Talanoa Dialogue

*By the **Climate Ethanol Alliance***

I. Where are we?

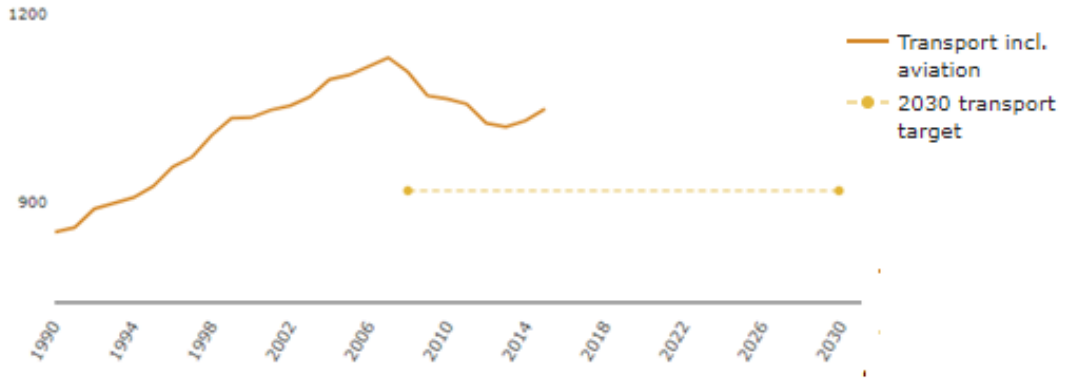
Climate challenge in transport

Transport is the only major sector in developed countries where Greenhouse Gas (GHG) emissions are increasing, not decreasing. Since 2013 transport GHG emissions have been on the rise both in Europe and the US. Transport is on its way to become the single largest sectoral source of carbon emissions in major economies, with road transport being the key problem.

Sectoral challenges

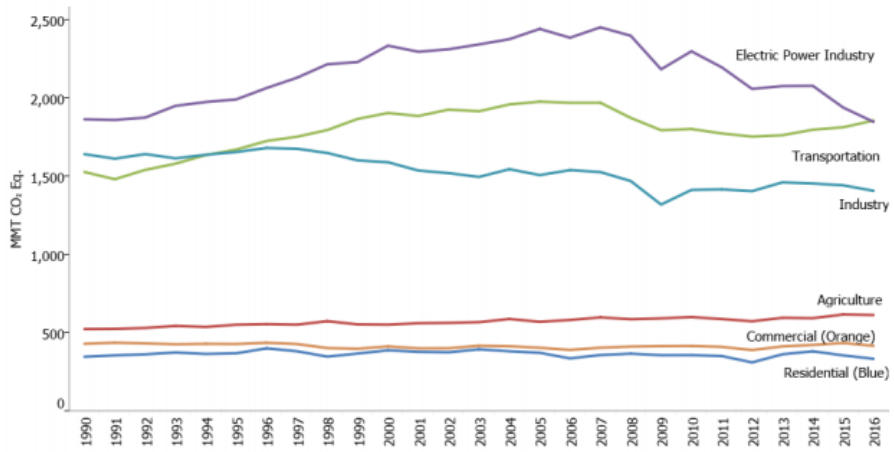
If road transport does not deliver carbon emission reductions, other sectors will face an ever higher burden in enabling the 2 degree target to be met, let alone the 1.5 degree target aspired to by the Paris Agreement. The IPCC SR1.5 report gives additional urgency to decarbonisation in the next 12 yrs.

Greenhouse gas emissions from transport in EU (mtCO2e)



Source: EEA

U.S. Greenhouse Gas Emissions Allocated to Economic Sectors (MMT CO2 Eq.)



Source: EPA

Mitigation measures

No silver bullets are available to solve the problem in transport. Electrification is fine but faces significant barriers to uptake, true advanced biofuels have limited scale or are not cost competitive, vehicle emissions standards have been shown to be unreliable, while demand side management and other soft measures are only mildly palliative. It is therefore highly likely that insufficient quantities of oil will be displaced by 2030 using these methods alone.

The only two measures that have delivered substantial GHG reductions in transport cost effectively in the past decade are conventional ethanol and more efficient (and often hybrid) internal combustion engines.

