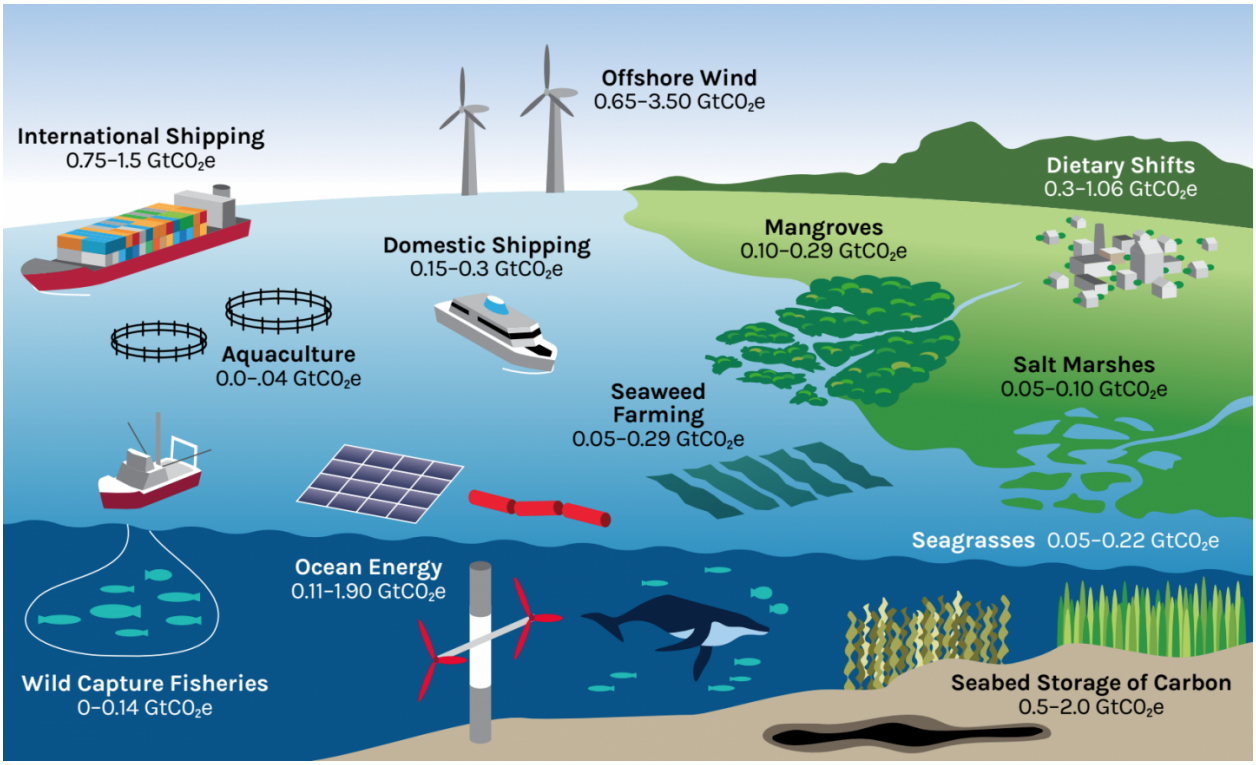
Welcome to Climate Solutions



Background

The impact of the burning of fossil fuels is very well known by now, and the EU, the UK & China have committed to taking steps to reduce their CO2 emissions by net zero. Surprisingly, the world's use of fossil fuels really took off fairly recently - after the Second World War:-

Another interesting fact is that the whole world has become much more energy efficient in last 25 to 30 years:-

The question is how can more be achieved, what's available now and what will be available in the future and by when.

Rather than focusing on negative stories, this website intends to highlight solutions to get us to a zero carbon future.

In order to achieve zero carbon emissions, the following areas will need to be addressed

Electrical Power Supply

This has probably been the biggest success story so far in terms of CO2 emission reductions. The reduction in use of fossil fuels in this area has primarily been achieved by investing in:-

- Offshore & Onshore Wind Turbines
- Solar Farms
- Hydroelectricity
- Nuclear
- Biomass
- Geothermal

Every country has a different challenge and different solutions here.

The challenge varies dependent on a country's access to renewable resources and it's population i.e. it's much easier for a country like New Zealand to move to zero carbon than it would be for the Netherlands

In north western Europe, Onshore Wind has proved to be the most cost-effective solution. In southern Europe, Solar farms are the better option. In Iceland, Geothermal supplies most of their energy.

The use of renewables for electrical supply continues to increase as a percentage, but the pie is getting bigger. We need renewables to start to encroach on fossil fuel energy demand, and not just prevent further increase as is the current situation.

Heating and cooling of buildings

This part of the energy supply is responsible for the most CO2 emissions. The challenge here is really twofold:-

1. Buildings need to be better insulated so as to not get too hot in the summer or too cold in the winter
2. The heating and cooling supplies need to be powered off renewable electricity

Again the challenges vary by country. Countries in the tropics have little need for heating but do need air-conditioning. In the UK, our challenges are:-

1. Houses that pre-date 1920 do not have cavity walls that can be insulated, so need to be retrofitted with external or internal solid wall insulation.

2. Most houses are either heated by natural gas or oil
3. 15% Hydrogen in natural gas supply is still being trialled. 100% Hydrogen necessitates a swap out of existing boilers
4. Tradesmen will need to be re-trained in large numbers in order to facilitate the transition to solar, heat pumps or hydrogen as well as solid wall insulation.
5. Externally insulating houses often needs to be carried out for entire streets, otherwise it does not look good aesthetically. In some cases, external wall insulation will stick out further than the roof eaves, so the roof would need to be adapted.
6. Internally insulating houses is very disruptive to households and would meet a great degree of resistance.

