



# THE ROLE OF ETHANOL IN IRELAND'S CLIMATE ACTION PROGRAMME

*“the case for E10 is utterly compelling”*

A report prepared for Ethanol Europe

With forward by Brendan Halligan

Jim Power, July 2019

## FORWARD BY BRENDAN HALLIGAN

In the fight against climate change it is indisputable that the biggest technical challenge is how to reduce, and then eliminate, GHG emissions from transport. After all, the private car is indispensable to modern life and trucks essential to the running of the economy. Doing away with either is unthinkable, yet transport in all its forms is responsible for two fifths of emissions and if let grow as predicted will surely accelerate the rise in global temperatures, thereby causing irreversible damage to the planet and even threatening the survival of the species.



Brendan Halligan, Founder and President of the Institute of International and European Affairs

In this report, so expertly assembled by the distinguished economist, Jim Power, the scale of the challenge confronting policy-makers is laid out with refreshing candour. Simply put, the task of decarbonising transport will take at least three decades, and probably more, by which time it will be really too late to prevent the environmental catastrophe predicted by the IPCC and other scientific bodies.

So, what emerges as the key issue is the speed at which the transition can be accomplished. The author properly points to electronic vehicles as the ultimate solution but is acutely aware that it is a long way off. In Ireland, for example, the number of cars trebled over the past thirty years but electric vehicles still only account for 0.1% of the fleet. Continuing as we are at a desultory pace, even if on the right track, will not save us from misfortune. The task of replacing a national transport fleet based on diesel and petrol is a gargantuan one and will take many decades to complete. What do we do in the meantime?

From this analysis, the report concludes that we need an environmentally friendly bridge to get us from where we are now to where we want to be in 2050 (or even earlier as the latest expert reports advise). It then provides a substantial part of the answer by proposing the greater use of ethanol in petrol, which has the merit of being a proven technology having already been introduced into Ireland in 2005. It recommends that Ireland should double the ethanol content of petrol to 10%, as is currently being done in France, Germany, Sweden, Finland and Belgium. The blend, known as E10, is the major fuel used in France and Finland, two economies which are usually ahead of the curve and invariably good role models to follow. There seems to be no good reason why Ireland cannot follow suit.


One of the attractions of ethanol is that it can be produced from either grain or sugar beet, the latter being eminently suitable to Irish conditions and a crop with which I am personally familiar as I began my professional career as an economist with the Irish Sugar Company. That experience brought home the tangible economic benefits of vertical integration such as described in the report and can be replicated by the production of ethanol from locally grown grain and sugar beet. It is a rare example of the win-win solution so beloved of governments, the mystery is why it has not been embraced. Economic spin-off, however attractive, is of course a subsidiary argument to the main proposition that we need to cut emissions immediately while long-term solutions are phased in but it is none the less a substantial one in its own right and should carry weight with decision makers eager to revive the Sugar Company model (which was so strongly supported by Seán Lemass). There's a prize there for the adventurous.

What remains true is that without the increased use of E10 there is no quick fix to hand, short of banning cars and trucks from the roads for defined periods. Put in these terms, the case for E10 is utterly compelling and the mystery is why it has not been accepted and acted upon with the urgency the situation demands. The report quite wisely does not venture into speculation as to why there has been inaction at official level but others can reflect on the report published earlier this year by the Oireachtas Committee on Climate Action which opined that the failure to initiate solutions to climate change was more likely to arise from bureaucratic and regulatory obstacles than from technology. The present failure to act on E10 would, indeed, appear to be an example of what the Oireachtas had in mind and the root cause of its evident frustration at the lack of progress in areas where progress seems eminently realisable. It's not too often that policy-makers are presented with a silver bullet, as in the case of E10, and it should be employed without further ado because it will have an immediate beneficial effect on GHG emissions.

For that reason alone, this report on the Role of Ethanol in Ireland's Climate Action Programme is to be welcomed and its author commended. It is an invaluable contribution to the national debate on climate action. And it should be acted upon without delay.

**Brendan Halligan**

Dublin, 24 May 2019



## INTRODUCTION BY JIM POWER

For anybody who has in the past or who continues to doubt the reality of and the global implications of climate change from both a human, social and economic perspective, the evidence that is being presented on a daily basis should provide a strong reality check. Climate change represents the most fundamental challenge that humankind has ever faced and the window of opportunity to address it in a real and meaningful way is rapidly closing.



Jim Power, Economist

*Climate change represents the most fundamental challenge that humankind has ever faced*

Despite the small size of the country, Ireland will have to play its part in addressing this momentous global challenge. Unfortunately to date, its progress is limited and somewhat half-hearted. As a small country that likes to consider itself as punching above its weight in many different arenas, Ireland is not performing well in relation to its climate change obligations, but there is still an opportunity to alter that fact.

Ireland's international climate obligations are clear. These are to reduce Greenhouse Gas (GHG) Emissions by 20% relative to 2005 levels for areas outside of electricity; and achieve a 16% renewable energy share of gross energy consumption by 2020. Under new EU legislation for the period 2020-2030, Ireland will be aiming for 32% renewable energy across all sectors, and 14% in transport by 2030, plus a 40% cut in overall emissions.

Progress towards these goals is unacceptably slow. In 2017, the contribution of renewable energy sources to gross final consumption (GFC) was 10.6%; compared to a target of 16% by 2020. The target for renewable electricity is 40% and this stood at 30.1% in 2017; the target

for renewable heat is 12% and this stood at 6.9%; and the target for transport is 10% and this stood at 7.4% in 2017. Ireland will not meet its targets by 2020 and will be subject to EU fines as a result. The targets for 2030 are even more ambitious, but it seems clear that unless Ireland changes its approach dramatically, it will stand little chance of achieving those new longer-term targets. From an economic perspective and from a global climate change perspective, this situation is totally unacceptable.

I was commissioned by Ethanol Europe to consider the role that Ethanol could play in meeting Ireland's international climate change obligations. This led me to explore more deeply climate action and progress in the transport sector.

Transport is the largest energy-consuming sector, with a 43% share of final energy consumption. In 2017, transport accounted for the largest share of energy-related emissions, with a share of 39%. This is up from 33% in 2005. Under EU legislation, Ireland is supposed to have reached 10% renewable energy use in the transport sector as a whole by 2020. By 2017, the country had reached 7.4% and until very recently was without a plan for going beyond this by 2020. The problem is that of the progress made to date, over four fifths of it is due to the double counting of used cooking oil (UCO) biodiesel. The provenance of much of this used cooking oil is very questionable.

### *Transport is the largest energy-consuming sector, with a 43% share of final energy consumption*

Ireland's progress towards its 2020 transport decarbonisation goal is only three quarters along the way and is now effectively stalled. Most of what has been achieved is through imported double counted UCO, much of it of dubious origin. It would not be appropriate to suggest that UCO should not be used as biofuel, but it should be kept to genuine UCO, single counted and properly audited. Ireland needs to make genuine and real progress towards its transport goal. It is not doing that at the moment.

In the context of Ireland's environmental challenges and obligations, the targets for moving towards total electrification of the car fleet are positive and appropriate. However, for a variety of reasons the targets look totally unobtainable based on existing evidence. While it is essential that Ireland continues to move towards the zero-carbon position, it is essential that an environmentally-friendly bridge is put in place to ensure that the country can move from the current position to a zero-carbon position. Ethanol could and should be part of this solution.

In 2018, diesel cars accounted for 54.4% of total new registrations, down from 65.2% in 2017; petrol cars accounted for 38.5% of the total, up from 30.7% in 2017; petrol hybrid accounted for 5.5% in 2018 compared to 3.4% in 2017; and electric accounted for just 1% of the total in 2018, up from 0.5% in 2017. Based on a combination of factors, it is fanciful to believe that Ireland will achieve full electrification of the car fleet by 2050.



*There was an annual increase of almost 20% in the number of private cars taxed for the first time in the Republic in April 2019.*

The recently published Climate Action Plan, which in theory effectively puts the issue of climate change at the heart of the political and administrative system in the country, has to be welcomed by anybody who cares about the climate, but its targets are incredibly ambitious while falling short in terms of specifics regarding how they will be achieved.

In 2017, transport accounted for 19.8% of Ireland's greenhouse gas emissions (and well over a third of non-farm emissions). Therefore, it is totally appropriate that transport will have a key place in the climate action targets contained in the new strategy. The Climate Action Plan strategy is to achieve a 45 to 50% reduction in transport emissions by 2030.

In order to achieve this objective, the key targets in relation to the electrification of private transport include:

- Increase the share of electric cars in total new car purchases to 100% by 2030;
- Increase the number of passenger EVs on the road to 840,000 by 2030;
- Increase the total number of EVs to 936,000 by 2030;
- No NCT Certificate will be issued for non-zero emission cars after 2045; and
- By the middle of the 2020s, EVs will reach Total Cost of Ownership -parity with diesel and petrol engines. This effectively means that when a consumer factors in both up-front cost and on-going running cost, it will be as cheap to have an EV as a petrol or diesel vehicle.

The Climate Change Action Plan recognises that an optimum mix of regulatory, taxation and subsidy policies will be required to drive significant ramp-up in passenger EVs and electric van sales.

The shortcoming in the government plan for transport is that the measures described, while very ambitious, still don't meet with the ambition of 45%-50% emissions cuts: The fleet size will likely be 3 million or more by 2030, so even if the number of EVs on the road reaches 936,000 they will still represent less than a third of the fleet while at least 30% of the energy they use will be fossil based. They will consume 11% of Ireland's electricity<sup>1</sup> and they will result in significant loss of tax revenue. Something substantial will be needed to lower the emissions of the non-electric fleet. There is a role for biofuel in the Plan, but the levels and timing envisaged are modest.