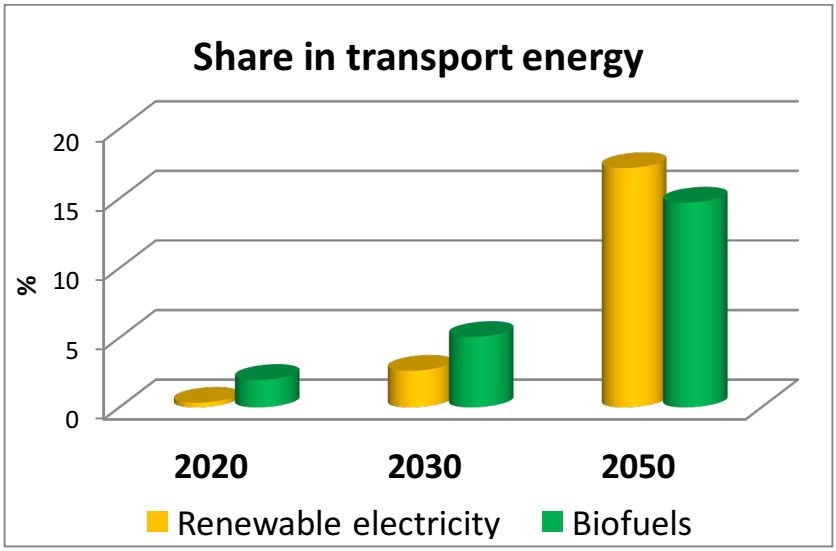
Oil still king

Transport policies around the globe have not reduced the market for oil. It is projected that oil will continue to dominate transport fuel use in 2030 (around 90% share is estimated for major economies).

II. Where do we want to go?

IPCC modelling

The IPCC Global Warming of 1.5 °C report (Table 4.SM.1) indicates the pace of the transitions that are deemed necessary in 2020, 2030 and 2050 at the sector level for 1.5°C-consistent pathways, and complements this with bottom-up studies from literature that give actionable policy targets. It is shown (as depicted below in the chart based on IPCC data) that the role of biofuels is expected to be more prominent than renewable electricity based e-mobility in the critical upcoming decades. Given the fact that ethanol is the most prominent biofuel, it deserves special attention.



Source: Based on IPCC SR1.5 (2018)

Proven technology

Ethanol technology is a proven and scalable climate solution. Decades of production have shown it to be safe and reliable. Its abatement cost is the lowest of alternative fuels, and its potential is substantial.

Ethanol offers a practical solution for transport emissions that delivers significant GHG savings. The use of different methodologies in different countries makes comparison difficult, however irrespective of the choice of models, ethanol is remarkably good. Under the EU methodology, today's ethanol has 80% lower lifecycle GHG emissions than petrol, while the saving under the US methodology is around 40%. These methodologies, however, are more alike than different and each shows solidly increasing GHG savings over the past decade, indeed a doubling in both cases and reflecting the same leaps forward in production technology and innovation. The uncertainty in ethanol is only over how much better than oil it is, not whether it is.

With continuous investment and innovation in the industry and its supply chain, ethanol's climate profile gets better by the year, and is on track to become carbon neutral in the foreseeable future, probably by 2030.

Scale

Ethanol plants have a good track record of producing the fuel at scale, and there is currently around 100 *billion* liters of ethanol produced in the world today. These ethanol plants are getting more efficient by the day.

There is vast potential in feedstock availability around the globe by closing the crop yield gap and hence increasing land productivity sustainably and also by utilising marginal and under-utilised or abandoned lands. Corn yields have improved across the globe, above trendline increases. According to the farmers who have reduced their carbon footprint by doing this, ethanol requirements have played a significant part in yield enhancement.

Cost

A wide range of mitigation technologies are available in transport, but very few offer competitive prices. Most technologies come with high carbon abatement costs and therefore their prospects are limited. Mature and inexpensive technologies are in short supply.

In contrast, ethanol has been shown to have a relatively low carbon abatement cost. It ranks among the cheapest transport decarbonisation technological options. Research finds that ethanol blending delivers substantial carbon saving inexpensively.

In every major ethanol market in the world (namely Brazil, Europe and the United States), a liter or gallon of ethanol is moderately to substantially less expensive than petrol. Remarkably, this makes ethanol one of the only renewables capable of replacing their counterparts at scale without immense subsidies (but, in each case, with enabling laws).

