CLIMATE JUSTICE
STRONG UNIONS SUSTAINABLE TRANSPORT

ITF climate justice factsheets

www.itfclimatejustice.org

Factsheet 1: The basics - carbon dioxide

The world is getting warmer. The main cause of this is carbon dioxide (CO2). Since 1850, but especially since 1950, humanity has been putting more and more CO2 into the air.

This happens because we are burning more and more coal, oil and natural gas. Oil and natural gas are partly made of carbon. Coal is almost completely made of carbon. When coal, oil, and gas burn, the carbon combines with the oxygen in the air to make carbon dioxide. This new carbon dioxide from burning is called “CO2 emissions”.

CO2 in the atmosphere traps heat that is rising from the earth and going into space. The more CO2 in the air, the more the earth warms up.

Luckily, not all of the CO2 stays up in the air. Each year about half of the new CO2 emissions are absorbed by plants, trees, and the ocean. This means we don't have to get rid of all emissions. On a global level, we only need to cut these emissions by about one half.

But the other half now stays up in the air for an average of more than 100 years. This is why the world is warming, and why it will get much hotter.

Other warming gases

Burning CO2 is not the only cause of man made climate change. Factsheet 4 – Methane, Nitrous Oxide and Forests – explains the other main greenhouse gases and the effect of cutting down forests. But CO2 is the most important gas, and burning CO2 accounts for more than half of global warming.

Natural warming and man-made warming

Climate change is not new. But we have a new kind of climate change.

For hundreds of thousands of years, the earth has been going back and forth between cold ice age periods and warm periods – like the warm period now.

The earth warms and cools over thousands of years as the earth's orbit around the sun changes. There are three slow changes in the orbit. One takes 21,000 years, another 41,000 years, and a third 100,000 years. These changes interact to create gradual change in the temperature. This is why the earth has warmed and cooled.

But man made warming is different, because it is happening at least 200 times faster than natural warming. No one knows exactly what difference that will make. We can't know, until it happens. But the big danger is what scientists call 'abrupt climate change'.

Scientists are now worried about this because of what happened in the past. For hundreds of thousands of years, the earth has gone back and forth between cold ice ages and warm periods. When the earth cooled into an ice age, temperatures and CO2 levels went down slowly and gradually.

When the earth warmed, it started gradually. Then suddenly there was a swift increase in both CO2 and temperatures. The pace moved from thousands of years to tens of years, and sometimes faster.

Scientists know this from drilling down through the ice in Greenland, Antarctica, and glaciers around the world, from drilling into the mud on the continental shelf in several oceans, and from analysing rock formations in caves in Brazil, France and Israel.

Feedbacks

As soon as scientists found these fast explosions in temperature, they knew the reason had to be some kind of feedback effect. But they are not yet agreed what feedback effect will be crucial.

Here are two examples of global warming feedback: One starts because snow and ice are dazzling white. That means they reflect heat. But as the temperature

rises, the snow and ice in the Arctic begins to melt. That exposes dark tundra and dark sea, which absorb heat. That raises the temperature, which melts more summer snow and ice, and so on. This feedback has already begun.

A second feedback starts because rising temperatures melt the frozen peat bogs of Siberia. As the bogs melt, they release trapped methane, a much more powerful warming gas than CO2. That raises the temperature, which unfreezes more methane, and so on. This feedback has already begun.

The scientists are not yet agreed which feedback or feedbacks will be crucial. It looks likely that feedbacks will work together, reinforcing each other. Because scientists don't know which feedback effects will be critical, they don't know how long we have before abrupt climate change. A very rough guess is twenty years. But it could be fifty, or even a hundred years. It could be five years or less.

There is that worrying statistic – we have changed the CO2 in the air more than the difference between an ice age and the nineteenth century.

The cuts we need

How much do we need to cut CO2, and how fast?

There are many complex, confusing ways of calculating this. They involve scenarios, percentages, models, degrees, and what will happen in 2050.

The easier way to understand is to focus on a simple truth. We need to stop increasing the amount of CO2 we put in the air. Some scientists argue we can increase it by a bit. An increasing number of scientists argue we have to reduce it by a bit. But the truth is that when we get serious about CO2, the big challenge will be stabilising the levels. If we can keep the amount of CO2 in the air steady, we can reduce it a bit.

Luckily, we don't have to cut all the CO2 emissions. We don't need 'zero carbon' globally. Remember, trees, plants and the ocean currently absorb about half the CO2 emissions each year. So on a global level we will stabilise if we cut emissions by half – 50%.

The global average of emissions is:
4 tonnes per person now.

A 50% cut would be:
2 tonnes per person.

However, rates of emissions per person each year vary enormously from one country to another:

	CO2 per person per year
USA	20 tonnes
Germany	10 tonnes
Europe	8 tonnes
China	5 tonnes
Brazil	2 tonnes
India	1 tonne
Kenya	0.3 tonnes
Nepal	0.1 tonnes

We need to get the average down to 2 tonnes. That means:

USA	90% cut
Germany	89% cut
Europe	75% cut
China	60% cut
Brazil	no change
India	twice as much
Kenya	six times as much
Nepal	twenty times as much

This is the fair way to do it. Just as important, people in poor countries will refuse to control emissions if richer countries don't share. (See also Factsheet 18 on *North and South*.)

To summarise, we need to cut CO2 globally by about 50%, and by about 80% in the rich countries. And we need to do it in 20 years.

Our great challenge is that what the scientists are telling us is different from what the politicians are doing. No government is currently planning cuts this deep and fast. And every year global CO2 levels keep rising.

This is part of a series of factsheets on climate change produced by the ITF, www.itfclimatejustice.org

Factsheet 2: The basics – the physical effects of climate change

This is the first of two factsheets explaining the effects of climate change. This one explains the basic science. The next one explains the implications for human society.

Climate change will have a wide range of effects. First, the bands of climate in the world will move. The very hot climate of the Sahara will move north to the Mediterranean. Northern Europe will become like the Med. And the Arctic will become like Northern Europe.

In the southern hemisphere the climate will move south in the same way.

The climate will also move up. The low hills will become like the plains, the slopes of the mountains like the hills, the high reaches of the mountains like the slopes.

The changes will be least at the equator, and strongest in far North and far South. The Arctic has already seen an increase of several degrees in temperature.

The Earth has warmed before. But humans have not seen warming on this scale. And when the ice ages came, the human population was very small, and was able to retreat over thousands of years – to walk away from the ice.

Now we have almost 7 billion people, in a fixed and very complex economic and social system. Moreover, the climate will be changing very quickly.

Plants and animals will face worse problems. Many animals will be unable to move fast enough. But even if they could, dense human settlements lies in the way. For trees and plants which move over generations by casting seeds, the problem will be worse.

The different species of life in any one area also part of an ecological web. Eliminate some species, and many more will be threatened. Estimates of the number of species that will be lost are 30%and up. But there is no real way of knowing.

The daily weather, as opposed to the long term climate, will also become much more unstable. This will create more extreme weather events.

Rains, seas, storms, heat waves and fires

The rains will change, the seas will rise, and storms will grow stronger.

In many areas, the rains will weaken or fail, with prolonged drought in some regions. Then the crops will fail, farmers will lose their livelihoods, and people will starve.

In some areas, conditions will get better and yields will increase. But on balance, farmers will lose.

The rains will also come in more unreliable ways. The rains in temperate regions will be more like tropical rains, falling in hard bursts the soil cannot absorb. Much rain will come out of season, when it is no use, or so hard in the growing season that it kills the crops.

Hard, long rains create floods that destroy crops, homes and cities.

All over the world, the glaciers have already begun to melt. They will disappear. This threatens irrigation water for farmers and drinking water for cities. The glaciers of the Himalayas feed many rivers, including the Hindus, the Ganges, the Brahmaputra, the Irrawady, the Mekong and the Yangtze. More than a quarter of the world's farmers depend on that water.

Storms will grow stronger, wetter and more energetic. Tornadoes and hurricanes, in particular, will increase. Tornadoes are caused by a long hot spell on land. Hurricanes are caused by a long hot spell on the ocean. The higher the temperature for longer, the bigger the storm and the higher the winds. (Hurricanes are also called cyclones and typhoons.)

Hurricanes and tornadoes will also extend further north in the northern hemisphere, and further south in the southern.

Storms will also combine with sea level rise to destroy coastal cities. The sea level will rise over years, and decades, as the ice packs melt. It is the ice over land that matters – the sea does not rise when sea ice melts. The two key ice packs are Greenland and Antarctica. Greenland is smaller, but will melt sooner. Both ice packs are melting faster than expected.

Over years, perhaps generations, they will flood the coastal cities – New York, Shanghai, Mumbai, Alexandria, Singapore, London, Lagos, Havana and all the rest.

But for many cities it will not be gradual. Hurricanes and other tropical storms push forward a 'hurricane surge'. This works like a tsunami. It is a wave of water that the hurricane has been pushing in front. Across the open sea that wave may only be 15 centimetres, or 6 inches, high. But then that wave hits rapidly shallowing water at the coast, and the pressure behind it creates a very high wave, moving very fast. This is also what happens with a tsunami.

Hurricane Katrina, in New Orleans in 2005, for instance, was not a very strong hurricane. But when the hurricane surge hit the coast of Louisiana, it was 18 feet, or 5.5 meters high. That force combined with a rise of 3 feet, or 1 meter, in sea level rise, to destroy the city's flood defences.

With stronger hurricanes, coming further north and south, higher hurricane surges will combine with rising sea levels. In many cities, the rise along the coast will be gradual for many years. Then the city will be destroyed in a matter of hours.

Warming also creates fires and heat waves, for obvious reasons.

It is happening now

These are the likely first consequences of global warming. Almost everything we have described is already happening somewhere.

We now have drought in Australia, southern China, Mongolia, Central Asia, the African Sahel, parts of Southern Africa, northern Ghana, northern Kenya, the south-western United States and northern Mexico. In Central Asia, Afghanistan, Darfur and Chad, the drought has lasted most of the last forty years. We have seen floods in Pakistan, on the Mississippi, and in Australia. Tropical storms have doubled in total strength. Bangladesh and Burma have both seen the worst cyclones ever to hit those countries. Harvests have been hit in many parts of the world.

This is not the future. This is now. Almost all of these events, except for the melting in the far north, are within the bounds of the possible. They are not unprecedented. They cannot be explained simply by climate change. In each case we have to say, climate change made this more likely.

But they also suggest what is coming. The future events will be more intense, more common, and stretch further. They will also interact with each other, so that people face more than one disaster.

With abrupt climate change, disasters will come thick and fast upon each other, in one country and across the world. That will erode readiness, defences, logistics, food stocks and compassion.

Moreover, all of this will happen within the limits of modern market economies, with the kinds of societies and governments we have now. And that will turn a natural disaster into a human catastrophe. *Factsheet 3 – natural disasters and human society*, explains what this will look like.

This is part of a series of factsheets on climate change produced by the ITF, www.itfclimatejustice.org

Factsheet 3: The basics – natural disasters and human society

Factsheet 2 explained the natural effects of climate change. This sheet explains the human consequences. Climate disasters will not be simply natural events. They will happen in the global economic and political system we live in now. That system turns natural disasters into human catastrophes.

We can guess what will happen in future from what happens now. Our current climate disasters are complex events. For instance, there was a lot of debate about the famine and suffering in Somalia in 2011. Some said it was caused by climate change and drought. Others said no, it was war, geopolitics and neoliberalism. The truth is it was caused by all of them, together.

One way to think about this is that climate change is an accelerant, like pouring petrol on a fire. Another way is that is like what doctors call 'acute on chronic'. They mean the way a sudden illness acts on a patient already weakened by a long term illness.

Famine

Climate change will have several effects. When the rains fail in some areas, the price of food there will rise, and many people will starve to death. But not everyone. Some have enough money to buy food at any price.

Nor do most people usually die of simple lack of food. Many die of contagious diseases that spread among people weakened by hunger and kill the weakest. Parents often face a choice. They can wait at home, and hope the rains arrive before death does. Or they can take their children to refugee camps, where there is food but they are more likely to die in an epidemic.
Far away, in the capital or in other countries, the lost crops will drive up the price of food. As that happens across the world, the high prices increase the risk of famine in every country where the rains fail.

We have already seen a global rise in the price of food grains in 2009, and again in 2011. There were several reasons behind this. Climate change had hit the crops in some countries, so there was less grain globally. Biofuels had taken some of the remaining grain. Banks and hedge funds moved their money out of real estate into speculation in the price of food. And the price of oil rose. Oil is used to make fertiliser. So that drove up the price of fertiliser, and that too drove up the price of grain.

All these factors contributed to the rising price of grain. But in future the failure of the rains will matter more and more.

Refugees

Climate change will create refugees. Some will flee long droughts and famine. Some will flee floods, rising seas and storms. Some will be fleeing climate wars – of which more later.

We cannot know how many, but there will hundreds of millions of refugees. On the other side of the border, racism will increase to justify keeping out the refugees. Often these will be new racisms, for these will be new kinds of refugees.

Economic chaos

Climate change will create economic chaos in cities and industries. Many ports, refineries, chemical plants, factories, nuclear plants, financial centres and big cities are built on low lying coasts. If those go under in storms, the loss

of property and infrastructure will be immense, and so will the poisoning of the land.

The result may be that governments step in and organise a massive rebuilding boom. Or there may be a financial crash and economic devastation.

War

Climate change will also mean war. Change the balance of geographical and economic power, and the small and large powers of the world will go to war to change the balance back.

But also, climate change will set ordinary people against each other. For example, 40 years ago the rains failed in the Darfur province of Sudan because of climate change. The rains never really came back. Since then there have been famines in the worst years in Darfur. There have also been local civil wars, as farmers and herders have killed each other for disappearing grass and water. And the famines and the wars have created hundreds of thousands of refugees – and epidemics.

Outside powers have also been involved in the wars of Darfur, competing for regional influence and Sudanese oil. They have armed both farmers and herders, turning a war with spears into a war with machine guns and pickup trucks.

So the Darfur tragedy has not been simple. But it started because the rains failed.

