

CAR FUTURES WALES

THE ROLE OF THE CAR IN A LOW-CARBON, SUSTAINABLE ECONOMY



ARUP



We are grateful to Arup, SP Energy Networks, Drive Electric and Sustrans for their generous support for this event.

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Summary headline recommendations for national and local governments:

- 1:** Align Electric Vehicle actions to other transport priorities and general policy. In other words, integrate EVs as part of an overall sustainable development strategy for Wales seeing them not as an end in themselves but a contributor to a low carbon and more equitable economy.
- 2:** Facilitate communication between fleet managers to enable peer to peer learning and help fleet professionals make purchasing decisions that take into account the whole life cost benefits of EVs.
- 3:** Public sector procurement needs to align to a long term, low carbon transport vision and drive the decarbonisation of transport. Use procurement to encourage car sharing, EVs and hydrogen for heavier vehicles. Be aware that rural challenges are different to urban and that there are social as well as technical challenges to overcome.
- 4:** The shift to EVs brings new challenges for fuel poverty. Being a car-free household should be an aspiration not an impediment. Therefore low carbon public transport and mobility as a service needs to rapidly evolve and be an attractive option. New charging points should be co-located with community-owned renewable generation so that car charging becomes additional revenue for rural communities or those located near tourist destinations.
- 5:** Achieve a “critical consistency” in which power supply, connections, and physical infrastructure grow in parallel and co-evolve in order to avoid future disruptions and allow for upgrades. Change needs to be systemic not piecemeal and this requires strong incentives and facilitation from government.

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Introduction

On the 15th February 2018, Cynnal Cymru and its partners convened a diverse group of industry experts, academics, Welsh Government and local authority officers, community activists and concerned citizens to examine and debate the role of the car in an emerging, low-carbon, sustainable economy.

The conference comprised of two sections – one in the afternoon and one in the evening. The afternoon session was addressed by the Cabinet Secretary for Economy and Transport, Mr. Ken Skates, AM.

Debate in the afternoon focused specifically on what infrastructure was needed to support a growth in electric cars. From this discussion, a set of recommendations emerged and we present these below.

Debate in the evening focused more on the culture of car use and how changes in power supply (electric and hydrogen as opposed to petrol and diesel), and the growth of “mobility as a service” would impact upon daily life, communities and the automotive industry.

Cynnal Cymru was able to hold this event thanks to the support of Arup, the Institute of Welsh Affairs, Renewable UK Cymru, and the National Trust. Financial support was provided by Arup, Drive Electric, SP Energy Networks, and Sustrans.

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The Role of Transport in Decarbonisation

In Wales, transport is a major (and growing) contributor to climate change. We need to clean up transport as fast as possible. BEIS figures for Wales (Department for Business, Energy & Industrial Strategy, 2017), show that transport accounted for around 25% of energy consumption in Wales during 2015.

Decarbonising our transport sector is not only vital for the health of our planet, but also the well-being of citizens. Several areas in Wales suffer from dangerous and illegal levels of air pollution caused largely by road transport, with the most vulnerable in our society (including children and the elderly) particularly at risk. Air pollution contributes to around [2,000 deaths per year in Wales](#) (6% of total deaths).

The purpose of this event was to consider the role of the car (particularly electric vehicles) in a low-carbon, sustainable economy. It's important to state here that there are many ways to make travel cleaner, cut carbon emissions, and improve air quality. Moving to a nation where 'active travel' is the norm should be Wales' main aim as this would deliver multiple benefits. Electric vehicles (EVs) do still have pollution impacts. For example, a significant amount of particulate matter (airborne pollution particles) come from brake and tyre wear and EVs will contribute to this even though their direct emissions from fuel consumption are zero. There is also considerable embedded energy (carbon) in the form of extracted minerals, steel, and plastic in each vehicle that needs to be recovered at the end of the vehicle's working life. The significance of EVs however is their potential to lower Wales' carbon emissions (if they are recharged from renewable energy sources) and improve air quality.