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<sup>1</sup> 936,000 EVs will require 2.8 TWh or 11.2% of Ireland's current 25TWh demand

A recent report from the EPA<sup>i</sup> shows how public health is at risk due to high levels of Nitrogen Dioxide (NOx) in parts of Dublin City. Traffic emissions are the main cause of Nitrogen Dioxide in Ireland, along with electricity generation and industry. An EU Commission report<sup>ii</sup> showed NOx to be reduced by 34% and non-methane hydrocarbons by 60% when moving from E5 to E10, with E85 offering even further improvements.

Ethanol provides a very compelling partial solution to Ireland's transport targets. The country currently has 5% Ethanol in its petrol, which was introduced without any adverse effects in 2005. It would now make sense for Ireland to move to E10 for a number of reasons. These include the fact that E10 would help Ireland move towards its RES-T targets and avoid fines or financial commitments; it would reduce the dependence on imported energy and reduce the energy import bill; and it would provide an alternative activity and source of income for Irish farmers. E10 and higher works well in many other countries and has had no adverse impacts on engine performance and unlike Palm Oil, does not pose an environmental threat.

### *It would now make sense for Ireland to move to E10*

It is difficult to understand why E10 is not accepted by the Irish Government as the way forward for Ireland's transport climate obligations. It is the strongly held view of the author of this report that Ethanol should be accepted and taken on board as a solution for Ireland, and a solution that would have many positive direct and indirect effects.

The reality is that climate change is startlingly bad and despite much rhetoric, Ireland still is not making substantial progress in climate action. Transport is the biggest emitter of fossil carbon and is growing way faster than Ireland's efforts can catch up. Thousands of children are now taking to the streets to protest against climate inaction. The Irish government will have to take this on board, think outside the box for once and grasp the most obvious solutions.

**Jim Power**  
Dublin, July 2019



## EXECUTIVE SUMMARY

Ireland effectively has two targets to achieve by 2020: Reduce Greenhouse Gas (GHG) Emissions by 20% relative to 2005 levels, for areas outside the emissions trading system (emissions reduction in transport, agriculture and heat count towards the 20% GHG); and achieve a 16% renewable energy share of gross energy consumption. It is intended that Ireland's 16% energy target from renewable sources will be met by delivering the following sectoral targets:

- RES-E: Renewable Electricity Target of 40% of the country's electricity in 2020 to come from renewable sources. In 2017, this stood at 30.1%;
- RES-H: 12% of Ireland's heat to be provided from renewable sources by 2020. In 2017, this stood at 6.9%; and
- RES-T: 10% of Ireland's transport energy to be provided from renewable sources by 2020 (7.4% in 2017 but nearly half of this was "double-counted" so not actually real).

Ireland is clearly a long distance from achieving its targets. SEAI believes that as we get closer to 2020, the continuing growth in the economy will make it difficult to meet 2020 renewable energy and energy efficiency targets. The targets for 2030 will be even more ambitious, but unless the Irish Government addresses the problem these targets will become even more elusive. Ireland could be exposed to annual fines of between €68 million and €315 million.

The transport sector is a significant consumer of energy and consequently contributes significantly towards national greenhouse gas emissions. The use of fossil fuels is deeply embedded in driving culture in Ireland and will be very difficult to change. Transport is also a huge generator of income for the government so any tinkering with it to encourage climate friendly modes could result in loss of income, a net spend by the government to provide incentives and the risk of public dissatisfaction. Transport is the country's biggest emitter of fossil carbon and these emissions are growing.

In 2017, Transport was the largest energy-consuming sector, with a 43% share of final energy consumption. Transport accounted for the largest share of energy-related emissions, with a share of 39%. This is up from 33% in 2005. Under EU legislation, Ireland is supposed to have reached 10% renewable energy use in the transport sector as a whole by 2020. By 2017, the country had reached 7.4% and is without a plan for going beyond this by 2020. The problem is that of the progress made to date, over four fifths of it is due to the double counting of used cooking oil (UCO) biodiesel. The provenance of much of this used cooking oil is very questionable.

The Irish Government has a target whereby all new cars sold in Ireland will be zero carbon emissions capable. The total number of licensed vehicles in Ireland trebled from 922,484 in 1987 to 2.68 million in 2017. Of this total in 2017, private cars accounted for 2.07 million. Electric cars accounted for just 0.1% of the total, while petrol and diesel combined accounted for 98.4% of the total. The Government target of electrification of the fleet is fanciful and appears totally incapable of being achieved. The Electric Vehicle target, while very laudable,



may be undermined by a variety of factors. These revolve around cost, availability, supporting infrastructure and choice.

In the context of Ireland's environmental challenges and obligations, the targets for moving towards total electrification of the car fleet are positive and appropriate. However, for a variety of reasons the targets look totally unobtainable based on existing evidence. While it is essential that Ireland continues to move towards the zero-carbon position, it is essential that an environmentally-friendly bridge is put in place to ensure that the country can move from the current position to a zero-carbon position. Ethanol could and should be part of this solution.

Ethanol is a clean, high-performance renewable fuel that works in most modern cars and certain trucks. Its use boosts engine efficiency, helps reduce harmful emissions and helps the fight against climate change. From an Irish perspective, the country currently has 5% Ethanol in its petrol, which was introduced without any adverse effects in 2005. It would now make sense for Ireland to move to E10 for a number of reasons.

The invocation of E10 by the Irish Government would have a number of positive effects. These include the fact that E10 would help Ireland move towards its RES-T targets and avoid fines or financial commitments; it would reduce the dependence on imported energy and reduce the energy import bill; and it would provide an alternative activity and source of income for Irish farmers. E10 and higher works well in many other countries and has had no adverse impacts on engine performance and unlike Palm Oil, does not pose an environmental threat.

## THE CONTEXT FOR IRELAND'S ENVIRONMENTAL OBLIGATIONS

Ireland effectively has two targets to achieve by 2020:

- Reduce Greenhouse Gas (GHG) Emissions by 20% relative to 2005 levels for areas outside of the ETS. Emissions reduction in transport, agriculture and heat count towards the 20% GHG; and
- Achieve a 16% renewable energy share of gross energy consumption.

Under the Paris Agreement, which was adopted on December 12<sup>th</sup> 2015 and which came into effect in November 2016, the EU committed to a reduction of at least 40% in greenhouse gas emissions by 2030, relative to 1990 levels. The IPCC's 2018 Special Report *GLOBAL WARMING OF 1.5 °C* points to the importance of results being achieved in the next dozen years and the often-overlooked factor that cumulative carbon savings racked up in the immediate future matter more than hypothetical cuts some decades off.<sup>iii</sup>

Under new EU legislation for the period 2020-2030, Ireland will be aiming for 32% renewable energy across all sectors, and 14% in transport.

Despite the small size of the country and its economy, Ireland will have to play its part, but unfortunately is not doing so at the moment. In August 2018, the then Minister for Climate Action and Environment, Mr Denis Naughton T.D., admitted that the Government's plan to address climate change by reducing carbon emissions and adopting renewable energy is not working.<sup>iv</sup> He stated that the National Mitigation Plan adopted in 2017 would have to be radically revised in light of data from the Environmental Protection Agency (EPA) showing that Ireland is locked into a trend of rising CO<sub>2</sub> emissions.

The most recent Greenhouse Gas Emissions projections from the EPA<sup>v</sup> suggest that total emissions in Ireland are projected to increase from current levels by 1% by 2020 and by 4% by 2030 based on a *With Existing Measures* scenario. Based on a *With Additional Measures* scenario emissions are estimated to increase by 2% by 2020 and decrease by 1% by 2030. It is estimated that by 2020, Agriculture will account for 33% of emissions, Transport will account for 23%, and Energy will account for 18% of emissions.

Worldwide as in Ireland, emissions in transport are rising as car ownership and distances travelled continue to rise. Peak oil on the road is some decades away based on current trends. Road travel based on renewable electricity may have captured the public imagination but it has yet to become anywhere near a mainstream reality. Current trends indicate that it will be 2050 or thereabouts before e-mobility and conventional vehicles reach parity, by which time transport demand will have more than doubled. The IEA and IPCC envisage half of transport energy still being fossil derived by 2050 under the 1.5-degree scenario, with the other half divided roughly evenly between biofuels and renewable electricity.

The EPA concludes that Ireland is not on the correct long-term trajectory in order to meet its national 2050 targets in the electricity generation, built environment and transport sectors.

The projected growth in emissions is largely being driven by projected strong economic growth and relatively low fuel prices leading to increased energy demand.

Under EU Directive 2009/28/EC (The Renewable Energy Directive), Ireland is obliged to reach a target of 16% of all energy consumed in the State coming from renewable sources by 2020. The Directive requires each Member State to adopt a national renewable energy action plan (NREAP) to set out Member States' national targets for the share of energy from renewable sources consumed in transport, electricity and heating in 2020 that will ensure delivery of the overall renewable energy target.

It is intended that Ireland's 16% energy target from renewable sources will be met by delivering the following sectoral targets:

- RES-E: Renewable Electricity Target of 40% of the country's electricity in 2020 to come from renewable sources;
- RES-H: 12% of Ireland's heat to be provided from renewable sources by 2020; and
- RES-T: 10% of Ireland's transport energy to be provided from renewable sources by 2020.

Table 1 shows the progress that is being made towards each of the individual component targets and the overall target.