Potential solutions for buildings are a combination of:-

1. Solar Panels
2. Battery Storage
3. Heat Pumps
4. Hydrogen
5. External Wall insulation
6. District Heating Schemes e.g. burning municipal waste and using the heat to keep a district of a town warm.

Transport

Transport is an area that is showing promise as electric vehicles aim to displace petrol & diesel cars.

Challenges around electric vehicles include:-

1. Range between re-fueling. Some of the higher end models can now reasonably achieve 250 miles but the cheaper models have much lower ranges
2. The time it takes to re-charge an EV. This can vary from overnight at home to half an hour using a supercharger. Both will be inadequate unless there are more charging stations than there are currently fuel pumps
3. Extent of recharging stations. These are gradually being rolled out and things are improving each year
4. Incompatibility of recharging options. The different EV vendors really need to agree a common standard in terms of shape of charger and power options. Government will need to intervene if the industry cannot resolve this.
5. Use of Cobalt in batteries. There are 2 problems here:-
    - Cobalt is a comparitively rare element so there won't be enough of it to supply all EV vehicles if everybody has one.
    - Cobalt is mined in Africa often using child labour and causing pollution to the land

Electric Vehicles work well for cars, vans and potentially heavy goods vehicles (due to them having long wheelbases that could support battery storage). They're not such a great option for ships (which require more power) or for aeroplanes (which would not be able to carry passengers and heavy batteries) In both cases, Hydrogen is currently looking like the best power option.

Agriculture

Animals that are produced for meat require large areas of lands for crops to feed them. Domesticated animals also emit large amounts of methane, which is a fossil fuel.

Removal of existing emissions

As well as reducing CO2 emissions, there is a need to remove CO2 which has already been emitted from the atmosphere.

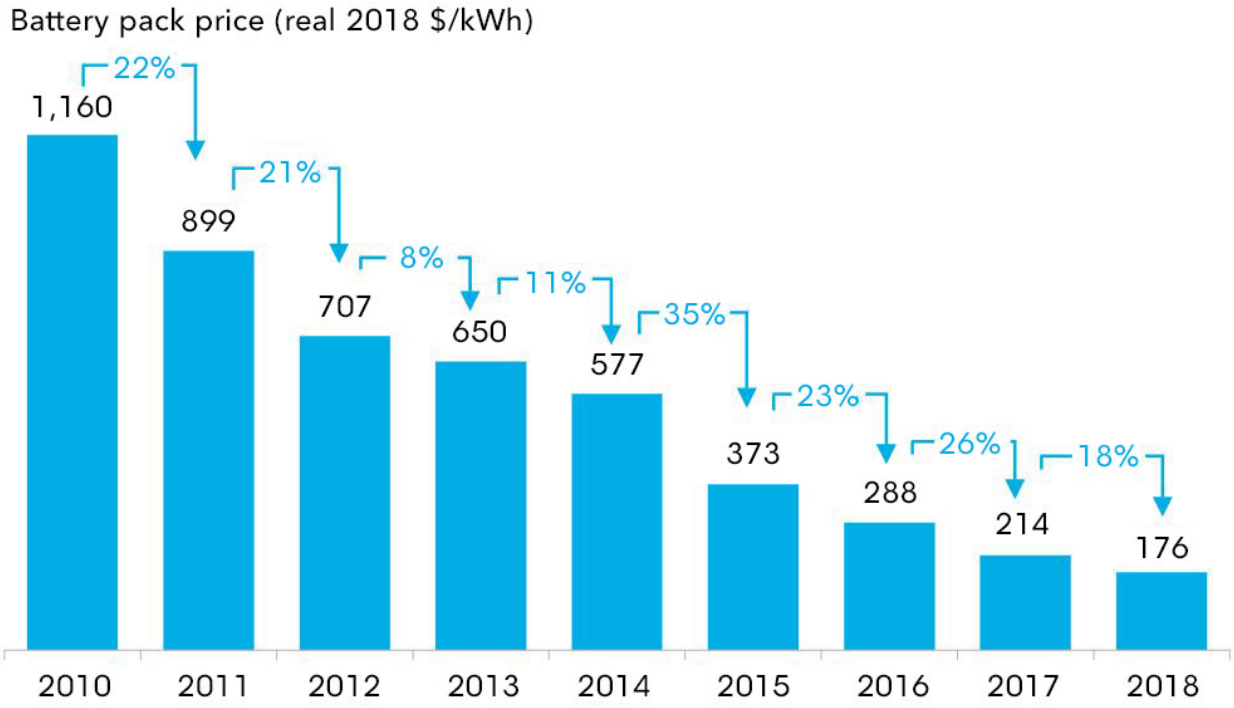
Carbon Credits

Somewhat controversially, richer nations and companies meet their renewable commitments by paying for carbon credits to other companies & poorer countries who promise to do things like grow trees

Battery Storage

This is the optimal solution. If better batteries can be invented, the reliance on fossil fuels disappears as solar & wind can be stored for use when the sun isn't shining and the wind isn't blowing. The good news here is that Lithium ion battery storage continues to decrease in price. There will be a need for substantial improvements in battery tech, however.

Lithium-ion battery price survey results: volume-weighted average



Source: BloombergNEF