At present, Wales generates over [43 percent of its electricity consumption](#) from renewables. Welsh Government has made a commitment to raise this to 70% by 2030. The Welsh Government, as part of its decarbonisation agenda, is currently setting statutory carbon targets up to 2050 and developing its action plan as part of The Environment (Wales) Act 2016. The Wellbeing of Future Generations Act, which is unique to Wales, requires public authorities to take an integrated approach to policy making to ensure the wellbeing of people in Wales now and for future generations, also taking into account the global impact. These two Acts give Wales a legislative architecture that compels public bodies and their private sector partners to vigorously pursue a decarbonisation strategy.

Institute of Welsh Affairs Re-energising Wales project

The IWA were one of the key partners that helped Cynnal Cymru in putting together this event. The event was particularly timely for the IWA who through their [Re-energising Wales project](#) are creating a practical plan for Wales to move to 100% renewable energy by 2035. The project is bringing together leading thinkers from industry, academia, government and local communities to find and address the barriers that are slowing down renewable energy developments and look at opportunities to support growth.

The project has a number of outputs to date which can be seen on the [IWA website](#). Most notably, the project has created a [low carbon energy system vision](#) for the Swansea Bay City

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Region within its “Swansea Bay City Region: A Renewable Energy Future” report. This includes an assessment of how to make best use of local generation and renewable energy resources and assets to meet the energy demands within the Swansea Bay City Region for electrical power, heat and transport.

Whilst there are a range of opportunities identified within this report, the need for a transport revolution is highlighted as one of the key actions needed to meet the low carbon energy system vision outlined within the paper. It states that the future energy vision requires a transport revolution that will deliver an exponential growth in Ultra Low Emission Vehicles (ULEVs), and an increased use of public transport systems. Road transport will need to be decarbonised with a rapid uptake of electric vehicles in the private and light goods sectors, while hydrogen and biogas vehicles will also play a key role for HGVs and public transport. It states that the SBCR could become a leading region for the reduction of vehicle emissions through:

- The electrification of transport with 80% of new cars, and over 30% of all cars electric by 2035
- Growth and decarbonisation of public transport with 100% Ultra Low Emission Vehicles by 2035.

Overall, electric vehicles (cars, LGV, HGV and public transport) could deliver at least a carbon saving of 324,000 Mt CO₂ in the SBCR, equivalent to 30% of today’s road fuel emissions. Together with other ULEV technology, (such as biogas and hydrogen), increased use of public transport, and active travel and conventional fuel efficiencies, if the SBCR meets the energy vision outlined within the report, it has the potential to achieve the 44% transport carbon reduction that the Committee on Climate Change have identified as needed to meet the Fifth Carbon Budget.

The IWA has undertaken further research into decarbonising transport in Wales and launched a research paper on Tuesday June 26th 2018, with a big focus on reducing the demand for energy within the transport sector within Wales as a whole.

Conference Report:

The following is a summary of the presentations by headline speakers, the response from delegates, and the discussions that took place in the breakout groups.

1. The Current State of Electric Vehicles in Wales

With any new technology, uptake is initially slow and a minority of enthusiastic pioneers struggle to operate it when there is minimal support infrastructure. This has certainly been true of the electric car in Wales. At the time of writing however, we are in a period of rapid change. The Welsh Government has committed a small but significant sum of £2 million to enable a network of electric charging points along main roads throughout Wales.

Welsh Government clarified in the event that the focus of the £2 million is to help provide a charging network along/near Wales’ trunk road network. These include roads not registered as part of the Trans-European Transport Network (TEN-T) - in other words, a more far-reaching impact. A general point was made at the event that public money should be spent where it will

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produce a net economic benefit and create a charging network that supports the government aims on active travel, decarbonisation, health, and economic/social equality of opportunity. The recent Economic Action Plan committed to making all taxis and buses in Wales zero-carbon within 10 years. This is a great start, but, given the lower running costs of EVs (electricity is cheaper than oil), why not electrify the entire public sector fleet? This has the additional benefit of making people more familiar with EVs, and more likely to switch themselves.