Authoritarian government and dictatorship

Climate change will also lead to authoritarian government. Faced with a major natural disaster, governments already react by sending large numbers of heavily armed troops to secure the area. This is what the US government did in New Orleans in 2005 and in Haiti in 2009. The Japanese government did it in 2011 after the Fukushima natural disaster. It is what other governments will do too.

But as major disasters accumulate, governments will face a political crisis each time. The population will know that these disasters come from climate change, and know that their leaders have done nothing to stop it. Governments and elites will be terrified of uprisings by an angry population. So governments will send in the army, but with a political message. The message will be:

'This is a time of national suffering. We must all pull together. We have asked too much of the Earth. Now we must sacrifice. We need a strong government to keep order and help us sacrifice.'

But the real meaning will be – working people and farmers are going to pay. And if you step out of line, there will be consequences.

Abrupt climate change

War, refugees, epidemics, famine, and repression reinforce each other. The tragedies we see will never be simple climate change events. They will be driven by climate change, and reinforced by climate change.

Now think for a moment about what abrupt climate change, will mean. Not one disaster in one country, but many, in many countries, all at the same time. Refugees moving in many directions, uprisings, massacres, epidemics, wars, suffering criss-crossing the world.

We cannot know when this is coming. (See *Factsheet 2*). A reasonable estimate is in about 20 years. But maybe we have 50 years. And maybe we don't.

This is part of a series of factsheets on climate change produced by the ITF, www.itfclimatejustice.org

Factsheet 4: The basics – methane, nitrous oxide and forests

Human made global warming comes from:

- About 60% is CO2 from burning coal, oil and gas
- About 15% is forest loss and land use change
- About 17% is methane
- About 8% is nitrous oxide

Factsheet 1 was about CO2 from burning. Almost all transport emissions come from burning oil. This factsheet is about the other causes of global warming.

Methane

Methane emissions come from the decay of biological matter and leaks of natural gas.

We will take decay first. Carbon is the central building block of life. CO2 is made from carbon and oxygen. When living things are burned or decay in contact with oxygen, the carbon and oxygen mix to make CO2.

Methane (CH4) is made from carbon and hydrogen. When living things decay with no oxygen present, they mix with hydrogen to make methane.

So when living things decay in rice paddies under water, they make methane. When vegetable matter decays in landfills, it creates methane. Sewage works also produce methane.

When animals digest food, they make methane, because there is no oxygen in their stomachs. Cattle, sheep and goats emit more methane because they take longer to digest their food. Cattle are particularly important, because they are big and numerous.

Methane also gets into the air from natural gas leaks. Natural gas is almost all methane. Natural gas leaks from coal mines, oil wells, and gas wells. It also leaks from natural gas pipelines, and it leaks in use.

So the main sources of methane emissions are:

- Cattle, sheep and goats
- Rice paddies
- Landfills
- Sewage works
- Coal mines
- Oil wells
- Natural gas leaks

It is difficult to tell how much methane comes from these different sources. With CO2 from burning, governments keep pretty careful track of how much oil, gas and coal is produced. With methane we know how much methane there is in the air now, and how much last year. So we know how much methane goes into the air each year. But we can't be sure how much comes from different sources. Emissions from cattle are the single largest source, but much less than half.

Methane is rare but powerful

To understand the importance of cutting methane, you have to understand some numbers:

Over 100 years methane has 21 times the warming effect of the same amount of CO2.

But CO2 is more than 150 times as common as methane.

So right now the CO2 in the atmosphere has about six times the effect of the methane.

The amount of methane in the air has increased a lot in the last 200 years. But it has been pretty steady for the last ten years. So unlike CO2, there is not much reason now to worry about methane increasing now.

However, cutting methane emissions could have a big effect very fast. This is because methane in the atmosphere breaks down in 12 years on average. CO2 takes more than 100 years on average.

So methane has a stronger short term effect. In the first year, a molecule of methane has 200 times more warming effect than a molecule of CO2.

Therefore, if we don't put that methane molecule into the air, it makes a big difference immediately.

Cutting methane

There are several straightforward ways to cut methane:

- Trap the methane emissions from landfill and burn them.
- Do the same with sewage works.

- Use renewable energy instead of coal, oil and natural gas. That stops gas leaks.

Methane from cattle, sheep and rice farming is harder to cut. Two billion people rely on rice as their main food grain. People also like beef, lamb, milk and cheese. There are other meat animals with low emissions – mainly chicken and pigs. And there are some people in the world who eat too much meat. But there are billions of poor people who feel they don't get enough meat.

There are technical ways of changing rice growing and the care of cattle and sheep so emissions can be reduced by a quarter or a third.

With those reductions, and very big reductions to the other sources of methane, it would be possible to cut methane emissions overall by at least 80% within ten years. That would have an enormous effect on global warming over the short term.

Nitrous oxide

Nitrous oxide, also called 'laughing gas', accounts for about 8% of global warming. Nitrous oxide is made from nitrogen and oxygen. The amount of nitrous oxide in the atmosphere has only grown 40% in the last 200 years. It is still growing slowly now.

Nitrous oxide has about 200 times the warming effect of CO2. It stays in the atmosphere for over 100 years. So cuts in emissions will take a very long time to make a big difference.

Most nitrous oxide emissions come when the nitrogen in commercial fertilisers mixes with air. There are two ways to cut these emissions.

One is to use fertilisers carefully, and not too much. This is hard to enforce, because farmers have good reasons for wanting a lot of fertiliser. Moreover, many modern seeds sold by big agricultural companies require a lot of fertiliser.

Another solution is 'organic farming' – not using manufactured chemical fertilisers or pesticides. In some places, this means the farmer grows less crops. Often, the farmer can make up for this by using different methods that require a lot more care and more labour.

Forests and land use change

The other main source of greenhouse gas emissions is changes in the way we use land. Most of this change comes from cutting down forests. This releases carbon dioxide because the dead trees contain a lot of carbon. The undergrowth below them contains some carbon. And the soil in forests contains more stored carbon than the trees. Cut down the trees and you lose all the carbon stored in the soil.

All forests matter. But tropical forests matter more, because they are richer and denser, and so have more carbon in the trees, the undergrowth and the soil.

It is difficult to estimate how big the emissions are as forests are cut down each year. But a rough guess is 15 to 20% of total greenhouse emissions. All those emissions will stop if and when people stop cutting down forests.

This alone will not stop climate change. Even if we forested the whole planet, emissions from burning coal, oil and gas would eventually roast us. But saving and growing forests can make a large difference in the short term.

'Sustainable forestry' is not an alternative to leaving old forests. 'Sustainable' means that forests are cut down new forests are grown, then they are cut down and regrown, and so on. However, these new commercial forests use thinner, shorter trees with less undergrowth and less carbon in the soil. Moreover, the carbon in these forests spends most of its life cycle in the air. Only when the forest is just about to be cut down is most of its carbon in the trees.

The only solution is to leave old forests alone. And to grow new, dense forests and leave them alone too.

This is part of a series of factsheets on climate change produced by the ITF, www.itfclimatejustice.org

Factsheet 5: How to cut CO2 emissions – general overview

We need large cuts in greenhouse gas emissions. That means cuts of about 50% globally in the next 20 years. This would mean cuts of about 80% in most of the rich countries. (Factsheet 1 explains the reasons why.)

We can do it. We already have all the technology we need. This factsheet explains the main ways to cut emissions from carbon dioxide. CO2 accounts for almost three quarters of global warming. The great majority of this CO2 comes from burning oil, coal and natural gas. Globally, most of the burning comes from:

Industry: Just over a third of emissions.

Half of this is from electricity made by burning gas and coal.

The other half is from burning coal and gas for industries that require great heat – particularly iron and steel making, cement making, and oil refineries.

Houses and buildings: just under a third of emissions.

About half of this is electricity for lighting, air conditioning, and machinery like fridges and computers. The other half is for heating by coal, gas and oil.

Transport: about one quarter of emissions.

Almost all of this comes from burning oil.

Transport accounts for a bigger proportion of emissions in North America, and a smaller proportion in poor countries. But as developing countries use more fuel for transport, their emissions too will rise.

Homes and public buildings account for a larger proportion of emissions in Europe and North America, and a smaller proportion in poorer countries.

Industry accounts for a larger proportion in many Asian countries, and a smaller proportion in Europe and North America.

But globally, industry, buildings and transport account for 90% of all CO2 emissions from burning coal, oil and gas.

The main emissions

Another way of thinking about this is that the main areas we need to cut are:

Electricity
Transport
Iron and steel, cement, and oil refineries
Heating buildings

Reduce, shift and improve

There are three different ways we can cut emissions.

We can change what we are doing, so there are less emissions. For instance, we can get out of cars and into buses.

We can use energy more efficiently. For instance, we can use new light bulbs that use less electricity.

We can reduce the amount of energy we need. For instance, the more we live in cities instead of suburbs and villages, the less energy we need for transport.

(This factsheet will deal with changes and energy efficiency. Factsheet 10 on changing cities talks about reducing the amount of transport we need.)

Renewable electricity

The most important thing we need to do is to change the way we make electricity. This means renewable energy instead of oil, coal and gas. The two main sources of renewable energy for electricity will be wind power and sun power. Basically, we have to cover the world with wind turbines and solar power. But we will also use wave power, tidal power, power from dams, and geothermal power.

Many commentators insist that we will have to use a lot of biofuels and nuclear power as well. Others object strongly to these methods. Factsheets 15 and 16 discuss the pros and cons. But even if we use nuclear and biofuels, the main sources for new electricity globally will be wind and sun. Factsheet 6 explains in detail how these will work.

We need this renewable electricity to replace all the electricity we use now for buildings and industry. But then we need a lot more renewable electricity to replace oil in transport and to heat homes and buildings.

If we are to do that, we need at least three times the electricity we have now – all of it renewable.

We cannot construct that much renewable energy globally quickly enough. So we also need to cut the amount of energy we use. We can do this by using energy more efficiently, to make the energy go further.

Transport

In transport this comes down to four things:
Improve the design of cars, buses, trains, ships, and planes so they use less fuel.

Shift passengers out of cars and into buses and trains.

Increase the average number of passengers in each bus and train.

Shift freight onto rail.
(Factsheets 6 to 12 discuss how we can do this).

Homes and buildings

With homes and buildings, energy efficiency will come in two ways. One is reduce the amount of electricity used for lighting and machines. This means government regulation that requires all light bulbs, computers, domestic appliances and office machines to be as efficient as the best examples are now.

The other way is to insulate, refurbish and rebuild homes and buildings so they lose less heat in the cold and require less air conditioning. This means insulation of walls and roofs, more efficient boilers for heating, and better windows.

In many countries it means a return to more traditional buildings, using stone, wood and adobe. Traditional buildings are well adapted to the local climate. This also means using less cement. And it means an end to high rise office buildings surrounded by glass – these are greenhouses.

Industry

In industry, energy efficiency will come in two main ways. First, in most factories most electricity goes to run pumps and machines. Part of the answer is more efficient pumps and machines. But equally important is positioning them more carefully so the pumps have to do less work.

The other thing is to cut energy use in the three big industry users. Oil refinery emissions will be reduced if we use less oil in transport. Cement is a big emitter because it is made by taking carbon out of limestone and putting that carbon into the air. The solution is to use less concrete for building, and to make concrete out of other materials. Iron and steel is harder to cut, and there is no replacement. But steel plants can be run more efficiently, and they can shift to heating the steel with electricity from renewable sources.

The problem is political

All of these solutions are technically easy with the technology we have now. Moreover, with mass production the cost of these technologies will drop dramatically. Corporations in rich countries may well try to use patents and copyrights ('intellectual property rights') to keep these technologies expensive for poor countries. Unions should oppose this. And in any case all the technology anyone needs is available from India and China.

But the changes we suggest would still cost money. That makes governments reluctant to act. But think for a minute what 'cost money' means. It means jobs - real workers paid rupees, rand, pesos and euros at the end of a week's or a month's work.

We need about 100 million new workers globally for 20 years to do the work that has to be done. For corporations and governments, that is an expense. For unions and workers, it is the answer to mass unemployment. That is why it is technically easy to cut emissions, and politically difficult.

This is part of a series of factsheets on climate change produced by the ITF, www.itfclimatejustice.org

Factsheet 6: How to cut CO2 emissions – renewable energy

Most electricity is now made by burning coal and gas. Renewable energy makes electricity with no CO2. In effect, we need to cover much of the world with wind turbines and solar power.

Globally, electricity now accounts for almost a third of CO2 from burning fuels. Heating in industry and buildings accounts for almost another third. Oil for transport accounts for about a quarter of emissions.

So we need enough renewable electricity to cover the world's current demand for electricity. This mainly goes to lighting and machines in homes, buildings and industry.

Then we need enough electricity to replace oil as the power for transport. And enough renewable electricity to heat buildings and industry.

That does not just mean that renewables replace 100% of current electricity production. It means that renewables have to supply 200% or 300% of current electricity production.

This is possible.

Wind power

Renewable power is energy that comes from wind power, sun power, wave power, tide power, water power in dams, and geothermal power. It is called renewable because you can't use up the wind and the sun, the tides and the waves.

Many people worry, quite rightly, that economic growth means we will run out of resources. We will not run out of wind and sun. But the point for climate change is that renewable energy does not produce CO2.

Most renewable energy will come from wind and sun power.

Wind power comes from wind turbines – modern wind mills. The wind turns the blades, and they turn a dynamo which makes electricity.

Wind turbines produce the most energy when they are built in 'wind farms' of many turbines – big, high in the air, in windy places, on land or at sea. This is because the speed of the wind makes an enormous difference. Double the speed of the wind and you get 8 times as much electricity. Triple the speed and you get 27 times the electricity. So you need big blades, up high where the wind blows, in windy places.

Solar power

Solar power comes in three kinds. One is simple pipes on the roof where the sun heats water for use in the home.

The second kind is Photovoltaic (PV) Cells, the arrays of shining glass and silicon you see on roofs. These cells turn the energy of the sun into electricity.