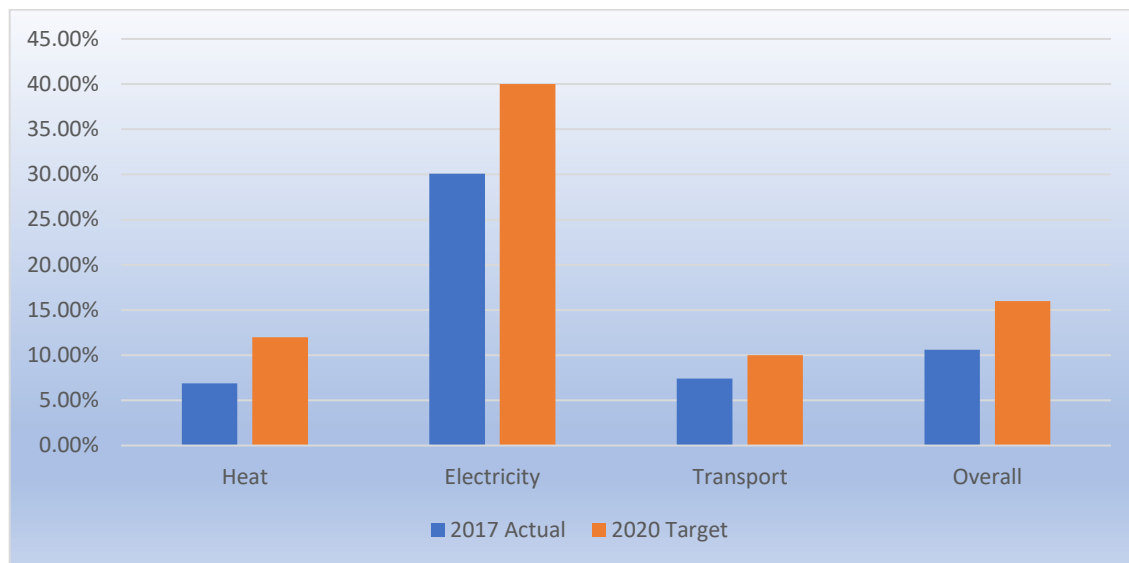
**Table 1: Renewable Energy Progress to Targets**

	2000	2010	2017	2020 TARGET
<b>RES-E (normalised)</b>	4.8%	14.6%	30.1%	40.0%
<b>RES-T</b>	0	2.4%	7.4%	10.0%
<b>RES-H</b>	2.4%	4.5%	6.9%	12.0%
<b>Directive (2009/29/EC)</b>	2.0%	5.6%	10.6%	16.0%

Source: SEAI, Energy in Ireland, 2018 Report, December 2018

Figure 1 shows the progress in graphical format. The limited progress made to date and the challenge ahead is immense but totally necessary.

**Figure 1: Renewable Energy Targets**



Source: SEAI, Source: SEAI, Energy in Ireland, 2018 Report, December 2018

SEAI estimates that in 2017, the contribution of renewable energy sources to gross final consumption (GFC) was 10.6%, compared to a target of 16% by 2020. In 1990, this was just 2.3%. In 2017, this avoided 4.1 million tonnes of CO<sub>2</sub> emissions and €439 million of fossil fuel imports.<sup>vi</sup> Ireland's energy import dependency has been reduced from 88% in 2015 to 66% in 2017.

Between 2005 and 2017, Wind accounted for 52% of the contribution towards the Directive target; Bioenergy accounted for 38% of the contribution, which consists of biomass at 23%, liquid biofuels at 13% and biogas at 2.1%. The remaining contribution came from hydro at 4.9%, geothermal at 3.3%, and solar at 1.2%.

Ireland is clearly a long distance from achieving its targets. SEAI believes that as we get closer to 2020, the continuing growth in the economy will make it difficult to meet 2020 renewable energy and energy efficiency targets.

There is a strong linkage between economic growth and energy use. For example, in 2016 Ireland's energy use increased by 3.7% and real gross domestic product (GDP) expanded by 5.1%. In 2017, energy use increased by 0.5% and real gross domestic product (GDP) expanded by 7.2%. This represents an improving trend, but the objective of Ireland's energy policy must remain clearly focused on decoupling economic growth from fossil fuel energy use.

The revised Renewable Energy Directive has been adopted by the EU, with the aim of adapting the original framework for renewable energy development to 2030.<sup>vii</sup> It contains 6 key areas for action:

- Creating an enabling framework for further deployment of renewables in the Electricity Sector;
- Mainstreaming renewables in the Heating and Cooling Sector;
- Decarbonising and diversifying the Transport Sector;
- Empowering and informing consumers;

- Strengthening the EU sustainability criteria for bioenergy;
- Making sure the EU level binding target is achieved on time and in a cost-effective way.

The overall target for 2030 is that renewables will account for 27% of all energy consumed in the EU. This is consistent with the EU's political priority of becoming the world's number one in renewables. It is posited that 50% of European electricity should be renewable; and member states should be provided with options to increase the share of renewable energy in heating and cooling supply by 1 percentage point per year until 2030.

## THE TRANSPORT SECTOR

The transport sector is a significant consumer of energy and consequently contributes significantly towards national greenhouse gas emissions. The use of fossil fuels is deeply embedded in driving culture in Ireland and will be very difficult to change. Transport is also a huge generator of income for the government so any tinkering with it to encourage climate friendly modes could result in loss of income, a net spend by the government to provide incentives and the risk of public dissatisfaction. Transport is the country's biggest emitter of fossil carbon and these emissions are growing.

Throughout Europe there is a recognition that the Union still depends 94% on oil supplies to fuel its cars, trucks, ships and planes. The long predicted electric vehicle boom has yet to take off.

A new obligation on European transport is being introduced for the period 2020-2030 to foster development of renewable and low-carbon fuels, including advanced biofuels, renewable transport fuels of non-biological origin, such as hydrogen, waste-based fuels and renewable electricity.

### THE POLICY OBJECTIVES

Article 3 of the Renewable Energy Directive for 2020 sets out mandatory national overall targets and measures for the use of energy from renewable sources for all EU Member States. Ireland's target for the share of its gross final consumption of energy to come from renewable sources, by 2020, is 16%.

Although Member States may set individual targets for heat and electricity, item 4 of Article 3 places the following obligation on all Member States:

'Each Member State shall ensure that the share of energy from renewable sources in all forms of transport in 2020 is at least 10% of the final consumption of energy in transport in that Member State'. This will rise to 14% by 2030 under RED 11, the new Renewables Directive.

Perhaps in recognition of how politically challenging transport is, the new obligation is strikingly unambitious. The 14% shrinks considerably in real terms as half of it is accounted for by "double or multiple counted" energy forms while the other half is optional and can be ignored if a country decides not to use crop-based energy in its transport system. The core target is actually less than 3.5% of energy in a period of expected sector growth of 1%-3% annually. Europe's – like Ireland's – transport emissions will rise considerably. Other sectors will have to do more, if climate progress is to be made.

Back in 2008 when the current renewables legislation was being drafted, the Irish government target was that EVs would make up 10% of the national car fleet — equivalent to 200,000 — by 2020 and that there would be renewable electricity to power them. In 2014, that target was downsized to 50,000. Last year, it was reduced to 20,000 and may not even reach that number, while the total fleet itself has grown considerably. The effect of this is that Ireland's renewable energy in transport is entirely accounted for by biofuels blended in the petrol and diesel supply.

It is in the context of this obligation that Ireland has implemented the Biofuel Obligation Scheme (BOS) which was given effect in law by the *Energy (Biofuel Obligation and Miscellaneous Provisions) Act 2010*. The Scheme is one aspect of a twin approach in meeting the EU target for the use of renewable energy in transport; the second is to encourage the accelerated development and usage of electric vehicles.

The BOS Scheme places an obligation on suppliers of mineral oil to ensure that 10% (by volume) of the motor fuel (generally gasoline and motor diesel) they place on the market in Ireland is produced from renewable sources, e.g. ethanol and biodiesel. The obligation will be raised to 11% from January 2020.

Suppliers are currently meeting this obligation by using up to 5% ethanol in petrol and up to 7% biodiesel in diesel. The higher 10% BOS target is being achieved on paper because the Renewal Energy Directive allows each litre of biodiesel made from used cooking oil and animal fats to be double-counted. Data from the National Oil Reserve Agency (NORA)<sup>viii</sup> shows that in 2017, around 75 per cent of Ireland's bio-fuel was subject to double counting, meaning that Ireland's progress in the diesel sector was overstated by a factor of two due mostly to use of waste used cooking oil (UCO). This double counting represents a weakness for Ireland in several ways: It does not represent the real level of renewables use or climate progress; It cannot be rolled up into the overall cross-sector progress figures; Use of double-counting may be restricted as checks and balances are put in place to assure the waste UCO, which is mostly imported from outside the EU, is genuinely "waste" and genuinely "used". Ireland's demand for UCO exceeds the entire domestic capacities of the UK or Germany, and this is a phenomenon common across Europe.

The use of biofuels in transport in Ireland is running at around 6% and the use of double-counted biofuels is running at 4%. In June 2018, the EU agreed a revision of the renewal energy directive. The revision means that the headline target is for 32% of energy to come from renewable sources by 2030. Via obligations on fuel suppliers, renewables will reach a level of at least 14% in transport by 2030, supplemented by a set of facilitative multipliers to boost renewables in different sectors. The amount by which used cooking oil and tallow derived biofuels can be double-counted by a member state has been capped at 1.7%. This figure is hotly contended and likely to be lowered or raised depending on how the debate evolves. Ireland is currently using considerably more than 1.7% so in 2020, if the limit is applied rigorously, the country will need to cut back on cooking oil and find other biofuels as substitutes.