Conference delegates debated the powers available to the Welsh Government and local authorities:

- Congestion charges and differentiated road access: for example, EVs could be permitted to use bus lanes or introduce Low Emissions Zones where polluting vehicles would be banned or fined.
- Workplace parking levies with concessions for ultra-low emission vehicles.
- Building standards and planning: The Welsh Government could require all new housing developments and shopping centres to have EV charge points designed in.
- Investment in charging infrastructure: this should focus on the current black spots in mid Wales which make traveling north-south very difficult. The £2 million recently announced to support EV infrastructure is a great start. This could go a long way towards alleviating range anxiety in Wales, although many more charge points will also be needed in urban areas.
- The Scottish Government is introducing a special innovation fund, designed to find solutions to charging for people living in tenement blocks or high rises. Welsh Government needs to find a similar way to ensure people who live in terraces and flats are also supported to switch to EVs. It also makes sense to install charge points at modal interchanges (e.g. train stations, park and rides) to connect with public transport.
- The Scottish Government has committed to end petrol and diesel vehicle sales in 2032 – eight years ahead of the Westminster Government. Given Wales has similar powers to Scotland in this area, we too should be stepping up to show leadership. The mood at the conference was supportive of a similarly ambitious can-do attitude with a credible programme. Striving for an ambitious target and just missing it is far more laudable than setting no target and making no progress. The Wellbeing of Future Generations Act requires integrated and transformational programmes from Welsh Government. EVs should be a properly funded cross-government priority, especially as we are lagging behind the rest of UK on this topic.

WRITTEN ASSEMBLY QUESTION

FOR ANSWER BY THE CABINET SECRETARY FOR ECONOMY AND TRANSPORT ON 18 APRIL 2018:

Simon Thomas (Mid and West Wales): In light of targets announced by the UK Government and Scottish Government to phase out the sale of new diesel and petrol vehicles, is the Welsh Government also considering setting an earlier target than 2040? WAQ76339

Ken Skates: The UK Government's target is to phase out the sale of diesel and petrol cars and vans by 2040 through its commitment to end the registration of such vehicles from 2040. We recognise that this measure will be the key driver in phasing out conventional fuel vehicles and encouraging the uptake of low emission vehicles and that vehicle registration remains a reserved matter. Whilst setting a devolved target based on a reserved measure is likely to be problematic, we would encourage the UK Government to consider bringing forward the date for ending such registrations and will be consulting this summer, as part of our decarbonisation programme, on measures the Welsh Government should take forward to encourage an earlier uptake of low emission vehicles.

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The conference was addressed by Mr. Ken Skates, Cabinet Secretary for Economy and Transport. Key points made by Mr. Skates:

- Welsh Government will be supporting measures for modal shift to active travel
- Welsh Government have allocated £100m over the next 10 years to a Welsh automotive business park in Blaenau Gwent: this will help with new technologies and advanced manufacturing, including the development of autonomous vehicles
- Welsh Government will be working with the UK government on strategy for decarbonising transport
- Funding will be nationally focused but regionally sensitive. It will lever in private money where possible
- The Welsh Governments 'Economic Action Plan' will be linked to the UK industrial strategy

Tim Armitage of Arup suggested that local authorities face social and technical challenges in providing leadership on electric vehicles. The technical challenges include;

- The need to meet the installation costs in a time of restricted public spending
- Choosing locations for charge points that will not cause disruption during operation but are accessible to all potential users
- The specification of the chargers – the speed of charge
- A power supply that is flexible and sufficient to meet demand
- The capacity to maintain and upgrade the chargers
- Choosing a business model that gives the authority a return on its investment
- Choosing chargers that operate for a wide range of makes and models

The social challenges are related to technology. Is it realistic, for example, to expect each house in a terraced street to have its own charge point although detached and semi-detached properties with a drive have that capacity? Should there even be public charge points or should the authority stand back and allow the market to evolve solutions? Public charging bays are vulnerable to being blocked by vehicles that stay beyond the charge period, or even by non-electric vehicles using them as parking bays. We will need to create a new regime of by-laws, and evolve a new culture of road etiquette if electric cars are to become the dominant form of private transport.