The third form of solar power is Concentrated Solar Power. 'CSP' uses large numbers of mirrors to focus the heat of the heat of the sun on a long tube. In the tube salt or mercury reaches very high temperatures. That drives a dynamo that produces electricity.

In the medium term, CSP will be the most important form of solar power. All solar power works best in very sunny places.

There is a problem

Renewable energy fluctuates. The sun only shines in the day. There is more wind and more sun in some places than other places. So the supply of electricity goes up and down locally and regionally.

You cannot store electricity. It has to be used when it made. There are batteries. But think how big a battery is needed for a car, which uses very little electricity. Then think of the battery you would need for a city.

There are three solutions to this problem. One is to balance different kinds of renewable energy. Wind can work when sun does not, and the other way round. Wave, tidal, geothermal and hydropower may

not be able to supply as much energy as wind and sun. All but hydropower are also more expensive. But they supply steady power, and power that is steady in different ways. So the best mix of renewable power is not necessarily the cheapest.
The second solution is to balance the energy over long distances. New long distance cables can carry electricity efficiently over thousands of kilometres (or miles).

So if the wind is not blowing in Bengal, it may be blowing in Kerala, or in Burma. The same with the sun.

These long distance cables, connected through a sophisticated grid, can balance the wind of the North Sea off Norway with the wind of Siberia, the sun of North Africa, and the sun and wind of Kazakhstan. Or the wind of Canada with the sun of Mexico.

There are obvious political problems, of a familiar sort. Peace is required, military control of cables is key, and there will be a struggle to control the resources of sunny and windy countries.

The third solution is to build slightly more electrical capacity than you need ('more headroom'). That way even if the amount fluctuates, you still have enough.

The fourth solution in hot places is to use PV cells on the roofs of all buildings that need air conditioning. Then the moment of maximum demand for electricity is the moment of maximum supply of sun.

Scale

Renewable energy is natural, but it requires big machines. It needs enormous grids across continents. A proper supply of renewable electricity will require tens of millions of workers globally. At least half of these workers will be factory and transport workers. The factory workers will be manufacturing solar power and wind turbines. The transport workers will be mainly truck drivers delivering turbines and solar power, seafarers and port workers for offshore wind farms, and rail freight workers. So it is a natural form of energy, but also an industrial form.

Although it is large scale, there is more than enough space on the earth for current demands. The current resources of wind and sun are thousands of times the current demand for all energy.

Electricity for transport and homes

However, simply switching to electric buses and trains now will not make a big difference. The most efficient uses for electricity are the ways it is used now, for lighting, machines and industry. That is not an accident. Electricity is currently used in the places where it works best.

Using electricity for transport is less efficient. In a diesel engine, the fuel is burned right there in the engine, on site. With electricity, the fuel is burned in a power plant, and then turned into electricity, and then moved long distances, and then turned back into motion. A lot of energy is wasted.

This means that there is little reduction in CO2 when electricity is made by burning gas. When electricity is made from coal, it makes more emissions than burning diesel or petrol in a car.

The same is even more true for heating buildings.

Moreover, because electricity is now used where it works best, we need to convert all that electricity to renewables before we start using renewable electricity for transport.

This is why it makes so much sense to move to public transport and efficient transport now. In the longer run, in ten years or so, with massive investment and tens of millions of jobs globally, electricity will transform transport. But first renewables need to transform the electricity we use now.

This is part of a series of factsheets on climate change produced by the ITF, www.itfclimatejustice.org

Factsheet 7: How to cut CO2 emissions - cars and public transport

Cars are the biggest source of CO2 emissions in transport, because they burn so much fuel per passenger. The best way to cut those emissions is to get people out of cars and into buses and trains.

Buses have about half the CO2 emissions of cars per passenger kilometre. That's an average. It varies with the design of the bus. But it varies a lot more with the average number of passengers on the bus.

For example, Spain has an average of 27 passengers per bus. The UK has 9. So the UK has three times the emissions per passenger kilometre.

If passengers switch to buses, that cuts emissions per passenger by half. If the number of passengers in the bus also doubles, that gets emissions per person down by 75% in total. Changes to the design of the bus can get the total down by 85%. Then switch the bus to electricity run made with renewable energy, and you have at least 95% cuts in emissions for each passenger who switches.

Buses

In many countries the switch to buses can be quick and easy. The roads are already there. But in some developing countries this is not the case. Roads will have to be built or improved. This will provide an opportunity to build Bus Rapid Transport systems, which have dedicated lanes and stations like rail.

But often all you need to do is buy the buses, train the drivers, and put them on the roads. You can do that in twelve months.

Put 40 passengers on a bus, and you take 20 to 30 cars off the road. Then the buses move more quickly. And you make more jobs.

However, we also have to make buses more appealing than cars. This means clean buses, warm in winter, cold in summer, that come often, on time, that run all night, and that go all places. The more buses we have, the easier this is to do.

The best way to get higher numbers of passengers into each bus is to have more passengers altogether. If most people switch to buses, each bus will be fuller and come more often.

To appeal, buses also need to be quick and cheap. They will be much quicker if they have their own bus lanes. Bus only streets will make an even bigger difference. The ideal would be much faster trips than we have now, so buses would save people time and grief.

Improving public transport on its own, however, is not enough. We also have to make cars less attractive. Otherwise people take buses, the streets get less crowded, traffic moves more quickly, and so more people go back to cars. Bus only streets, and express buses in cities, would change this.

Cheaper fares would also make a big difference. In the long term the ideal is 'free' public transport. Of course it is not really free. Someone has to pay for it. This would be done in the same way people pay for schools in most countries. Everyone pays taxes for schools, including rich people who send their children to private schools. In the same way, car drivers would pay taxes for bus journeys.

But even free passes for old people, children and the disabled would help. And if ticket prices are lowered for everyone, more people will use the buses. Then the average number of passengers on each bus will rise, and emissions fall further.

Improvements in bus design, driver training, and hybrid buses will also make a difference. But the decisive changes are a switch to buses, more bottoms on seats, bus only lanes, and cheap fares.

Trains

On the face of it, trains produce even lower emissions than buses. The main energy use in a vehicle is moving the air in front out of the way. Then the rest of the vehicle follows in the slipstream, like riders in the pack in the Tour de France. Trains are

long. Also, they move with less friction because the rails and the wheels are made of the same thing – steel.

However, it needs more energy to build the rail cars and the tracks. The roads are already there (but not in all countries and regions), and the more buses expand, the more roads come free. So in practice trains work out about the same as buses – about half the emissions of passenger cars.

Again, however, there is variation in passenger numbers. France, for instance, has 183 passengers on the average train. The UK has 95. If the UK was like France, it would have half the emissions.

As with buses, the key to more passengers is more services, longer trains, longer platforms, and reliable services. And above all, lower fares and free transport for some or all.

Trains have three great advantages. They are faster. They are easier to electrify. And most people prefer trains to buses. But buses can go more places, and new bus lines can be opened instantly. Train lines take longer to build.

A switch to public transport will create many jobs. Take a country where two thirds of journeys go by car. Change that to one third cars and two thirds public transport, and you double the number of jobs on buses and trains.

Integrated services

It is not, however, simply a matter of running separate bus and train lines. 'Integrated' services will bring more people onto public transport. That means easy, quick changes between one bus and another, or between a bus and a train.

An integrated transport system will also encourage more walking and cycling. Cycling transforms health. But even short walks to and from the bus stop every day reduce body fat and extend life.

There is a global epidemic of obesity. It is worst in the United States, but spreading across Europe and China. The most important cause – even more important than changes in the food industry – is the fall in exercise as people switch to cars.

Cycling and walking will not simply happen, however. They require space for bikes on trains and buses, and building safe dedicated lanes for cycling and for walking.

Electric cars?

Many people think about cutting emissions from passenger transport mainly in terms of making better cars. This won't solve the problem.

For one thing, design changes and hybrid motors can cut fuel use in cars. But they can cut fuel in buses too. Improved electric buses will still be better than improved electric cars.

Secondly, car use is growing quickly in the developing countries. If the whole world uses cars the way they are used in the rich countries now, emissions will be enormous. But as long as the rich countries are full of cars, people in poor countries will want them.

Third, we will need enormous amounts of new renewable electricity just to run buses and trains. There will not be enough for cars too.

NOTE – this factsheet is about cutting emissions by switching to public transport. That is only part of the answer for passenger transport. You should also have a look at factsheet 10 on changing cities and factsheet 6 on renewable electricity.

This is part of a series of factsheets on climate change produced by the ITF, www.itfclimatejustice.org

Factsheet 8: How to cut CO2 emissions – freight

Globally, most CO2 emissions from moving freight come from trucks. There are four main ways to cut freight CO2:

- Improve the efficiency of trucks.
- Shift freight from trucks to rail or inland navigation.
- Power railways with electricity from renewable energy.
- Reduce the amount of freight moved.

Improving trucks

Improving trucks can cut emissions in most countries by a third over the short term and more than half over the long term. Some changes so trucks use less fuel are:

Improved aerodynamics
Wide based tyres
Weight reduction
Low friction lubricants
Speed reduction
Ecodriver training
Full loads
Strict government fuel standards

These improvements can cut emissions from trucks in most countries by more than half over the long term.

The three changes that will make the most difference are speed reduction, full loads and strict government fuel standards. All these changes can be made quickly.

Speed limits can be changed immediately. They make a difference because much of the energy in moving a truck goes in pushing the air at the front out of the way. A truck at 110 kph uses twice as much energy to do that as a truck at 80 kph. The overall reduction in fuel use is less, but still substantial.

A 20 km cut in speed, from 115 kph to 95 kph, means a 17% cut in fuel to cover the same distance. And trucks that go slower can also be built lighter, with smaller engines.

Reducing speed limits means more jobs. Companies will still send the goods. But it will take longer for trucks to get there. That will mean more jobs for drivers. However, there is already a problem with fatigue in road transport, and many drivers are vulnerable because they are self-employed. Trucking needs regulation to avoid longer hours, more fatigue, more exploitation and more accidents.

We would also need more trucks. This would have a carbon cost in the factories. But that would also make jobs in the factories. And governments could insist on state of the art, low carbon new trucks. That would reduce the average emissions of all trucks quickly.

Running trucks with full loads requires careful control of inventory, shipping and planning, but it can make an enormous difference. A truck with full load on the flat uses 30% of its fuel to move the load, and 70% to move the truck.

That means a truck one-quarter full uses two and a half times more fuel per tonne of freight than a truck three-quarters full.

Stricter government regulations for energy efficiency will also make considerable difference. The key is regulations that insist that within three to five years all trucks are as efficient as the most efficient truck now. Once that is achieved, then the standards are tightened again.

In some poor countries, the trucks are particularly inefficient and polluting. This is often because old, dirty trucks are exported from the rich countries. In these places, strict government controls of imports and engines can deliver even larger cuts in emissions.

Taken together, these changes can reduce emissions by at least 50%. Very strict speed limits and careful loading could reduce them by even more.

Switch to trains

The second solution is a switch from trucks to rail freight and inland navigation.

A diesel railway engine uses about half the fuel per tonne of freight of a diesel truck. One reason is that a train is much longer, and has the same advantage as the Tour de France. Another is that freight trains move more slowly.

Inland navigation on rivers and canals uses less than half the fuel of a diesel truck, partly because it moves slowly.

Of course railway lines, rivers and canals don't go everywhere. Trains and boats have to take the freight to depots. There it can be unloaded into light vans and trucks to deliver it the last few kilometres. Crucially, however, vans that cover short distances can run on electricity.

The market, left to itself, will not deliver rail. For the last fifty years we have seen a steady shift from rail to road. This is not just driven by profits. It has been encouraged by governments – partly by railway closures, but mainly by building roads. Globally, the World Bank worked steadily to encourage road building and car buying all over the world.

We need these policies reversed. That requires government regulations to direct freight to rail, and money for new rail networks.

What about truck drivers' jobs?

A switch to rail will mean some jobs in trucking will be lost. On the other hand, a switch of passengers from cars to buses will mean that many more jobs driving than are lost in trucks. And there will be jobs driving electric vehicles the last few miles.

But truck drivers will also need government policies that guarantee them retraining and a good job in rail, buses or shipping. See the factsheet on Jobs Lost for more details.

Switch to electricity

Adding electric cables to a railway line is not difficult. But as with passenger rail, the really big saving comes when most of the electricity on the grid comes from renewable sources. Then it is possible to reduce emissions from rail to almost nothing. This is the big reason for switching from road freight in trucks to rail freight – the possibility of renewable electricity.

Reduce freight

We can also cut emissions by moving less freight. The solutions here involve difficult political and moral choices.

It is possible to say, for instance, that 'food miles' should be drastically reduced. It makes no sense for the UK to export hundreds of thousands of tonnes of pork every year, and to import hundreds of thousands of tonnes of pork as well.

But any moves to reduce global trade will also be moves to reduce exports, and therefore jobs, in the poorest countries in the world. They will also damage the economies of several rich exporting economies like Germany and Japan.

So reduction in trade is not a simple matter. But there is one thing transport workers can campaign for. Economists say that 'cheap transport' has been essential to the growth of global trade. That is true. But that transport is cheap because many port workers, seafarers and truckers have seen their unions undermined, their conditions worsen, and their real wages fall. If unions can win back those losses, transport will become more expensive. Then the growth in global trade can be restrained.

Timing

It makes sense to take these changes in a certain order. The first changes are almost immediate. Speed limits can be reduced in a week.

Driver training and strict emissions standards for new trucks could follow within a couple of years. Switching large amounts of freight to rail requires a few years to build the new lines. In many cases, though, new lines could be built for faster passenger trains. Then much of the old network could be turned over to slower freight trains. In some countries, particularly in South America, many railway lines have been closed. These could be reopened. Finally, a switch to renewable electricity on all lines would follow.

We are not proposing that all road freight switch to rail. Even at the end of 15 or 20 years, there would still be a mixture of road and rail freight.

This is part of a series of factsheets on climate change produced by the ITF, www.itfclimatejustice.org

Factsheet 10: How to cut CO2 emissions – changing cities

We can cut CO2 emissions by changing the kind of energy we use, by using it more efficiently, and by reducing how much energy we need.