Sustainability

All technologies have some impact on the environment, there are no ideal solutions, and ethanol is no exception. There are two major criticisms of biofuels. The major criticism has come from the food v fuel debate. This has been shown to be a false dichotomy, with food and feed prices lower now than 10 years ago, while ethanol production has nearly tripled. The second, indirect land use change impact (ILUC), contrary to overblown early estimates is increasingly found to be low for ethanol, so low as to be entirely negligible. In other words, ethanol's impact on food security is minor (and is just as likely to be positive as negative), and its ILUC risk is so low as to be on the same order of practical concern as bird mortality from wind turbines.

Engine efficiency improvement

A little known phenomenon, that ethanol is an octane enhancer, makes the climate profile of ethanol even better. Research finds that the higher octane fuel that results when ethanol is blended into petrol brings significant engine efficiency improvements. High-octane, midlevel ethanol blends allow automakers to produce smaller, higher compression and therefore more efficient

engines. As a consequence, for E20 (20% ethanol blend), ILUC impacts appear to be entirely offset by fuel economy improvements. Ethanol as an octane enhancer also replaces toxic substances previously used for this purpose.

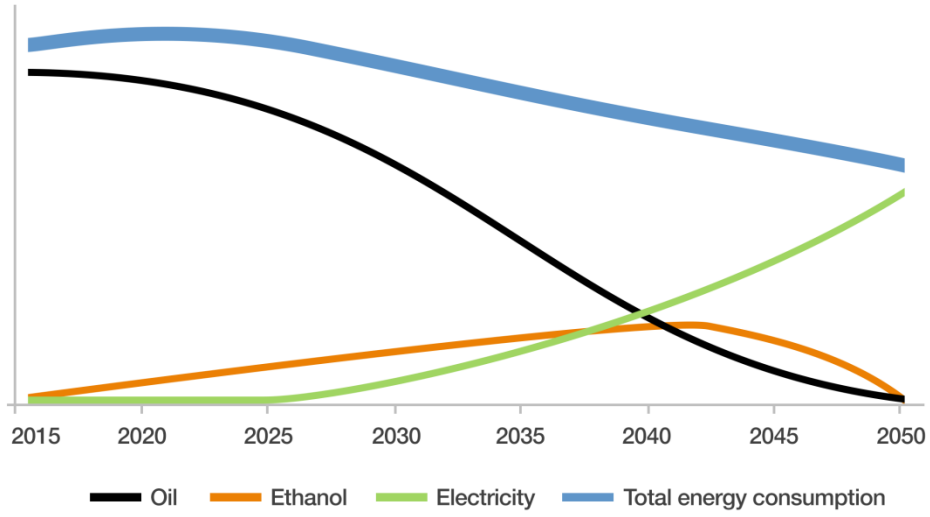
Rural development dimension

In addition to climate benefits, ethanol contributes to rural development by creating and maintaining jobs in rural communities, advances farming by stimulating investments in sustainable technologies, improves urban air quality and provides valuable high protein animal feed and an increasing range of innovative bio-based products. It also contributes to energy independence at a regional level.

III. How do we get there?

Replacing oil by 2030

Ethanol immediately helps countries meet their climate goals and provides an immediate, near-term solution to climate change, hence its use should increase globally in a sustainable manner. Ethanol is just one technology with the potential to displace large quantities of oil. The difference with most other technologies is that ethanol is available now at scale and is the principal source of oil displacement across the world. Electrification and ethanol offer the best prospect of replacing oil in quantity for several decades ahead. Electrification is growing rapidly from a low base but has a long way to go to achieve scale. It has a relatively small penetration in the existing vehicle fleet. Both technologies are needed to achieve climate targets. The schematic chart below shows the desired trajectory in transport energy use.



The potential in ethanol should be tapped, and it can be achieved in a sustainable manner. Ethanol use should be allowed to increase, roughly in line with historic trends, and when electrification reaches scale, sometime after 2030, ethanol plants are not threatened with closure. The ethanol industry is developing other bio-based products that enable it to contribute at another level to climate targets. Ethanol can replace oil in fuel tanks; but it can also replace oil in biomaterials like plastics, which electricity cannot. Pursued intelligently, there is no tension between ethanol and electrification of transport.

E20/E25

The evidence base for high octane fuels bringing climate mitigation, fuel economy and financial benefits is growing. Recognising these potential benefits is important for society. They need to be given appropriate priority in their own rights to ensure the potential is not lost to society. Standardisation of fuels with 20% or 25% ethanol blended (E20 or E25), would ensure that octane is increased in the final fuel. These blends should be introduced by 2020 to facilitate the optimisation of engines by 2025, bringing additional climate benefits.