Government has a stated aim of meeting the challenge of transitioning from conventionally fuelled vehicles to alternative fuels and technologies. In the *National Policy Framework on Alternative Fuels Infrastructure for Transport in Ireland: 2017 – 2030*, it refers to a national target whereby all new cars sold in Ireland will be 'zero carbon emission capable' by 2030 as well as many of the country's public transport buses and rail lines. The government has yet to propose measures by which this may be achieved, and given the low rate of zero carbon emission capable vehicles sold today it is a challenging goal. It seems likely it will also be a very costly goal for the Exchequer if it results in lost tax revenue and provision of cash incentives. The UK by contrast has a goal of 50% low-emissions capable vehicles sales by 2030

and 100% zero-emissions by 2040. The ultimate aim is to totally decarbonise the national passenger car fleet by 2050 and increase the use of alternative fuels in the freight sector.<sup>ix</sup>

The Framework outlines the main options that could provide alternatives to oil in transport. These include electricity, hydrogen, biofuels, and natural gas in the forms of compressed natural gas (CNG), liquefied natural gas (LNG), and liquefied petroleum gas (LPG), and hybrids of these (in 2018 Toyota launched a zero-emission capable hybrid electric-ethanol flex-fuel car). The strategy is based on a belief that electricity will fuel the majority of passenger cars, commuter rail and taxis; while natural gas and biofuels will play an increasingly important role for larger vehicles such as heavy goods vehicles and buses. Hydrogen is expected to increase its penetration across the entire fleet spectrum in the coming decades, but not in the short-term.

Internationally, aspirations for totally decarbonising road transport in relatively short periods of time are not uncommon. In contrast studies by bodies such as the International Energy Agency (IEA) and the United Nations Intergovernmental Panel on Climate Change (IPCC) result in outlooks which are more conservative. Transport energy demand is expected to rise steadily in the coming decades, doubling in the space of two or three decades. A rapid transition to renewables in such a large and growing sector presents great challenges for energy generation, for infrastructure and for vehicles. In Ireland, as is the case internationally, biofuels constitute the dominant form of renewable energy in transport. The IPCC, in its Special Report of November 2018, envisages a 7-fold increase in biofuels in transport by 2050 if global warming is to be kept under 1.5°C.

Ultimately, the Government believes that ‘a full electrification of the car fleet could represent a feasible option for Ireland, where supporting grid infrastructure is developed’.<sup>x</sup> This will require advances in battery technology, increased competition in the market, major infrastructure works and either lower vehicle costs or large-scale government incentives (accompanied by loss of tax revenues for traditional vehicles and fuels).

## IRELAND’S CURRENT PASSENGER CAR CONFIGURATION

The total number of licensed vehicles in Ireland trebled from 922,484 in 1987 to 2.68 million in 2017. Of this total in 2017, private cars accounted for 2.07 million.

Table 2 shows the breakdown of the car fleet by engine type in 2017. Electric cars accounted for just 0.1% of the total, while petrol and diesel combined accounted for 98.4% of the total.

**Table 2: Breakdown of Ireland’s Private Car Fleet (2017)**

CATEGORY	TOTAL	% OF TOTAL
<b>Diesel</b>	1,070,518	51.8%
<b>Petrol</b>	962,775	46.6%
<b>Hybrid</b>	21,157	1.0%
<b>Electric</b>	2,718	0.1%
<b>Other</b>	8,944	0.5%
<b>Total</b>	2,066,112	100.0%

Source: Irish Bulletin of Vehicle & Driver Statistics 2017, Dep. of Transport, Tourism & Sport

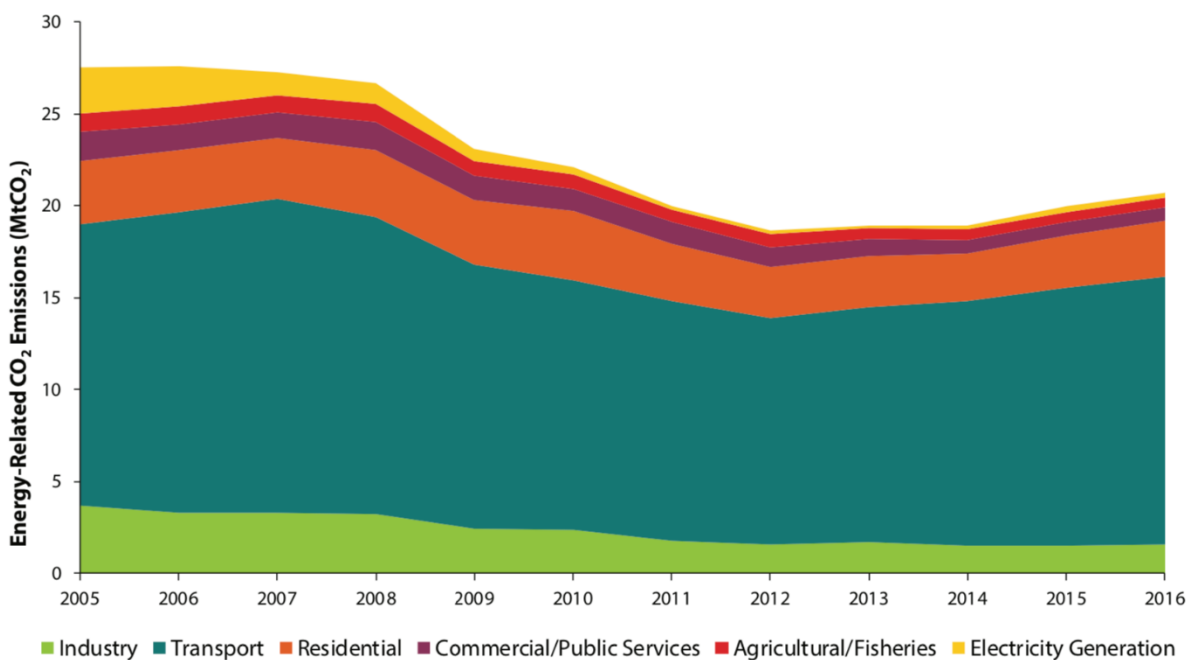


In 2008, VRT and motor tax changes were introduced to support the most energy efficient vehicles entering the Irish car fleet. Vehicles were initially categorised in seven graduating bands based on CO2 emission levels. These policy changes to reduce carbon in transport had the unintended consequence of increasing the uptake of diesel cars. CO2 levels reduced, but Nitrogen Oxide (NOx) levels have increased as a result of the move towards diesel.

It is interesting to note that in 2008 the government was forecasting<sup>2</sup> that 10% of the fleet (over 200,000 units) would be electric by 2020. The reality will be well under 1%. All over the world climate thinkers are turning to other solutions to add to the electric strategy.

Over the past couple of years, one of the key trends in Irish new car registrations has been the move away from diesel towards petrol. Diesel cars accounted for 54.4% of total new registrations in 2018, down from 65.2% in 2017; petrol cars accounted for 38.5% of the total, up from 30.7% in 2017; petrol hybrid accounted for 5.5% in 2018 compared to 3.4% in 2017; and electric accounted for just 1% of the total in 2018, up from 0.5% in 2017.

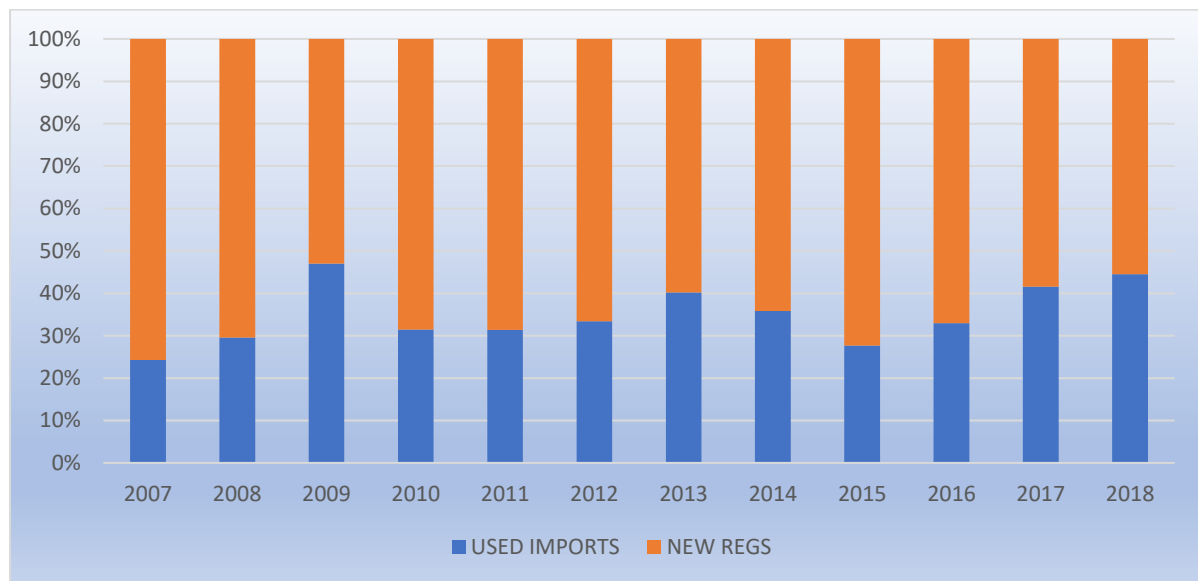
**Figure 2: CO2 Emissions from Oil Use (SEAI)**



Diesel cars accounted for 47.4% of total new registrations in the first half of 2019; petrol cars accounted for 40.7% of the total; petrol-electric accounted for 8.4%, and electric accounted for 2.4% of the total.

<sup>2</sup> <https://www.irishexaminer.com/ireland/only-8000-electric-cars-to-be-on-our-roads-by-2020-471479.html>

**Figure 3: Share of New Petrol and Diesel Cars 2007-2018**



Source: SIMI

Another feature of the Irish car market since 2016 has been a decline in new car sales despite what has been in theory a very supportive economic background. New car sales declined by over 10% in 2017 and by 4.4% in 2018. The key factor that has undermined new car sales has been the substantial decline in the value of sterling and a consequent surge in used car imports from the UK.