This factsheet is about reducing how much we need. This is not mainly a matter of giving up trips we would otherwise make. It is about changing how we live in cities.

Here is the amount of CO2 emissions per year from passenger transport in:

Houston	5,690 kg
Chicago	2,910 kg
Montreal	1,930 kg
Munich	1,390 kg
Brussels	1,290 kg
Madrid	1,050 kg
Paris	950 kg
Berlin	774 kg
Tokyo	818 kg
Hong Kong	378 kg

Houston, Texas has 15 times the transport emissions per person of Hong Kong. These are extremes. 95% of car journeys in Houston are by car. 84% in Hong Kong are by public transport. Houston is suburban sprawl and Hong Kong is urban dense.

Is it because Houston is richer or Asia is different? No. Houston has 7 times the emissions of Tokyo, and Tokyo is richer.

There is also a lot of variation within regions. Chicago has half the emissions per person on Houston. Montreal has a third. And in Germany, Munich has almost double the emissions of Berlin.

The difference is public transport and how densely people live in cities. And density makes public transport better. So we can cut emissions by at least half by gradually changing the shape of cities.

Dense cities

Dense cities use less energy than cities that are spread out in suburbs. One reason is that it takes less heat to warm a building in a dense city, because all those people are living close to each other. This is why cities are warmer than villages. And you need less heating every time you share a wall or a floor with another house or apartment.

Moreover, the more dense the city, the shorter the journey to work, to school or to see friends. Not only that, the easier it is to use buses and metro trains, and the better service they can offer.

It is not just density. The other key is mixing homes, businesses and shops together. This already happens in many older cities. If jobs are close, and daily shops are close, people travel less and walk more.

It helps a great deal, too, if there is not enough parking space.

This is not a matter of shoving people into high rise buildings. Very tall buildings use more energy in heating, and a lot more in moving people and things up and down in lifts (elevators).

It is a matter of buildings in rows, five to eight stories tall. Like Paris.

Nor is it a matter of taking people out of the suburbs, where they have access to the grass and nature, and forcing them into concrete jungles. You have to go a long way from most suburbs to reach nature. If people live more densely, then each average person is closer to the countryside.

City and country

In richer countries, cities have smaller CO2 emissions per person than rural areas. This is because cities are warmer and need less heating. And rural people travel further and have less public transport.

This is the opposite of what most people in developed countries think – that country living is better for the environment.

However, in poorer countries city dwellers use more

energy than villagers. This is because villagers are on average poorer. So they are more likely to simply do without the things that cause CO2 emissions. Many walk to work, and go cold in the winter or hot in the summer.

Although city dwellers are a good deal richer, they only have a bit more emissions. If you look at emissions per $100 of income, then city dwellers have less emissions. And the solution to climate change is not going to be keeping the poorest villagers very poor.

But, there are exceptions to the energy benefits of urban density. One is that it works better for colder countries. In very hot places, people need air conditioning more than they need heating. There the savings on energy come if housing is spread out. Also, photovoltaic solar cells on the roof are a good way of matching energy supply to demand – when the sun is shining brightest is when people need air conditioning most. And that works better with a lot of roofs.

The points about saving energy on transport still work well for hot cities. So what makes climate sense is a balance between density and air.

Also, urban density is only part of the answer. The kinds of buildings are also important. There are reasons why Tibetans built tall narrow stone buildings with narrow windows – and why people in hot countries built short mud (adobe) houses with verandahs, shade and indoor ponds.

Traditional building styles fit the climate better than 'modern' cement buildings. They are more satisfying to build and to live in. And the manufacture of cement emits a lot of CO2, because limestone is heated, and then all the carbon is extracted and sent into the air as CO2.

Finally, urban density helps, but you can still have efficient public transport even with low density suburbs. In many cities and suburbs in the US, the number of passengers on the average bus is very low. That makes buses few and far between. A small increase in bus use is not going to make much difference. But a bus service that moved more than half the population could reach most people conveniently even in Los Angeles and Houston.

How to change

None of this can happen quickly, because people already have homes and jobs. But planning can be biased to reinforce density and locality. At the moment planning is biased in the other direction, toward cars and out of town shopping malls.

There is one further step that would make an enormous difference – removing cars from the cities. This has been done in the historic centre of many cities. Once done, people don't want to go back.

But we are talking about something larger – no cars in most of the city. The benefits would be enormous. Some roads would be reserved to buses. Motor wheelchairs and small vehicles for the disabled would be allowed on all streets. But most streets could be closed to cars and parking. A street two cars wide, with parking each side, and then a pavement, would become open space six cars wide. Children could play football, or hide, and older people could sit in the sun or walk about and talk to the neighbours. The system of allotments and community gardens found in many European cities could extend into allotments right in front of houses. The air would be cleaner and quieter. Trees would grow. And on the streets that remained the traffic would flow more quickly and easily.

This is an ambitious idea. It is not something to force on people. But if the people of just one city voted to do it, others would want to do likewise.

This is part of a series of factsheets on climate change produced by the ITF www.itfclimatejustice.org

Factsheet 11: Cutting CO2 emissions - challenges for the aviation sector

At the moment it is estimated that aviation accounts for only 3% of total global CO2 emissions. But the aviation industry has come under scrutiny because there will be larger problems in the future if nothing is done, for several reasons:

- Aviation is the second fastest growing source of transport emissions. (Only shipping is growing faster).
- Much of the aviation emissions are deposited high in the atmosphere, where they have a greater effect. There is controversy about how much greater, but a reasonable estimate would be twice the effect.
- Planes have a limited capacity to change their fuel source. Importantly, they cannot run on electricity. The main hope for deep cuts in CO2 emissions from transport is to use wind and solar power to make electricity to run buses, trains and small trucks. But this won't work with planes.

Even aviation employers, represented by IATA, have recognised that changes needs to be made. IATA has been an influential voice at ICAO (the International Civil Aviation Organization) whose member governments have agreed principles for the stabilisation of aviation emissions by 2050.

Apart from the human and environmental cost, climate change will also have a very real impact on aviation workers through the inevitable changes that will take place in the whole aviation industry and in their individual workplaces. If workers and their unions can't engage in and influence this debate, they may end up bearing an unfair proportion of the cost of responding to climate change.

Solutions: making changes within the aviation industry

In order to tackle climate change we need to cut fuel use, and by doing so, reduce emissions. These are some of the ways that have been proposed to achieve this:

- Improve design
- Build with lighter materials
- Eliminate business class
- Direct flight plans
- Improve air traffic control systems to reduce time wasted in circling airports
- Reduce the number of flights to and from each airport

Some important measures will require government regulation. For instance, planes could fly at slower speeds. This would save fuel, and save the airlines money. Trips would take longer, so there could be more jobs for pilots and cabin crew. But the airlines' wage bill would increase and they may try to avoid this, giving rise to potential health and safety concerns. Passengers would also arrive later. So this will not happen unless governments and international regulations require that all planes slow down.

Another issue is that planes are built to last, but the new generation of aircraft now use much less fuel. In could take twenty years or more to replace the old planes. A solution would be regulations to insist that older aircraft are retired, and new planes introduced. This would create jobs in aircraft manufacture but could have negative impacts on maintenance workers.

Biofuels are also a possible alternative to conventional aviation fuel. Biofuels work in the same way as ordinary aviation fuel, but they are made from plants. At the moment the main biofuels are made from corn, sugar cane and palm oil, though other plants can be used. Unfortunately, there are serious problems with biofuels. The main one is that biofuels are grown on land which would otherwise be used to feed people. (See factsheet 16 on *biofuels*.) But if there is a case for biofuels anywhere, it is in aviation.

All of these measures taken together could reduce emissions from flights by at least a third, and possibly more. The input of workers and unions is critical in ensuring that such measures are effective and balanced, taking into account social as well as environmental and economic needs.

Solutions: switching modes of transport

A further prominent proposal for cutting emissions is for people to switch from planes to high speed trains for short haul flights. This switch could bring deep cuts in emissions. Short journeys make a large difference because much of the energy used in the average flight comes at take-off and landing. On a flight of 250 km,

take off and landing is about 50% of the fuel used. On a flight of 3,700 km, take off and landing is 7% of the total fuel. The very short flight uses about 40% of the fuel per kilometre of the long flight.

These short journeys could be made by rail instead. It does not have to be very high speed rail. At very high speeds, there is a lot of wind resistance and the train needs more energy. But trains averaging only 240 kph (150 mph) will, once the convenience offered is factored in (e.g. they go from city centre to city centre and boarding is quicker) provide acceptable alternatives to air travel in terms of total journey time and comfort.

Once a high speed line is built, the experience in different countries is that most people will switch from air if it takes three hours or less. In Spain, for instance, the new line from Madrid to Barcelona has largely replaced planes.

On slightly longer routes, some government regulation and rationing of flights may be needed to encourage people to switch. In any case, new rail lines will not be built without massive government funding. Globally, this could mean many millions of new jobs.

High speed rail run on ordinary electricity creates much lower emissions than air travel. But the real pay off would come with electricity made by renewable energy. At that point the emissions would go down to almost nothing. This would probably take more than ten years (see factsheet 6 for why).

So, assume that 25% of all passenger kilometres switch to rail, this would reduce CO2 emissions by about 40%. Further savings from design, new planes, slower speeds and different work routines are anticipated to bring the total cut in emissions up to at least 60%.

Lost jobs

So far, so good. But we cannot make cuts in aviation emissions on this level without cuts in the number of short haul flights. And that threatens jobs in aviation.

We cannot, and should not, hide this. But there are ways of coping. Let's say that 25% of kilometres are cut – all of them from short haul flights. That would also mean a significant cut in jobs.

It makes sense to phase in these cuts over 20 years, because it will take that long to build all the renewable energy to provide zero carbon electricity for high speed rail. If this approach is adopted, that means a cut of about 1.25 % a year in aviation staff. This is far below the number of people leaving the industry and retiring each year. It can, for example, be absorbed by government regulations restricting new hiring to make sure everyone already in the industry has a job.

Conclusion

Some people worry that these and other proposals to tackle climate change will discourage air travel and the negative impact that this will have on an already volatile industry with small profit margins. However, climate change will not go away, nor will the international community ignore the impact of aviation emissions for long. Initial research undertaken by the ITF suggests that even if steep reductions in emissions were to be made, there would still be an overall increase in employment in the industry as the projected growth rates for the 'business as usual' model were massive. Nevertheless, the increase in employment would be different regionally. The key is for unions to make their voices heard and to claim climate change as a union and employment issue - one that is interlinked with their struggle to improve terms and conditions and to raise social standards.

NOTE: Factsheet 14 on *carbon trading* includes a discussion of whether aviation fuel should be included in carbon trading schemes.

This is part of a series of factsheets on climate change produced by the ITF, www.itfclimatejustice.org

Factsheet 12: How to cut CO2 emissions - ports

Carbon dioxide emissions in ports come from three sources:

- Ships burning marine fuel
- Trucks burning diesel
- Fuel use in the port itself

Of these, fuel use in the port itself is the least important.

For years there have been debates in many countries about pollution in ports. These debates can make it difficult for port workers to think clearly about carbon dioxide emissions.

The confusion runs like this:

Climate change is an environmental issue. Carbon dioxide is a pollutant. We are trying to reduce pollution in ports. The more we do that, the more we stop climate change.

This is an easy confusion, but it's wrong. Carbon dioxide causes climate change. But carbon dioxide emissions are different from pollution. And cutting pollution will not affect carbon dioxide emissions.

The most important source of pollution in ports is burning marine bunker fuel. Bunker fuel is dirty. It is literally the bottom of the barrel – the heavy oil that is left in the refinery after the gasoline, the kerosene and all the other cleaner fuels have been burned off. Bunker fuel is high in particulates and sulphur. It was traditionally used at sea because there were fewer people out there to be affected.

But ships in port run their engines. Then the air around the port looks dirty and damages lungs. The worst affected are the port workers and the children who live nearby.

Campaigns to clean up port pollution have gone for two solutions. One is requiring cleaner fuel. The other is turning off the engines in port and using shore side electricity.

However, marine bunker fuel has no more carbon dioxide emissions than any other kind of fuel. In fact, sulphur and particulates in the air block incoming sunlight. If you look up on a smoggy day, you can see them blocking the sunlight. That cools the world, the opposite of global warming. The result is that the net affect of shipping on climate over the last thirty years has been cooling.

This might seem like good news. It is not. The reason is that sulphuric acid and particulates stay up in the atmosphere for days or months. CO2 stays up for a hundred years or more. So in the short term sulphur and particulates cool the air. In the long term, the amount of CO2 from bunker fuel will overwhelm the cooling affect.

This does not mean that efforts to clean up ports are wasted. Stopping climate change is one form of taking care of the environment. Stopping the children around ports getting asthma is another. In practice, in campaigns, both sorts of concern reinforce each other.

But CO2 is not a pollutant like other pollutants. You cannot see it, it is not bad for your lungs, and it is not dirty. It does not affect the area around the port more than anywhere else. CO2 mixes in the air all over the world. The CO2 from ports and ships contributes to global warming, but not to local pollution.

If you turn off the ship engines in port, and use shore side electricity instead, it reduces the pollution. But the power station still burns coal or gas to make the electricity. And that still produces roughly similar amounts of CO2 emissions. This can only change once most electricity comes from renewable energy.

Trucks

The second most important source of emissions in port comes from the trucks that use the port. These burn diesel, which is polluting, but not as polluting as bunker fuel. Efforts to clean up ports, like those in Los Angeles and Long Beach, have concentrated on

requiring trucks to have cleaner engines and cleaner fuel.

This is welcome, but it does not make any difference to climate change. For climate change, what matters is not how much fuel is burned. The more fuel, the more CO2.

To stop climate change, we need changes to trucks. (For the details of the changes, see Factsheet 8, *Road and Rail Freight*.)

The importance of ports

All this might suggest that ports and port workers cannot make much difference to climate change. That's wrong. But the key thing is not what goes on in the port, it is the people, vehicles and ships that go through the port.

