- Making loans available to purchase new sustainable vehicles has to be affordable. The changes need to be phased in for the new drivers – buying hybrid vehicles isn't currently an option in the second hand market so all purchases would need to be new.

- A taxi firm representative explained that there is an issue in Cardiff around the use of the 'Prestige List' (also known as the 'Exceptional Conditions Policy'). It is not fit for purpose as many drivers are claiming that older vehicles are 'prestige vehicles'. The very wide definition of a 'prestige vehicle' means that it is difficult to reject an older vehicle from the list. This means that older vehicles can still taxi on the back of this list – these tend to be higher polluting vehicles which potentially have an impact on Cardiff's air quality.

- To improve the quality of the taxi fleet in Cardiff local standards need to be introduced that force drivers to make a change. Once they understand the direction of travel then they will have to invest in greener and less polluting vehicles. This can only be achieved once the results of the Welsh Government consultation into taxi services is published.

- A witness explained that there are 2,200 licenced taxis in Cardiff, 406 of these are over 10 years old. The policy around the prestige list (Exceptional Conditions Policy) needs to be revisited and updated. Setting new emissions standards would be a good way of lifting the quality of the fleet. The powers for changing taxi legislation in Wales has recently been devolved to the Welsh Government. They are currently undertaking a consultation into the current taxi regulations in Wales and are due to provide feedback at some point in 2018. All Welsh local authorities have contributed to this consultation exercise by completing and submitting a consultation response – these will all be considered before announcing any changes.

- A taxi service representative explained that the Welsh Government consultation into taxi standards in Wales has been a breath of fresh air. It is much needed as the industry needs a clean-up. Moving forward as an industry everything has to focus on efficiency. Financial considerations is the main driver for most taxi drivers and the majority of taxis in Cardiff are owned by owner drivers.

- A Member asked if the taxi companies would help in raising awareness with drivers on a range of key issues such as air pollution. He was told by a taxi company representative that taxi companies could be great drivers for this information and that they would be happy to do this, particularly if the Council got a grip of the current regulations.

- One taxi company representative explained that they were aware of the changes and that when they replace existing vehicles they are ensuring that they are replaced with low emission fleet. Another taxi company representative explained that running low emission disabled access vehicles wasn't currently viable.

- A Council officer explained that the Council's response to the Welsh Government taxi consultation made that point about disabled access vehicles and raised a number of other issues. He felt that a now would be

a good time to review the wider taxi licensing conditions and that this could include disabled access vehicles.

- A taxi company representative explained that government funding needed to be put in place to encourage taxi drivers to switch to low emission vehicles. Support has been provided for taxi upgrades in other parts of the United Kingdon, for example, Birmingham and Scotland. Easy access to refuelling infrastructure also needs to be put in place.

- A witness explained that the taxi industry has successfully evolved many times over the years – these proposed changes will be no different and the industry will adapt to any new proposals.

- A taxi firm representative explained that taxi companies are now able to provide hydrogen kits to its drivers that are Arriva approved for the cost of £500 including installation. These are proven to significantly reduce emissions.

- A comment was made about one taxi company who when renewing their fleet generally replaced older vehicles with the new Toyota Avensis. It was explained that staying technology neutral is important when taking vehicle investment decisions. There needs to be at least a consistent Euro 4/6 standard for taxis applied across Wales. This will really help and will be supported by natural vehicle changeover.

- A Member stated that it is important to open up the debate between bus and taxi companies about the issue of taxis blocking bus lanes. The bus companies are complaining that taxis are regularly blocking lanes and slowing down services. He wanted to know if the message around blocking bus lanes was being clearly communicated to taxi drivers.

- Some of the representatives from the taxi companies were aware of there being an issue around Greyfriars Road in Cardiff, i.e. a bus lane was regularly being used as a drop off point. In response a comment was made that there is a need for a rank or drop off point in this part of the city.

It was explained that there are approximately 1,100 Hackney licences in Cardiff and only 70 rank parking spaces. The issue for many taxi drivers is where are they able to park?

- A Council officer explained that the Council's Moving Traffic Offences Service were asked if any Fixed Penalty Notices had been issued against taxi drivers for parking in bus lanes, however, none had. They stated that the Council is able to revisit this issue, however, it needs evidence to support taking any action. It was suggested that no Fixed Penalty Notices had been issued because Moving Traffic Offences are not specifically looking for the problem. A taxi company representative suggested that if this was an issue then it was something that Council needs to review using its Civil Parking Enforcement and Moving Traffic Offences teams.

- A taxi firm representative stated that the benefits for all taxi drivers being able to use bus lanes – he felt that the decision to allow them to use the bus lanes was a positive thing and felt that a harder approach needed to be taken against individuals who regularly broke the rules around 'banking'.

**Part 3 Society of Motor Manufacturers –** Sukky Choongh - Campbell from the Society of Motor Manufacturers attended the meeting to brief the task group on the view of the Society of Motor Manufacturers on managing air pollution.

**Key Findings**

- The Society of Motor Manufacturers & Traders presentation started by setting out the scale of the United Kingdom automotive sector for the start and end of the period 2006 to 2016, the data was as follows:

    - Turnover - £50.4 billion in 2006; £77.5 billion in 2016.
    - Value Added - £9.5 billion 2006; £22 billion 2016.
    - Vehicles Exported – 1,242,312 in 2006; 1,354,216 in 2016.
    - Vehicles Manufactured Annually – 1,649,789 in 2006; 1,816,622 in 2016.
    - Jobs in Automotive – 851,000 in 2006; 814,000 in 2016.
    - Jobs in Manufacturing – 205,000 in 2006; 169,000 in 2016.
    - Engines Manufactured – 1,442,085 in 2006; 2,545,608 in 2016.
    - New Cars Registered – 2.34 million in 2006; 2.69 million in 2016.

- National Air Quality Plan – the presentation outlined the government's ambitions as:

    - End the sale of conventional diesel and petrol vehicles by 2040;
    - Clean Air Zones – original five cities to develop plans, plus an additional 29 local authorities to produce new plans (March and December 2018);
    - Funding - £255 million Implementation Fund and new Clean Air Fund which would cover mitigating actions;
    - Consultation to be launched in Autumn 2017 on mitigation measures (retrofit, discounts, car clubs, subsidised public transport and scrappage);

- New labelling and consumer information requirements to be developed.

- The presentation touched on the proposals for a diesel related United Kingdom scrappage scheme - the consultation for the diesel scrappage scheme was due to be launched in the autumn of 2017. It was anticipated that the aim of the scrappage scheme would be to target support at those that are most likely to be impacted by measures to improve air quality. The government has stated that they are open to ideas from stakeholders through the consultation on how some of the challenges to implementing a scheme could be overcome.

- The presentation touched on 'Clean Air Zones' and explained that the Government will take forward as previously announced plans to introduce Clean Air Zones. Clean Air Zones will be mandated in five United Kingdom cities (Birmingham, Leeds, Nottingham, Derby and Southampton) with a 2019 implementation timeline envisaged. A further 29 local authorities have been identified as requiring to take action due to persistent exceedances of the annual mean objective limit for nitrogen dioxide. Secondary legislation requiring these authorities to implement a Clean Air Zone is still to be passed. Emission standards for Clean Air Zones remain as previously planned with cars/vans at Euro 6 (diesel) and Euro 4 (petrol) and HGVs/buses at Euro VI. Vehicles which meet these minimum emission standards will be able to enter or move within the zone free of charge. Fully electric or hydrogen fuel cell ULEVs will also be able to enter or move within zones free of charge. Government has stated that charging zones should only be used where local authorities fail to identify equally effective alternatives, i.e. as a last resort.

- Clean Air Zone plans will only be approved by government if local authorities can demonstrate that:

    - It is likely to cause nitrogen dioxide levels in the area to reach legal compliance within the shortest time possible;

- The effects and impacts on local residents and businesses have been assessed, including on disadvantaged groups, and there are no unintended consequences; and
- Proposals that request Central Government funding support demonstrate value for money.

- **Client Earth –** The Presentation explained that the recent Client Earth legal action against the United Kingdom Government had succeeded, however, it had not mandated the following:

  - The five local authorities referenced in the case have not been mandated to introduce clean air zones;

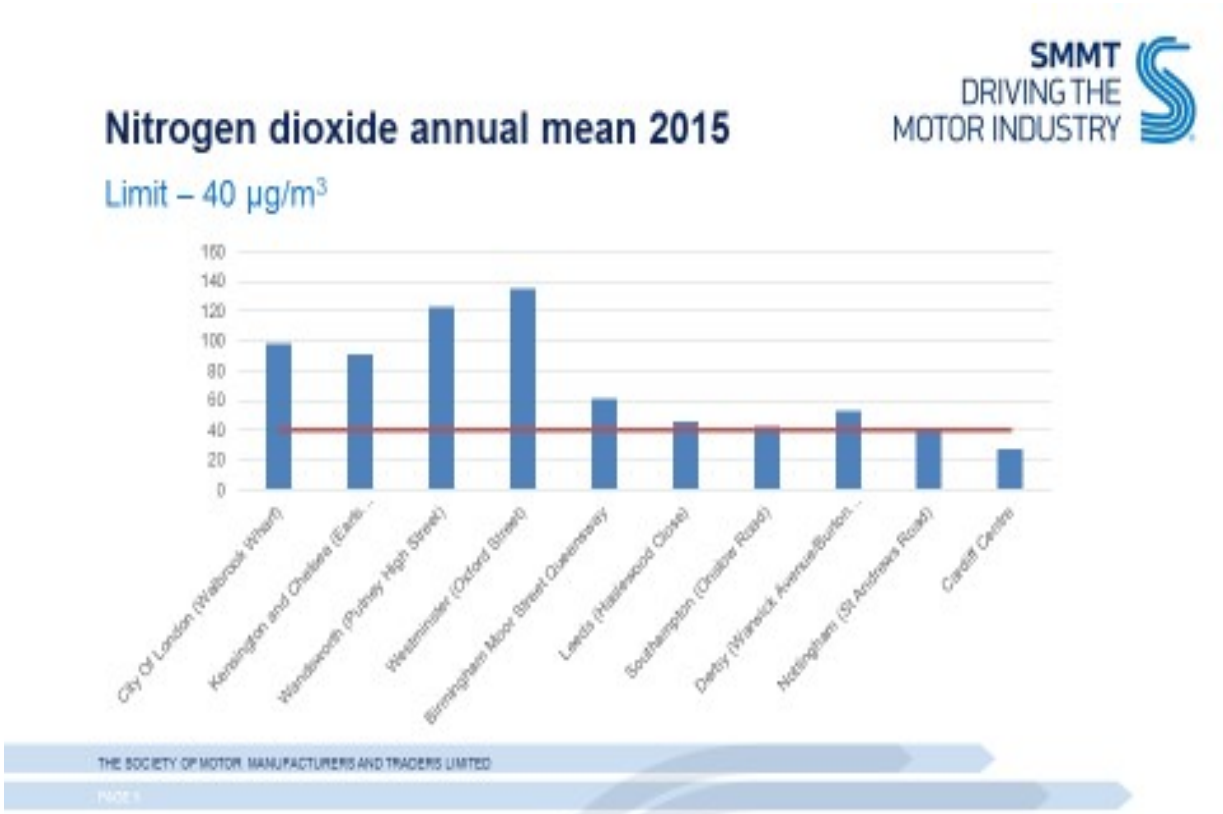
  - 45 local authorities exceeding the nitrogen dioxide limit are not required to do anything;

  - No action is required in Wales.

- It is anticipated these might be addressed in the third Client Earth legal action due to take place against the United Kingdom Government in 2018.

- The presentation included **Diagram 12** that set out the nitrogen dioxide annual mean for 2015 for a number of areas in London and compared these against the annual mean in Cardiff City Centre. It is clear from the data that Cardiff City Centre is by far the lowest of the sites identified and the only one under the nitrogen dioxide limit. Westminster (Oxford Street) was the highest at 135 – almost four times higher than the Cardiff value. It should be noted at this point that the Cardiff City Centre value was taken from the 24 hour City Centre ambient background tracking site in Frederick Street which is in a pedestrianised area. The London values are based on roadside recordings that are adjacent to the public highway.

**Diagram 12 – Nitrogen Dioxide Annual Mean 2015**




- The presentation identified the four types of electric and ultra low emission vehicles currently available in the United Kingdom, these were:

  - **Battery Electric Vehicles (BEVs)** - A battery electric vehicle is a type of electric vehicle (EV) that uses chemical energy stored in rechargeable battery packs. BEVs use electric motors and motor controllers instead of internal combustion engines for propulsion. They derive all power from battery packs and thus have no internal combustion engine, fuel cell, or fuel tank. BEVs include motorcycles, bicycles, scooters, skateboards, rail cars, watercraft, forklifts, buses, trucks and cars.

  - **Extended – Range Electric Vehicles (E-REVs)** – AN E-REV, or Extended-Range Electric Vehicle, offers all of the benefits of a plug-in hybrid, but with the promise of even greater efficiency. Think of an E-REV as an electric car, but with a generator on board to stop the batteries from getting flat. The idea is that you can recharge an E-

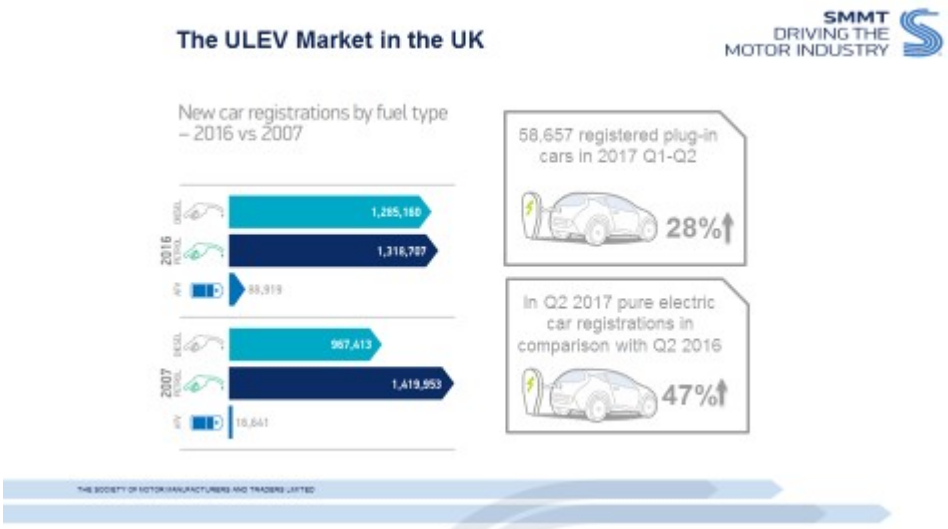
REV's batteries from a socket at home or work, and hopefully the car's range will be sufficient for most journeys. But if it isn't, the petrol engine just kicks in and works as a generator, keeping the battery at a minimum charge level until the next mains charge can top it up.

- **Fuel Cell Electric Vehicles (FCEVs)** – A fuel cell electric vehicle (FCEV) is a type of electric vehicle which uses a fuel cell, instead of a battery, or in combination with a battery or supercapacitor, to power its on-board electric motor. Fuel cells in vehicles generate electricity to power the motor, generally using oxygen from the air and compressed hydrogen.

- **Plug-in Hybrid Electric Vehicles (PHEVs)** - A plug-in hybrid electric vehicle (PHEV) is a hybrid electric vehicle that uses rechargeable batteries, or another energy storage device, that can be recharged by plugging it in to an external source of electric power as well as an on-board internal combustion engine and generator.

- **Diagram 13** was included in the presentation and sets out the new car registration for diesel, petrol and AFV in the years 2007 and 2016. It is clear to see that there has been a significant increase in AFV's since 2017. 58,657 plug in cars were registered in quarter 1 – 2 of 2017 which represents a 28% increase. In quarter 2 2017 pure electric car registrations were up by 47% when compared against Quarter 2 2016.