Public authorities could lead by example by providing some of their own charging infrastructure (not least for their own vehicles), and use this as a focal point for a dialogue with householders and drivers on how best to support the evolution of an electric vehicle market. The principles of sustainable development enshrined in the Well-being of Future Generations Act are pointedly apt in this context: plan for the long-term and involve the public in the debate, collaborate with industry in order to prevent problems, and produce solutions that deliver integrated social, economic, and environmental benefits. These five ways of working will give us a better opportunity to ensure that ownership of electric and hydrogen vehicles is widespread and not

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restricted to certain communities or social groups, and that operation of the vehicles is legal, safe and hassle-free.

While the market is still small, it is worth noting that charging availability directly affects vehicle purchase decisions and can be a catalyst for a market change. Visible infrastructure also supports a wider debate around sustainability, air quality and decarbonisation. Many local authorities in the UK are currently grappling with the challenge of improving air quality through a charging system for access to urban centres. Providing free entry or similarly, free parking to EVs is a provocative statement. Ultimately however, no authority wants to replace congestion by one type of vehicle with congestion by another so such concessions to EVs are likely to be a short-term response to the specific issue of air quality.

The challenges of equality of opportunity, EV congestion and the high up-front cost of ownership may be off-set by the growth of mobility as a service. In this model, private citizens choose not to own a car but instead have a contract or service agreement with a supplier such as a car club or taxi on demand. There are signs that mobility as a service is growing in popularity in cities and amongst young adults.

Another aspect of this evolving market is the concept of autonomous and connected vehicles. The vernacular term “driverless car” does not adequately explain the potential of the technology and the safeguards that could underpin it. In an urban environment or “Smart City”, vehicles could communicate with each other, traffic controls, even the road, and be aware of pedestrians and cyclists.

Many analysts are confident that autonomous and electric vehicles will be the majority technology on our roads in the near future. Tim Armitage of Arup cautions however that a systems approach is required to include Smart City connectivity, energy supply and storage. This could mean that hydrogen becomes increasingly important as an energy vector and store, while there is also the option for private electric vehicles to provide added storage capacity connected together in a “smart grid”. This idea is already being trialled.

Energy suppliers such as SP Energy Networks caution that we do need to think about new ways of storing and moving energy. They ask us to consider what would happen if every one of 1.4 million domestic customers in their region plugged in an electric vehicle when they got home from work. While this may seem far-fetched, the forecasted growth in global EV ownership has increased by 500% in one year. SP Energy Networks estimate that investment of between £300million to £700million and £1.7billion to £2.2billion is required to facilitate a 100% EV uptake across the Scottish Power Manweb area. This equates to a cost of £25 per customer per year. The energy supply industry is investing and investigating in response to this challenge.

With its wealth of renewable energy sources and a modest growth in community-owned renewable energy supply, Wales has an opportunity to link the need for mobility to a social business model and the equality of opportunity this offers. Specifically, this means that communities that own their own energy supply could operate a not-for-profit car club. This could

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prove significant in rural towns and villages if changes in urban centres, driven by the necessity to improve air quality, push the market against diesel and older petrol vehicles.

Summary of the Breakout Sessions on Electric Vehicle Charging Infrastructure

As explained above, the first part of the event looked at what was required to enable a growth in electric vehicles across Wales. Delegates were allocated to groups that looked at specific aspects of the challenge. The outputs of the group discussions are presented below.

Group 1

This group focused on how the £2 million and other potential government contributions should be spent.

An EV charging network needs to extend beyond main roads and be part of a wider strategy that integrates private electric vehicles with active travel and public transport.

Work with local authorities to identify the most useful and strategically significant places to locate chargers. Tourist destinations should be a priority and the National Trust are already taking independent action to install chargers at their properties.

Sites should be equipped with a variety of different chargers so that all makes of car can be serviced.