Ports are meeting places and bottlenecks. First of all, they have always been a place where transport workers meet each other. Dockers, other port workers, seafarers, truck drivers and rail workers come together in ports. Truck drivers and seafarers are often isolated workers. In ports they meet up in lines waiting to load or in bars. In many different countries, on all continents, port workers have been central to organising seafarers, transport workers, and the workers in the city more generally. This centrality has sometimes been formal, and always been informal.

Ports are also a bottleneck – a place where regulation bites. Ships and trucks have to go through ports. If trucks or ships have to meet certain standards to use a port, they will meet it. Because trucks and ships have to be prepared to drive to ports at short notice, tight regulations will be generalised across all the trucks in a certain region. Ships might avoid one port – they will have to conform to the standards of several ports in a region.

This means that port workers can make a considerable difference to climate change. If, and only if, they have strong unions.

The longshore workers union (ILWU) in the port of Los Angeles in the United States provides an example of what is possible, and on some of the difficulties. The union organised to make the port cleaner. They had the support of the mayor, the teamster's (truckers') union, and of African-American and Latino groups.

The union also organised with local communities. They found these communities had two different understandings of the environment. Up on the hill, in the expensive houses, people were concerned that the port cranes were too tall and the lights kept them awake at night. Down on the other side of the port, in the working class houses, people were concerned because many of their children had asthma and none of them were allowed out into the playground at school because the air was so toxic.

The longshore workers union united all of these groups in a successful campaign to require strict environmental controls on all port operations, but particularly on all trucks using the port.

The air is much cleaner now. But the trucking employers have taken the port to court. And the judge has ruled against the new regulations, because they favour union drivers. The port and the union are appealing the ruling.

This example suggests several things. First, alliances between unions, community groups, and local political forces can have a major effect. Second, the employers are likely to come back at you, and you need an alliance prepared to fight.

Finally, this example deals with fighting pollution, not emissions. And any environmental alliance will need to fight pollution, because it has such a strong effect on workers and local residents. But such campaigns can also fight for stricter regulation of fuel use by trucks, and regulation of ship speeds.

That is where port workers can make a major difference to climate change.

This is part of a series of factsheets on climate change produced by the ITF, www.itfclimatejustice.org

Factsheet 13: Controversies – carbon taxes

Carbon taxes, carbon trading and carbon offsets are all 'market solutions' to reduce CO2 emissions. All of them try to encourage people to burn less carbon by making it more expensive.

These market measures are controversial, and also often hard to understand. This factsheet covers carbon taxes, because this is the simplest and easiest market solution to understand. Factsheet 14 covers carbon trading. But you need to understand this factsheet before you read that one.

Arguments for carbon taxes

The idea is that there is a tax of so much on each kilo (or pound) of carbon burned. In effect, it's a tax on each kilo of CO2.

The tax is easy to work out and understand. We know the amount of carbon in gas, coal and oil. The tax is on the gas, coal and oil. These fuels are easy to tax, because the government can find where they come into the economy.

The gas, coal and oil companies pay the carbon tax first. Then they pass the price on. The price of petrol for cars and electricity for cars goes up. So does the price of heating oil for homes, electricity for industry, and aviation fuel. This works its way through to increases in electricity prices, bus tickets, and factory goods. The result is to discourage people using high carbon goods and services. So, for instance, they will turn from cars to buses.

Another advantage is that the 'polluter pays' for fixing the problem. The companies and people who create the problem will pay carbon taxes, and the virtuous companies and people will not.

Moreover, this is a simple tax. It is easy to understand, easy to do, and fair.

Arguments against

The first argument against is that there is always a better way to cut emissions. Let's take a few examples:

If the government raises the price of petrol for cars, some people in the city will switch to the bus. But if the government forbids cars in an inner city, everyone will take the bus or train to work.

If the government raises the price of electricity, some people will buy more efficient light bulbs, TVs or computers. But if the government regulates all appliances so they have to use less energy, that cuts emissions more.

If the price of heating increases, that will encourage some people to turn down the heating. Many of these will be poor old people. But if the government sends teams of construction workers street to street, refurbishing and insulating every house in every street, then everyone will need less energy to keep their house warm.

'Inelastic prices'

Another argument against is that often the price can rise a great deal and people still won't change their behaviour.

For instance, if the price of petrol goes up a car owner in Paris can take the metro. But a US suburb does not have a bus, so people have to drive to work no matter how high the price goes.

Again, if the price of gas or kerosene for cooking goes up in India or Egypt, people will still spend large amounts of their income cooking food.

The effect is that high carbon prices punish ordinary people.

'Regressive taxes'

Moreover, carbon taxes are unfair. In a fair society, people at the top would pay a bigger share of their bigger income in tax. Even if they did that, they would still have a higher income than the people in the middle.

But carbon taxes go in the opposite direction. The rich pay a smaller proportion of their income. The middle and the bottom – most of us – pay more.

This is because people in the middle and poor people pay a bigger proportion of our income on transport anyway. This if true even if we take the train or drive a small car, and the rich person takes planes and drives a big car.

People in the middle and poor people also pay a bigger proportion of our income on heating, electricity and other household bills. This is even true when rich people have big houses and leave the lights on all the time. As with transport, the rich are paying a bigger amount, but a smaller proportion of their income.

There is an exception to this – where electricity or heating is already so expensive that many poor and middling can't afford it at all, or have been cut off for not paying their bills. Making electricity or heating more expensive does not solve this problem.

Finally, carbon taxes raise the price of food, particularly wheat and corn. This is because these crops use large amounts of fertiliser. Oil is used in the manufacture of fertiliser, and so a rise in oil prices feeds through into a rise in basic food prices.

Unfair taxes are a political mistake

This unfairness also creates a political danger for environmentalists. Governments can pass a law taxing carbon, or even just taxing some forms of carbon, such as petrol. People are inclined to accept that because they do want something done about climate change.

But they also feel the hurt each time they pay a bill, or buy petrol or a bus ticket. Then right wing parties and media corporations which are already hostile to action on climate change, can step in. They can attack the carbon tax by saying it is an attack on workers and their families. The government gets it from both sides – the left and the right. The government will then probably lower or abolish the tax.

Governments are usually well aware of this danger. They are therefore careful not to tax petrol, cooking oil or electricity too hard. So even where there are taxes on carbon, governments usually keep them low enough that they don't irritate people too much or change their behaviour.

But, underlying all the discussion so far is the question of who pays. The argument against carbon taxes is that working people and the poor will pay for climate action. The alternative is government regulation of business and government spending on renewable energy, public transport and insulating homes. This will save the climate and create jobs.

However, regulation will cost business money. And government spending will have to be paid for by taxes on corporations and the top quarter of the population.

From a simple union viewpoint of fairness, there is no question which is better. However, there is a still a strong argument for carbon taxes. It is this:
In an age of austerity, governments and corporations will not accept more government spending. We have to cut carbon emissions now. If we don't, working people will suffer far more than rich people, and the poorest of all will suffer the most. A carbon tax will work and can happen. We have to act now.

This is part of a series of factsheets on climate change produced by the ITF www.itfclimatejustice.org

Factsheet 14: Controversies – carbon trading and carbon offsets

This factsheet explains arguments for and against carbon trading. It will only make sense if you have read factsheet 13 on c*arbon tax* first. This is because carbon trading is a kind of carbon tax, but with added features.

In theory, it works like this:
The government of a country sets up a carbon trading scheme. At the beginning of each year, the government gives each corporation an allowance to put so many tonnes of CO2 into the air. If it's 10,000 tonnes of CO2, the company gets 10,000 permits of one tonne each.

The government just keeps track of how much coal, oil and gas each corporation is using.

If the corporation does not use up all their permits, they can sell left over ones to other corporations. Any corporation that needs need more permits can buy from those who are selling. If a corporation goes over their limit they lose money. If they go under, they make money.

The first year sets a total number of permits to be handed out and then divides them up. After that, each year the government cuts the total number of permits by a certain amount – say 3% a year. That brings down the total emissions by 3% a year.

This is called 'cap and trade'. The total amount of emissions each year is the 'cap'. The buying and selling of permits is the 'trade'.

The idea is that emissions come down steadily. This is better than a carbon tax, which does not automatically limit emissions. Also, the market ensures that emissions are cut in the cheapest possible way. This is because companies that find it very expensive to cut emissions will be willing to buy more permits. And companies that find it relatively easy to cut emissions will be willing to sell.

It is an elegant solution that costs the government nothing.

Arguments against

One argument against is that cap and trade has the same weaknesses as a carbon tax. Have a look again at the Factsheet on *carbon tax*.

These arguments say that a cap and trade system passes the price on to the consumer. In general, the people in the middle and the poor will pay a bigger proportion of their income. That will make the cap and trade system politically vulnerable.

Also, there is always a better solution than a cap and trade system. Government regulation and government spending will deliver deeper cuts in emissions.

Moreover, government spending will make new jobs and stimulate the economy. Cap and trade will cost more and more, and mean that jobs are lost and the economy does not grow.

It does not work

Another argument is that cap and trade will not work in practice. So far the only one existing example is the European Union scheme. This has not worked.

When it was set up, the scheme only applied to about half of the emissions in the EU. National governments handed out the permits. Each government gave out a lot of permits. The result was that the total cap was so high that corporations mostly do not need permits and the price has been sinking lower and lower.

The EU has announced that in future they will auction all permits, instead of giving them away. This should raise the cost to companies. They will also lower the total cap. And they will extend the scheme to cover new areas, like aviation fuel.

However, opponents of cap and trade argue that the ineffectiveness is built into the system. At the point where corporations really started hurting from the cost of carbon permits, they would intervene with governments and get the cap raised. The problem is

the same as with carbon taxes – when they get close to working governments may be tempted to shy away.

For carbon offsets

There is a third kind of argument against cap and trade. This is that cap and trade always comes hand in hand with 'carbon offsets'. Here is how carbon offsets are supposed to work:

The simplest form of 'carbon offset' is this. You book an aeroplane flight. That is going to put a tonne of carbon dioxide into the air. So you tick the box that says you will pay to sponsor growing some trees somewhere in the tropics. That saves as much carbon as you were emitting. You are 'offsetting' your travel emissions.

There are also offsets for companies, local governments and national governments. Let's say that you own a power station in Germany. You have been given permits in the European Union for so many tonnes of emissions. But you have gone over your limit.

You can buy offsets from another company or government outside the cap and trade scheme. For instance, you can buy from a forestry company in Uganda. They plant trees and save carbon. You support them, and get to offset their trees against your extra emissions.

People in poor countries get money. This helps them cut emissions in poor countries. And it is cheaper to cut emissions in poor countries, because wages are lower.

It's a win-win, and the rich are helping the poor.

Against offsets

The first argument against is that no one polices the offsets. They are open to outright fraud, and to tricks that resemble fraud.

For instance, a company can acquire forest land in Brazil. They cut down the dense rainforest and release the carbon from the soil. Then they plant eucalyptus trees, which grow very fast, nowhere near as tall, and release a poison that kills the undergrowth. As soon as the trees grow, they are cut down again. The company is planting trees, and storing carbon. But much more would have been stored if they had never cut down the forest.

Or a factory in China is using CFCs, a very rare and very strong kind of greenhouse gas. The company agree to spend a little money on changing the production process, and make a lot of money from offsets because they are cutting a lot of emissions. Without the money, the Chinese government would have made them make the changes anyway.

The big objection, though, is that offsets increase the emissions from rich countries. The UK, for instance, is planning, by law, for 80% cuts in CO2 emissions. But the UK government knows that they can't make the 80% cuts without spending money they do not plan to spend. So they are already planning that much of their 'cuts' will in fact come from offsets they buy from poor countries.

The result is that the UK won't cut 80%. In fact, every government in Europe is planning on this get-out clause.

Moreover, governments and companies in poor countries will be encouraged to allow rich countries not to cut, because they make money. And they will be encouraged not to sign up to cut their own emissions, because that will lose them money on offsets.

But, there is another argument for cap and trade. Governments and corporations are not willing to spend money. They may be willing to do cap and trade. It is better than nothing.

This is part of a series of factsheets on climate change produced by the ITF, www.itfclimatejustice.org

Factsheet 15: Controversies – nuclear power

This factsheet explains the arguments for and against nuclear power. The strongest argument for is the simplest. Burning oil, gas and coal is creating climate change. Nuclear power works by using the energy of a controlled reaction to generate energy. So it does not put any carbon dioxide into the air. Nuclear power is renewable energy, like wind and sun power.

Look at France, where 80% of electricity comes from nuclear power. That's why France has one of the lowest rates of CO2 emissions of any rich country.

Advocates of nuclear power are not arguing for stand alone nuclear. Instead, they say that renewable energy requires nuclear power as a backup. A nuclear power plants provides a steady, predictable supply of electricity. Wind power varies as the winds vary. Solar power works better when the sun is shining, and it does not provide any power at night. Nuclear power provides a steady, predictable 'base load' the electricity grid can rely on.

Finally, nuclear power is now cheaper per kilowatt hour than wind power, and a great deal cheaper than solar power, tide or wave power.

Controversy among environmentalists

Some environmentalists say that they used to be against nuclear power, because of the risks and the association with bombs. But the risks are not that great. And climate change will kill far more people than any possible nuclear power meltdown.

The majority of environmentalists, including Greenpeace and Friends of the Earth, remain opposed to nuclear power.

Safety

The first argument against nuclear power is that it is dangerous. There have been thousands of small nuclear accidents, and four major ones:

Chelyabinsk (now Mayak) in the Urals in Russia in 1957.
Three Mile Island in Pennsylvania, USA, in 1979.
Chernobyl in Ukraine (then USSR) in 1986.
Fukushima in Japan in 2011.

Defenders of nuclear power argue that this is a good safety record. Especially when compared to coal. In China, for example, government figures say that 6,000 coal miners die in accidents each year. Unofficial guesses are much higher. And several hundred thousand people in China alone die each year of respiratory illnesses caused by burning dirty coal.

Critics of nuclear power say that serious accidents may be rare, and produced by unusual circumstances. The radiation released in a meltdown, however, remains in the air for a long time. A quarter of a million years from now, half the plutonium released will still be in the air. Radioactive material also remains in the soil, the plants, and in the bodies of people affected.