In 2018, used imports reached the highest level ever at 100,755, which was 7.8% ahead of 2017. Used imports accounted for 44.5% of the total car market in 2018. Sterling weakness is the key driver of used imports, with 96% of the used imports coming from the UK. In 2018, 74.9% of the used imports were diesel models.

For the car buyer, the savings to be made on used imports are significant based on currency and taxation differentials. However, there are a number of downsides for Ireland as whole, with the main one being environmental. New cars typically are more environmentally friendly than older ones, so there is a distinct risk that Ireland is just filling up its roads with older higher emission vehicles.

In Budget 2019, Government imposed a 1 per cent VRT surcharge for all diesel cars registered from 1<sup>st</sup> January 2019. From an environmental perspective, it would have made more sense to apply the increase to used cars alone.

The market penetration of electric cars is still very low, and is only increasing very slowly. In 2018, 1,233 new electric cars were registered, which is equivalent to just 1 per cent of total new car registrations. In the 6-year period 2013 to 2018, just 2,830 new electric cars were registered in Ireland.

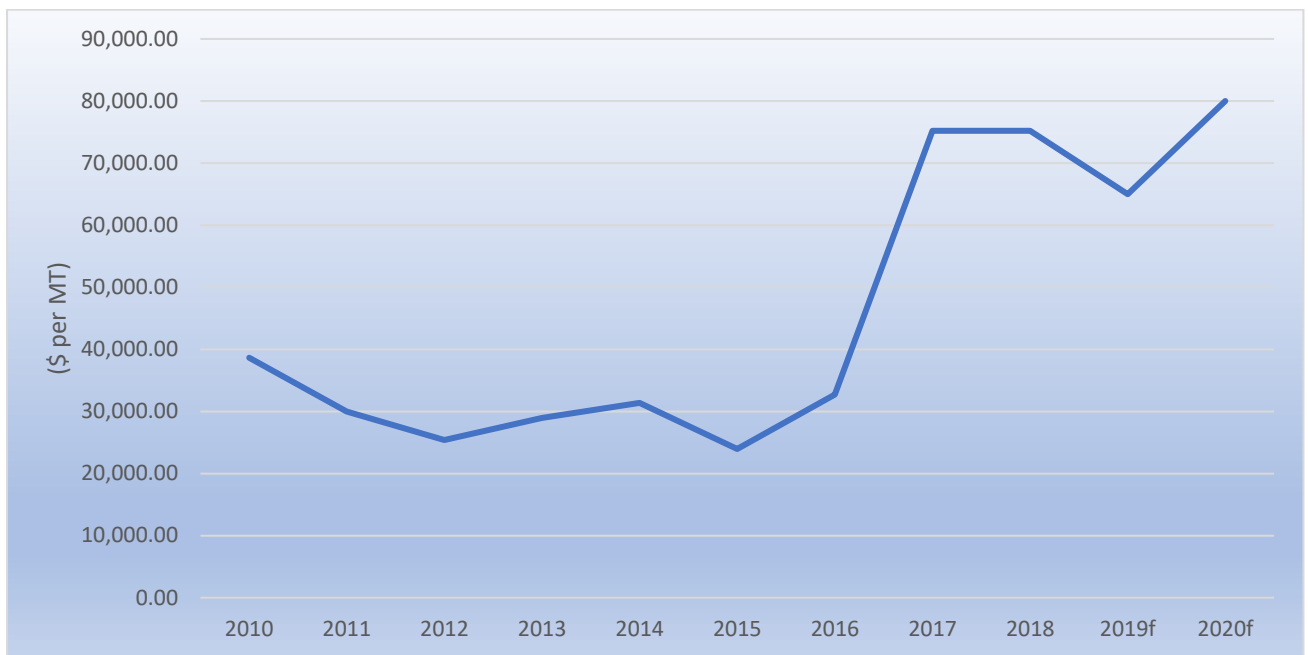
It does not appear conceivable that the Irish Government will achieve its stated objective of ensuring that all new cars sold in Ireland will be zero carbon emission or zero-emission

capable by 2030 as well as many of the country's public transport buses and rail lines, and that the national passenger car fleet will be fully decarbonised by 2050.

The Electric Vehicle target, while very laudable, may be undermined by a variety of factors. These revolve around cost, availability, supporting infrastructure and choice.

- It is likely that by 2050, the car pool in Ireland could be 4 million or even more. The percentage of electric vehicles sold in the Irish market is miniscule today and it would take a dramatic transformation in the penetration of electric vehicles to achieve a 100% penetration by 2050 or indeed to account for all new cars sold by 2030.
- Most of the world is now seeking to move quickly towards electric vehicles, which means that demand will increase exponentially over the coming years. It is highly unlikely that supply will be capable of matching this demand. Ireland, along with the UK, Malta and Cyprus are the only European countries that drive on the left-hand side of the road, so there may be a particular issue relating to the supply of right-hand drive vehicles. The UK will have first preference on new electric vehicles if supplies are limited, and second-hand UK cars will be marketed attractively in Ireland.
- In Budget 2019, the 0% Benefit-in-Kind (BIK) relief for electric vehicles was extended for a period of three years, with a cap of €50,000 placed on the Original market Value of the vehicle. This will create competition for limited supply and it appears unlikely that the demand will be capable of being met.
- New technology is always expensive, so cost factors will be likely to curtail the penetration of electric vehicles.
- On the behavioural economic front, it is arguable that the car we drive is an extension of self-image. At the moment there is not enough choice and style in the electric vehicle offering to drive the penetration that is planned.
- Issues around batteries may also inhibit market penetration. Lithium and Cobalt are critical components in batteries for electric cars. The rapid growth in the demand for rechargeable batteries has resulted in a sharp increase in these raw material prices in recent years, and this has given rise to concerns about potential cobalt and lithium scarcity that could slow down the production of electric vehicles. Figure 2 shows the recent trend in Cobalt prices. As well as demand, the uncertain supply chain for Cobalt is also an issue as more than 50% of global supply comes from the Democratic Republic of the Congo. It will be necessary to develop smaller and more energy-dense batteries that do not need Cobalt.
- The life of the battery is currently estimated at around six years and batteries are currently very expensive to replace. The risk for the buyer of an electric vehicle is that capital depreciation and the cost of battery replacement could render the purchase of an electric vehicle a poor investment choice. The cost of disposing of the battery may also act as an impediment to the future penetration of electric vehicles.

**Figure 4: Cobalt Prices**

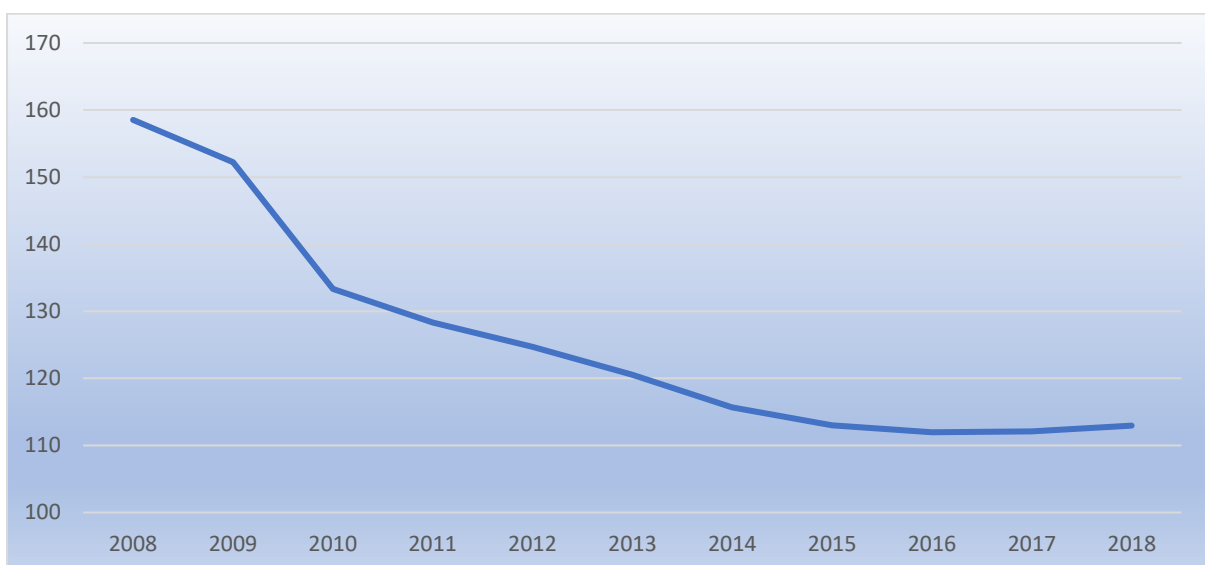


Source: Capital Economics

- The infrastructure for charging electric vehicles is not good at the moment. For many households, due to roadside parking issues, charging at home is not a viable option. The public charging infrastructure will have to improve dramatically and this will require significant investment.

The average CO2 emissions relating to new cars sold had been declining steadily since 2008. However, with the recent move away from diesel towards petrol, this trend is changing. In 2018, the average CO2 emissions from new cars sold was 0.9% higher than a year earlier.

**Figure 5: Average CO2 Emissions for New Cars**



Source: SIMI Motorstat

The average emissions of new cars purchased in 2017 was 112.1 g CO<sub>2</sub>/km. From 2020 onwards, EU Regulation 433/2014 sets a target of 95 g CO<sub>2</sub>/km for the average emissions of the new car fleet. With the move away from diesel cars towards petrol cars, this will prove a very challenging target for Ireland based on current performance and current practice.