Sites should be designed and constructed with the potential to upgrade, in pace with changes in technology, with minimal disruption and cost.

The cost of connecting a site to the grid should be the first consideration in any project. If only starting with two chargers, the choice, design and planning permission for the site should anticipate growth in the number of chargers.

Locations should ideally also bring benefits to local businesses, recognising that the dwell time of motorists is an opportunity for local shops and cafes.

The government and local authorities should consider the issue of car ownership when planning a national infrastructure strategy: does the government want to encourage car sharing and car clubs as part of a change to less car ownership? To encourage a move away from reliance on the car and to encourage greater public transport, park and ride transport hubs should be a priority location for chargers. The implication is that it is more convenient to leave your car on charge and take public transport into the city centre rather than contribute to congestion by driving in. Within the motor industry, there is a view that the growth in ownership of full electric vehicles will not be as fast as some analysts predict. Instead, it is more likely that we will see a growth in plug-in hybrids and that this will be beneficial to Wales given its rural and challenging topography – the petrol engine will provide a greater re-assurance and resilience while the hybrid technology will contribute to a reduction in overall emissions.

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Switching to an EV requires upfront capital that is not available to many families. Therefore, enthusiasm for EVs by policy makers must be kept in perspective. It is likely that there will not be a like for like replacement with no interruption to the car-owning society that was encouraged by policies in the eighties. The future is more likely to see a growth in requirement of high quality buses as fossil fuel cars are priced off the road.

In spending public money on a charging infrastructure, the government needs to be sure that the sites will be well-used and re-pay the investment. At certain times of the year, tourist destinations receive large flows of traffic. These are clearly strategically important locations for chargers where investment will support the important tourist industry but also provide a satisfactory return.

Group 2

This group considered what was needed to support a transition to EVs amongst fleets.

Current barriers to transition include availability of vehicles, and perceptions of inadequate infrastructure. Investment should be directed at grid infrastructure.

EVs are not always suitable in a commercial/fleet context but when they are, they provide demonstrable benefit. These examples should be highlighted and widely shared as best practice. The people who have taken these pioneering steps can act as advocates within industrial/commercial sectors and lead peers by example.

While companies with suitable estates can provide charging infrastructure at base, a comprehensive public charging infrastructure needs to be in place to persuade fleet managers to make the change.

- Identify candidate fleets to encourage as emerging best practice e.g. estate agents.
- Focus more on revenue funding and less on capital funding.
- Make charging infrastructure adaptable (future proof).
- Promote workplace charging for any organisation that has the means even if they do not operate large fleets or have large buildings/grounds.
- Local authorities should mandate charging infrastructure in planning permission including detail on minimum charge and sufficient power supply.
- Bring forward 2020 BiK Tax changes – these would make a big difference between the attractiveness of pure EV and “interim technologies”.
- EV advocacy should talk about the total lifetime cost of ownership not just the upfront cost.

Group 3

This group looked at the enabling role of local authorities.

It was recognised that local authorities have an important, pivotal role particularly those presiding over urban areas.

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Local authorities (LAs) have access to a lot of data and analysis on the social and economic realities of particular areas. These should inform the decisions on where to locate chargers and on how to support EVs generally. This insight should ensure that charging infrastructure is viable, profitable, and equitable. Customers who don't have and who can't afford cars or EVs will end up paying for the costs associated with an increase in EVs such as reinforcement of the energy grids or local public charging infrastructure.

Not all authorities in Wales are convinced that EVs are a long term solution and are cautious as they wait to see how the market develops with concerns over things like the cost of batteries. In other words, EVs are an expensive option while it is more desirable to improve public transport and encourage a culture of reduced car numbers.

Generally, the discourse within local authorities in Wales is focused on supporting public transport and active travel. EVs are useful in helping an improvement in air quality but LAs do not want to see traffic congestions remain the same while air quality improves. The general goal of LAs at the moment is to foster a decline in the number of cars by providing attractive alternatives. Therefore local authorities should discourage a large growth in charging infrastructure in city centres but encourage and implement at integrated hubs such as park and ride. Active travel should be enabled now – ahead of the growth in EV numbers.