Estimates of the consequences of Chernobyl, for instance, vary widely. The United Nations Atomic Energy Authority estimated that 4,000 people would die of cancer because of the meltdown. In 2006 Greenpeace, relying on doctors and scientists in Belarus and Ukraine, estimated that 200,000 people would die of cancer because of the meltdown. A recent study based on many papers by scientists from Russia, Ukraine and Belarus estimated 800,000 dead.

These estimates do not include the large number of children still being born with birth defects, many of whom fill care homes in Ukraine and Belarus.

Fukushima

No one knows what the results of the Fukushima meltdown in Japan will be. Two details suggest problems.

A few days after the accident a US aircraft carrier sent a helicopter to help clean up the stricken plant. On its return to the carrier, the copter crew were checked for radiation. The aircraft carrier

immediately sailed away from Japan, and the US government urged all Americans with 50 miles (80 kilometres) of the plant to leave.

Also, the city of Fukushima, the provincial capital, is about 35 miles (50 kilometres) from the plant. 300,000 people continue to live there. Parents, in particular, are worried for their children. They do not know, for instance, whether the school playgrounds are radioactive.

Insurance

Another argument against is that no insurance company in the world will write comprehensive insurance for a nuclear power plant. No bank will loan money to build a nuclear power plant without insurance. No power company in the world will build a nuclear power plants without insurance. This tells us that all power company executives, insurance executives and bank executives believe that nuclear power is risky.

This is why every country with a nuclear power plant also has a law that says either the government will be liable for the effects of a nuclear accident, or no one will.

What has become clear after Chernobyl and Fukushima is that no one is liable for the damages. Governments do not compensate victims.

Enough uranium

Opponents of nuclear power also say there is simply not enough uranium to build enough nuclear power plants to make much difference to world energy demand. Supporters say that this is true at current prices for uranium. But at higher prices, very large deposits of low grade ore could be extracted.

Waste

Opponents also say that the main problem with nuclear power is the waste. No one has worked out a way of safely disposing of the waste. In the early years much was simply dumped at sea. Now it is stored. Where possible, governments and companies try to export radioactive waste and bury it somewhere else. But it will remain dangerous for hundreds of thousands of years.

This is partly a matter of safety. But it is also the main expense with to nuclear power. It is enormously expensive to dismantle an old power station. Indeed, nuclear power companies, including private ones, rely on the government to pay the cost of dismantling and storage.
Opponents say these costs make nuclear power much more expensive than wind power. Since 1945 nuclear power has also received massive subsidies in many countries. There are no reliable statistics on this, and opponents insist many of the subsidies are hidden. But supporters of wind power say that if they had only a fraction of the subsidies nuclear has received, they could bring the price of wind power down far below nuclear.

Nuclear war

Finally, there is the issue of the connections between civilian nuclear power and nuclear war. Sometimes this is raised directly, as when the US accuses Iran of wanting nuclear power to make a bomb. Moreover, every country that has developed a nuclear bomb since 1950 has done so by using civilian nuclear power – France, Israel, India, Pakistan and North Korea.

A meltdown in a nuclear power station kills by poisonous radiation. A nuclear bomb is far more terrible, and kills by heat, explosion and radiation. Moreover, one nuclear bomb can lead to hundreds exploding in retaliation. Nuclear war between major powers retains the possibility of eliminating hundreds of millions in minutes.

However, 'civilian' nuclear power gives legitimacy to nuclear weapons. No one is likely to want to live near a factory that simply makes bombs. And military planners do not expect that countries which give up nuclear power completely will keep nuclear weapons.

This is part of a series of factsheets on climate change produced by the ITF, www.itfclimatejustice.org

Factsheet 16: Controversies – biofuels

Biofuels are gases that replace oil, but are made out of plants, trees, and other living things.

There are three main kinds of biofuels in use now. One is ethanol made from corn (maize). This is a kind of alcohol, and can be used to run a car or other engine in place of petrol (gasoline). This kind is most common in the United States.

A second kind is ethanol made from sugar cane. This too can be used in cars or other engines. It has been encouraged by the government of Brazil, where it has been the main form of fuel for cars for many years.

The third kind is palm oil, which is extracted from palm trees. The main producing country is Indonesia, and most of the oil is exported.

Of course, there are also natural fuels that have been used for heating for a long time, like wood and cow dung. These are usually called 'biomass', to distinguish them from 'biofuels', which can be used as a gas in engines.

Until recently most environmentalists were very enthusiastic about biofuels. Now many have strong doubts. This factsheet puts the arguments on both sides.

Some arguments for

Biofuels replace fossil fuels like oil, coal and gas. Biofuels are endlessly renewable. You grow the corn, you turn it into ethanol, the car burns the ethanol, and that turns the carbon in the corn into carbon dioxide in the air. But then the growing corn absorbs that carbon dioxide into the plant to make more carbon. Then that carbon is harvested, burnt, and returned to the new plants in turn.

The whole process is natural, and no carbon is permanently lost into the air. That is how plants grow – they take carbon dioxide out of the air and turn it into carbon, the basis of all life.

Moreover, biofuels provide a livelihood for farmers in Brazil, Indonesia, the US and other places.

Against: food and forests

There are several arguments against. The first is that there is only a limited amount of good land in the world. If that land is used for biofuels, then you reduce the amount of food in the world.

Faced with a choice between a thirsty car in Los Angeles and a hungry child in Lagos, the market will always choose the car. This is because the California car owner has more money. Yet the amount of grain needed to fill the tank of a big car can feed a child for a year.

This pushes the price of food grains up globally. Over the last few years prices of grain – wheat, corn and rice – have gone up and down. But the main direction is up. That hurts the poorer people in poor countries hard, because they are already spending much of their income on basic foods.

Some of this price increase is because of biofuels. There are other factors pushing the price of grain up as well. These include speculation, and falling harvests because of climate change. Also, the price of oil has been rising, and oil is used to manufacture fertiliser, and that pushes up the price of fertiliser. So there are many estimates of how much rising prices are driven by biofuels, but no one knows for sure.

The amount of food available can be increased by cutting down forests to make new farmland. But every time that happens much CO2 goes into the air. This is because forests have a lot of CO2 in the trees, and in the undergrowth, and even more stored in the soil.

This is particularly a problem with tropical rainforests, because they are so much more dense than temperate forests, and so contain much more CO2.

Other arguments against

Another argument against is that it takes a lot of fossil fuels like coal, oil and gas to make biofuels. In the US, for instance, fossil fuels are used to heat the corn to make ethanol. They are also needed to harvest the corn, transport it, pressurise the gas, and transport the gas. One estimate is that it takes more CO2 emissions to make a gallon of ethanol than you get from burning a gallon of gasoline.

Palm oil has even larger problems, because it is so often transported over long distances, like from Indonesia to Europe.

Another objection is that mixing biofuels can fool people. If you put a fuel that is 10% corn ethanol and 90% gasoline into a car, you feel you have done a good green thing. Indeed, the ads tell you it's a green fuel. It is not. It is 90% oil, instead of 100%. You have done a 90% bad thing.

Moreover, the carbon from burning trees and plants goes back into new plants. But at any given time, most of that carbon is still up in the air. This is not an easy point to grasp. Let's take the example of trees. Imagine that you cut down one square mile of forest and burn the trees. The carbon goes up into the air. Gradually, new trees grow up and take that carbon out of the air. But it takes 20 years or more before the trees have grown back to the same height. For much of those 20 years, most of the carbon stays in the air. If you had never cut the tree down, most of it would stay in the trees.

The problem with plants is not as great, because they grow more quickly. But it is still real. And if you simply let the land go back to mixed forest, it would hold a lot more carbon.

New types of biofuels

Some kinds of biofuels that are not subject to these objections. Crops like jatropha that can be grown on the edges of roads or in arid regions. Or the cooking fat that is used in restaurants can be recycled. In the future, we may be able to grow algae in tanks on land and turn it into fuel on a massive scale.

Many environmentalists therefore want to distinguish between bad biofuels (also called 'agrifuels') and good biofuels.

Other environmentalists say that at the moment that confuses things. There is a political argument now in many countries about biofuels. This argument will be resolved in one way or another. In this context, arguments for good biofuels are in practice likely to let all biofuels in.

Planes and ships

There is one more argument for biofuels. This is that ships and planes are the fastest growing forms of transport. Unlike buses, trains and cars, they cannot run on electricity. So they cannot depend on electricity from renewable sources. There is no other way to cross oceans.

So if there is an argument for using biofuels anywhere, it is strongest with ships and planes.

This is part of a series of factsheets on climate change produced by the ITF, www.itfclimatejustice.org

Factsheet 17: Controversies – carbon capture and storage

Carbon capture and storage is a way of maybe almost eliminating CO2 emissions from coal fired power stations. But there is controversy over whether it will work. This factsheet puts the arguments for and against.

Carbon capture and storage (CCS) is also called 'carbon sequestration' and 'clean coal'. It works like this. As the exhaust fumes full of CO2 leave the power station, they pass through 'scrubbers'. The scrubbers capture almost all the CO2 in the fumes. This is the 'capture'.

The CO2 is then turned from a gas into a liquid under pressure. That liquid is sent down a pipeline to a place where the CO2 can be stored forever. Different storage places have been suggested – old oil and gas fields, old coal mines, and undersea caverns.

Old coal mines are leaky. But oil and gas fields seem less so. After all, they have held the oil and gas for millions of years. Indeed, carbon dioxide is already injected into oil and gas fields for commercial reasons. The CO2 increases the pressure in the well, and forces more oil and gas to the top.

It is also possible to use carbon capture and storage in other processes, but the major proposed use is in coal power stations.

The argument for carbon capture and storage is simple. It makes coal use possible. Coal is cheap. There are still large reserves in many parts of the world. Many workers depend on mining – miners, but also power station workers and rail workers. If the CO2 can be taken out, we can use the coal.

This is a simple argument. That does not mean it is wrong.

Doubts

There is general agreement that the capture part of carbon capture and storage works. There are several demonstration projects in different parts of the world. They work.

There is argument about whether the storage part works on not. Several experimental projects in the world now store CO2. One, using an underground cavern in the sea off Norway, has been operating for years. They seem to work.

However, there are question marks about the future. We simply do not know if most potential storage places will leak.

Small leaks would make a large difference. For instance, if a cavern lost 1% of its CO2 each year, it would have lost half of the CO2 in 50 years.

This would be ok if there was not much carbon capture and storage was rare. But if CCS works, there will be a lot. If 40% of global energy comes from burning coal with CCS, and half of that eventually escapes, then the emissions will be far more than if we just used renewable energy instead. The danger is that CCS could make us feel safe, and once the leaks surfaced there would be no going back.

However, the largest difficulty seems to be neither capture nor storage, but moving the CO2 from capture to storage. Very large amounts of energy have to be used to pressurise and move CO2 long distances down a pipeline. But very few power stations are near an undersea cavern or old oil field.

Why no CCS power stations yet?

There is another question. CCS technology has been intensive development for more than a decade. Why are there no working power stations anywhere using CCS?

There are small demonstration projects in parts of coal fired power stations. There are demonstration projects in experimental plants that are smaller than a normal power station. And there are projects storing CO2. But there is no working power station yet of normal size that uses CCS for all its power. Why?

One possible reason is money. CCS is expensive. Estimates of the extra expense vary, from 15% to almost double the cost of building and running a normal power station. And power stations are already very expensive to build. It is also possible to retrofit scrubbers to old power stations, but this is even more expensive.

It is possible that CCS already works, but that power companies do not want the very considerable extra expense, so they have not built CCS. No one is forcing them to, and it does not make financial sense to them.

In that case, they are waiting until it becomes much cheaper. But technologies only become cheaper if they are manufactured over and over again.

There is another possible explanation. Many supporters of CCS, and many engineers involved with CCS, say the technology will work, but does not work now on any affordable scale.

If this is the case, it will take 20 to 40 years before CCS works for all power stations. That means CCS is not a solution now, so we need other solutions now. After all, we need change during the next twenty years, starting now, not in the far future. But CCS may be a solution at some point in the future.

Greenwash?

Some opponents of CCS subscribe to another explanation of what is happening. They say that clean coal is a smokescreen designed to justify continuing to use coal.

The point to the way that many new power plants are described as 'CCS-ready'. This means that scrubbers and pipelines could be fitted in the future. They are just not there now. It makes a high carbon option sound almost low carbon.

Similarly, the UK government in 2009 insisted that a power station be part CCS, trapping at least 10% of the CO2. This is like telling your mother that you have cleaned the kitchen floor and now it is only 90% dirty. Interestingly, the power company involved, EON, refused to build the power station unless they had a government guarantee that it would never be required to be fully CCS.

In this understanding, critics argue that coal companies and power companies either don't believe CCS will work, or don't ever plan to use it. They are just buying time.
No one is saying that all the engineers involved in developing clean coal are lying. But they may be overly hopeful about the long term possibilities, and unclear about the motivations of company executives.

There are also large numbers of people who are not sure, but desperately want carbon and storage to work.

A possible compromise?

There is a possible compromise between supporters and opponents of clean coal. This is an agreement that the government should require all new power stations to be fully CCS. And all old power stations to be within 10 years – otherwise you get the situation with oil refineries in the US. There all new refineries have to obey strict environmental rules, so the oil companies don't build any, and keep expanding the old refineries.

This compromise, if enforced, would show us whether CCS works. The power and coal companies would also have to speed up the process of research and innovation. And if it did not work, coal plants would close and coal emissions cut to nothing.

There is one possible catch to this compromise. What if CCS works, and the pipelines work, but the storage leaks?

This is part of a series of factsheets on climate change produced by the ITF, www.itfclimatejustice.org

Factsheet 18: Controversies – global north and south

This factsheet explains some of the controversies about the different responsibilities of rich and poor countries for doing something about climate change.

The 'Global North' means the rich industrialised countries: the USA, Canada, Europe, Japan, Australia, New Zealand, and sometimes South Korea. The 'Global South' means the poorer countries of the Americas, Africa, and most of Asia.

