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## **Moving to low carbon transport in Ireland**

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### **1. Introduction**

The purpose of this paper is to outline how and what options are available to Ireland to reduce emissions in the transport sector. From the outset it should be noted that no one solution will achieve this goal. National and international research has shown that a mix of policies reduces our car usage and makes our car usage greener. A multi faceted approach yields the best results in trying to achieve this goal. Ireland, like many other countries, has busy urban areas and remote rural areas, all of which need to have efficient transport access. This paper sets out several ideas based upon experience and evidence that could be used to reduce emissions from the transport sector.

Transport accounted for about 20% of all emissions in Ireland in 2015 (EPA, 2017a). Economic growth and subsequent demand for transport are closely linked. The knock on impact means emissions in this sector are also growing and are predicted to grow by 10-12% above 2015 levels by 2020 (EPA, 2017b). This demonstrates the scale of the problem in this sector.

The number of cars in Ireland is predicted to increase from approximately 2 million in 2016 to over 3 million in 2050. This increase represents the extent of the problem in the transport sector. This projected increase means reducing emissions and implementing low carbon transport options is crucial. This has to be done even when the numbers of vehicles and the demand for transport are both increasing.

### **2. A low carbon transport model for Ireland**

With pressures of congestion and the negative environmental impacts of modern transport systems, it is not surprising that there is not one transport model that is 100% low carbon and sustainable. Internationally, governments are constantly seeking solutions to these problems. To date, this has not been achieved.

Typically, there are two solutions suggested aimed at achieving a low carbon transport network.

1. **Change how we fuel our transport:** electrification of our vehicles, improving vehicle technologies and the use of bio-fuels.

2. **Reduce our reliance on private vehicles:** reduce our reliance on private vehicles and shift towards public transport, shared car usage, walking and cycling.

In reality, neither of the solutions can be pursued in isolation and a mixture of both approaches are needed.

In a low carbon transport model our cities would have high quality, connected and efficient public transport networks that would take would meet the needs of the majority of those living in these areas. Walking and cycling would be the main mode of transport for the majority of short-distance trips. Shared cars (such as go car) and car-pooling would have a larger mode share and private vehicles would have a lower mode share.

In the rural areas of our country, low carbon transport can be achieved by the electrification of private vehicles. Efficient public transport is not something that should be limited to those living in our cities. Rural public transport requires the use of technologies that enable demand responsive transport in which users can book the use of public transport to service lower populated areas. Many countries (USA, UK, Australia, Japan, New Zealand and others) use this “dial-a-ride” model and it is an efficient model for rural transport.

To conclude our future transport model would see the following:

- Much greater usage of public transport
- Electrification of our car stock
- Sustained growth in walking and cycling for lower distance trips
- In rural areas the use of demand responsive transport

### **3. Emissions and how to reduce them**

The majority of all transport trips made in Ireland are taken by private car. The 2016 census shows us that 61.4% of us drive to work alone on a daily basis (CSO, 2017). While this has decreased from 2011, this high percentage of car usage is not sustainable.

Electric vehicles are seen as one of the most realistic solutions to decrease emissions from the private car fleet. Norway is the most successful country in the world in relation to the uptake of electric cars. At the moment 32% of the Norwegian car fleet are electric - compared to less than 1% in Ireland. This has been achieved by large tax incentives and allowing electric vehicles to use bus lanes in urban areas.

Research undertaken by the EPA funded Greening Transport project detailed in Figure 1 shows the results from several scenarios aimed at increasing the share of electric vehicles. The results show that if we achieve 25% of all cars as electric vehicles by 2025 and then 50% in 2030 our carbon emissions will still grow by 22%. These targets of 10%, 15% and 25% are very ambitious and the investment required to reach these targets is considerable.