## BIODIESEL AND IRELAND'S TRANSPORT SECTOR

Under EU legislation, Ireland is supposed to have reached 10% renewable energy use in the transport sector as a whole by 2020. By 2017, the country had reached 7.4%<sup>xi</sup> and is without a plan for going beyond this by 2020. The problem is that of the progress made to date, over four fifths of it is due to the double counting of used cooking oil biodiesel.<sup>xii</sup>

In 2017 Ireland put 164 million litres of used cooking oil and animal fat into the diesel system, and – by an accounting trick created to encourage emerging waste-to-energy innovation but now applied as the norm – is allowed count it as 328 million litres, even if in reality those double counted litres are actually fossil based diesel.

That represents a lot of used cooking oil (UCO). Developed countries with high levels of dining out, processed food and waste recycling manage to collect only a couple of litres per person per year (no country collects significant amounts of home cooked oil). Ireland uses about 40 times its domestic capacity for UCO collection. It is as if Ireland were using the entire UCO output of the UK or Italy. In reality it comes from over 60 different countries, most of which are outside the EU, which is a pity because they are out of sight of any inspectors wanting to verify provenance. Not surprisingly, given the double counting system and high demand in Europe, markets pay a premium for UCO to the extent that it costs more than virgin vegetable oil. The fear is that it would be feasible for an unscrupulous supplier in a distant land to boil up container loads of virgin palm oil, throw in some ash and other waste and pass it off as UCO.

The addiction to UCO is not just an Irish phenomenon. Europe's current renewables legislation includes no provision for distinguishing between good or bad biofuels, so it has been a race to the bottom in the last five years with UCO and palm oil now accounting for two thirds of EU biodiesel. Domestic ethanol and rape biodiesel, which are sustainable and traceable, account for the other third.

The EU now consumes about 3.5 billion litres of UCO biodiesel per year. While the 3.5 billion number roughly matches the supply countries' theoretical capacity for collecting UCO there is no chance whatsoever that remote towns in all those far flung countries – from Russia to Bangladesh, to Indonesia, India and Brazil, are diverting it all to Europe. Much of that 3.5 billion declared in Europe could well be virgin oil adulterated to seem used, or virgin oil with fake certification or the same tanker loads of UCO diesel showing up multiple times at diesel blending sites and being accounted for multiple times.

In a 2016 report, the European Court of Auditors repeatedly sounded alarm bells regarding the paucity of Europe's mechanisms for monitoring the sustainability and provenance of UCO.<sup>xiii</sup> The sustainability of most biofuels placed on the EU market is certified by voluntary schemes recognised by the EU Commission. However, in the 2016 report, the Court of Auditors concluded that 'because of weaknesses in the Commission's recognition procedure and subsequent supervision of voluntary schemes, the EU certification system for the sustainability of biofuels is not fully reliable'.

Renewable energy legislators in Brussels did spot the risk of fake UCO, and the obvious limit to how much of it could be sourced across the world, so in the new RED II legislation covering 2020-2030 they apply a cap to UCO deployment. From January 1 2021, EU member states will be allowed use and double count UCO only to the degree that it covers up to 1.7%, but no more, of their entire transport energy requirement.

This poses a problem for Ireland as UCO currently accounts for 2.5% of its entire transport requirement. The drop back from 2.5% to 1.7%, and equal loss of double counting, will leave a gap that will have to be filled by something else. In parallel, Ireland's fuel suppliers will see the biofuels blending obligation increase to 11% from 10%. These two regulatory changes combined mean that Ireland's fuel suppliers will need to find upwards of 200 million litres of extra non-UCO biofuel for 2021.

It will force fuel suppliers to consider how they will exceed the physical blending limits they have traditionally been subject to of 7% biodiesel in diesel (double counted to 14%) and 5% ethanol in petrol (where the 5% is real). They could double the ethanol usage level by going to E10 petrol, which would yield 55 million extra litres of high sustainable properly certified volumes. It is difficult to understand why the Irish government is not planning on trying to do this. The remainder could be achieved by using palm-free HVO biodiesel which is expensive, but traceable.

Another option for Ireland would be to go back to Brussels and argue to be treated as a special case (RED II "*Member States may, where justified, modify that limit (of 1.7%), taking into account the availability of feedstock. Any such modification shall be subject to approval by the Commission*"). Given Ireland's track record, there is the possibility that the government will go back to Brussels in order to preserve its UCO usage.

CNG (Compressed Natural Gas) is another transport option. CNG transport is common in countries like Hungary and Italy. Biomethane can be used in the same way as CNG and can be used in the same grid. Italy has one million CNG powered private passenger cars on the road and it is paying out €5 billion over the next ten years to subsidise biomethane production in an effort to get those cars off fossil CNG and onto biomethane, thereby helping achieve its 2030 climate goals. It won't be easy though, as small biomethane producers (mostly farms) are too far from the grid while municipal waste biomethane projects won't get planning permission in time to enjoy the incentive.

Ireland's progress towards its 2020 transport decarbonisation goal is only three quarters along the way and is now stalled. Most of what has been achieved is through imported double counted UCO, much of it of dubious origin. It would not be appropriate to suggest that UCO should not be used as biofuel, but it should be kept to genuine UCO single counted and properly audited.

Ireland needs to make genuine and real progress towards its transport goal. It is not doing that at the moment.

## NATIONAL ENERGY AND CLIMATE PLAN

As of early 2019, the most up to date and comprehensive expression of Ireland's energy and climate intentions is contained in the draft National Energy and Climate Plan (NECP) which it submitted to the European Commission in December 2018. This has been strengthened by the publication of the Climate Action Plan in June 2019.

The NECPs are being developed by all EU countries and are intended to provide a common means for planning, monitoring, comparing and meeting Europe's goals under the Paris Agreement. The plans are a requirement under the 2018 Governance Regulation and Europe has given itself a year to finalise them.

The Governance Regulation is at the same time very broad and very vague. The NECPs should be comprehensive, adhere to a common template, allow comparison and aggregation of national plans across the Union while at the same time allowing flexibility for Member States to set out the details of national plans reflecting national preferences and specificities.

Ireland's draft NECP is still in a very early stage of development, containing few of the elements one might expect of such a plan, such as targets, measures, milestones, budgets or responsibilities. It limits itself to a number of high-level ambition statements. Where specifics are given it discusses a number of scenarios for renewable energy in transport ranging from 4% to 9.3% renewables, from current biofuels usage levels to double that and from 10% to 20% share for electric vehicles in the fleet.

## WHAT IS THE POTENTIAL COST OF IRELAND NOT MEETING ITS RENEWABLE ENERGY TARGETS?

It appears highly unlikely that Ireland will meet its binding EU target of achieving a 16% share of renewable energy in gross final energy consumption by the end of 2020 as set out in Directive 2009/28/EC. SEAI estimates that Ireland could fall short of this target by at least 3%.<sup>xiv</sup> This would be regarded as a failure to 'fulfil an obligation under the Treaties'. Such a failure would result in the EU Commission pursuing an action in the more time-consuming Article 258 TFEU procedure, which would mean that it could take years before an actual penalty payment is imposed.<sup>xv</sup>

It is not yet clear what the penalty will be to EU Member States for not achieving their binding targets. If a country does not reach the 16% target the Directive anticipates that there will be a market where Member States will be able to trade renewable energy.

Under Article 6 of the Renewable Energy Directive (2009), this would involve a statistical transfer of a specified amount of renewable energy from one country's share of renewable energy in gross final energy consumption and added to another's. These statistical transfers can only be sold by a country that has exceeded its nationally binding target and the Directive states that 'a statistical transfer shall not affect the achievement of the national target of the Member State making the transfer'.



In effect this means that if, as appears virtually certain, Ireland fails to meet its renewable energy targets, the Irish Government could be able to purchase renewable energy credits from countries that have already exceeded their target.

The SEAI estimates of a 3% shortfall in the RES target, which could equate to 4.5 TWh based on an assumption of final energy use of 150 TWh. It is estimated that such a shortfall could cost between €68 million and €315 million, based on various cost scenarios (Deane).<sup>xvi</sup>

Deane argues that Ireland's current poor performance places the country in a more challenging position for the next phase of targets to 2030.

**Figure 6: Energy-Related CO<sub>2</sub> Emissions by Mode of Energy Application (SEAI)**



## ETHANOL AS AN ALTERNATIVE SOLUTION

There is a perception that the renewable transport targets in the EU will be met by Electric Vehicles, but the reality is that the penetration of EVs across the EU is still very low. In 2018, 57.6% of new passenger cars sold in the EU had petrol engines; 34.7% had diesel engines; and just 2.1% were fully electric vehicles. Given the approximate 17-year lifespan of a modern vehicle it takes 17 years for 2.1% new car sales to turn into 2.1% of the fleet on the road.

The vast majority of the current progress in meeting the RES-T target is being met by liquid biofuels, which are blended with conventional diesel and petrol.<sup>xvii</sup>

In the context of Ireland's environmental challenges and obligations, the targets for moving towards total electrification of the car fleet are positive and appropriate. However, for a variety of reasons the targets look totally unobtainable based on existing evidence. While it is essential that Ireland continues to move towards the zero-carbon position, it is essential that an environmentally-friendly bridge is put in place to ensure that the country can move from the current position to a zero-carbon position. Ethanol could and should be part of this solution.

### WHAT IS ETHANOL?

Ethanol is a low carbon substitute for petrol and it is made in conjunction with a process for making protein rich animal feed. Ethanol is the chemical name for alcohol and is produced from the starch and sugar in plants such as beet, cane and grains. Most ethanol in Europe is produced from corn, sugar beet and wheat, but new technologies are now enabling ethanol to be created from other materials like waste and residues, such as straw. Though policy makers beware: in 2018 straw in Ireland cost €200 per tonne which is more than the price of wheat or corn. Straw, though classified in EU renewable energy legislation as source of "advanced" biofuel and hence double-counted, is anything but a waste or residue.