To understand the debate, we have to start with two sets of statistics. First, in 2008 ten countries produced two-thirds (67%) of global emissions of CO2 from burning fossil fuels:

Global	29.4 billion tonnes of CO2
China	6.6 billion tonnes
USA	5.6
Russia	1.6
India	1.4
Japan	1.2
Germany	0.8
Canada	0.5
Iran	0.5
UK	0.5
South Korea	0.5
Mexico	0.5

The list looks different if we rank those countries by tonnes of CO2 per person:

Global average	4 tonnes of CO2 per person
USA	18 tonnes per person
Canada	16
Russia	11
Germany	10
South Korea	10
Japan	9
UK	8
Iran	7
China	5
Mexico	4
India	1.3

And here are some countries with very low emissions per person:

Cambodia	0.3 tonnes per person
Bangladesh	0.3
Kenya	0.3
Haiti	0.2
Liberia	0.2
Zambia	0.2
Ethiopia	0.1
Madagascar	0.1
Nepal	0.1

In other words, the average American has 60 times the emissions of the average Bangladeshi, and 180 times the emissions of the average Nepali.

The 'Global South' position

These numbers can be read in two ways. One way emphasizes the gap between rich and poor countries in emissions per person. We can call this the 'Global South' position. Many governments and activists in poor countries support this position. And so do many climate justice activists in richer countries. They say:

"The rich countries of the world produce far more CO2 per person. The poor countries should be allowed to industrialise, to catch up and have an equal share.

"There is also a historic 'climate debt'. The rich countries have been industrialising over the last 200 years. The overwhelming majority of the CO2 in the last 100 years has come from the rich countries. That's why they are rich. They owe the poor countries a chance to do the same.

"Moreover, climate change will hit the poorest people in the poor countries hardest. This is partly because they are poor, and partly because accidents of geography mean rainfall will be affected more in Africa and Asia."

Policy recommendations in global negotiations follow from these arguments about inequality. They are:

"The countries of the global north should cut their emissions first. (This was reflected in the Kyoto Protocol, which specified that rich countries should go first.)

"The global north should pay aid to help countries of the global south cut emissions and cope with the effects of climate change. (There is a lot of argument in international negotiations about how much money and who should control it.)

"Countries of the global north should share renewable energy technology with the global south."

Another position: 'American' jobs

The opposite position emphasises how big the total emissions of poor countries are. This is most often heard in the United States, but is common in many rich countries. This says:

"Unemployment in the US is about 10%. In many European countries it is higher. Unemployment in China is 4%.

"China creates more CO2 emissions than the US.

"Poor countries as a whole are responsible for about half of greenhouse gas emissions each year. Soon they will be responsible for two thirds.

"So there is no point in the US or Europe cutting emissions if poor countries don't limit their emissions. It is a waste of time and jobs for the rich countries to cut alone."

Compromise

These arguments are deeply felt by many people. However, governments and corporations can also use them in manipulative ways. This is because both positions are arguments why your country should do nothing.

One argument says that poor nations should not limit emissions because they should have a chance to industrialise. The other says that rich countries should not limit emissions because they have to protect jobs.

The possible compromise between these two positions is for no one to be forced to limit their emissions. This is what is now happening in international negotiations. Governments whose rhetoric sounds bitterly opposed have been able to make these compromises quickly.

Contraction and convergence

There is a third position between these two: 'contraction and convergence'. This position says forget about the climate debt. But make sure that emissions are equal in future – each country will have the same emissions per person.

In this scheme, most rich countries will contract their emissions. Some poor countries will be able to increase theirs. Every country will converge – meet in the middle.

For instance, average global emissions are now 4 tonnes of CO2 per person. For 50% cuts, this has to fall to 2 tonnes per person. This would mean the following cuts:

	tonnes per person now	cuts to 2 tonnes
USA	18	88%
Canada	16	87%
Russia	11	82%
Germany	10	80%
South Korea	10	80%
Japan	9	77%
UK	8	75%
Iran	7	71%
China	5	60%
Mexico	4	50%
India	1.3	increase by half
Kenya	0.3	increase seven fold
Nepal	0.1	increase twenty fold

Inequality inside countries

So far we have only been talking about inequality between countries. But the picture looks different if you consider inequality within countries. Here is the difference in incomes between the top 20% of people and the bottom 20% in each country:

In Mexico the top 20% of the population has 13 times the income of the bottom 20%.
In China the top 20% makes 12 times the bottom 20%.

Iran	10 times the bottom 20%
USA	8 times the bottom 20%
UK	7 times the bottom 20%
India	6 times the bottom 20%
Canada	6 times the bottom 20%
South Korea	5 times the bottom 20%
Germany	4 times the bottom 20%
Japan	3 times the bottom 20%

These are not differences between the incomes of the filthy rich and the unemployed. On average, they are differences between university teachers and people on the minimum wage.

Now let's assume that emissions per person are about equal to income. That is not quite right in reality. But it will do for our purposes here, because income is a reasonable marker for how much people benefit from the total emissions of a country.

In that case, emissions per person for the top 20% and the bottom 20% of each country are:

Top 20%		Bottom 20%	
USA	41 tonnes per person		
Canadians	32 tonnes		
Russians	25		
Koreans	19		
Germans	19		
UK	18		
Iranians	18		
Japanese	18		
Chinese	13		
Mexicans	11	(bottom 20%)	
		Canadians	6
		USA	5
		Germans	5
		Japanese	5
(top 20%)		Koreans	4
India	3		
		Russians	3
		UK	2.5
		Iranians	2
		Chinese	1
		Mexicans	0.8
		Indians	0.5

On these measures, the top 20% of Mexicans and Chinese have more than twice the emissions per person than the bottom 20% of Americans and Japanese.

The top 20% of Chinese have six times the emissions per person of the bottom 20% of British people.
The top 20% of Indians have slightly more emissions than the bottom 20% of the British.

Now let's assume again that share of income is a reasonable marker for share of emissions. This time let's compare the top 10% of each country to the lower 80% of each country. Here we are comparing the top tenth of each country to most working people:

Top 10%		Lower 80%	
USA	54 tonnes per person		
Canadians	40		
Russians	34		
Iranians	24		
UK	23		
Koreans	23		
Germans	22		
Japanese	20		
Chinese	18		
Mexicans	16	(lower 80%)	
		USA	12
		Canadians	12
		Germans	8
		Koreans	8
		Japanese	7
		Russians	7

(top 10%)		UK	6
Indians	3		
		China	3
		Mexicans	2
		Indians	0.9

The share of the top 10% of Mexicans is double the share of most Germans.

The share of the top 10% of Chinese is three times the share of most British people. But the share of the top 10% of British people is almost eight times the share of most Chinese people.

The share of the top 10% of Canadians is five times the share of most Germans. And so on.

There is tremendous variation between the ten countries with the most emissions. But the variation within these countries is more important than the variation between them.

The impact north and south

Finally, we need to look at the different impacts of climate change on the north and south.

Many people assume that the damage from climate change will only affect poor countries. That is not true. At the moment climate change is hitting hardest in North Africa, Central Africa, Bangladesh, India, Pakistan, Afghanistan, Central Asia, the Andean countries, Australia, Greece, Spain, Russia and the United States.

What is true, though, is that the richer countries are better at protecting their people. So Arizona, Australia and Somalia are all badly hit by drought, but only Somalis are dying in large numbers.

In famines, the poor die first. In natural disasters, the poor die most, but among them it is people who cannot walk, climb stairs or swim who die – the elderly and the disabled. Lonely people are more likely to die – no one helps them. Epidemics take the old and children. Modern war kills mainly women and children.

Not only the poor die, however. Refugee camps and wars are great levellers. Most people are at risk in a social catastrophe. The very rich in gated communities are safer.

Hurricane Katrina in New Orleans is an instructive example. This was partly caused by climate change. 1,500 people died. Most were poor African-Americans.

That was the worst consequence – death. But the other consequences spread far more widely. But in Plaquemines parish, just to the south, and largely white, almost everyone lost their houses. Those who have returned now all live in mobile homes they can run from.

In New Orleans, people in public housing lost their homes forever. People who owned their houses found that the insurance companies would not pay out. The companies claimed they did not insure for flood, only for storms. And the storm had passed hours before the flood began. The courts backed the insurance companies. So many people lost everything, and most could not get a mortgage to rebuild.

That was all in a rich country. But the effect is worse in poorer countries. In 1998, for instance, Hurricane Mitch killed 14,600 people in Honduras. In Honduras, too, however, we can be sure that working people suffered more.

This is part of a series of factsheets on climate change produced by the ITF, www.itfclimatejustice.org

Factsheet 19: Controversies – growth and sacrifice

There is a long history of a divide between environmentalists and trade unionists about growth and sacrifice. At its most basic, greens fear growth, workers want jobs. This divide has implications for climate change.

Against growth

The argument against growth runs like this:

"Growth means a relentless consumption of resources. At the moment houses are getting bigger and more numerous, fuel use in transport is growing, and more and more electricity is needed as industry makes more and more things.

"There are two ways of understanding what drives this endless growth. One is that consumerism makes people want more and more things they don't need. The other is that capitalism requires endless growth or profits will collapse.

"Growth means that we will eventually use up all the natural resources of the world. It also means we are filling the sky with the waste of our wealth creation – CO2. If the global economy grows 3% a year, in 50 years it will four times the size it is now. And we will have four times as much CO2. No amount of alternative energy can cope with that.

"We have to stop wanting things we do not need. We have to learn to live with less. This will be hard for many people, but we have no alternative.

"Moreover, there is no need for the poorer countries to follow the toxic Northern model of accumulation without happiness. They can build a society of 'well being', taking the best from traditional society, living with enough.

"There is no Planet B. The Earth is our mother. It is not a toy for rich children."

Against sacrifice

The arguments for growth are usually arguments against sacrifice. They start:

"We cannot cut CO2 and other greenhouse gas emissions by simply doing less of what we do now. We need to cut 80% of our current emissions in the rich countries, and at least 50% on average across the world. Most workers in the rich countries spend at least 80% of their income on transport, housing, clothing, food, health, child care, and household bills. Many spend more than 100% and live in debt. These are not luxuries.

"The trouble with the anti-growth approach is that it considers the amount of resources or emissions as fixed. People who think this way assume that we will go on in the same old way – that we can change how much we do, but not what we do.

"This is wrong. The way to reduce emissions is not to do less of the same. It is to do things differently. The governments can build enough renewable energy to provide all our current electricity use, and to run buses and trains for everyone, and to heat houses with renewable electricity. Instead of turning down the heating, the government insulates all the houses so people can have the same temperature using less energy. And so on.

Government programmes like this will bring jobs, not sacrifice. And there is a problem asking people to sacrifice. They won't do it.

In the richer countries working people have learned something the hard way over the last thirty years. They have seen a young man or woman in a suit come to their workplace, or community, and tell them we will all have to sacrifice for the good of the country. Working people have learned that means they will sacrifice, and the suit will not.

Workers and farmers in poor countries feel the same, only more so. They want to escape from poverty, and

do not want to be told that industrialisation is bad for them.

This matters because the leaders of the world are not going to act on climate change soon. We need a mass movement that can force them to act, or replace them with leaders who will act. That movement will not succeed without the enthusiastic support of workers and farmers in China and India. No one thinks those people will support calls for sacrifice. They will support a campaign for millions of climate jobs. And that would count as growth.

Equality

These are two opposed positions – one against growth, one against sacrifice. But it is worth also thinking about who sacrifices – about equality.

Richard Wilkinson and Kate Pickett's book *The Spirit Level: Why Equality is Better for Everyone* shows that once countries reach a certain level of wealth, getting richer doesn't make life better. What makes life better is more equality. Wilkinson and Pickett rank the industrialised countries of the North according to inequality of incomes. The most unequal rich societies are the US, the UK, and Portugal. The most equal are Japan and the Scandinavian countries.

Wilkinson and Pickett looked at wide range of social indicators you can count – life expectancy, drug addiction, alcohol addiction, mental illness, achievement in schools, teenage pregnancy, rates of imprisonment, murder, rape and obesity. The most unequal countries are worst in all categories, the most equal best.

They then measured the inequality in income in the 50 states of the USA, and counted the same categories – life expectancy, drug addiction and so on. The correlations worked the same for the 50 states.

They also found that well-to-do people in very unequal countries like the US and the UK had shorter life expectancies than well-to-do people in more equal countries like Japan and Sweden. And the well-to-do Americans and British were also more likely to have serious mental illness, drug addiction, obesity, etc. Unequal societies are bad for rich people too.

We cannot be sure of the reasons for these correlations. But it looks likely that inequality makes people feel sad, disrespected and worthless. It also makes them lonely, because the more unequal the society, the fewer people are like them. So people are desperate to have more things, because they need more respect, and respect is measured in money and things.

In the USA, for instance, almost 80% of the population has less than the average income. It may be that those people need less than they have. But if you tell them that, they hear you saying they should have less respect and equality.

Take the example of an unemployed 30 year old African-American man in Baltimore, USA. Compare him to a 30 year old university lecturer in Accra, Ghana. The American probably has more things – more space in a house, a car, a sound system. The Ghanaian has a life expectancy 20 years longer. He is near the top of an unequal country. The American is near the bottom of an unequal country.

This has implications for how people talk about growth and climate change. The key here is the word 'we'. People who argue that 'we' have too much are calling for everyone to sacrifice – to keep inequality level. People who listen to them know this.

Instead, it is possible to say that 'they' – the rich – have too much. and 'we' – the majority – should have more. In simple terms, tax the rich to create more jobs for the rest of us.

This is part of a series of factsheets on climate change produced by the ITF, www.itfclimatejustice.org

Factsheet 20: Why unions matter to climate change

Unions exist to defend their members at work. What does climate change have to do with that? Or, to be brutal, what is in it for my union?

This factsheet will answer that question. But first we will turn the question round – why does humanity need unions to take action?

It's because people live on Earth. They cannot go elsewhere. Union members need action because they are human.

This action is particularly important now because mainstream politics is dominated by the economics of austerity. Climate action costs money, so governments are doing little or nothing.