**Diagram 13 – Changes in the United Kingdom ULEV Market**




- It is estimated that 15% of vehicles in the United Kingdom will be electric by 2021.

- The presentation then considered the experiences of other cities in developing a clean air strategy and reducing air pollution, the areas covered were:

  - **Manchester** – The planning for the approach to be taken has been delivered in Manchester by Transport for Greater Manchester as six of the local authorities required to deal with the clean air issue are within the Greater Manchester area (Manchester, Rochdale, Stockport, Trafford, Bury, Oldham, Salford, Tameside and Wigan). It is being driven by the Mayor for Manchester Andy Burnham who has publically stated that publically that he will not charge drivers to use the road. Planned initiatives include an electric bus trial with Volvo; a 'Go Ultra Low' event with Europcar; they are very keen to increase the number of ULEVs in the city and they are looking to showcase an event next summer around the National Clean Air Day. Manchester has an established tram system - which helps.

  - **Leeds** – Leeds launched an **i**nformal public consultation on Clean Air Zones in November 2017. The critical issue in Leeds is that the non-

compliant areas currently have 75% through traffic, i.e. the bulk of the problem isn't caused by local resident traffic. To help deal with this improvement works for traffic flow are being planned which should be completed in 2022. The main local bus operator has committed to only use Euro VI diesel by 2020. They are also in the process of accessing funding to help convert local taxis and are looking to secure a site for an alternative re-fuelling station. They are looking to work with local dealerships to help increase educational awareness on Clean Air Zone requirements and to help promote the uptake on ULEVs. Leeds was one of the first five cities in the England to be given £1 million for taxi improvements.

- During this part of the meeting it was suggested that one national bus company was passing older buses across to Cardiff / Wales because certain English cities have now increased emission standards.

- **Derby** – In Derby the main areas of exceedance are caused by the M1 corridor. As with most other exceedance areas, cars are the greatest source of emissions. Derby has undertaken research into census data to identify the residents most likely to upgrade their vehicles. They have also used the planning and development process to install electric vehicle charging points. Derby has a non-retrofit policy and are looking to arrange an event to promote Ultra Low Electric Vehicles in the city. The Leader of the council is an ex-taxi driver and has been reluctant to do anything that will charge drivers or adversely affect the economy in anyway. They are very keen to work with dealerships to promote the benefits of electric vehicles and the potential impact of a clean air zone. They are keen to access the JAQU funding which is potentially able to provide each clean air zone authority £1m for electric Hackney carriage taxis.

- **Nottingham** – They are in the early stages of writing their plan. The main area on non-compliance is the inner ring road with the private vehicles contributing to 83% of the emissions. DEFRA has advised they should implement a Class D Clean Air Zones by 1st January

2020. Additional measures include the implementation of trams, biogas vehicles and electric buses. They are looking to convert to a 100% electric taxis fleet by 2025. They have a workplace parking levy in place. This has raised £44 million since its introduction and currently generates a £9 million income each year for investment into Nottingham's transport infrastructure.

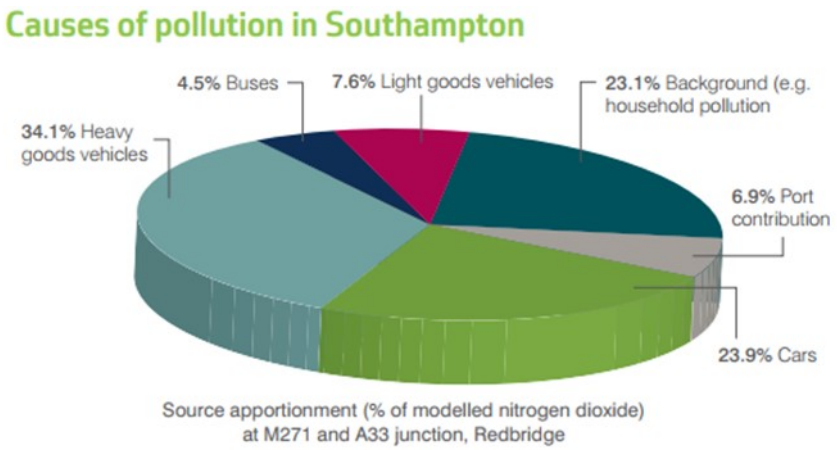
- **Bristol** – They are looking to implement the most stringent Clean Air Zone to deter cars from entering the city centre. The first Clean Air Zone feasibility study was deferred due to Client Earth contact, there is a need for a new AQAP and they need to deliver a completed Clean Air Zone feasibility study. It estimated that 60% of vehicles drive into the city from outside Bristol. They are looking to achieve the 'Go Ultra Low' (GUL) city status, and plan to install a large number of EVCPs. They have the ambition of upgrading the entire taxi fleet to electric vehicles. In doing this they are applying for help with upgrading their taxi and bus fleets.

- **Bath** – The city is trying to introduce a number a freight interventions, and to this end DHL are supporting this initiative by trying to acquire an alternative to the Smith electric truck. Source apportionment shows diesel to be the greatest contributor to air pollution, and the most polluted place is a strategic road with high volume of freight. They have recently added a combined natural gas re-fuelling station to the list of potential options for implementation. They are looking to introduce electric taxis into the fleet. Bath is keen to become a test area for connected & autonomous vehicles (CAV's). Bath also considers it important to spread the message of sustainable vehicles by working with dealerships, i.e. they ultimately sell cars and so it is probably a good idea to develop their sales pitch to support sustainable fuel vehicles.

- **Southampton** – Southampton has a large port which makes a large contribution to air pollution. The PCM model doesn't recognise other AQMAs. They have an Enterprise car club which is reluctant to move to

ULEVs. Southampton would like their taxi fleet to become EVs. **Diagram 14** sets out the main pollution sources in Southampton, this shows that the port contributes to 6.9% of the pollution, with heavy goods vehicles accounting for the single largest pollution contribution at 34.1%.

**Diagram 14 – Causes of Pollution in Southampton**




- Due to exceptionally high air pollutions caused by NO2 emissions a 'Clean Bus Corridor' has been introduced on Putney High Street. This now means that only vehicles achieving Euro 6 standards or higher can access the route. As can be seen on the **Diagram 15** this has significantly reduced nitrogen dioxide concentrations.

**Diagram 15 – Air Quality – Putney High Street**

- The Society of Motor Vehicle Manufacturers representative made a number of suggestions on the next steps for Cardiff's Clean Air Strategy, these included:

    - Encouraging the uptake of Ultra Low Electric Vehicles;
    - Develop a recharging infrastructure for electric vehicles in Cardiff;
    - Bus fleet upgrade;
    - Taxi fleet upgrade;
    - ULEV incentives, for example, parking, bus lane use;
    - Procurement – build the use of using vehicles that use sustainable fuels into the procurement process to ensure that the Council and public bodies convert as well the key parts of the supply chain;
    - Planning and Development – use active planning and development to encourage sustainable travel;
    - Encourage and expand car clubs;
    - Promote car sharing across the local authority and with its partners;
    - Introduce the 'Mobility as a Service' (MaaS) concept into Cardiff – i.e. this combines options from different transport providers into a single mobile service, removing the hassle of planning and one-off payments;
    - Freight – develop schemes to divert heavy goods vehicle transport out of key areas of the city;
    - Communications – clearly communicate the message of what is happening and more importantly why it is happening;
    - Lead by example – take control of the situation, deliver the required changes and other bodies and individuals will follow your example.

- It was suggested that the Council should work with a commercial partner to introduce electric charging points into public spaces. They are experienced in delivering this type of infrastructure whilst most local authorities aren't.

## ‘Improving Cardiff’s Air Quality’ Meeting 5 – Planning, Development & Other Pollution Sources - Thursday 23rd November 2017 – 11:30am to 2:45pm

**Part 1 - Planning & Development -** Councillor Caro Wild, Cabinet Member for Strategic Planning & Transport and officers from the City Operations Directorate were invited to attend the meeting to discuss the role that planning & development has on Cardiff’s air quality.

**Key Findings**

- An officer stated that the Planning Service has numerous interfaces with air quality issues, and that they work closely with the Air & Noise Team within Shared Regulatory Services.

- Cardiff’s Local Development Plan has been adopted and sets out Cardiff’s growth plan until 2026. The site planning includes future transport infrastructure which will have a large impact on air quality in the city. One of the fundamental aspects of the plan is to maintain or improve air quality in the city.

- The Planning Service is going through the long task of developing new supplementary planning guidance and is able to create additional guidance to support the planning process where a specific need is identified. New supplementary planning guidance has recently been published on green infrastructure, managing transport infrastructure. These were presented to Council in November 2017.

- Cardiff deals with the largest number of planning applications in Wales – it also deals with the most complicated by type. The Air Quality Team within Shared Regulatory Services are regularly contracted to act as a technical consultee for these planning applications.

- A Member felt that dealing with air quality issues was sometimes a tick box exercise. A Planning Officer disagreed saying that today it was a far more regulated and highly technical process than had previously been the case.

- A Member stressed the importance to consider the wider (further afield) knock on effects of air quality issues caused by new developments, for example, building a new housing estate could cause air pollution issues at a road junction several miles away. In response it was explained that larger developments now have to be supported by an Environmental Impact Assessment. Such documents now look at the impacts caused over a much wider area.

- A Member explained that objections were put in for a specific Cardiff site over wider traffic problems. There was no new road to support the work required and the planning department was not minded to ask the developer for a new one. He felt that for such large sites we should be telling the developer that one is required, not asking or having the debate.

- It was explained that thorough assessments are undertaken and considered for all sites. The process involves deciding if a development should proceed based on a balance of factors, not just one or two. A development can proceed within parameters of acceptable harm. The task of the Planning Service is to challenge and then debate on the background of professional advice.

- A Member commented that large new sites created large levels of traffic during the construction phase and that this should be factored into the planning decision. A Planning Officer replied by saying that the bigger the site the more traffic, etc…. This is addressed through the master planning process, for example, sites are designed with more internal trips to keep traffic / travel within the site; there is significant investment in public transport. Lots of thought is applied in getting under the skin and detail of the development.

- It was stated that the Planning Service had offered good collaboration and support to the development of the Clean Air Strategy.

- A Member agreed that the process of internalising developments was important and that it needed to work to cope with the scale of growth in the city and wider city region. A Planning Service Officer explained that good planning is not just about onsite provision, it should also focus on offsite contributions, for example, transport infrastructure.

- Planning obligation contributions have been large in Cardiff in recent years, for example, one site has attracted a planning obligation payment of £250 million.

- Trigger points should be applied to certain traffic levels, for example, if traffic increases in certain points then developers would become liable. Ensuring that good transport planning is put in place is crucial.

- A Member explained that a bus gate was put in place at a Cardiff site without there being any discussion with the bus companies. No one actually understood if there would be sufficient demand to make the route viable. Without financial support no bus company would take on the route.

- The strongest tool that the Council can use to ensure that developments deliver the required infrastructure is planning obligation. It is important to be as strict as possible when applying this. Front loading of planning obligations is also important when developing transport infrastructure – this provides an option to get bus subsidies in from the start.
- A Member asked if we have supplementary planning guidance that relates to electric cars and supporting provision. She was told that technology is changing really quickly, for example, things seem to change on an annual basis. This means that the relevant supplementary planning guidance will need to be reviewed each year.

- A Member asked if the Council should take the risk of keeping up with technology. It was explained that policy integration is a huge issue and

striking a sensible balance in this area is very challenging. The Wellbeing of Future Generations means that the Council is now obliged to evidence that the planning process satisfies such need.

- National Planning Policy Wales is updated every year to ensure that it follows the needs of the Wellbeing of Future Generations Act. The Council follows and updates its policies to ensure compliance with the Act.

**Part 2 - Dr Clare Beattie - Associate Director at Air Quality Consultants Ltd –** Dr Clare Beattie was invited to attend the meeting to comment on the important characteristics of a clean air strategy and discuss the opportunities and challenges that exist for the Council as it develops 'Cardiff's Clean Air Strategy'.

**Key Findings**

- Local Air Quality Management should be delivered through a systematic review of air quality against health based air quality 'Objectives' and that where necessary 'Air Quality Management Areas' would be required. Action Plans required where objectives are not met.

- EU Requirements - Welsh Ministers are responsible for meeting 'Limit Values' in Wales and failure in this area could result in potential fines for non compliance. Such assessments are undertaken on a different basis to LAQM (national modelling – PCM (Pollution Climate Mapping Model)).

- As explained by previous witnesses it was stated that nitrogen dioxide is the dominant pollution issue in Wales and that limit levels are set at a constant level of 40 mg.

- The presentation explained that the Welsh Government has recently produced the Well-being of Future Generations (Wales) Act 2015 - air quality clearly has an impact of well-being. Poor air quality impacts on health in Wales and so it needs to be addressed to comply with such legislation. The Welsh Government has recently introduced an average population exposure to nitrogen dioxide national indicator which Cardiff has to report on and comply with. By July 2018 consultation on Clean Air Zone Framework for Wales will need to be assessed in relation to whether other measures could achieve compliance more quickly. Welsh Government will need to work with Cardiff Council (and any other LAs) on this consultation and all other Welsh local authorities.

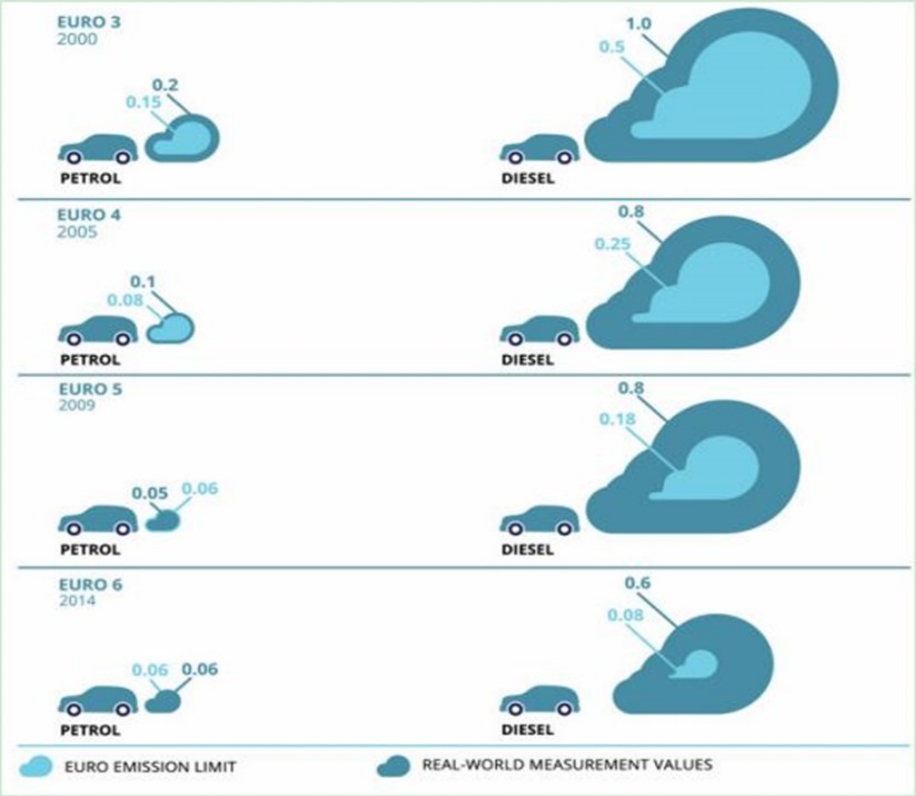
- Other Relevant Issues – Dr Beattie commented on a number of other relevant issues around air quality, these included:

    - That objectives and limit values are measured as an annual mean;
    - Several parts of Cardiff with Air Quality Management Areas are impacted on the 'Street Canyon' affect. Tall buildings create a canyon effect and hold the pollution in a confined area preventing dispersion;
    - Complex chemistry of nitrogen dioxide;
    - Drop off in concentrations away from road for nitrogen dioxide and other forms of pollution are quite rapid;
    - Congestion increases emissions - stop/start driving significantly increases the level of vehicle emissions;
    - HGVs/ Buses – these produce greater emissions per vehicle;
    - Gradients will increase emissions – although Cardiff is fairly flat which is a positive for air pollution levels in the city;
    - Real world emissions – especially diesel.