On the production side, Ethanol is a purely biological process in which enzymes are used to break down starches into sugars, and then yeasts are used to convert sugars into Ethanol. The products of these processes also result in high quality feeds for livestock and speciality nutrition products, with as much feed being produced as ethanol according to Farm Europe<sup>xviii</sup>

Because it comes from plants in the main, ethanol is a renewable and climate-friendly source of energy. The carbon released in the combustion process is fresh atmospheric carbon and not fossil carbon extracted from oil wells. There is some fossil carbon attributed to the ethanol, to account for fossil energy used in the cultivation and production process. The process of producing ethanol from crops also results in the co-production of high-protein animal feedstuffs, and CO<sub>2</sub> that can be captured and re-used in other products such as carbonated drinks and greenhouses. Scientific progress is also being achieved that will have the effect of creating higher value-added by-products that can be used in human health and food nutrition. The potential looks very significant.

The main advantageous use of Ethanol is that can be added to petrol in order to reduce climate harming fossil fuel greenhouse gas emissions. European ethanol currently results in

average carbon emissions of 71% less than oil and this figure increases by 1%-2% per year as the life cycle of the ethanol production process becomes more efficient and less dependent on fossil energy. Compared to oil, ethanol fuel results in 70% less greenhouse gas emissions. Apart from reducing the level of particulate emissions in vehicle exhausts, the production and usage of ethanol from plants reduces imported oil dependency; contributes to the farming sector by creating the opportunity to secure and diversify farm production; and it generates positive by-products that enhance protein feed availability.

### **WHAT CONTRIBUTION CAN ETHANOL MAKE TO IRELAND'S CLIMATE OBLIGATIONS?**

In 2009, the EU adopted the Renewable Energy Directive (RED), which for the first time mandated that 10% of the transport energy used by member states must come from renewables by 2020. The revised Renewable Energy Directive (RED II) sets a target of 14% by 2030.

The Irish Government has committed to a transition from fossil fuel to renewable energy. In the transport sector, the Government has placed a general obligation on fuel suppliers in the country to use a certain percentage of biofuels, but suppliers are free to decide the precise type and mix of biofuel to use.

The current biofuels obligation is 10%, and up to 11% by 2020. This obligation is currently being met by using up to 5% ethanol in petrol and up to 7% biodiesel in diesel. In practice, the 10% obligation is being met due to the fact that biodiesel from used cooking oil and tallow is counted twice under the terms of the EU Renewable Energy Directive, even though in reality that second litre is just normal diesel. As a consequence, the progress being made in real terms is less than would appear on the official reports. Renewable Ethanol energy is counted once and so represents a more transparent and true form of progress.

The revised Renewable Energy Directive (for the period 2020-2030) caps the amount of waste-based biofuels that can be double-counted at 1.7%, which is significantly lower than what Ireland currently double counts. This will have the effect of lowering Ireland's reported progress to RES-T targets and could lead to even higher financial commitments to compensate.

### **E10 AS A POLICY IN EUROPE**

In Europe, transport accounts for about a quarter of EU greenhouse gas emissions, and road transport makes up more than 70% of that amount. Sustainable biofuels such as ethanol produced from grain or beet appear to be amongst the best near-term solutions for reducing emissions and moving towards its climate change targets.

Ethanol is a clean, high-performance renewable fuel that works in most modern cars and certain trucks. Its use boosts engine efficiency, helps reduce harmful emissions and helps the fight against climate change.

The International Renewable Energy Agency (IRENA)<sup>xix</sup> has estimated that the global share of renewable energy in the transport sector is very small at just 4%. It shows that the use of renewables is dominated by biofuels, mostly bioethanol and biodiesel, in certain countries,

and that electrification of transport associated with renewable power generation is extremely limited, with a share of just over 1%.

In its roadmap to 2050, IRENA projects that the share of electricity in all of the transport sector needs to rise from just above 1% in 2015 to 33% in 2050, 85% of which is renewable. Biofuels are projected to increase their share from just below 3% to 22% by 2050. Over the period from 2015 to 2050, total liquid biofuel production is projected to grow from 129 billion litres to just over 900 billion litres. It estimates that nearly one half of this total would be conventional biofuels, whose production would more than triple and the other half would be advanced biofuels, which can be produced from a wider variety of feedstocks than for conventional biofuels.

E10 is a petrol grade containing up to 10% ethanol by volume. Since 2016, E10 has been the European test fuel for type-approval fuel consumption and emissions testing. It is currently widely available in Belgium, Finland, France (it is the top selling grade in France), Sweden and Germany, as well as sporadically in other European countries. Other countries such as the UK, Netherlands, Luxembourg, Hungary, Poland, Czech Republic and Slovakia are considering adding E10 to petrol pumps. In Europe as a whole, the average Ethanol blend level is 5%, with some fleets using 85% or higher, particularly in Sweden and France, where E10 is the major petrol sold. In the US, all petrol has 10% or more ethanol in it.



*E10 is the number one selling petrol grade in France.*

The advantages of Ethanol as a petrol mix for Europe are numerous. They include:

- Blending Ethanol into petrol reduces greenhouse gas emissions;
- Helping Europe move towards its renewable energy targets and obviate the financial liabilities for countries that do not achieve their targets;
- Improving energy security and reducing the energy import bill. It is estimated that the EU import fuel bill is €20 billion per annum and this could grow to €60 billion by 2050;
- Providing an opportunity for farmers to diversify and generate a more stable income flow. This is particularly important in the context of the environmental sustainability of beef farming. It is estimated that the production of crop-based biofuels in Europe generates at least €6.6 billion in revenue for EU farmers every year;

- Ethanol production would result in considerable employment and boost economic growth. A recent report<sup>xx</sup> shows that the investment by Pannonia Ethanol in Dunafoldvár in Hungary since 2010 has reduced outward migration from the region since 2011; has been instrumental in the creation of over 5,000 new jobs in and around the plant; retained young people in quality careers; has generated incomes twice the local average; has boosted local tax revenues, with 70% of local government tax revenue now emanating from Pannonia; it has created a predictable market for agricultural produce; has stimulated the local services sector; and has attracted more investment into the area.

## **E10 AS A POLICY IN IRELAND**

From an Irish perspective, the country currently has 5% Ethanol in its petrol, which was introduced without any adverse effects in 2005. It would now make sense for Ireland to move to E10 for a number of reasons.

The invocation of E10 by the Irish Government would have a number of positive effects. These include:

- Climate change is the biggest challenge facing global policy makers, and every country has a role to play in seeking to mitigate its effects. Ireland is still not making progress in climate action, but as a small country that has considerable international clout, a move towards E10 would send out a very positive message and help push other countries in the right direction;
- Transport is the biggest emitter of fossil carbon and it is growing way quicker than Ireland's efforts can catch up;
- Electric vehicles will one day dominate the roads, but in the decades it will take to get there, bioenergy will be at least as important as electricity for climate progress in transport. There won't be enough renewable electricity for decades to come; there is unlikely to be a sufficient supply of electric vehicles; the infrastructure is wholly inadequate; and consumer acceptance is still very low. Peak oil on the road is two decades away and parity of combustion engines and electrical engines is four decades away, at best;
- The current fleet of conventionally propelled vehicles is large and growing (fortunately with ever greater efficiency and more hybrid options) so we need to apply climate solutions that suit this reality;
- We need these liquid biofuels soon and where do we get them but from where we get them already in the case of petrol, i.e. EU crop ethanol;
- Under EU biofuels regulations, Ireland has 18 months to maximise its use of safe effective EU biofuels derived from crops and build them into the climate programme. After 2020, due to regulations that currently exist but which will need to be changed, Ireland cannot raise levels of use of such biofuels. The opportunity for introducing E10 will have passed, so Ireland should act now;
- E10 would help Ireland move towards its RES-T targets and avoid fines or financial commitments;

- E10 would reduce the dependence on imported energy and reduce the energy import bill;
- E10 would provide an alternative activity and source of income for Irish farmers;
- E10 would result in the creation of employment; and
- E10 would boost economic growth.

## THE COMMON ARGUMENTS AGAINST ETHANOL AS A MOTOR FUEL

There are two common arguments made against Ethanol as a motor fuel. These are engine suitability and the impact on food production. Neither of these arguments is backed up by an evidence base, but nevertheless have a significant influence over policy makers in adopting a pro-active policy towards using Ethanol as a transport fuel.

### **ENGINE COMPATIBILITY**

Every petrol engine ever made or sold in the USA runs on E10 petrol. E10 has been the standard fuel there for close to 40 years and there hasn't been a single incident of a claim relating to it<sup>3</sup>. Ireland has already been using petrol with 5% ethanol (E5) exclusively for some years. In Brazil cars run on 27% ethanol and above while E10 is now the dominant blend in France, Belgium, Bulgaria and Finland. Around half a billion cars - a quarter of planet Earth's entire fleet - are operating trouble-free in regions where E10 is standard.

Nearly all cars built after the year 2000 are compatible with E10. There is no need to adapt vehicles to obtain instant benefits with such blends. All new cars are compatible with E10 and are optimised to run on it.

### **IMPACT ON FOOD PRODUCTION AND THE ENVIRONMENT**

The production of fuel ethanol in Europe is sustainable and uses a small amount of land. It does not cause deforestation. Virtually all crops used to produce EU Ethanol are grown sustainably in Europe and thus are not responsible for diverting land away from food production or for deforestation. Crops used by Ethanol refineries account for less than 1% of the European utilised agricultural land in 2017. The crops are used to produce Ethanol, animal feed and captured CO<sub>2</sub>. In addition, the use of crops for Ethanol product provides a product diversification strategy for farmers and helps protect them from the vagaries of farm price volatility. The effect of ethanol production from domestic EU crops is simply to slow down the rate with which Europe's farmed land area is decreasing. Worldwide, commodity crops are experiencing a period of long-term low price and surplus, with many EU farmers unable to make a living from tillage farming. Domestically produced biofuels contribute over six billion euros to farm incomes (equivalent to about 12% of CAP payments), representing a vital source of market stabilisation.