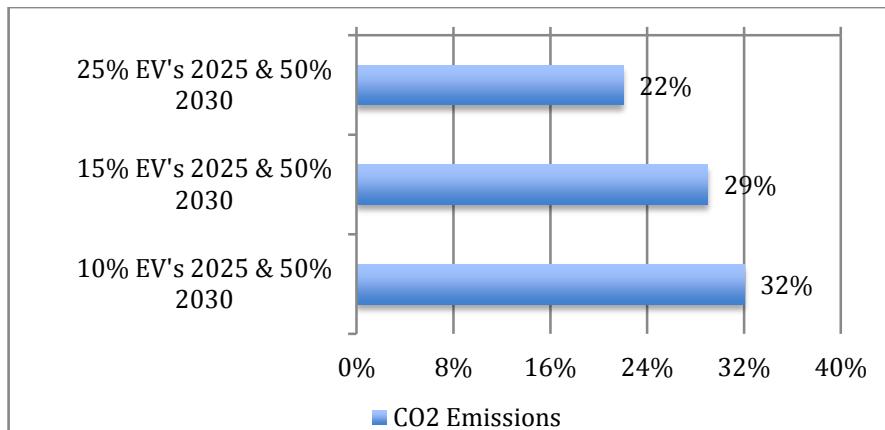


Figure 1 EV take-up scenarios

Changing how we fuel our public transport fleets can also reduce emissions. Further research conducted by the Greening Transport project in Trinity has shown that changing our bus fleets could result in substantial reductions in emissions. This would be achieved by using Compressed Natural Gas (CNG) and electric buses. The use of CNG in buses has been shown to be a success internationally with many cities able to reduce emissions and improve air quality.

A key question here is: 'What are the drivers for change?'. The automobile industry is changing and many big manufacturers like Volvo have announced dates by which they will no longer produce internal combustion engine cars and will move to plug-in hybrids and fully electric cars. Ireland is a technology taker in this field and as the car fleet changes Ireland will see reductions in emissions. But, should we as a nation try accelerate this transition? Further research to the prudence of this policy is required. Questions and answers need to be posed about how and if the investment could achieve greater savings in other areas of the transport sector.

#### 4. Changes in planning?

Transport and land use are interlinked. Changes in land use for housing, retail or industrial uses will result in changes in distances we have to travel. It can't be ignored that poor planning in the past has resulted in longer travel distances – research conducted by Caulfield & Ahern (2014) demonstrated that those living in housing built during the Celtic Tiger period had longer travel distances.

Globally, many examples exist of "Transit Orientated Developments". These are developments where efficient public transport is built into the development, for example a light rail system would have a stop adjacent to a block of apartments. In most cases parking is restricted in these developments. These types of developments have been proved to promote sustainable transport and in turn reduce emissions.

## 5. How can the state support this transition?

The state can in many ways support the transition to this low carbon model for transport. Primarily this will be achieved via strategic investment and policy development. The following are some of the key areas in which the state can support this transition:

- **Public Transport:** If this public transport is expected into the future to become the backbone of our transport network – we need to get serious about the investment in this mode. Large projects like Metro North and DART underground which have been mooted for many years should be delivered. Bus projects like Bus Rapid Transit and the Dublin Bus Connects project will increase the efficiency of this mode. With a more extensive and connected public transport network we can then consider elements of road user charging in our cities.
- **Evaluation of projects:** Transport investment is not cheap and the government needs to ensure that the citizens' investments in these modes are prudent and efficient. We need to look to new models of evaluating these projects which take into account longer pay back periods and that also fully incorporate how we value reducing carbon.
- **Electric Vehicles:** The state has been supporting the roll out of electric vehicles via purchase incentives. Many other countries have this type of support, most notably in Norway – with large financial incentives cited as one of the main reasons for this success. However, with many car manufacturers now indicating that they will soon only offer electric or plug-in-hybrid cars – should the state now change investment focus? Should charging infrastructure now be focused on and allow the market to promote vehicles?
- **Pilot schemes:** Our transport investment in Ireland, in the most, has been very conservative. Few schemes are invested in without extensive analysis proving positive benefits. While I am not suggesting we be less prudent with our investment – space needs to be found for new ideas and pilot schemes. Much of the success in recent years in cycling projects like the Mayo Greenway and bike sharing schemes have been driven by local authorities. Many other countries tap into EU funds to run demonstration and pilot schemes to test for impact. This is something the state needs to examine, as this is where innovation in the transport field can be found.
- **Behavioural Change:** Much of the change required across all sectors of society to meet our climate change challenges requires behavioural change. Studies conducted in Trinity have shown that many are unaware of the impacts transport have on the environment. More work needs to be done to educate and inform the public on this and schemes that monitor and encourage behavioural changes should be conducted. Technology can be leveraged in this area and success has been seen in the use of journey planners and other smart phone apps to measure behaviour change.

## **6. To what extent would the recently announced National Mitigation Plan deliver this?**

The National Mitigation Plan is a very ambitious and detailed plan. The chapter on transport outlines detailed proposals on how to reduce the carbon impact of transport. If the plan as outlined is followed it will result in substantial reductions in emissions.