- **Real World Emissions** – **Diagram 16** provides a comparison of emissions of nitrogen dioxide for different car Euro standards, by emission limit and real – world performance. It is clear from the diagram that nitrogen dioxide emissions are significantly higher for diesel than petrol for each of the four Euro categories, and that actual emissions from vehicles when driven in a real world environment (and not under laboratory conditions as used for the Euro limit standards) are significantly higher than the prescribed Euro standard values. The diagram illustrates that in terms of nitrogen dioxide emissions, diesel engines present a far more significant threat to health than their petrol equivalent.

**Diagram 16 - Comparison of emissions of Nitrogen Dioxide for different car Euro standards (diesel & petrol), by emission limit and real world performance**

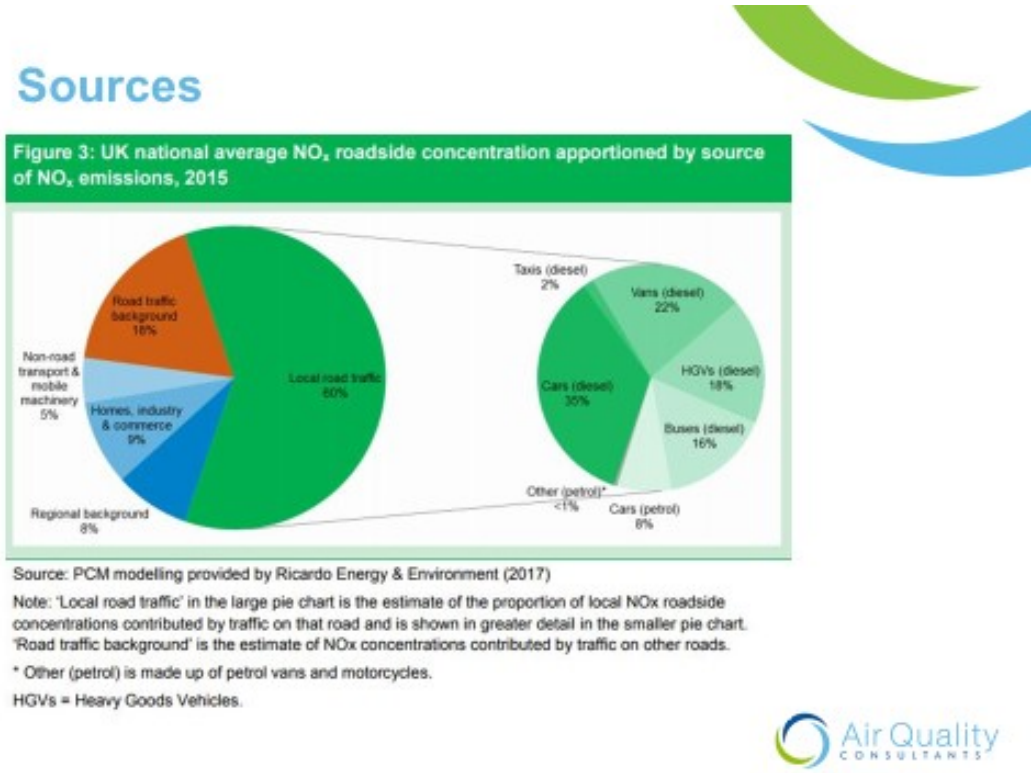
**Figure 6: Comparison of emissions of NOx for different car Euro standards, by emission limit and real-world performance (grams/kilometre)**




Source: Adapted from a report by the European Environment Agency[25].

- **Diagram 17** sets out the United kingdom national average nitrogen dioxide roadside concentration apportioned by source of nitrogen dioxide emissions 2015. The diagram illustrates that 60% of nitrogen dioxide is generated by local road traffic – from this 60%, 93% is generated from diesel vehicles (cars (diesel) 35%; Taxis (diesel) 2%; Vans (diesel) 22%; HGV's (diesel) 18%; Buses (diesel) 16%). This means that as a United Kingdom average in 2015 55.8% of all nitrogen dioxide emissions was generated by diesel vehicles.

**Diagram 17 - United kingdom national average NOx roadside concentration apportioned by source of NOx emissions 2015**




- The presentation touched on the Client Earth High Court cases to date and the impact that this has had on dealing with air pollution in the United Kingdom. In particular the presentation made reference to:

  - The Client Earth High Court cases relate to the Defra National Air Quality Plan, which ClientEarth considered had only taken 'minimum steps' to achieve the EU Limit Value.
  - In November 2016 the High Court concluded that modelling of when the Limit Value will be met was based on overly optimistic vehicle emission factors in future years. It also identified that the Defra National Air Quality Plan was not sufficiently ambitious to meet the Limit Values by the 'soonest date possible'.
  - In November 2017 a further legal action against the Government was announced. This also included taking the Welsh Government to court for failing to meet their obligations in Wales.

- **Clean Air Zone Feasibility Work** – it was explained that most of the local authorities who have a requirement to consider implementing a clean air zone are at an early stage of the process, i.e. are involved in the planning or are actually undertaking a feasibility study. DEFRA has set out prescriptive reporting requirements for English local authorities with 2020 Limit Value exceedances. JAQU (Joint Air Quality Unit – Defra and DfT) is providing considerable financial support to English local authorities in planning for and implementing clean air zones. It was felt that Wales needed to utilise this existing experience and that the resource allocation for Wales for carrying out this work was still unclear.

- The presentation made some suggestion on how to go about creating a Clean Air Strategy in Cardiff, in doing so she explained that:

    - It would need a 'Steering Group' of relevant Council officers and other key stakeholders – this should include the Welsh Government;
    - Extensive traffic and air quality modelling would be required to identify the scale of the problem in the city;
    - A list of options would need to be identified for dealing with the issue, this should include a range of Clean Air Zone scenarios (size of area? the type of vehicles to include?);
    - It would be important to engage political involvement at the earliest possible opportunity.

- It was suggested that a Clean Air Strategy for Cardiff should include:

    - A detailed evaluation of options impacting on air pollution in Cardiff and not just air quality;
    - A detailed business case setting out the option(s) chosen for the Clean Air Strategy and why these had been selected;
    - Prioritisation of measures – i.e. those that need to delivered first to achieve the Limit Values as quickly as possible;
    - Consideration of consultation/ engagement with the public and other key stakeholders;
    - An 'Implementation Plan' for the Clean Air Strategy';

- A defined monitoring approach to ensure that the chosen initiatives are being properly implemented;
- Key elements / wider measures worth building into the Clean Air Strategy should include ‘Smarter Travel’, ‘Low Emission Vehicles and Infrastructure’, ‘Traffic Management’, ‘Planning Frameworks’ and ‘Communication’.

- The challenges facing the Council in developing the Clean Air Strategy were highlighted as:

  - A Clean Air Strategy will need to cover the identified Air Quality Objectives and deal with addressing the EU Limit Value requirements;
  - Working through the lengthy processes of feasibility work, gaining approval and public / political acceptability;
  - The funding position in Wales is still unclear for developing a Clean Air Strategy and dealing with the implications of potentially introducing a Clean Air Zone;
  - Many aspects of the work that needs to be delivered is outside of local authority control;
  - Brexit and all of the uncertainty that this presents.

- The opportunities presented to the Council in developing the Clean Air Strategy were identified as improved health; a more agreeable city centre environment; the development of a collaborative approach for dealing with the issue.

**Part 3 - Natural Resources Wales – Air Quality Monitoring –** An air quality officer from Natural Resources Wales was invited to attend the meeting to explain the role that the organisation has in monitoring and compliance around air quality in Cardiff and across Wales.

**Key Findings**

- The Natural Resources Wales role can be broadly categorised as adviser, regulator and evidence gatherer/provider. Within this remit they have a number of duties including:

    - They ensure that the industrial facilities comply with EU requirements on Wales and the United Kingdom (for example, Air Quality Directives, Habitats Directive, the National Emissions Ceiling Directive and the Industrial Emissions Directive, Domestic and UK requirements such as the Environmental Permitting Regulations, the Air Quality Standards (Wales) Regulations, the UK Air Quality Strategy and the Countryside and Rights of Way Act and the Well-being of Future Generations (Wales) Act).

    - They support local authorities in improving local air quality, including the provision of ambient air quality modelling, advice and guidance.

    - They coordinate ambient air quality monitoring for incidents that can have an impact on air quality.

    - They provide air quality modelling, analysis, guidance and advice services to support permitting, conservation and compliance activities.

    - They are not generally responsible for monitoring or assessing ambient air quality.

    - They are the advisor to the Welsh Government - air quality is a devolved matter, and the Welsh Government is responsible for their

own air quality policy and legislation. The UK government leads on international and European legislation.

  - Natural Resources Wales is the principal environmental advisor to the Welsh Government. They support the Welsh Government in its duty to achieve air quality limit and target values set in European Directives and domestic regulations. They also support its duty to minimise the harmful effect of air pollution on human health and the environment. They provide the Welsh Government with advice, guidance and evidence.

- Natural Resources Wales is committed to working with local authorities and playing its part in Local Air Quality Management. They continue to agree improvements with local authorities for the installations they regulate that contribute significantly to breaches of an Air Quality Strategy objective.

- Natural Resources Wales provides local authorities with information that identifies the current releases from industrial installation(s); any assessments on the effect of the releases from the installation on local air quality; any plans already in place that will deliver future improvements for local air quality; any equipment or operational changes that could deliver improvements for local air quality.

- The monitoring and compliance arrangements in place to measure air quality includes:

  - **Stack monitoring** - Large combustion plant (LCP) and waste incineration plant (covered by WID/IED) are required to take stack monitoring. For example,  permit at Viridor requires continuous monitoring (CEMS) for Oxides of Nitrogen (NO and NO2 expressed as NO2), Particulate Matter TOC, HCl, SO2, CO. Such data has to be provided every hour or half hour.

- **Ambient monitoring** - When it is necessary, installations will be asked to carry out stack or ambient air quality monitoring as a permit condition or compliance check.

- **Diagrams 18** & **19** set out the sites that Natural Resources Wales routinely monitors for air quality standards in Cardiff and the wider South Wales Region. An officer from Natural Resources Wales explained that Cardiff in particular did not contain a high concentration of industrial facilities that needed constant monitoring and that there were no recent examples of emissions breaches in the city.

**Diagram 18 – Cardiff Permit Sites Monitored by Natural Resources Wales**

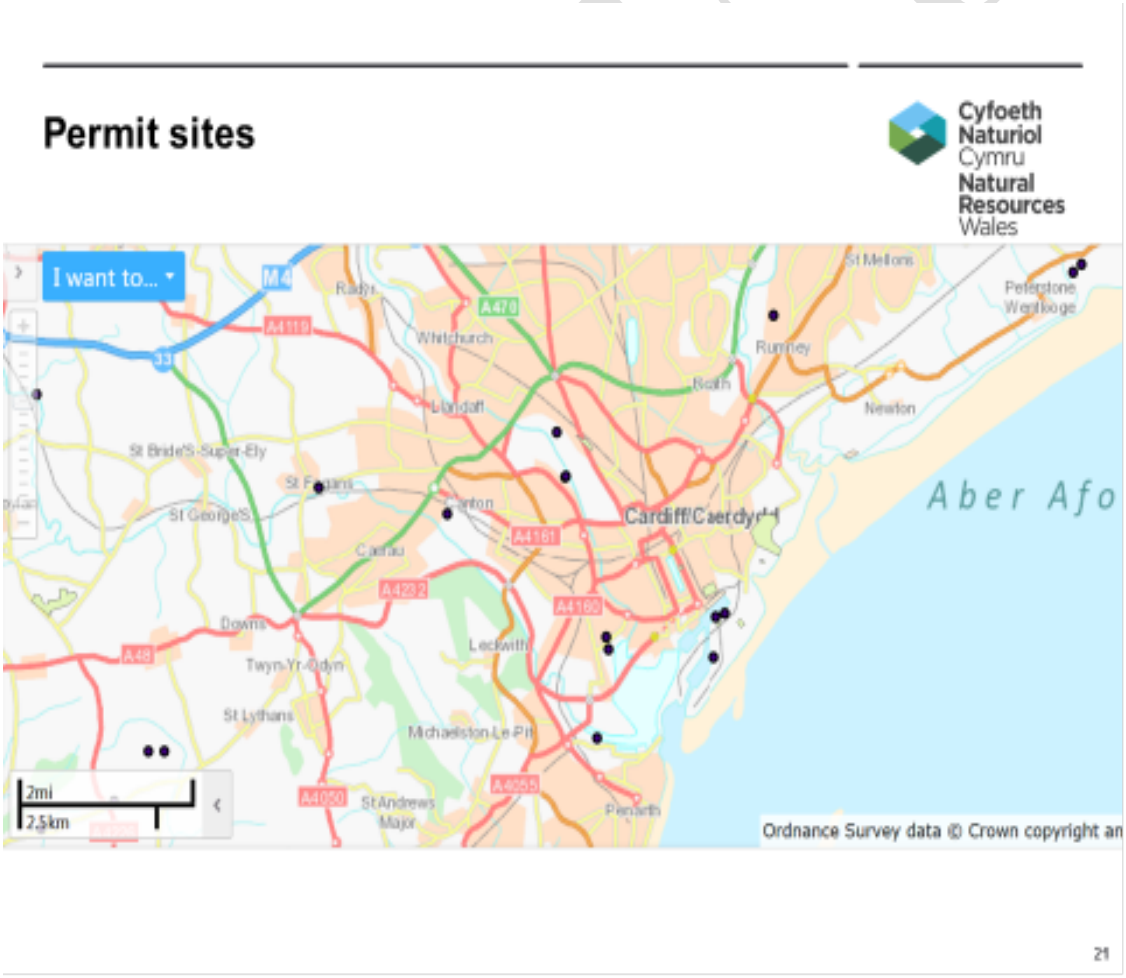
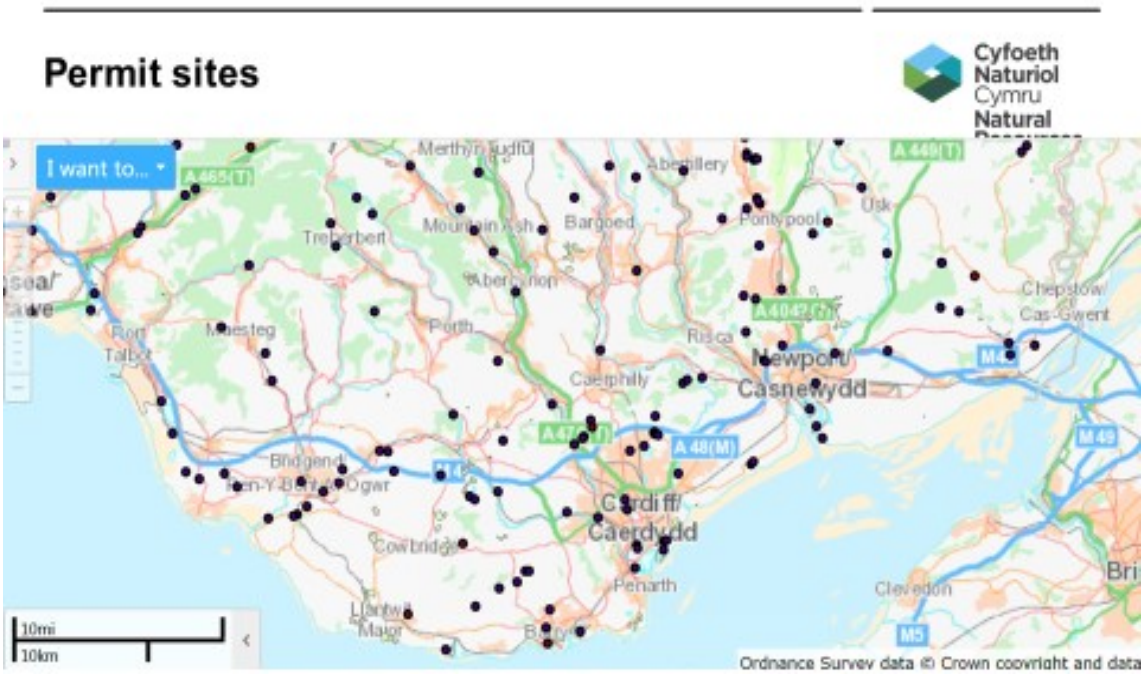


**Diagram 19 – South Wales Permit Sites Monitored by Natural Resources Wales**

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- Natural Resources Wales has the following enforcement powers at its disposal, the main one that they use is the Environmental Permitting (England and Wales) Regulations 2016.