The group view was that the most important contribution LAs can make is as planning authorities and a source of public guidance. The market will play an increasingly important role in EV and hydrogen evolution and authorities can either seek to enable or resist this market trend by the planning permission and guidance they give. Authorities do have direct control over their own fleets and the need to decarbonise and support these fleets will drive commercial decisions that have knock-on effects for the general population. There are signs that Welsh authorities could be supporting a shift to electric buses by 2030. This will put additional challenge on the grid but will also act as a major indicator of trend for the car buying public.

Decisions by authorities have to anticipate changes in technology and market demand. They have to overcome any risk aversion therefore, and in planning for the long term, accept a certain level of risk in horizon-scanning and anticipating what is not yet manifest. Euro 6 diesels are a safer bet but will they end up being an expensive halfway measure in place of a bold leap forward?

Local authorities can influence the market through major procurement decisions that relate to infrastructure (roads, trams, metro) – requirements will demonstrate that a particular approach to transport is the future and encourage purchasing decisions by local business and citizens. Local authorities, who adopt clean air zone charging need to either work together or, through the oversight of government, ensure that charges are consistent across the country.

Group 4

This group considered the needs/opportunities of communities.

Local renewable generation and battery storage should be put where the EV chargers are located.

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There is a big opportunity to encourage car clubs and encourage a decline in car ownership giving people attractive alternatives to owning cheap, second-hand fossil fuel cars.

With communities in mind, the generation and the demand have to be designed together. Therefore, if it is thought that a castle for example, would be a good place to site some chargers, then why not link these chargers to renewable technology in the adjacent village thus giving the village extra revenue from tourism?

Diesel, petrol and hybrids will continue to be vital as the transition proceeds. The ambitious approach to air quality in urban areas cannot be replicated in the countryside. Rural people will need petrol and diesel for some time (echoes the industry point about hybrids made in group 1). The ways EVs work and the benefits they bring should be explained to rural communities.

EV advocates in NGOs/industry/government should speak to communities of need or geographical communities to find out what their specific needs are and how EVs can meet these. As the market for EVs grows, the costs will reduce and so EV ownership will become more viable for a growing number. The second hand EV market will then also increase.

Group 5

Designing a future proof charging and road network for autonomous vehicles.

New communities and new buildings should be equipped with micro grids: open APIs
Governments and industry should collaborate to establish common standards of communications system and charging requirements: legislation to support this and the principle of interoperability. Consistency (2G/3G/4G etc.) is important.

There is likely to be a new business model which includes; grid to vehicle and vehicle to grid charging cycles, leasing models to replace actual car ownership, and the role of domestic and vehicle mounted batteries as part of the overall energy infrastructure. This may include demand-responsive pricing where the cost of charging a vehicle (or releasing stored energy to grid) changes as demand fluctuates.

As car ownership declines, less parking spaces will be needed but there will be a greater need for pick-up and drop-off zones.

Autonomous and smart-grid-connected vehicles may mean there will be no more need for traffic lights!

Speed is a strategic issue: higher speed areas like motorways will consume vehicle charge faster but slower speed area like the city centre will drain the battery more slowly. So this should inform where charging terminals are sited and how they are dispersed across the landscape.

Smart cars will require smart cities – there is a need to consider the wifi or wire-based connectivity of the urban landscape.

Even with autonomous vehicles, roads will largely stay the same – tarmac.

There is a “critical consistency” required to unify power supply, connections, and the physical environment in order to avoid future disruptions and allow for upgrades.

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Updates – 12th July 2017

The UK Government has launched [Road to Zero Strategy](#) to lead the world in zero emission vehicle technology

The [Welsh Government seeks views on a low carbon future for Wales](#) including action on transport

The Re-energising Wales project [‘Decarbonising Transport in Wales’](#) report highlights opportunities that could significantly improve and decarbonise the transport sector in Wales.