This is a living document and is subject to change. Transport in 2050 will look very different as technology changes how we travel. These changes should be examined as work continues on this plan.

## **7. Wider economic benefits of reducing emissions**

A low carbon transport model as described in this paper would have significant wider economic benefits. The main economic benefits typically estimated from improved transport systems relate to travel time-savings, emission reductions, decreased accidents and health benefits.

Research conducted by my research group in Trinity has shown substantial health benefits from increased cycling (Deenihan & Caulfield, 2014). Recent research has demonstrated significant health benefits could be achieved by reducing the number of diesel cars in our car fleet (Dey et al, 2018).

While little has been published on societal and competitiveness benefits in Ireland, many international studies have shown that improved transport networks can have substantial positive impacts in these areas.

## **8. What role can shared transport take in the transport solution?**

In recent years, the shared economy has made many inroads into the transport sector. In Ireland, shared bicycle schemes now exist in Dublin, Cork, Limerick and Galway. These schemes have had been shown to be very successful and are delivering transport alternatives in these cities.

The shared economy and the utilisation of cars have yet to be fully exploited. Small-scale car sharing schemes exist in some of our cities – no evidence exists yet on the success of these schemes. Internationally, research shows that our cars spend on average 95% of the day parked (Shoup, 2005). This coupled with low average occupancy of private cars; show that private cars are a very wasteful resource. Methods of leasing and renting in an “Airbnb” style have many barriers in relation to insurance and flexibility. The full potential of this has yet to be researched in Ireland. While the shared economy can contribute in the transport field – little is known yet on how much these initiatives can really change our travel behaviour.

## 9. Barriers to achieving sustainable transport

The type of change that is required to achieve some of the sustainable transport objectives will face a number of barriers.

***Investment in public transport:*** The large investment that is required for public transport is a barrier to achieving sustainable public transport. The large rail projects that have been discussed in Dublin for a number of years should be delivered to achieve public transport targets for emissions and to reduce congestion. This public transport investment is not limited to Dublin as investment is also required in our regional cities.

***Reducing car usage:*** While investing in public transport and increasing electric vehicle uptake are barriers – perhaps the greatest barrier will be reducing car usage. Internationally, many studies have used behavioural change campaigns that use marketing and information to reduce private car usage. A “carrot and stick” approach to reducing car usage has been followed in many cities. The carrot, typically a good public transport system and the stick, some element of road user charging. Examples of this exist in London, Stockholm and Singapore.

***Spatial configuration:*** Ireland has a number of legacy issues in relation to our spatial structure. Poor planning has resulted in urban sprawl, low-density housing and larger distances to travel. This problem makes investment in public transport solutions more expensive as they have to service larger areas. This barrier is not one that can be changed in the short run and requires extensive planning.

***Acceptance of Electric Vehicles:*** Much has been published internationally on the acceptance of these vehicles, these mainly relate to range anxiety (fear that battery charge will run out prior to reaching a charging point) and a lack of electric vehicle model options. These concerns will overtime, reduce as technology improves and battery life increases and more manufacturers invest in new models.

## 10. What actions would individuals/ businesses need to take?

The National Transport Authority funded “smarter travel work places” and “smarter travel campus” are both very important in promotion of sustainable travel. These schemes work with companies to change travel habits. These initiatives are taking a leading role in the behavioural change elements of promoting sustainable transport. This initiative could be built upon and harness the strength in our communities to work together. Initiatives like “tidy towns” have been hugely successful in this field and elements of this competition could be used in the sustainable transport space.



## 11. Conclusions

This paper outlines some of the main challenges in the transport sector. As a country we face a number of pressures in this sector, a growing and dispersed population, legacy issues of poor planning and a public transport infrastructural deficit.

There is no one solution to these problems, but a true mix of some of the solutions that have been outlined in this paper. The National Mitigation Plan and the good work being done by the agencies needs to be fully supported and funded. Also, further research on the National Mitigation Plan needs to take place as our mobility needs in 2050 will be very different to those we see today. This will be particularly evident as autonomous and connected vehicles come on stream.

Key points I think should be considered from this document are:

- Investment in public transport needs to take place in both infrastructure and changing how we fuel public transport
- Mode change to sustainable modes of transport need to be facilitated by behavioural change and advances in technology
- Where private car use happens, the lowest emission vehicles are used

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