## ‘Improving Cardiff’s Air Quality’ - Meeting 6 – Sustainable Fuel for Vehicles - Wednesday 6th December 2017

**Part 1 - Council Approach to Sustainable Fuel for Vehicles -** Councillor Michael Michael, Cabinet Member for Clean Streets, Recycling & Environment and officers from the City Operations Directorate / Economic Development Directorate were invited to attend the meeting to discuss the work that the Council is doing to support the delivery of sustainable vehicle fuel within the Council and across Cardiff as a whole.

**Key Findings**

- The presentation set out why the Council needs to act in terms of developing low emission transport in Cardiff. It addressed six key points including:

    - **Poor Air Quality** – this contributes to 40,000 premature deaths per year in the United Kingdom. Cardiff is in breach of EU limit values, with diesel fuel related emissions being the largest contributor to Cardiff’s problem.

    - **Carbon Reduction** – There are national and city wide targets for carbon reduction across the United Kingdom. Transport accounts for 24% of emissions nationally. The Welsh Government is pushing for a carbon neutral public sector by 2030.

    - **Cost** - Fossil fuels are an ever increasing cost to the Council and citizens. Fuelling the Council fleet cost £1.5m in 2016/17.

    - **Demand/Supply Standoff** - Market confidence needs to grow in low emission transport. High consumer cost and an uncertainty/slow emerging supplier market slows down potential growth. Strategic leadership and “intelligent customer” actions needed are needed to

help push things forward. This underlines the Council role as an “early adopter” and strategic player.

- **Cardiff’s Competitive Position** – It was explained that Cardiff should have a strong competitive position in pushing forward low emission transport, for example, it presents a ‘World Class City Offer’; it is a city at the forefront of technology and it is a city that facilitates a cleaner smarter quality of life.

- The Cabinet Member stressed the importance of taking a lead in this area, i.e. upgrade the standards within our fleet and to act as an enabler for things like public electric charging infrastructure. He also commented on the potential benefits of dealing waste on a South Wales Regional basis, for example, he felt at the time that it would be great to have a waste collection vehicle that ran on sustainable fuel (electric or hydrogen), however, there didn’t appear to be an appropriate vehicle in the market to meet this ambition. As a consequence he felt that a waste collection vehicle using sustainable fuel would not feature in the next procurement exercise, but hoped it would happen in the one after that.

- Background studies have been commissioned to help understand the Council’s role, opportunity and key points of impact in terms of developing and supporting sustainable fuel infrastructure.

- A Member explained that £4 million had just been made available for electric charging infrastructure in Wales. An officer explained that he was off to a meeting the following day to discuss the potential implication for Cardiff from this fund.

- Members commented and agreed that it was essential to build sustainable fuel vehicle options into future procurement strategy. The Cabinet agreed with this and felt that it should now be easier to do this as all fleet procurement is delivered through Central Transport Services.

- £50,000 in the 2017/18 budget was allocated to fund a study into how Cardiff supports and delivers electric charging infrastructure in the city.

- The Cabinet Member explained that as a general rule of thumb hydrogen currently works better for larger vehicles and electric is more efficient for smaller vehicles. An officer then explained that there is strong hydrogen expertise in South Wales, for example, at the Baglan hydrogen centre and University of South Wales.

- An officer explained that it is important to acknowledge that in the short, medium or long term there is no single silver bullet to solve this problem. Cardiff needs to embrace the complete range of technologies available.

- Five examples of best practice in terms of using sustainable fuels in the United Kingdom were mentioned in the presentation, these were:

    - **Dundee City Council** – they have introduced electric vehicle charging infrastructure across the city (15 rapid chargers & 50 fast chargers); converted 81 Council vehicles to electric); created electric vehicle charging "hubs" and a pool car scheme; they have converted the main taxi fleet to electric (81 vehicles). To help achieve this they have received £3m in financial support from the EU, the United Kingdom Government and the Scottish Government. They were 'Highly Commended' in the United Kingdom cities 'Go Ultra Low' scheme.
    - **Fife Council** – they were cited as a best practice example as they are trialling hydrogen waste vehicles and using renewable energy assets to generate hydrogen as a fuel for the vehicles.
    - **Greater Manchester Combined Authority** – They have made bids to the 'Green/Clean Bus Fund'; they are implementing 200 electric vehicle charging points as a part of a 'Plugged in Places" initiative; they are aiming to set stricter emission standards for taxis operating in the area.
    - **Nottingham City Council** – They have rolled out electric vehicle charging infrastructure across the city; they have converted the Council fleet to electric; they have introduced a 'Low Emission Zone' and they are now operating compressed Natural Gas Buses. This has been

achieved thanks to £6 million of United Kingdom Government financial support. Nottingham City Council were winners of the United Kingdom cities 'Go Ultra Low' scheme.

- **Mayor of London Assembly** – They have created 'Low Emission Zone exemptions'; introduced an 'Ultra Low Emissions Zone plan'; all new buses introduced in London are either hydrogen or electric; they have introduced an extensive range of car clubs and electric vehicle charging points.

- The presentation went on to explain the main opportunities available to Cardiff in terms of growing the use of low emission or sustainable fuels, the actions that it needs to take and why we need to deliver the actions. These included:

  - Cardiff is the capital of Wales and as such it should take a 'Leadership role' in growing the use of low emission or sustainable fuels;

  - Cardiff is a population and business centre. It has the critical mass to stimulate uptake of low emission or sustainable fuels;

  - The Council is in a strong position to control and influence the introduction of sustainable fuel infrastructure. Also given its size it can act as an early adopter in terms of converting its large fleet and build the use of sustainable and low emission fuel into its procurement process and the procurement supply chain;

  - The Council has close working links with Cardiff Bus, Cardiff's taxi companies and other partner public sector organisations (for example, Health Service, Police Force, Universities, etc..);

  - They have the responsibility of managing the public highway and major development sites across the city;

  - The Council is able to support and deliver local energy supply opportunities that can be used to produce sustainable energy and create circular economies. Local sustainable / renewable energy

examples include the Lamby Way Solar Farm, Viridor Energy from Waste Facility and the Tidal Lagoon;

- South Wales has significant levels of hydrogen fuel expertise, for example, at the University of South Wales and several manufacturing sites across the region. In addition to this, the South Wales Steel Industry has huge potential for capturing hydrogen as a waste product and then reusing it as a sustainable vehicle fuel;

- Do-nothing is not an option. Improving air quality to achieve compliance with EU limits without some type of clean air zone was unlikely and that without the growth of sustainable / low emission fuels it would be even more difficult.

- The presentation set out a 'Strategic Vision' that the Council needed to deliver to act as a catalyst for change, this included:

  - Facilitating and speeding up a pathway to zero emission transport;
  - Proactively addressing Air Quality Challenges;
  - Using procurement power to provide market confidence;
  - Accessing grants to proactively kick-start infrastructure provision;
  - Engaging with and supporting local innovation;
  - Exploring beneficial business models on supply and generation;
  - Securing the best Circular Economies for the City and for Wales.

- The presentation then provided three slides that set out short, medium and long term actions that the Council needed to take to drive the clean / low emission fuel agenda forward. These are set out in **Diagrams 20, 21 & 22**.

## Diagram 20 – Short Term Strategic Actions

STRATEGIC ACTIONS

### Short Term

| Action | Evidence | Progress |
|---|---|---|
| **Fleet Procurement** Gradual conversion to ULEV vehicles | • *Pool cars and small vans* – already cheaper on a whole of rental life analysis but requiring associated charging infrastructure<br>• *HGVs* - less mature market still needs piloting approach | • Testing 2 EV vans<br>• Corporate target around fleet emissions<br>• Draft Procurement strategies pointing towards inclusion of ULEV vehicles |
| **EV Charging Infrastructure** Install more publically available Charging Points | • Growing consumer demand<br>• Market needs support in dense urban areas<br>• OLEV Funding available | • Detailed feasibility study commissioned<br>• Preparing for bid to OLEV |
| **Understand the Council's Energy Supply Role** | • Renewable projects - business models significantly enhanced with Council Fleet as a potential customer<br>• Unclear governance and delivery models around on-street sale of electricity | • Already using innovative solar to supply EV's<br>• Modelling impact on Solar Farm proposal<br>• EV study looking at issues to do with sale/supply |


## Diagram 21 – Medium Term Strategic Actions

STRATEGIC ACTIONS

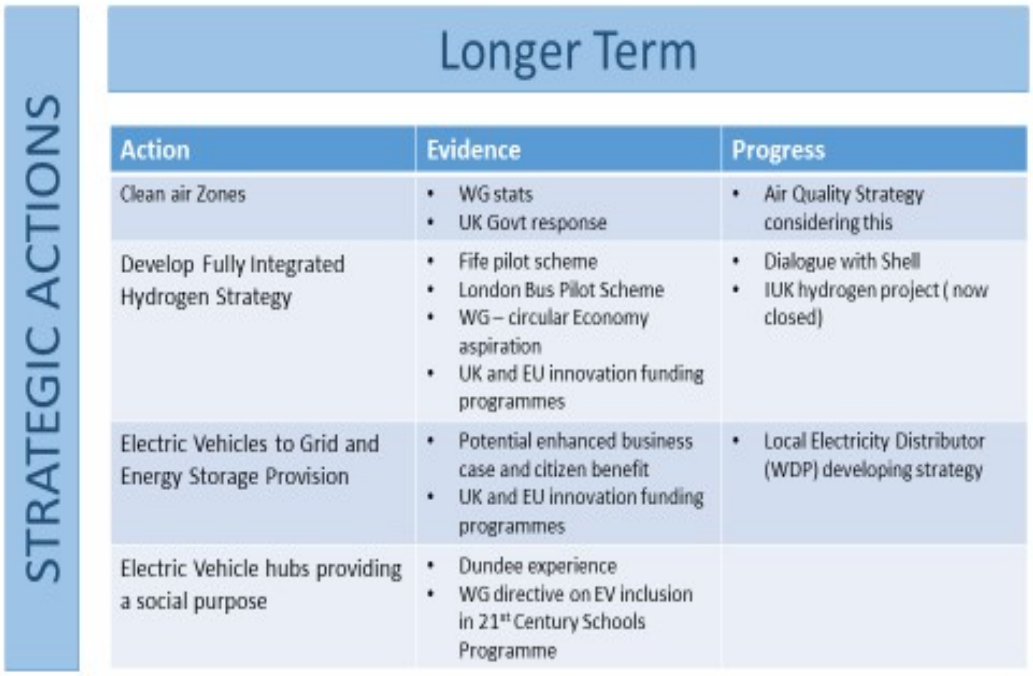
### Medium Term

| Action | Evidence | Progress |
|---|---|---|
| **Cardiff Bus** Understand current investment approach and identify more ambitious opportunities for Hydrogen, electric and CNG vehicles | • Best Practice in London, Manchester, Nottingham and elsewhere<br>• English Schemes have benefitted from funding not available in Wales | • Significant carbon and emissions reductions already achieved<br>• Needs further and longer term strategy to address Carbon Neutrality and Air Quality agendas |
| **City Growth** Explore opportunities for ULEV infrastructure as part of new development proposals (LDP sites, Park and Ride, Metro, etc) | • Clear and increasing demand.<br>• Relates to general SD design principles<br>• Cost effective business models (viability)<br>• CIL item? | • Developing SPG |
| **Taxis** Explore incentives and licencing levers to favour ULEV Incl Council Taxi Use strategies | • Working in Dundee and elsewhere<br>• Needs level playing field in licencing (UBER risk) | • Residential areas with high incidence of licenced taxi drivers targeted for on-street EV charging points<br>• Explore ULEV criteria for CCC taxi use contracts |


Hydrogen Bus - London

Dundee EV Taxi rank

**Diagram 22 - Long Term Strategic Actions**




- The task & finish group were pleased to see that the slides provided an outline plan and structure for driving forward the development and growth of sustainable / low emission fuels in Cardiff. Seeing a series of actions, supporting evidence and progress to date across the short, medium and long term was encouraging and seemed like the basis for a sound Low Emission Transport Fuels Strategy.

- The presentation concluded by explaining that the Council is currently in the process of delivering an Electric Vehicle Feasibility Study. The scope of the study is to:

    - Review the electric vehicle market including – electric vehicle charging infrastructure providers;  demand for electric vehicle charging & charging types and developing technology.

- Review ‘Best Practice’ including - Technology in the UK and abroad; potential links to other projects (e.g. car clubs, renewable fuels, fleet, parking sensors, smart living principles etc.); enforcement.

- Consider a range of infrastructure technology, including types of charge point; connection types; charge speed and site suitability; system architecture.

- Consider Energy requirements including - power availability by location and power requirements by charging technology type.

- Consider installation issues, including potential locations and feasibility assessment placement considerations; maintenance and warranty.

- Review costs, including capital (excluding delivery and installation) and revenue (indicative).

- Consider funding options and availability including - OLEV and commercial partnership options;

- Consider commercial/operational models including - an understanding of business models around direct sale of energy through on street charging points;

- Consider the procurement - options appraisal and recommendations emerging;

- The development of a Draft Action Plan.

## ‘Improving Cardiff’s Air Quality’ - Meeting 7 – Clean Air Zones & Scrutiny Research - Tuesday 12th December 2017

**Part 1 - Scrutiny Research –** Gladys Hingco from Scrutiny Research attended to brief Members through the findings of her research into the implementation of ‘Clean Air Zones’ and the emission standards of Cardiff’s public sector fleet.

### Key Findings

- The Environment Scrutiny Committee commissioned a research report to identify current initiatives and arrangements that selected cities have adopted to achieve improvements in air quality. The report focused on initiatives and measures introduced by selected local and transport authorities to reduce levels of nitrogen dioxide emissions and Particulate Matter (PM10). In the UK, this research examined the work in improving air quality in London and its Boroughs as well as initiatives that were implemented in the cities of Nottingham and Manchester. More specifically the report focused on best practice initiatives in implementing Low Emission Zones; the procurement of clean cars and transport; the use of economic incentives and disincentives such as congestion charging, parking management approaches and improvements in modal shift.

### European City Ranking

- The European City Ranking report examined various initiatives to improve air quality in European city capitals. In 2015, their evaluation work reviewed initiatives in 23 key cities in Europe. The city which has achieved the highest ranking for improving air quality for that year was Zurich, closely followed by Copenhagen, Vienna and Stockholm. Although the City of London ranked 7$^{th}$ in 2015, this latest ranking is a significant improvement from the previous review in 2011. **Diagram 23** shows the ratings and achievements of the twelve highest ranked cities in 2015.