Palm Oil from South East Asia is used to produce biodiesel, and not renewable Ethanol. Consequently, analysis of the negative effects of Palm Oil should not be confused with the growing of sustainable crops to produce Ethanol.

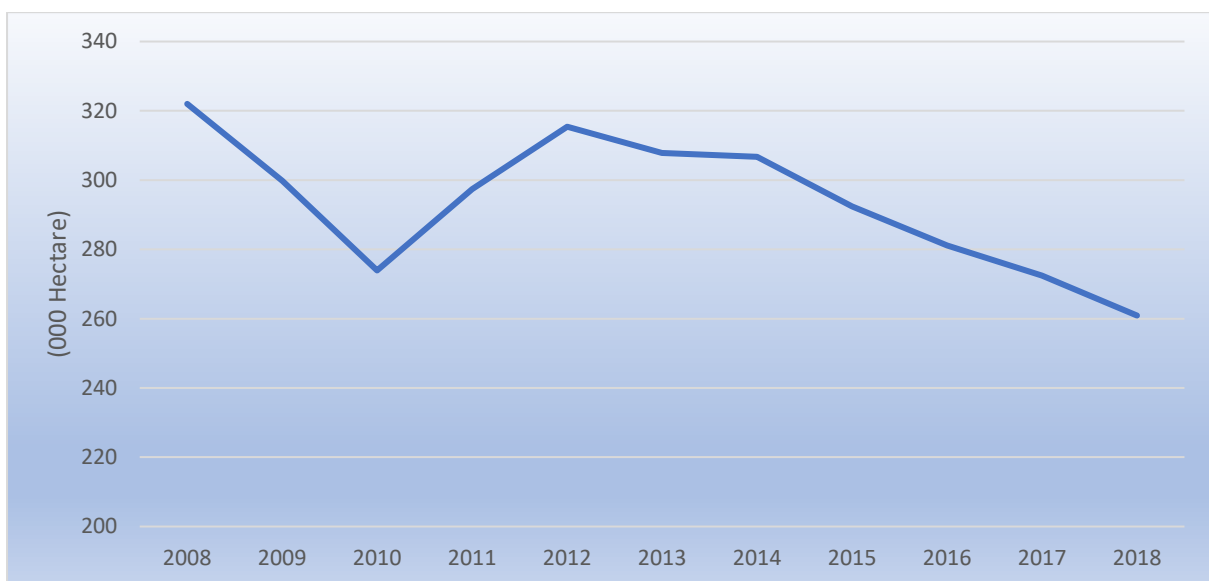
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<sup>3</sup> A BrownWinick review of litigation cases shows no cases found of warranty claims denied because gasohol/E10 was used

Every tonne of grain used by the EU Ethanol industry produces as much high-protein animal food as it does greenhouse gas reducing fuel. Ethanol production in the EU and the animal feed by-product helps offset the heavy EU reliance on imported soy protein for animal feed use. Ethanol is derived from the starch and sugar in grain, beet and cane crops. There is an abundance of starch and sugar at a global level, which suggests that Ethanol production from crops is not affecting the supply of sugar and starch. Furthermore, once the Ethanol has been produced, the protein, oils and fibre from the crops are returned to the farm in the form of animal feed for livestock, thereby going back into and contributing positively to the food chain.

Figure 5 shows the recent trend in cereal farming in Ireland in recent years. Between 2008 and 2018, there has been a decline of 19% in area farmed for cereal production. This reflects negative price trends. Farmland is being taken out of tillage production all over Europe. Despite this, the tillage output is actually increasing, reflecting higher productivity. Europe can comfortably and sustainably supply all the Ethanol it needs both now and in to the future. European farmers will benefit from the market demand created by Ethanol production and the consumer will not suffer through higher prices.

**Figure 7: Area Farmed for Cereal Production (June – 000 Hectares)**



Source: CSO Statbank

In the past, Ethanol has been blamed for food price inflation, but there is no evidence to back this up. Since 2008, EU biofuels production increased by 68%, but global food prices actually declined by 20%. The EU Commission shows that EU biofuels policy has not led to negative impacts on food prices, nor is it expected to.<sup>xxi</sup>



## CONCLUSIONS

Climate change is correctly recognised as the biggest threat facing the planet. It is resulting in more frequent extreme weather events and all of the scientific evidence suggests that this situation can only get worse over the coming years. This will result in serious economic dislocation; significant forced migration and it has the potential to cause severe global geopolitical turmoil.

It is incumbent on policy makers everywhere to take the threat more seriously and act more aggressively and with greater urgency to reduce greenhouse gas emissions and seek to reverse the drivers of climate change.

As a small country, Ireland on its own cannot reverse climate change. However, as a country that does punch above its weight in many different spheres, the country could become a leader in fighting climate change. However, the country is currently a laggard and despite considerable rhetoric, its progress in meeting its international obligations is pathetic.

This is particularly true in relation to the transport sector, which is the biggest contributor to greenhouse gas emissions.

Ethanol provides a very compelling partial solution to Ireland's transport targets. The country currently has 5% Ethanol in its petrol, which was introduced without any adverse effects in 2005. It would now make sense for Ireland to move to E10 for a number of reasons. These include the fact that E10 would help Ireland move towards its RES-T targets and avoid fines or financial commitments; it would reduce the EU dependence on imported energy and reduce the energy import bill; and, if ambitiously supported, it would provide an alternative activity and source of income for Irish farmers. E10 and higher works well in many other countries and has had no adverse impacts on engine performance and unlike Palm Oil, does not pose an environmental threat.

It is difficult to understand why E10 is not accepted by the Irish Government as the way forward for Ireland's transport climate obligations. It is the strongly held view of the author of this report that Ethanol should be accepted and taken on board as a solution for Ireland, and a solution that would have many positive direct and indirect effects.

E10 can be introduced overnight; it is suited to all petrol cars; there would be no cost to the consumer and no loss of revenue for the Exchequer; there would be no requirement to change infrastructure or logistics; it would reduce fossil emissions by 150,000 tonnes CO<sub>2</sub>eq, which would be equivalent to taking 50,000 cars off the road; it would be good for the farm economy; and could reduce EU fines by €25 million.

## ABOUT THE AUTHORS

### **Jim Power**

Jim Power is a graduate of University College, Dublin with a BA in Economics & Politics, and a Masters Degree in Economic Science. During a career within the financial services industry, he has worked as a Treasury Economist at AIB Group and Chief Economist at Bank of Ireland Group Treasury and Friends First Group.

In October 2000 he testified before a UK House of Lords Committee on Economic & Monetary Affairs on Ireland's experience in the European Monetary Union. He argued with prescience that the Irish political elite would not be capable of managing a small open economy in a monetary union and suggested that Britain would be ill-advised to join the Single Currency.

He has taught Financial Management to under-graduates in Dublin City University and Economics on the Local Government MBA at Dublin City University. He currently teaches Business Economics on the Full Time MSc Management and the Full Time MBA programme at the Michael Smurfit Graduate School of Business, University College Dublin.

He writes regular columns in The Irish Examiner and contributes to numerous other newspapers and magazines on an occasional basis. He is also a frequent contributor to radio and TV on a variety of different shows.

He is a board member of Agri-Aware, the food awareness body and is Chairperson of Love Irish Food. He is Chairman of investment firm Three Rock Capital Management.

He is editor of Friends First's regular 'Economic Outlook', which has become established as one of Ireland's leading commentaries on the Irish economy and he also writes the SIMI quarterly motor industry update.

His first book 'Picking up the Pieces' was published by Blackhall Publishing in November 2009.

He is a native of Waterford.

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### **Brendan Halligan**

Brendan Halligan is the founder and current President of the Institute of International and European Affairs (IIEA), a leading European think tank on European and International affairs.

Brendan graduated with a Masters Degree in Economics from University College Dublin in 1964. He worked in the public sector before entering politics in 1967, when he became General Secretary of the Irish Labour Party.

During his political career he served both as a member of the Irish Senate (1973) and as Teachta Dála (elected member of the Irish Dáil) three years later.

He continued in his role as General-Secretary of the Labour Party until 1980, and later set up his own consultancy firm, Consultants in Public Affairs (CIPA). He was appointed as a Member

of the European Parliament (MEP) from 1983 until 1984, where he specialised in economic affairs and energy policy.

He acted as Chairman of Bórd na Móna (Irish Peat Energy Authority) for ten years, and was also Adjunct Professor in European Integration at the University of Limerick. From the early 1960s, Brendan Halligan has been a passionate advocate in the fields of both European affairs, and sustainable development.

For seven years, he served as Chairman of the Sustainable Energy Authority of Ireland, and he is currently a director of Mainstream Renewable Power. He was director of his own firm, Consultants in Public Affairs (CIPA) from 1985 to 2014, which served both the Irish and International public and private sectors.

Currently President of the IIEA, he frequently delivers papers and lectures.

Brendan is a keen scholar and speaker of the Irish language, and holds an honorary Doctorate of Letters from University College Dublin.

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## **Ethanol Europe**

Ethanol Europe is an Irish organisation founded ten years ago and now the operator of the Europe's largest, newest and most innovative biorefinery. In 2019 it will make over half a billion litres of sustainable climate friendly ethanol along with 350,000 tonnes of high grade GMO-free protein animal feed and a number of other high value biobased products. The organization employs dozens of Irish professionals and service companies at its offices in Dublin and production facility in Hungary, under the name Pannonia Bio.



Photo: Ethanol Europe facility (Pannonia Bio), Tolna County, Hungary

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[www.eerl.com](http://www.eerl.com)

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