**Diagram 23 - Top tweleve ranked European cities in terms of delivering iniatives for managing air quality in 2015**

| City | Overall Mark | Emission Reduction Success | Low Emission Zones and bans of High Emitters | Public Procurement | Non-Road Mobile Machinery | Economic Incentives | Mobility Management and Modal Split | Promotion of Public Transport | Promotion of Walking and Cycling | Participation and Transparency |
|---|---|---|---|---|---|---|---|---|---|---|
| Zurich | ↗B+ (89%) | ++ | 0 | ++ | ++ | + | ++ | + | + | ++ |
| Copenhagen | ↗B (87%) | + | 0 | ++ | + | + | ++ | ++ | ++ | + |
| Vienna | ↗B (84%) | ++ | 0 | + | + | + | ++ | ++ | + | + |
| Stockholm | B- (80%) | 0 | 0 | 0 | + | ++ | + | ++ | ++ | + |
| Berlin | C (76%) | 0 | ++ | ++ | + | 0 | + | 0 | 0 | + |
| Helsinki | ↗C-(71%) | ++ | 0 | 0 | -- | 0 | ++ | ++ | + | 0 |
| London | ↗C-(71%) | - | 0 | + | + | + | 0 | ++ | + | 0 |
| Paris | ↗C-(71%) | -- | + | ) | - | + | ++ | + | ++ | + |
| Stuttgart | C-(71%) | 0 | ++ | + | -- | + | + | + | 0 | + |
| Amsterdam | D+(69%) | + | - | 0 | - | + | 0 | + | ++ | + |
| Graz | D+ (69%) | 0 | 0 | 0 | 0 | 0 | 0 | ++ | + | + |
| Dusseldorf | ↗D (7%) | 0 | ++ | 0 | 0 | - | 0 | 0 | + | + |

- **Diagram 23** sets out the top tweleve ranked European cities in terms of delivering iniatives for managing air quality in 2015. Zurich is the best performing city and scores 89% - the overall mark is based on it performing well in areas such as emission reduction success; low emission zones and bans on high emitters; public procurement; non-road mobile machinery; economic incentives; mobility management and modal split; promotion of public transport; promotion of walking and cycling; participation and transparency. The only United Kingdom city to feature in the top twleve is London which scored 71%. It is clear from the table and following evidence that the best performing cities have been working to improve air quality for some time and that they have invested considerable resources into managing the air quality problem. In comparative terms these are wealthy cities - the list (excluding Frankfurt) contains five of the largest financial centres in Europe. German, Austrian and Danish cities are dominant in the list accounting for six of the twelve places – these are countries that have received strong support from central government to improve air quality standards. In short, achieving quick improvements is expensive and generally requires financial support from central government.

- In reducing PM10 and nitrogen dioxide emissions, the Scrutiny Research report cited that the cities of Helsinki Zurich and Vienna had made significant improvements in this area. In Helsinki, the reduction in these pollutant indicators was partly attributed to the implementation of the low emission zone, while in Zurich this partly attributed to regulations around emission standards for old and new vehicles.

**Low Emission Zones**

- Low Emission Zones are often introduced to reduce particulate matter (PM10 and PM2.5) and nitrogen dioxide emissions. Minimum emission standards are set within these areas for vehicles that wish to enter the zone. Such schemes operate by regulating the entry (ban, restrict, charge) of highly polluting vehicles into the area.

- So far it is reported that there are as many as 225 active or planned low emission zones in Europe. In the United Kingdom, there are only two low emission zones, the biggest covering most of the Greater London area. In Europe, the cities of Stuttgart and Berlin are reported as leading practice in implementing Low Emission Zones. 55 of the 225 low emission zones are in Germany – principally because central government has prioritised the matter, issued clear guidance and provided financial support.

- The LEZ s in Berlin and Stuttgart as with others in Germany are also referred as Green Environmental Zones. These environmental zones only allow traffic for vehicles bearing a green environmental badge i.e. vehicles that meet the minimum EURO 4 or better emission standards. This stricter regulation has been inforce since January 2017. The restriction to traffic apply all the time irrespective of whether the levels of air pollution are higher or lower at any one time. Vehicles that drive as well as stop and park in an environmental zone without a valid environmental badge, will be fined 80€ plus an additional 25 € to cover administrative fees.

- It is also planned that traffic restrictions for diesel vehicles will be introduced in selected German cities including Berlin, Hamburg, Munich, Leipzig and Stuttgart by 2018. These “diesel restriction zones” or “blue

environmental zones" and is intended to regulate traffic of diesel vehicles depending on their emission rate of nitrogen dioxide.

**Low Emission Zone – Berlin**

- The environmental zone in Berlin covers 88 km2 and was introduced in 2008. Significant reductions were seen in the level of PM10 and nitrogen dioxide following the introduction of the measure. Reports have cited that the introduction of the scheme had no measurable impact on traffic flows in Berlin. However, this scheme is credited for speeding up the turnover of vehicle fleet towards more cleaner vehicles and is regarded as a significant factor to the change in composition of vehicles in the area.
- The Berlin Low Emission Zone restricts entry by only allowing vehicles with EURO 4 or better emission standards into the area. All vehicles entering the city need to display a green environmental badge – failure to adhere to this will generate a non-compliant fine of 80€ plus an administrative charge 25 €. In addition to this Berlin is planning to introduce "diesel restriction zones" or "blue environmental zones". The results to date measured against the baseline figures have achieved reductions in PM by 58% and nitrogen dioxide by 20%. There has been no measurable impact on traffic flows in Berlin following the introduction of the Berlin Low Emission Zone, but there has been an increased vehicle turnover in favour of cleaner or low emission vehicles. In 2012 around 96% of diesel cars and approximately 85% of all trucks had a green sticker.

**Low Emission Zone & Congestion Charging - Milan**

- Milan has adopted a combined Low Emission Zone and congestion charging. The measure was trialed in 2008 and was fully implemented in 2012. The scheme in Milan differs to the environmental zones in Germany in charging petrol and diesel cars entering the zone. Entry to the zone is forbidden for pre-EURO gasoline vehicles and for pre-EURO, EURO1 and EURO2 diesel vehicles. The entry fee for vehicles that meet emission standards is €5. The restriction applies every working day (Monday-Friday) from 7:30am-7:30pm with shortened hours on Thursdays from 7:30 am to

6:30 pm to encourage weekday shopping activities. The area is free to access (no charge) on weekends and public holidays. The payment allows users to travel for the whole day in the charged area. Electric vehicles, hybrid vehicles, bio-fuel natural gas vehicles and scooters, public utility vehicles are exempted from the charge.

- The implementation of the measure in Milan led to significant reduction in PM10 (~19%) and nitrogen dioxide (~14%) levels. The scheme also led to a significant reduction in traffic volume with the average number of vehicles that entered Area C declining by 34%. The number of polluting vehicles entering the area also declined by 49%. The number of cleaner vehicles entering the area has increase from 9.6% to 16.6% of total vehicles entering the area.

**Low Emission Zone - London**

- In London, the Low Emission Zone was introduced 2008. Unlike the low emission zone in Milan and Berlin, this measure only applies to all heavy goods vehicles greater than or equal to 3.5. tonnes (for example, diesel lorries, buses, coaches, motor caravans, motorised horseboxes, larger vans, minibuses and other specialist vehicles) so that cars and motorcycles are not affected by this regulation. From 2012, heavier goods vehicles including busses have to meet Euro 4 emission standards, and Euro 3 for heavier vans and mini buses. All heavy goods vehicles in these categories that do not meet the required emissions standards have to pay a daily charge. The charges range from £100 - £200 depending on vehicle category and weight. The low emission zone covers most of the Greater London area. It operates 24 hours a day, every day of the year, including weekends and public holidays. Charging days run from midnight to midnight. Similar to the impact of low emission zone in other cities in Europe, the scheme in London has also led to reduction in PM10, nitrogen dioxide and black carbon, it is estimated that this Low Emission Zone has reduced emissions of PM10 by 1.9% (28 tonnes) and nitrogen dioxide by 2.4% (26 tonnes).

**Ultra Low Emission Zone - London**

- The Ultra Low Emission Zone was planned to be introduced in 2020 but will instead come into force in Central London in April 2019. The Ultra Low Emission Zone will replace the “toxicity charge” T-charge, that was recently introduced. The Ultra Low Emission Zone will cover the same area as the Congestion Charging Zone in London. It is also planned that in 2020, Ultra Low Emission Zone could be further expanded to cover nearly all of Greater London for heavy polluting buses, coaches and lorries. Starting April 2019, all vehicles will need to meet exhaust emission standards (Ultra Low Emission Zone standards) or pay a daily charge, when travelling in central London. With the implementation of this measure, the minimum Euro standard for Motorcycles is Euro 3 and for petrol cars and light utility vehicles not exceeding 500 kg, the minimum standard will be Euro 4. For diesel cars and vans, Euro 6 and for lorries and busses the requirement is Euro VI. The daily charge for non-compliant smaller vehicles is £12.50 and £100 for buses and lorries. These charges are in addition to the congestion charges in London and the Low Emission Zone requirements.

**London Toxicity Charge & Zero Emissions**

- The London Toxicity Charge or T-charge came into force on 23 October 2017. The charge was introduced to further improve air quality within the capital and to prepare Londoners for the Ultra Low Emission Zone that will be introduced in 2019. The T- charge costs £10 per day and is payable on top of the London Congestion Charge and applies to all vehicles that do meet the current emission requirements within the zone. For petrol and diesel vehicles the minimum standard required is Euro4/VI and Euro 3 for motorised tricycles and quadcycles. There are no charges for motorcycles.

- It is also intended by Transport for London that the entire road transport system in London will be zero emission by 2050 at the latest. Zero emission zones will be introduced in Central London and town centre zero

emission zones from 2025, with a view of achieving this zero emission zone for inner London by 2040 and a London-wide zone by 2050.

**Low Emission Neighbourhoods - London**

- Another scheme that has been introduced via the Mayor of London's Air Quality Fund is the Low Emission Neighbourhood. This is defined as an area-based scheme that includes a package of measures delivered within a specific area and is focused on reducing emissions and promoting sustainable living locally. This scheme is currently being implemented in five areas across different Boroughs in London. This scheme is focused on areas of high exposure to high pollution which can be reduced through local measures, and locations with high trip generation. The measures associated with Low Emission Neighbourhoods are less suited to areas where the high pollution levels are restricted to a single road, especially if through-traffic is a large source of emissions. Key to the success of Low Emission Neighbourhoods is the partnership and involvement of the local community, businesses and the local authority to jointly identify and deliver a common set of goals. The Mayor of London has provided £1m in funding to each of the five Low Emission Neighbourhoods to support the measure and a range of initiatives.

**Marylebone Low Emission Neighbourhood**

- The partnership between Westminster City Council and local stakeholders, including businesses, landowners and residents gave rise to the Marylebone Low Emission Neighbourhood. The Low Emission Neighbourhood implements a range of innovative projects to improve air quality throughout the area including encouraging behavioural changes that directly impact on reducing emissions. This includes projects that involve working with major landowners to improve emissions from buildings, better management and reduction of freight movement and service vehicles entering the area, for example, by consolidation of deliveries and use of shared supplier scheme. The scheme also implemented an emissions based on street parking charges wherein

vehicles are charged according to their emissions level when parking in on-street pay and display and residents' bays. This measure intends to encourage use of electric vehicles and discourage more polluting vehicles. The Council has also commenced the trial for a 50% parking surcharge for all diesel vehicles in certain locations in area (for example, in the Hyde Park, Marylebone and Fitzroviaareas typical parking charges increased from £4.90 to £7.35). The Low Emission Zone is also working with the taxi industry to improve the management of taxi ranks through the use of parking sensors that provide taxi drivers with real time information of the location of available taxi rank spaces. The Low Emission Neighbourhood scheme is also working with taxi drivers and local hospitals to reduce unnecessary vehicle idling in the Westminster and Marylebone area. Air Quality champions were recruited to encourage drivers to stop vehicle idling and inform them of its harmful effects. They will be empowered to enforce unnecessarily vehicle idling via a penalty charge notice. The scheme will also include a pilot scheme to provide on-street electric vehicle charging points, a schools emissions engagement scheme and focus on children's play activity through temporary street closures designed to encourage children to play and explore the outside environment.

**Manchester Air Quality Strategy**

- The Transport for Greater Manchester has developed the Greater Manchester Low-Emission Strategy and Greater Manchester Air Quality Action Plan – their approach was identified as best practice at the UK Clean Air Day 2017. These identify key priority areas and commitments in improving local air quality. A key priority is to increase the take up of electric vehicles and alternative fuel vehicles. The authority hopes to achieve this by providing incentives and by setting emission standards and restricting vehicle access to specific areas. It is also committed to increasing the number of publically available charging points (with an initial implementation of 200 and an aim to eventually reach 700) and increasing the number of low emission vehicles within the public sector via joint

procurement schemes. Transport for Greater Manchester will work with licensing authorities to standardise the minimum emission requirements of the vehicles that are allowed to operate and the standards that will operate in future years. The strategy is also committed to reducing freight emissions by shifting freight to Urban Distribution Centers'. This will allow loads to be broken down for final delivery via low emission vehicles. It is also planned that local consolidation centers will be set-up so that courier services and small deliveries are coordinated to avoid multiple delivery providers from visiting same premises. The strategy also supports the take-up of zero emission transport refrigeration and will also promote anti-idling policies with freight transport companies. Transport for Greater Manchester will work with bus companies to ensure that they sign-up to targets for improving emission standards and in implementing practical measures such as the deployment of buses with the lowest emission in areas with the highest pollutant concentrations. The Transport for Greater Manchester will also continue to work with bus operators to roll out the bus electrification scheme, to encourage the use of new technology (such as geofencing control systems and exhaust abatement technology) and to support a driver training initiative for drivers of hybrid buses.

- Transport for Greater Manchester will also explore the feasibility of establishing a Low Emission Zone in the Greater Manchester area, as well as the implementation of the 20mph zones in areas where this will have significant impact on emissions. Finally, Transport for Greater Manchester will work with the planning authorities to develop common guidance and toolkit for assessing proposals to support the identification of appropriate mitigating measures, for example, electric vehicle charging points, access to public transport or sustainable transport.

- Other initiatives included in the action plan are to set ULEV specifications for all car club vehicles; to work with licensing authorities (across the Greater Manchester area) to standardise the minimum emission requirements of taxi vehicles and the retrofitting of yellow school buses

**Procurement and Retrofitting of Vehicle Fleet**

- One of the key measures that many cities are working on is to improve emission standards of their fleet is through the retrofitting of older vehicles with diesel particulate filters and investment in vehicle fleets that use electric and sustainable fuels. Leading in practice is the city of Berlin which has adopted a policy for using green air technology. More than 50% of diesel vehicles are equipped with particulate filters or meet the Euro V/EVV standard. Similarly, the city of Copenhagen aim to make its public transit carbon neutral. So far, the city has acquired 255 electric vehicles and has attained its goal that 85% of the municipality's own vehicles are electric, hydrogen or hybrid powered. The city of Zurich has introduced regulations that require the strictest Euro standards for new vehicles and have also planned for the extensive retrofitting of its older vehicles. The city is working to increase usage of electric vehicles in its sustainability plans. The cities of Zurich and Copenhagen provide a host on financial incentives and infrastructure to support the use of electric vehicles through reduced taxation or exemptions from vehicle tax and increasing availability of charge points.

**Congestion Charging Zones**

- Some cities have implemented congestion charging schemes to restrict the number of vehicles entering a specified area to reduce traffic volume and improve environmental conditions including air quality. Such a scheme was introduced in Stockholm in 2006 in the form of congestion tax. The tax applies to cars, lorries and buses while there are exemptions for emergency vehicles, buses, diplomatic vehicles, disabled persons vehicles, military vehicles, hybrid or electric cars, motorcycles and mopeds. The amount charged varies depending on the time of day that the driver enters or exits the congestion tax area. Generally, the cost is higher during periods when traffic is heaviest. Unlike other congestion charging schemes, the scheme in Stockholm charges vehicles on both entry and exit of the affected area. A limit is set (£9.35 or 10.54 Euros) for the amount that a vehicle can be charged per day. The charges do not apply

Saturdays, Sundays, public holidays or the day before public holidays, in the month of July, nor during the night-time period (18:30 - 06:29). The vehicle owner is expected to pay the charges at the end of the next month. The scheme served as an effective stimulus for the adoption of alternative fuel cars. Following the introduction of the measure, the number of alternative-fuel cars increased from 3% in 2006 to 15% in 2009. The exemption was abolished in 2009 as the authority believes that the scheme had filled its role as a facilitator for market introduction. On the whole the scheme led to a reduction in traffic level (22%) and the reduction in congestion has led to increased in reliability of travel time and travel times have declined substantially inside and close to the inner city. The reduction in traffic also led to reduced emissions of between 10-15% across different types of emissions. There was also no adverse impact on retail as was initially feared. The number of passengers in the transit system has also increased because of the scheme.

- A key obstacle to congestion charging is often the support and acceptability of the scheme. The experience in Stockholm is an example in a change in the attitude and support of the public on issue or a measure that needed acceptance and support. In this case the attitude changed from fairly hostile to overwhelmingly positive. The experience in Stockholm supports the hypothesis that “familiarity breeds acceptability”, i.e. that once a system is in place, support will generally increase or build up as the benefits and advantages of the scheme becomes more evident.

**London Congestion Charging**

- The world’s first congestion charging scheme was introduced in Central London in 2003. It aims to reduce congestion and encourage motorists to use other modes of transport. The daily congestion tariff is £11.50. This daily charge allows motorists to drive around, leave and re-enter the charging zone as many times as required in one day. The charge is in operation Monday to Friday from 07:00-18:00 and does not apply at weekends, Bank Holidays, public holidays or the period between Christmas Day and New Year’s Day, when traffic levels are lighter. The

charges generate a significant source of revenue for Transport for London that is then invested to improvements to the bus network in London. Although the revenue from the scheme make a significant contribution towards the London Bus network, questions have been raised whether this is a cost effective way of generating the money for investment in transport improvement and infrastructure. Similar to the experience in Stockholm, the ring fencing of income proceeds for improvements in transport facilities and infrastructure has increased its acceptability. Following the introduction of the scheme, there was decline in the level of automobile traffic, however the long-term impact of congestion charging to traffic levels have yet to be established. Studies have reported that the measure changed people's travel patterns in London and have increased the use of buses (14%) and the underground system. The introduction of the scheme also resulted in significant increase in traffic speeds within the zone and peak period congestion has also declined. Although the measure has brought many benefits, the system is not considered optimal because the fee charged is not based on how many miles a vehicle is driven within the charging area and is not time-variable as the fee is not higher during the most congested periods and lower during less congested periods.

- There are certain exemptions for the London Congestion Charging scheme, these include:
  - Cars or vans (not exceeding 3.5 tonnes) which emit 75g/km or less of carbon dioxide and that meet the Euro 5 standard qualify for a 100% discount;
  - Any car registered as new on or after 1 January 2011- Euro 5 standard;
  - Vehicles that are powered by 'electric', hydrogen or are defined as a 'plug-in hybrid'.

- The scheme has brought in a significant source of revenue for the Transport for London Authority, for example, £190m in 2004/5 and £268m in 2007/8. Questions have been asked about the cost effectiveness for generating the money for investment in transport improvement and

infrastructure. The scale of initial investment required was quite high and the operating costs have been reported as being approximately 40% of total revenue.

**Singapore's Electronic Charging**

- Singapore adopted a congestion charging scheme in 1975, referred to as an Area Licensing Scheme which required vehicles to have a special license to operate within specific areas. In 1998, the scheme was replaced by Electronic Road Pricing. This new system introduced electronic toll collection, electronic detection, and video surveillance technology. The in-vehicle unit communicates with detectors when passing under gantries and the respective charge is deducted from the driver's cash card. The amount varies by time of day (rush hour is two to three times more expensive), type and size of vehicle (taxis and passenger cars according to engine capacity, goods vehicles and buses and others) and the type of road (arterial and expressways).

**Parking Management Schemes**

- Parking management is used as a travel reduction strategy in many cities in Europe and the US. The reductions in car travel will reduce traffic congestion and will reduce transport emissions. Various parking schemes have been adopted to dis-incentivise motorist from taking private vehicles in their commute into the city. In Rotterdam, the parking scheme adopted by the Erasmus Medical Centre in Rotterdam required employees to pay for parking according to arrival time and gives credit for every kilometre not travelled by car if employee decides to take public transport.

- Improving user information as part of parking management will allow motorists to identify parking locations and prices so they can choose the best option for each trip. Some cities make use of advance parking management systems that provide motorists with real-time information to help them quickly find a parking space. Since 2011, the San Francisco Municipal Transportation Agency has implemented a comprehensive smart parking system to help manage congestion. The system is demand

responsive whereby rates may vary by location, by time of day and day of the week. With this scheme, parking rates would vary incrementally, depending on time of day and availability of spaces. In areas and at times of the day where it is difficult to find a parking space, rates will increase incrementally. However, in areas where open parking spaces are plentiful, rates will decrease until some of the empty spaces get filled.

- Some local authorities in the UK use charging for parking to help with their CO2 reduction objectives. Richmond upon Thames Borough Council charges residents for parking permits according to the $CO_2$ emissions of the vehicle. The Council is considering extending this principle to charges at parking meters and in car parks. Edinburgh City Council has proposed to introduce a similar $CO_2$-related charge for residents parking permits.

- In Nottingham City Council introduced the Work-place Parking Levy in 2012. It was intended that the Work-place Parking Levy scheme will serve as an incentive for employers to manage their workplace parking provision and encourage commuters to use public transport on their journey to work. The scheme generates significant revenue for the Council that is ringfenced to finance improvements in transport infrastructure and air quality in the city. The scheme works as a levy for employers who provide parking spaces for its employees. The local authority collects a charge for each parking place used by employees, certain types of business visitors, and pupils and students. The employer decides whether or not they would pass the charge on to their employees. Each employer that provides more than 10 parking spaces for its employees is required to obtain an annual licence for the maximum number of liable places they provide. The current charge for each workplace parking for this financial year 1 April 2017 to 31 March 2018 is set at £387. The Work-place Parking Levy generates around £9 million pounds a year for the City and since its implementation has generated over “over £44 million of revenue” with “100% compliance of liable employers”. The scheme is low cost to run as the operating costs only take up around 5% of the total revenue. It is considered more cost effective scheme than the London Congestion Charge. The London

Congestion Charge raises more money in absolute terms than the Work-place Parking Levy, however it is regarded as less efficient due to more than 40% of total revenue taken up by operating costs. So far, the revenue form the Work-place Parking Levy has successfully leveraged £400+m funding from central government to finance major transport infrastructure developments and improvements.

**Reduction of Speed Limits**

- Cities can also impact on air quality by reducing speed limits. Vehicle emissions are at its lowest at 30-50 km/hr. A number of cities have adopted 30 km/hr speed limits in residential areas (Zurich and Copenhagen) while the City of Paris envisages reducing the 50km per hour limit to 30km/h across the central district in the future.
- The aim of the Clean Air Zone research was to identify current initiatives and arrangements that selected Cities have adopted to achieve improvements in air quality and review a range of documents available on-line.

**Stockholm Congestion Charging**

- All vehicles are required to pay the congestion tax in Stockholm. Exemptions are applied for electric cars, hybrid vehicles, mopeds and motorcycles. The amount charged varies depending on the time of day that the driver enters or exits the congestion tax area. The cost is higher when traffic is heaviest. Chargest are applied to vehicles both on both entry and exit of the affected area – the scheme has set a maximum charge of 10.54 Euros. Charges do not apply Saturdays, Sundays, public holidays or the day before public holidays, in the month of July, nor during the night time period (18:30 - 06:29).

- The impact of the scheme has been positive with a 22% reduction in traffic levels; an increase in reliability of travel time; declining travel times; reduced traffic emissions; no adverse impact to retail & business and an increase in patronage of public transport.

**Part 2 – Developing a Clean Air Zone in Cardiff** – Councillor Caro Wild, Cabinet Member for Strategic Planning & Transport was invited to attend the meeting to discuss the feasibility of creating a clean air zone in Cardiff. He was supported by officers from the City Operations Directorate and Shared Regulatory Service.

**Key Findings**

- It was explained that the Council had held a meeting with representatives from the Welsh Government and DEFRA around addressing air quality issues in Cardiff. The meeting focused on what needed to happen next in terms of assessing the situation, modelling various air quality improvement options, the technical approach that needed to be followed and undertaking a feasibility study. In addition to this they discussed the need for additional resources to deliver the work as what was being proposed was far from business as usual. The task group was told that discussions had been positive and that they were awaiting a letter from the Welsh Government confirming the actions that need to take place and how these will be funded.

- It was stressed that timescales were very challenging and so exercises like an options analysis and a feasibility study would probably need to take place at the same time.

- The feasibility study would focus on options around delivering a clean air zone or low emission zone in Cardiff, while the options analysis would consider how much progress could be achieved 'within the shortest time possible' by developing options like active travel, parking measures, sustainable travel, electrical charging and planning.

- The task group were informed that they would be provided with a copy of the letter once it arrived. The task group was also told that there wasn't much that the Council could do until they received the letter, other than

carry out some ‘soft market testing’ to establish the type of support available to deliver the work and the companies in the market with the relevant expertise.

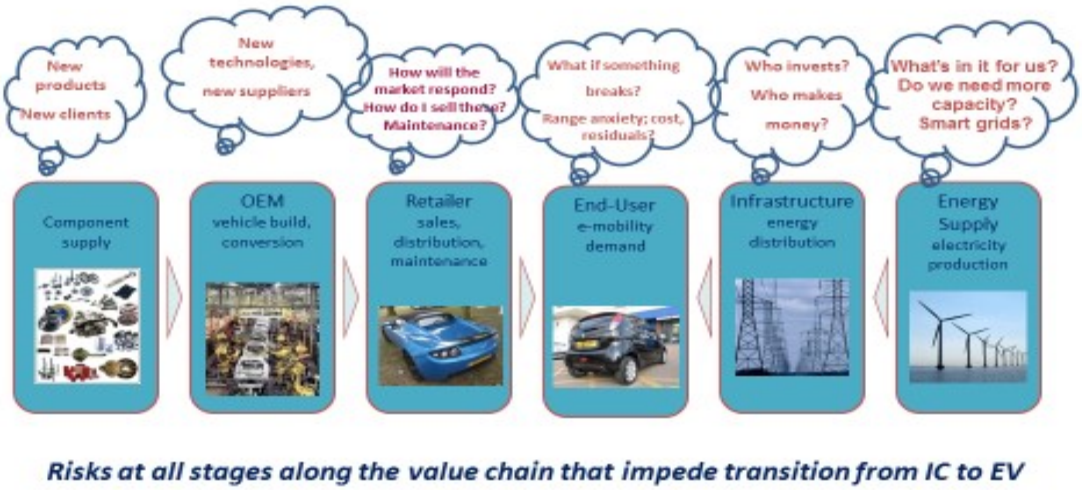
## ‘Improving Cardiff’s Air Quality’ - Meeting 8 – Sustainable Fuel for Vehicles & Cardiff BID - Wednesday 20th December 2017

**Part 1 - Dr Paul Nieuwenhuis from Cardiff University –** He was invited to brief the task group on the continually evolving market for sustainable vehicle fuel and the potential impact that this could have on cities like Cardiff. This included a discussion on key areas such as growing infrastructure, scaling the use of new fuels and the introduction of associated technologies.

### Key Findings

- The presentation started by explaining that electric vehicles are older than either petrol or diesel cars and the first ones date back to the 1840’s. It then questioned why they had not taken off and provided a number of suggestions explaining why this was the case. Some of the explainations provided are set out in **Diagram 24**.

### Diagram 24 – Risks at all stages along the value chain




*Risks at all stages along the value chain that impede transition from IC to EV*

- It was explained that the car industry doesn't talk to oil / fuel industry. The new model is very different from the previous combustion approach in that renewable energy can be produced everywhere and you don't need to be an oil or fuel company to produce fuel for low emission vehicles – this will become a complete game changer across the value chain. For example, fuel production will be possible from a much wider range of suppliers (including potentially the car manufacturers).

- The battery in a vehicle is worth half the value of the car, for example, if the car costs £30,000 then the battery would cost £15,000 to produce. Until the battery (or fuel cell) costs fall then this evolving technology will need to be subsidised.

- The first car to reach 100 miles per hour was a steam vehicle; the first car to reach 100 kilometres per hour was an electric car.

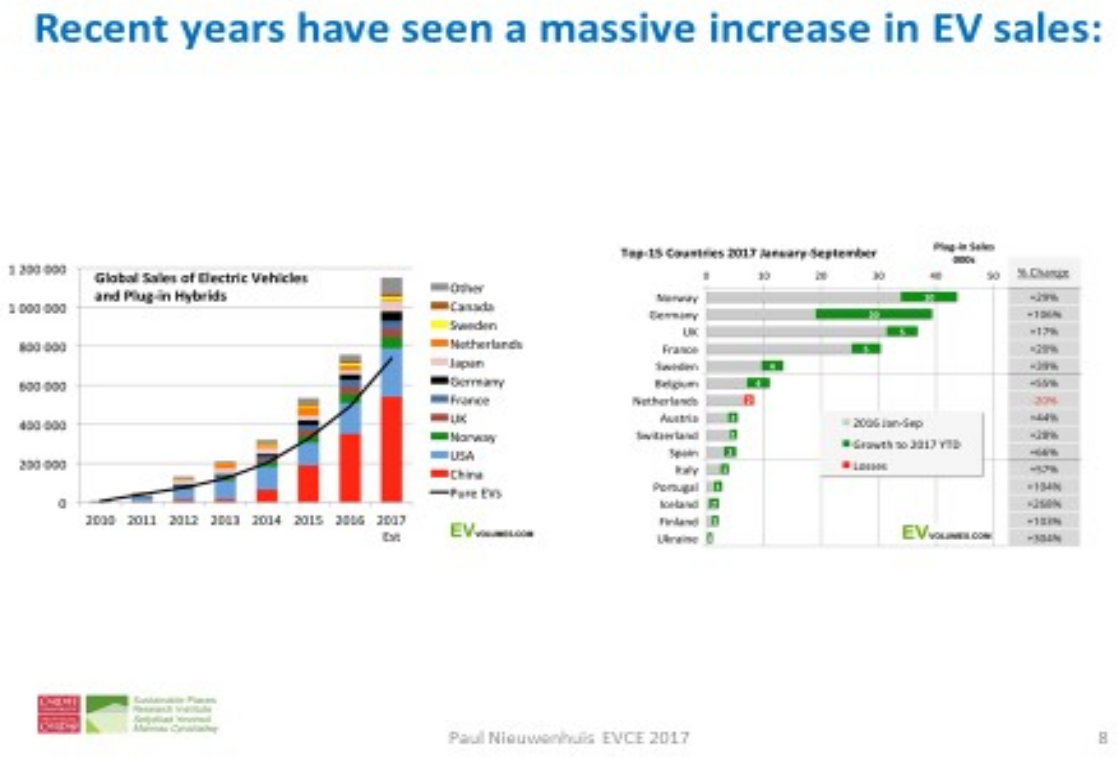
- Electric charging will never be as quick as petrol, diesel or hydrogen. A rapid charge will typically take 20 to 30 minutes, but the trip range will be no more than 100 miles. Hydrogen fuelled vehicles can be fuelled in less than a minute and have a 300 mile plus range.

- Recent growth in the global sales of electric vehicles and plug in hybrids has been very quick. In 2017 approximately two thirds of the sales of such vehicles were in China and United States. The United States has two separate emissions standards, the United States National Standard and the California Standard. The California Standard is much stricter, however, in recent years other states have started moving across to this new standard and the desire to reduce vehicle emissions increases.

- **Diagram 25** illustrates the sharp increase in electric vehicle and plug in hybrid sales between 2010 and 2017 (estimated). Sales increased from virtually none in 2010 to 1.2 million in 2017 (estimated). **Diagram 25** also includes a secondary chart that illustrates the top 15 European countries in terms of electric vehicle plug in sales for the period January to September

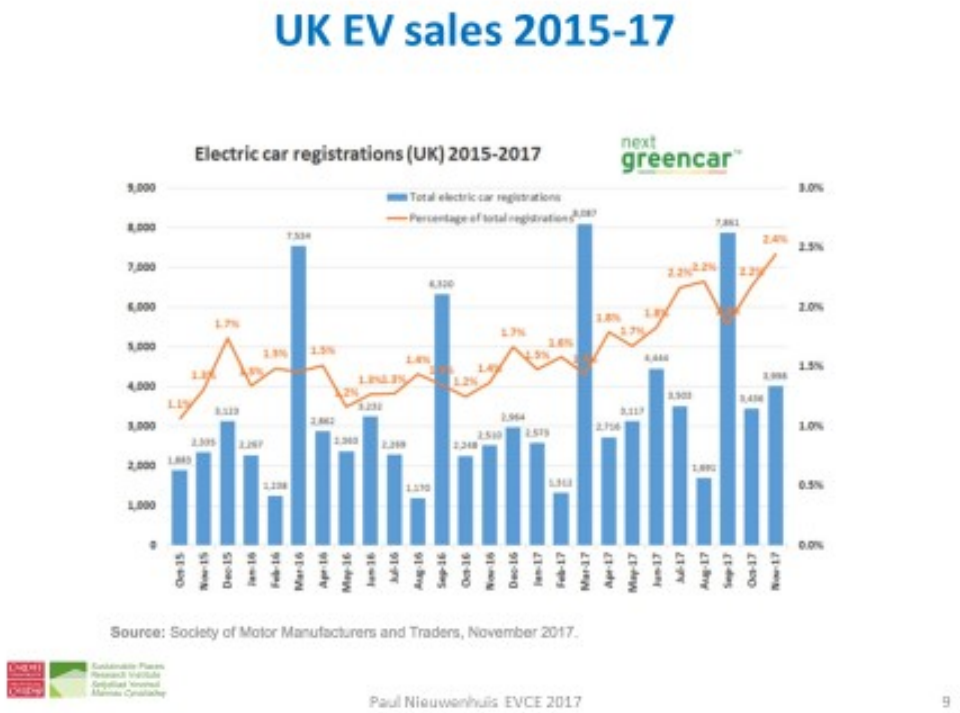
2017. It is clear from the diagram that sales increased rapidly in all but one counrty (the Netherlands). Norway was responsible for the greatest number of sales, while Germany saw the biggest percentage increase (20%). The German increase is attributed to the roll out of low emission zones across the country, clear Central Government policy / financial support and the Volswagen diesel scandal.

**Digram 25 – Increasing trends in electric vehicle sales**




- The counrty with the highest overall market share for low emission vehicles is Norway, this is probably due to the fact that they have been subsidising such vehicles for many years. The United Kingdom also offers incentives for low emission vehicles, for example, £5,000 is available towards the purchase of a new low emission vehicle and they are exempt of road tax.

**Diagram 26 – United Kingdom Electric Vehicle Sales 2015 to 2017**




- **Diagram 26** illustrates the growth of electric vehicle sales in the United Kingdom relative to overall registration for the period October 2015 to November 2017. Over the period electric vehicle registrations as a percentage of total registrations increased from 1.1% in October 2015 to 2.4% in November 2017. It was explained that a 5% market share (estimated to be reached in 2020) is the magic number in terms of starting to achieve economies of scale.

- In terms of taking a reality check it is important to remember that take up of electric vehicles in the public sector is crucial to help drive demand, and that electric vehicles still need to be a part of an incentive-driven market. Norway is the market leader in terms of overall percentage of people using electric vehicles - they have approximately 20 years experience of private electric vehicle use. Like all electric vehicle markets, the Norwegian market is incentive-driven, for example, electric vehicles are able to enter Oslo for free; they are allowed bus lanes; they can access free parking; free charging points are supplied and there is no sales or road tax. Tax on

a car purchase in Norway is typically 45% - there is no tax on an electric vehicles.

- Electric charing cables can be a health and safety issue, for example, there is a trip potential attached to the cables and the power coming down a charging line can be considerable (particularly for a Tesla vehicle).

- Dr Nieuwenhuis went on to suggest a number of possible air quality improvement options for Cardiff, these included:

  - **Public Charging Points** - Currently Cardiff only has private charging points in car parks (for example, NCP and IKEA) and dealerships (for example, BMW, Nissan, Renault). There are no public charging points - just a few would raise profile of electric vehicles and show support.

  - **Convert Council Fleet to Electric Vehicles** - Expensive initially; the running costs lower; most of Cardiff would be well within range; there would be an air quality benefit. An increasing number of private fleets (for example, DHL & UPS) are moving to electric vehicles.

  - **Convert Cardiff Bus to Electric or Fuel Cell buses –** They currently don't have any, so only having one show case bus would be a good start. They would contribute to a significant air quality improvement, for example, BYD e-buses are in operation in London; fuel cell buses have been in operation for years in Vancouver, Perth, Chicago, Amsterdam, London & Reykjavik.

  - **Promote Electric Taxis** - Public charging points could attract electric taxis, for example, as seen in Dundee. This would help air quality improvement.

  - **Attract Electric Vehicle Car Club** – For example, Autolib and Car2Go. The advantage here is that they will cover most of the cost, provided infrastructure needs are met. A note of caution here, they are generally more justifiable in cities larger than Cardiff.

- **Ban Internal Combustion Vehicles from the City Centre** – This would be a longer term option, so no immediate impact. It could be used as an opportunity to gradually expand the pedestrianised zone in the city centre.

- **Seriously Promote Cycling & E-bikes** - Cheapest option, but takes away road space from cars, trucks, buses. E-bikes are the world's most common form of electric vehicle.

- Some early local authority installers of electric vehicle charging points have come unstuck at the rapid development of the technology, for example, the charging plugs used have become outdated and are no longer suitable for use on the modern electric vehicles.

- BYD-ADL are the biggest manufacturer of e-buses in the world and operate an e-bus in London. They are close to the point of mass-producing this type of vehicle. A BYD-ADL e-bus is twice the cost of a regular petrol or diesel bus.

- The batteries for electric vehicles have become efficient, however, making and disposing of the battery has a very high cost implication.

- The Munich programme that was launched in 1999 used a BMW powered liquid hydrogen vehicle which was designed as a demonstrator model to illustrate how the technology could be used. Vancouver has a trolley bus that is powered on electric – Cardiff used to have a similar tram system.

- There are no low emission buses in Wales. On several occasions during the meeting it was felt that Cardiff Bus would be an ideal candidate for a low emission bus – either electric or hydrogen fuelled. Introducing a hydrogen bus could act as a catalyst to support the introduction of the first hydrogen refuelling centre in Cardiff.

- Two interesting quotes relating to electric vehicles were provided during the presentation, these were:

- "*The petroleum spirit cab will never be a practical proposition in large towns*" - (Hospitalier, 1898, quoted in Nieuwenhuis, Cope and Armstrong (1992)The Green Car Guide, p88).

- *Before 1900 most taxis in big cities were horse-drawn or EV. By 1900 1 in 3 cars sold in the US was an EV; many of these were taxis!*

- Several examples of cities using electric taxis were quoted during the meeting, for example, the BYD taxi in Brussels and the Tesla taxi that is used in Stockholm. Closer to home the city of Dundee in Scotland now run their entire taxi fleet on electric.

- Other suggestions made that could increase the introduction of low emission cars into the city included:

  - To raise public profile of any of your measures currently being delivered;
  - Or to inform colleagues about the same measures;
  - Inviting Green Fleet to do a launch event or an information event in Cardiff. Similar events have taken place in Dundee, Manchester, Bristol… Such events can help raise awareness on low emission vehicles and act as a catalyst to launch other private and public investments in this type of technology.

- The presentation explained that a major shift is taking place in terms of the type of vehicles that we use, examples included:

  - The shift towards using renewables to generate energy and fuel…;
  - This shift means that EVs make even more sense;
  - It is anticipated that access to electricity will be greater than to petrol and diesel;
  - And Wales is well placed as a potential renewable energy powerhouse.
  - Hydrogen is already used to store energy from renewables at times of peak supply but low demand in Germany.

- With Welsh renewables this is also an option and could potentially make Wales a clean hydrogen fuel hub – this is perfect for Welsh firm Riversimple.

- It was explained that Wales is potentially a Low carbon powerhouse because:

  - It is perfect for on shore and off shore wind; not bad for solar; good for micro-hydro and excellent for tidal. Many years after coal, Wales could once again become an energy exporter.
  - But a strategy is needed to build the necessary infrastructure (wind, tidal) and to promote the dispersed rural energy solutions (solar, micro-hydro). Key steps include attracting investment in EV/H2; ensuring that EV charging infrastructure is put in place and promoting / supporting new business models.

- 80 million cars a year are produced worldwide. In the long term this is not environmentally sustainable and so future vehicles will need a longer lifespan. Disposal will also be an issue as the battery is the big polluter.

- New battery technology allows for rapid battery charging. As we have not implemented any electric charging infrastructure in Wales there is no legacy to update or replace, this could be an advantage.

- Five years ago there were three separate charging systems and no crossover to allow all electric vehicles to share common charging points, this problem has reduced and common charging solutions have become available. The main divide now appears to be Japanese and non-Japanese charging solutions.

**Part 2 - Professor Alan Guwy from the University of South Wales –** he briefed the task group on use of hydrogen as a sustainable fuel for vehicles. This included discussion on recent developments in the field; the Baglan Hydrogen Centre and key challenges and opportunities facing this evolving technology.

**Key Findings**

- The University of South Wales Hydrogen and Fuel Cell Research & Development scheme addresses a range of energy and transport challenges, these include:

    - Production of hydrogen – electrolysis, biological, thermochemical;
    - Hydrogen storage – novel storage materials;
    - Fuel Cells – PEM, SOFC and Microbial;
    - Hydrogen vehicles and fuelling infrastructure;
    - Recovery of hydrogen from industrial streams;
    - Hydrogen and an integrated gas and electricity system;
    - Hydrogen and Fuel Cell economics and environmental Impact.

- In 1839 William Grove invented the gas voltaic battery, the first fuel cell. Reversing the electrolytic separation of water, he recombined oxygen and hydrogen to produce electricity and water. William Grove is a Welshman from Swansea. His invention was the forerunner of the modern fuel cell. William Grove's experiments were conducted within 5km of the University of South Wales Hydrogen Research Centre.

- Hydrogen for Energy Storage Research & Development - The University has a major applied research & development programme investigating hydrogen by electrolysis. It is also developing industrial scale alkaline and PEM electrolysis test beds (1550kW) with a focus on interaction with renewable electricity production.

- The University of South Wales collaborates with industrial partners in prototype testing and product development. In addition to this the University of South Wales has solid oxide electrolysis and biochemical electrolysis laboratories at the Pontypridd campus. These facilities are used to explore the options of converting electricity to hydrogen and providing short and long term energy storage.

- Electricity Network Constraints – The United Kingdom target is for 15% of all energy to come from renewable sources by 2020. In addition to this there is an EU target of 27% of all energy from renewables by 2030, but not clear how United Kingdom exit from the European Union will affect the United Kingdom target. Connecting new generation changes power flows on network, and so variable renewable electricity generation can challenge the stability of the electricity network, for example, voltage rise due to current flowing across resistance in wires, or thermal constraints from resistive heating due to current flowing across the resistance. This has presented a major challenge to new renewable generation as networks need to be upgraded to accept the increased current flows.

- Electrolysis of Excess Renewable Electricity - Hydrogen as storage solution to overcome electricity network constraints. Known as ‘power-to-power’ it relies on rapid response electrolysis and fuel cells for regeneration of electricity.

- Hydrogen Recovery and Enhancement – The ~University of South Wales has extensive industrial and academic experience in steam reforming and adsorption / membrane separation systems. It acted as a test reformer at the Port Talbot Hydrogen Centre following a collaboration with Shell. In doing this it researched the complex syngas streams and biogas/bioliquids produced as by products from the steelworks, particularly investigating how this process can be used to maximise hydrogen production.

- Hydrogen and Fuel Cell Vehicle Research & Development - The University of South Wales has supported industrial hydrogen vehicle development and deployment for 10 years. Hydrogen refuelling stations at Port Talbot

and Pontypridd have been developed as a result of such work. This expertise has been used to provide advice for the development of Honda Swindon and Bristol hydrogen refuelling stations.

- The Riversimple car (which is linked to the University of South Wales project) can be refuelled in less than a minute – it has the capacity to hold 1 kg of hydrogen fuel. The vehicle is capable of covering over 300 miles on one kilogram of hydrogen. The Baglan Hydrogen Centre produces 80 kg of hydrogen a day using renewable energy (from a relatively small number of solar panels). This means that each day the plant produces enough hydrogen to power the Riversimple vehicle for over 24,000 miles – or 8.76 million miles a year (the equivalent to more than eleven trips to the moon and back).

- **UK Government Vision & Support for Fuel Cell Vehicle Deployment -** Recognising the role of transport in reducing emissions, the United Kingdom Government's vision is that by 2050 almost every car and van in the United Kingdom will be an ultra-low emission vehicle. This puts the United Kingdom at the forefront of their design, development and manufacture, making it one of the most attractive locations for ULEV-related inward investment in the world. The United Kingdom Government believes that Hydrogen fuel cell vehicles (FCEVs) will feature alongside plug-in hybrid and battery electric vehicles in delivering zero carbon dioxide emissions at the tail pipe.

- Creating a United Kingdom Hydrogen Refuelling Infrastructure – H2 Mobility is a collaboration between the United Kingdom Government and industry to evaluate and plan the development of hydrogen refuelling stations in the United Kingdom. The 2013 evaluation led to a phased plan for the introduction of hydrogen stations and hydrogen volume requirements to support FCEV deployment. The wider aim is for full coverage of the country in 2030's.

- The presentation provided the following information about hydrogen refuelling stations in the United Kingdom:

    - 14 existing hydrogen refueling stations in UK close to most (not all) major centres of population
    - 6 Stations at University sites, supporting R&D and demonstration – capacity generally <24kg/day
    - 8 industrial stations with higher capacity 50-100kg/day
    - Half of the existing hydrogen stations have on-site production (mostly electrolysis)
    - Port Talbot, Sheffield and Swindon stations are mostly fed by renewable electricity (Projected FCEV sales and Hydrogen Station deployment in UK wind and solar).

- **Projected FCEV sales and Hydrogen Station deployment in United Kingdom** - Projections assume convergence of vehicle costs, i.e. FCEV prices are same as petrol or diesel vehicles by 2030. It is predicted that early stations will be small, but stations will increase in size as demand grows.

- The presentation questioned the future of hydrogen production and asked if it would be achieved through a centralised or distributed production approach? In doing this the presentation identified that:

    - Existing United Kingdom industrial hydrogen market is approximately 690,000 tonnes per year;
    - Production is generally from hydrocarbon reforming and as an industrial by product;
    - Markets include chemical and petrochemical, metals, electronics and food industries;
    - Distribution is mostly on-site or ‘over-thefence’ by pipeline (c.94% of demand);
    - c.6% is distributed via (road) tube trailers;
    - < 0.1% of total market is currently used for vehicle application;

- Potential shift towards smaller scale, on-site production of hydrogen to suit the growth of hydrogen refuelling stations;
- Unlikely to replace all centralised production but economics will dictate the spread of distributed hydrogen stations;
- Anticipated dominant technology of electrolysis for refuelling station production, but may also include de-centralised reforming;
- Projected hydrogen demand for vehicles is 254,000 tonnes per year by 2030. This is a significant growth from the existing quantity of distributed hydrogen production of < 1,000 tonnes per year.

- Creating a Market for 'Green' Hydrogen – United Kingdom Government recognise that meeting 2050 decarbonisation targets will require innovative approaches, including hydrogen for energy and transport sectors.

- The presentation commented on the following United Kingdom Hydrogen Refuelling Stations:

  - **Sheffield & London Teddington ITM Power -** Originally built in 2009, the Sheffield site was upgraded in 2015 to house an 80kg/day refuelling station with 350 bar and 700 bar capability. The London station is also a 80kg/day and facility and opened in May 2016. Production is on-site by an ITM PEM electrolyser, which is fed by a 225kW wind turbine (Sheffield) and grid electricity (London). The Sheffield station is situated near to the M1 motorway and is supported by the European H2EME project, which aims to deploy 200 FCEV in Europe by 2019 - including partner projects in 10 European countries The London Station is part of the European funded HyFive project.

  - **H2 Aberdeen** - Opened in 2015, the Aberdeen refuelling station is the first hydrogen bus refuelling station in the UK to have onsite production. Three onsite alkaline electrolysers can produce up to 400kg/day. As well as ten fuel cell buses, the site also fills fuel cell and hydrogen combustion engine vans. The development cost £19million

and was funded by EU, UK and Scottish governments. Further enhancements are planned in the area in 2017.

- **Swindon - Honda** – It was originally built in 2011 by BOC Linde on Honda's Swindon manufacturing site. It was funded by the regional business agency and initially the station relied on imported hydrogen, but was capable of refuelling at 350 and 700bar The hydrogen refuelling station was upgraded in 2014 to include full on-site production via electrolysis which is fed by solar PV cells at the factory. Access to the station is currently being improved to allow third parties and the public to use the facility. Honda operate FC fork lift trucks on the site and Swindon Council and Commercial Group regularly refuel their hydrogen vans at the site.

- **Introduction of Fuel Cell Electric Vehicles to the UK** - Major Auto companies have started to introduce Fuel Cell Electric Vehicles in limited numbers into the United Kingdom. The Hyundai ix35 Fuel Cell Electric Vehicle was the first commercial fuel cell vehicle introduced to the United Kingdom in 2014 and the Toyota Mirai was first sold commercially in the United Kingdom in 2015. Sales increased in 2016; however, overall numbers were small. It is hoped that sales will increase in 2017 due to United Kingdom Government support schemes. The Honda Fuel Cell Vehicle Clarity was introduced into the United Kingdom market in 2017. Daimler have joined forces with Ford, Nissan and Renault in a joint development programme and anticipate new Fuel Cell vehicle launch in 2017, with costs competitive with comparable to battery electric vehicles.

- **Independent or Smaller Vehicle Manufacturers Fuel Cell Electric Vehicles & Hydrogen Vehicles with Internal Combustion Engines** - Non original equipment manufacturers are developing and selling hydrogen vehicles to the United Kingdom market. These are both fuel cell vehicles and hydrogen combustion vehicles, often buses or commercial vehicles rather than passenger cars. Examples include:

- Van Hool have provided ten fuel cell buses to Aberdeen and two to London to go with previous fuel cell buses in the capital;
- Revolve is a small independent United Kingdom company with expertise in hydrogen engine vehicle development. They have delivered hydrogen/ diesel dual fuel refuse trucks to Fife council in Scotland as well as a significant number of hydrogen vans throughout the United Kingdom;
- Independent United Kingdom vehicle developers Riversimple have a strong vehicle design pedigree together with a mission for environmentally friendly mobility. Riversimple's Rasa is a two-seater, lightweight fuel cell car in prototype phase;
- Microcab is also an independent fuel cell car developer, working in partnership with Coventry University. The Microcab H2EV with a 3kW horizon fuel cell is the latest development and has been deployed in limited numbers;
- United Kingdom Fuel Cell developer Intelligent Energy has worked with Lotus and the London Taxi Company for a limited run of fuel cell taxis.

- **Creating a Hydrogen Gas Network** - Over 80% of the UK population use natural gas from a national pipeline network to heat, cook and provide hot water. The H21 Leeds City Gate project is an ambitious plan to progressively convert part of the low and medium pressure gas network in large United Kingdom cities to pure hydrogen. The objective is to decarbonize the network at minimal additional cost to consumers, whilst allowing for additional energy storage. Since 2002 there has been a major iron mains replacement programme, upgrading the network to polyethylene, which is compatible with hydrogen at medium pressure and below. The H21 Leeds City Gate project initially focuses on conversion within the city and suburbs of Leeds. The planned scale means that the hydrogen is to be produced by reforming natural gas combined with carbon capture and storage.

- After the presentation discussion continued and the following key comments and observations were made:

- Wales does not have a clean air strategy and to drive improvements forward it probably needs one;
- Significant financial support will be required to grow the number of hydrogen vehicles and infrastructure in Wales and across the United Kingdom as a whole;
- The grid is not currently large enough to accommodate all of the renewable energy generated in the United Kingdom; this means that without effective storage a large amount of potential renewable energy is lost. Converting the renewable energy to hydrogen when grid capacity is reached seems to be a very effective way of capturing and storing this excess energy;
- The major car manufacturers have a foot in both camps in terms of hydrogen and electric vehicles. In fact some are even developing vehicles that run on electric but have a small hydrogen back up fuel tank;
- Due to Scottish Government investment Scotland is much further forward than Wales in terms of clean air and renewable energy initiatives;
- Converting renewable electricity into hydrogen currently has a conversion rate efficiency of between 60% and 70%;
- Germany hopes to be using 700 hydrogen-powered buses by 2025;
- A hydrogen bus would be a good idea for Cardiff; however, it would be expensive and need supporting infrastructure in the form of a hydrogen-refuelling centre (which would also be expensive);
- Mid Wales would be an ideal location for a hydrogen train;
- Hydrogen is a safer fuel than petrol or diesel. The tanks are the expensive part in the vehicles and are made from a range of metals – they are also bullet proof to stop the hydrogen from leaking – having a bullet proof tank is a practical and not a safety issue. The quantity of precious metals used in the built of a hydrogen fuel tank is no more than the quantity used in a catalytic converter in an average petrol or diesel vehicle.

- At the end of the session Professor Guwy summarised the United Kingdom position in terms of hydrogen fuel development and implementation as:

    - The United Kingdom is moving to include Hydrogen and Fuel Cell solutions to address affordable, reliable and clean energy issues;
    - Hydrogen's potential to overcome electricity system constraints is a key focus, for example, using it as a backup storage facility alongside the national grid;
    - The United Kingdom is moving from a planning phase to deploy hydrogen and fuel cell vehicles and is financially supporting this introduction;
    - The network of hydrogen refuelling stations in the United Kingdom is strengthening with larger, accessible stations providing hydrogen at 700 and 350bar, often produced on-site;
    - Major vehicle manufacturers are starting to see the United Kingdom as a viable market for fuel cell cars;
    - The United Kingdom's aim is to encourage investment in manufacturing in the sector for international organisations as well as smaller United Kingdom;
    - There is a growing opportunity for Japanese vehicle and component manufacturers to do business in the hydrogen and fuel cell field in the United Kingdom;
    - The electron to hydrogen conversion rate is typically between 60% and 70%;
    - With an electric battery you have to take the whole of life costs into consideration, i.e. essential to include the production and disposal costs into the equation. Hydrogen fuel cells are simply complex metal boxes that store hydrogen and can be reused;
    - Wales is a long way behind Scotland in terms of supporting green energy and fleet initiatives. Wales should watch the market and back both electric and hydrogen options in the short term.

**Part 3 - Adrian Field, Executive Director from the Cardiff BID (For Cardiff) –** He met with the task group to discuss the views of the Cardiff business sector on air quality in the city and the potential impact of creating a clean air zone.

**Key Findings**

- There has been no consultation to date with the BID or its members on the Clean Air Strategy and the potential introduction of a clean air zone in Cardiff. The BID would welcome the opportunity to be a part of any consultation exercise and would appreciate being updated on the development of the clean air strategy.
- Adrian Field has been with the Cardiff BID since January 2017. In that time they have not received any queries or complaints about air quality in the city centre.
- The BID is pleased that the new Next Bike Scheme is being rolled out in Cardiff and support the initiative. It was felt that offering the major employers in the city a discounted membership might work well and stimulate use of the scheme – the BID members employ a significant number of people entering and leaving the city centre every day.
- BID has eight ambassadors who are able to work with the 750 BID members to pass on and communicate on any air quality related issues.
- It was felt that more could be done to encourage BID members and their staff to use the park & ride facilities offered by the Council. To reduce traffic into the city and ensure commuting is more comfortable for staff and business owners the BID has worked with Cardiff Bus to offer levy payers reduced costs on the Cardiff East Park and Ride service. A BID park & ride pass is available for £450 per annum, that's less than £2 a day for parking and bus travel and helps free up invaluable parking and driving space in the city.
- The BID is pleased and supportive with the new Next Bike Scheme that is being rolled out by the Council. They are also running the 'Abandoned Bike Removal Project' that includes amongst other things includes work on

identifying and delivering new bike storage facilities in the city. Sustrans has provided support and endorsed this project. They would be keen to work with the Council to help identify suitable hosting sites in the city centre for the new Next Bike scheme as they feel they are gaining a good understanding for potentially available sites in the city. They view improved cycle parking as an important issue and one that will help increase cycling participation in the city.

- Over July and August 2017 the BID asked businesses to complete a bicycle survey so that they could understand the issues that BID employees were having with bike storage and parking to gauge demand for further stands. It became clear that abandoned bikes are a significant issue in the city. Cardiff BID, in partnership with Cardiff Council and the South Wales Police, undertook a removal operation of these abandoned bikes. That took place on Tuesday 29th August.
- Adrian Field had dealt with BID's in London where congestion and air pollution was an issue. One idea that he felt had worked well for these BID's was a pledge for all staff working for BID companies to avoid having personal deliveries in at work. This it was thought had been a success as it had reduced the volume of small delivery vehicles entering an already overcrowded area – it has been estimated that 40% of deliveries in a typical city centre area are to staff.
- The task group was told that adding click and collect schemes to key transport locations worked well in London. Similar facilities could be introduced at Park & Ride facilities and in the new integrated transport hub.
- BID would welcome and support a car free day in the city and could task its eight ambassadors to help promote the event across the city centre.
- During the discussion it was felt that Cardiff BID members could be encouraged to develop more flexible working habits to help reduce congestion, for example, greater promotion of the car sharing scheme, home working where practical and possible, flexible ticket pricing (rail & bus) to spread the volume of traffic normally experienced at peak travel times.

- The BID would be happy to lobby for additional train carriages across the South East Wales region. Train journeys into Cardiff from the wider South East Wales region are normally full, providing more capacity it is felt would encourage more people to use this form of transport and take cars off the road.
- It was felt that using 'stock transfer sites' at the edge of the city would help keep heavy goods and other types of delivery vehicles out of the city centre. The stock could then be transferred onto a low emitting vehicle (for example, electric) before transferring it into the city centre. This would reduce emissions. The BID would be an excellent tool for supporting a debate on such an initiative, with the collective buying power of all the members providing necessary economies in scale in terms of logistics. Such a scheme could be delivered through a BID wide procurement.
- Next Bike – offer a deal to the BID members for discounted use of the scheme or a corporate membership. This would provide many of the larger companies (for example, Admiral) with the opportunity to engage with the scheme and experience the benefits. If it was a positive experience then the larger companies might eventually see the benefits of sponsoring the scheme.
- It was agreed that collectively the BID membership represented a significant pool of knowledge, talent and experience – something that the Council should support and work very closely with. Members felt that a significant amount of congestion and pollution coming into and out of the city was caused by BID member employees and the customers that they support. With this in mind the task group felt that there would be value in running a BID wide focus group or 'brainstorming' session with a large range of BID representatives. This would involve setting out the current issues facing the city in terms of air quality and then challenging the group to identify potential solutions. This it was felt would add a different dynamic and angle to solving the air quality problem and hopefully identify new and innovative solutions.
- Run an event and car free day where certain roads were closed. It would be interesting to tie this in with a major event to help understand how we

might better manage travel congestion in the city. Car free days on lesser polluted roads, this it was felt would be an ideal opportunity to promote cycling and walking in the city. It was also felt that employers should be encouraged to introduce a car free day, similar to the one applied by the Council.

- Run a consultation on private parking facilities to identify how much is used in Cardiff and to understand the impact that a parking levy might have on businesses and congestion / air quality in the city.

## WITNESSES TO THE INQUIRY

During the inquiry the task group was grateful to the following witnesses who provided verbal evidence or written contributions:

- Councillor Michael Michael, Cabinet Member for Clean Streets, Recycling & Performance
- Councillor Caro Wild, Cabinet Member for Strategic Planning & Transport
- Councillor Susan Elsmore, Cabinet Member for Social Care, Health & Well-being
- Gary Brown, Operational Manager – Assets, Engineering & Operations
- David Lowe, Operational Manager - Operations
- Jane Cherrington, Operational Manager – Strategy & Enforcement
- Simon Gilbert, Operational Manager – Development Management, Strategic & Place Making
- Paul Carter, Head of Transport
- Gareth Harcombe, Commercial Manager – Energy & Sustainability
- Gladys Hingco, Researcher – Scrutiny Services
- Richard Jones, Fleet Manager, Commercial Services
- Tim Walter, Senior Planning Officer
- Craig Lewis, Specialist Services Officer– Environment (Enterprise and Specialist Services), Shared Regulatory Services
- Jason Bale, Team Manager – Environment (Enterprise and Specialist Services), Shared Regulatory Services
- Helen Picton, Operational Manager, Enterprise & Specialist Services, Shared Regulatory Services
- Dr Huw Brunt – Public Health Wales
- Dr Tom Porter - Consultant in Public Health Medicine, Cardiff & Vale Local Public Health Team
- Stuart Cole, Professor of Transport, University of South Wales

- Huw Williams, Emeritus Professor of Transport and Spatial Analysis, Cardiff University
- Sukky Choongh- Campbell, Society of Motor Manufacturers
- Peter Renwick – Premier Taxis
- Ryan Owen – Dragon Taxis
- Kieran Harte – Uber
- Desmond Broster – Dragon Taxis
- Dr Claire Beattie – University of the West of England
- Gareth Mole - Cardiff Bus
- Margaret Everson - Bus Users Cymru
- John Pocket – Confederation of Passenger Transport
- Roger Herbert – Welsh Government
- Martin McVay – Welsh Government
- Steve Lloyd Brennan – New Adventure Travel
- David Conway – Stagecoach Bus
- Dr. Ji Ping Shi, Senior Technical Specialist, Air Quality Modelling and Risk Assessment Team Leader, Natural Resources Wales
- Professor Alun Guwy, Head of the Sustainable Environment Research Centre, University of South Wales
- Dr Paul Nieuwenhuis, Centre for Automotive Industry Research & Electric Vehicle Centre of Excellence, Cardiff University
- Adrian Field, Executive Director, Cardiff BID

## LEGAL IMPLICATIONS

The Scrutiny Committee is empowered to enquire, consider, review and recommend but not to make policy decisions. As the recommendations in this report are to consider and review matters there are no direct legal implications. However, legal implications may arise if and when the matters under review are implemented with or without modification. Any report with recommendations for decision that goes to Cabinet / Council will set out any legal implications arising from those recommendations. All decisions taken by or on behalf of the Council must (a) be within the legal power of the Council; (b) comply with any procedural requirement imposed by law; (c) be within the powers of the body or person exercising powers on behalf of the Council; (d) be undertaken in accordance with the procedural requirements imposed by the Council e.g. standing orders and financial regulations; (e) be fully and properly informed; (f) be properly motivated; (g) be taken having regard to the Council's fiduciary duty to its taxpayers; and (h) be reasonable and proper in all the circumstances.

## FINANCIAL IMPLICATIONS

The Scrutiny Committee is empowered to enquire, consider, review and recommend but not to make policy decisions. As the recommendations in this report are to consider and review matters there are no direct financial implications at this stage in relation to any of the work programme. However, financial implications may arise if and when the matters under review are implemented with or without any modifications. Any report with recommendations for decision that goes to Cabinet/Council will set out any financial implications arising from those recommendations.



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