Elite climate politics has changed in the last ten years. Until about 2004, the dominant force in the rich countries was Big Oil and Big Coal. Their spokesman was George W. Bush. They wanted no action.

From about 2005 onwards, however, other leaders began to dominate the politics of climate. They spoke for the leaders of most corporations, but not Big Oil and Big Coal. They were politicians of the centre and centre right – like Merkel, Sarkozy, Blair, Gore and Schwarzenegger. They wanted action. They read the same science we read. And they own the world. Why would they want to destroy it?

However, these centre right leaders and businessmen had been pushing the power of the market for thirty years. To cut emissions fast and deep would take massive government action, not market incentives. Centre right leaders could not accept this. So they tried to cut emissions through the operation of market forces. It did not work. But they were trying.

Then came the economic crisis of 2008. Corporations and governments found themselves in desperate competition with each other. General Motors – the largest industrial corporation in the world for 50 years – went bankrupt. No corporation or government felt safe.

Most governments began heavy policies of austerity. Action on climate change would cost governments money and corporations profits. So at the UN climate talks in Copenhagen in 2009, the leading countries of the world came together to draft the 'Copenhagen Accord'. The Accord said that there would be no 'binding targets' for emissions reductions. Instead, each country could reduce emissions by as much as they felt they could. In effect, the global elite had decided to they could not afford climate action.

This demoralised many environmental organisations. The organisations' main strategy is to influence the media and lobby politicians. That requires that they stay within limits of what the policy makers will accept. If governments are moving away from action, environmental organisations are tempted to follow them part-way.

Many environmentalists also felt despair. If the leaders can't agree, what hope is there?

Some environmentalists and organisations held firm, though. Scientists stood their ground, and insisted more loudly than ever on the threat of climate change. Nature did not compromise, but instead delivered more heat waves, fires, droughts, floods and storms.

However, there will be no concerted global action soon on climate from the top. We will have to build a mass movement from the grass roots to force the leaders of the world to act.

This is where unions come in. Almost all policy makers and almost all the media accept the arguments for austerity. Unions do not. Unions

want massive government spending to create jobs and stimulate growth.

Since the recession of 2008, there has been little job growth in most countries. Globally, well over one million workers need jobs. It makes sense for unions to lead campaigns for massive government investment in programmes to halt climate change. Globally, that would mean at least one hundred million new jobs. (See factsheet 22: *climate jobs*.)

Unions have key strengths that they can bring to such campaigns. Labour activists can imagine government action. The politics of different unions in different countries varies a great deal. But there is a shared tradition of working for government policy to solve grave social problems – and therefore environmental problems.

Unions also have a tradition of building mass grass roots campaigns, because unions are basically mass grass roots organisations.

Moreover, the environmental movement is too small to build the mass movement needed. Union members, on the other hand, can reach almost everyone. In almost all countries the majority of working people are not union members. But the union members, between them, know how to reach unorganised workers. And can speak to them as friends, relatives and equals.

Finally, unions can mobilise, march and act collectively.

All this requires a sea change in how unions organise around climate change. Most unions have only begun working around climate in the last few years. To some extent we have been running to keep up. And we have usually felt we were the junior partner at the table with environmentalists and policy makers.

To campaign effectively for government climate action and jobs, however, unions and union activists will have to regard ourselves as leaders. Of course we still must work through alliances, and of course we seek to influence policy. But in this historical moment, many environmental groups who could act are held back by the politics of austerity. Union activists now need to be a driving force. If we are, many environmentalists and other group will be encouraged and join us.

This is a large responsibility, for which we are ill prepared. But that does not mean we cannot act.

Strengthening unions

So unions need to act not only for our members' interests, but for all humanity. Doing that will strengthen unions too. Unions will reach out to new people, many of whom will become union members.

Unions can also build public support because we are seen as part of a larger cause. In addition, in every local union branch, there is already someone who cares deeply about the environment. That person can become the climate activist in the local branch, and in the process become a union activist.

Moreover, in many places and times, unions have been built by activists who felt they were fighting for themselves, their families and their workmates, but also for a far bigger cause. The fight for the jobs and the planet can be that cause now.

Finally, serious climate change has come to some countries already. It will come to many more. When it comes, many workers will lose their jobs, and farmers their livelihoods. If everyone knows that unions are fighting to stop climate change, people will look to unions for help and organisation.

This is part of a series of factsheets on climate change produced by the ITF, www.itfclimatejustice.org

Factsheet 21: What unions can do

Climate change is a new issue for unions. So far, in most countries, unions have begun to draw up policy statements, educate their members, and form alliances with environmentalists. But we are still at the beginning, and still learning.

What needs to be done, however, flows from the situation we find ourselves in. It looks unlikely that governments will take the critical action needed unless a mass movement forces them to. So we need to build those mass movements.

The first step is educating our own union members. Most union activists already know a great deal about wages, pensions and work. They have a model in their heads of society, employers and workers. With climate change, workers don't have these kinds of basics.

We also need to develop our own understanding. Mainstream approaches to climate change have been worked out without regard to the needs or the wisdom of working people. So workers need to discuss these ideas, with each other, and ask what fits for unions and workers, and what does not.

Of course not all union members are going to be climate experts. But to build a mass movement, unions need such experts in each branch, local organisation and big workplace.

Policy

Unions need to draw up alternative union solutions to climate change. But drawing up a policy and presenting it to governments and employers will not solve our problems. At best, government departments will have a meeting with us, listen politely, shake hands when we leave, and then ignore us. This is because with climate, as with other issues, employers and governments listen to us when we make them. So we have to have a mass movement behind us when we approach policy makers.

Collective bargaining

Unions can propose ways of performing work differently in order to reduce emission levels, and where appropriate, negotiate the introduction of new technology. These issues need to form part of the collective bargaining agenda so that unions can ensure that any step taken to reduce emissions in workplaces does not have negative implications for workers. Unions could also bargain for recognition and time off for “environmental reps” to partner with shop stewards and other workplace representatives. The role of these reps will be to make sure companies establish commitments to reduce emissions and honour such commitments where they exist.

Alliances and action

Unions in many countries have begun to form alliances to push for government action on climate. These can be alliances with other unions, with local branches of some unions, with some political organisations or figures, with NGOs, and with environmental organisations. Exactly how you do this varies greatly – each country has its own traditions.

Change will not happen without these alliances. And they have to bring together a broad range of forces. However, when the alliance includes all the unions and all the relevant NGOs, there is a large danger of no meaningful action. Rhetorically, the alliance will say something must be done about the climate. In practice it will back away from particular actions or policies, because they upset one of the constituent bodies. It's a matter of building alliances broad enough to have a real effect, but not so broad they do nothing.

Then there is action. This can be meetings, protests, rallies, stunts, demonstrations and occupations. Sometimes these actions will be led

by unions. Sometimes union activists will be part of actions led by environmentalists.

Moreover, we can take unions and climate into the new social movements. These have begun with events like the Arab Spring and the Occupy movements, but there will be many more, in different forms, and in other countries. Unions have made ourselves parts of these events. Formal union support has been important. But being physically present makes a difference. The movement that can do something about climate change can grow where unions, new social movements, and environmentalists come together.

Responding to disasters

One way of campaigning is to respond to climate disasters in other parts of the country, or the world. When there is a flood, a famine, or a storm destroys a city, local union branches can raise money to aid the suffering. Often there will be people from the affected region among the workforce, and the union can involve them and their communities. And the activity puts the issue of climate change front and centre.

Then there is union action when climate disasters strike, in your city, town or country. Here union reaction needs to be very quick. The authorities, the police and the news media will set an agenda within 24 hours. They may also move to restructure the local society at the same time. The affected area often feels like a place under occupation, where organisation and protest is forbidden. And the authorities and the media will not mention climate change.

Local unions can react quickly with demonstrations, marches, rallies or vigils where the disaster has happened. They can insist that no one loses their job because of the disaster. (In New Orleans after Hurricane Katrina, all the teachers and many city employees were fired.)

Firefighters, social service workers, health workers, prison officers and relief workers on the ground will know what needs to be done. They are often furious about what is not being done. Their union can act as their microphone. The national leaders of the union can support their cause on television. And the union can say this is climate change, and something must be done.

All this will change the situation that follows the disaster. People will be more likely to organise for, and to win, food supplies, continuing health care, rehousing, and proper flood defences and other measures to prevent the disaster happening again.

Transport workers can be key. We carry the supplies people need. We stop when the road is blocked. Demonstrations and caravans of trucks sponsored by transport unions can shame governments into helping.

Defending jobs

Employers often move to cut jobs that help to reduce emissions. This includes closures of bus routes, firing railway workers, closing factories that make rolling stock, closing shipyards, closing wind turbine factories, and so on. Also, every closure of a small branch hospital or government office means workers and service users have to travel further every day, increasing emissions.

When these kinds of cuts are proposed, unions can define this as an attack on both workers and the climate. We can mobilise workers, environmentalists and the local community. This will increase the chances of defending the job and the service. But it will also build a campaign on climate change.

Finally, unions can campaign for large scale government investment in new jobs that will cut emissions. That is the subject of the factsheet 22 *climate jobs*.

This is part of a series of factsheets on climate change produced by the ITF, www.itfclimatejustice.org

Factsheet 22: Climate jobs

Unions all over the world are now campaigning for green jobs to stop climate change. There are also several campaigns to make governments employ large numbers of workers in "climate jobs". This factsheet makes the argument for such campaigns.

The argument for climate jobs

We are facing a global environmental crisis and a global economic crisis. We need solutions to both – now.

In much of the world, even if 'recovery' happens, mass unemployment will last for many years. Some countries seem luckier. But even in Brazil, India and China, there are still tens of millions of people in villages and cities who need decent secure jobs.

The second starting point is that to avoid climate disaster we need to stabilise greenhouse gas emissions within 20 years. We already have all the technology we need.

To cut emissions we need to do many things. But three things make more than half the difference:

We need to cover the world with wind power and solar power to supply electricity from renewable energy. Then we can use that electricity for industry, heating homes, and running buses and trains *(Factsheet 6 explains the importance of renewable energy).*

We need to get people out of cars and on to public transport.

And we need to convert homes and public buildings all over the world so they use less energy and are warmer in winter and cooler in summer.

All of the technology to do this is available now. Not just in the rich countries, but in India and China too.

But the governments of the world say they cannot act because it would 'cost too much'. Cost too much means that millions of workers will be paid rupees and pesos and dollars every month for work driving buses, building wind turbines, and insulating houses.

"Cost" means jobs. For instance, South Africa and the UK have roughly similar size populations. The union campaigns there are fighting for one million new climate jobs in each country. That is not an arbitrary number. It's is how much work needs doing to stabilise the CO2 in the atmosphere within 20 years. In Brazil it would be 3 million jobs, in the USA 5 million, and in India 40 million jobs.

What is a climate job?

Climate jobs are jobs that cut down the amount of greenhouse gases. This is different from 'green jobs', which can include many other jobs as well.

The climate jobs campaigns want new jobs, now. They are not asking governments to promise to 'create' jobs by 2030 by making encouraging noises to industry. They want the government to start hiring people immediately.

Lost jobs

With the change to a new low carbon economy, there will be many new jobs. But some workers will eventually lose jobs in high carbon industries like car manufacturing and mining. If we do not protect those people, different groups of workers will be set against each other.

Government jobs are best way to protect those workers. If the government employs the new climate workers, they can guarantee retraining and new jobs at the same wages to anyone who loses a high-carbon job. In reality, there will be a mix of public and private employment. We need strong unions to bargain for retraining, transferring skills and the rights of workers who are displaced or lose their jobs.

We can afford the jobs

We can afford climate jobs, for four reasons:

First, they won't cost that much. Remember it is the government spending the money. When the government gives someone a job, that person starts paying taxes. When they get a job, they also stop claiming benefits. The government saves money both ways.

Second, most climate jobs are not one-off spending. They are investments, making things people will pay for. The government provides public transport and renewable energy for electricity. People buy bus tickets and pay electricity bills. This is not wasted money.

Taxes and benefits are more important in some countries than others. But the government always make much of their expenditure back. Reasonable estimates are:

For every $100 the government spends:
Germany gets back $99
Greece gets back $70
South Africa gets back $50

Third, the money is there. The global financial crisis began in 2008. We found out that governments spend money when they care about something. We now know the Federal Reserve Bank of the United States can find $400 billion on a Tuesday if the banks need it.

There are many ways to raise the money. Governments could raise taxes on the rich, close loopholes and tax havens, and actually prosecute tax evasion. The US and UK governments have spent 100s of billions in 'quantitative easing' – printing money – in the last two years. Governments could take over the banks and hedge funds. They could sell green bonds. They could raise corporation taxes. Or they could take the money that would be spent on new oil fields, fracking gas, and new wars.

Fourth, the spending will get the economy moving again. The reason is that every time a million new workers get jobs, they start paying taxes. And they buy a lot more things – food, housing, clothing, games. The people who make those things get more jobs, and pay more taxes. And that gives jobs to yet more people.

This is the idea behind 'Keynesian' economics. John Maynard Keynes, the British economist, said in the 1930s that government spending in bad times was the only way to get the economy moving again.

The alternative won't work

The dominant economic idea in most countries now is not Keynesian. It is that governments should cut spending in bad times to balance their books. This may sound reasonable, but it does not work.

The IMF forced many African countries to cut government spending in the 1980s. Much of Africa has not recovered to this day. The IMF forced many Latin American countries to cut spending in the 1990s. In Latin America they call it the 'lost decade'. The IMF is now forcing Greece, Ireland and Portugal to cut spending. They are caught in a downward economic spiral. The US and much of Europe are cutting public services and pensions to 'save money' now. The more they cut, the higher unemployment and the worse the economy.

There is a reason cuts don't work. If you put public sector workers out of a job, they spend less. Then other workers lose their jobs. And everyone pays less taxes. So the government has less income, and has to borrow more. So the government cuts even more to balance the books, and more people lose jobs, and pay less taxes, and the government has less money and cuts more.

But there is a straight forward alternative – millions of new jobs to save the planet.

This is part of a series of factsheets on climate change produced by the ITF, www.itfclimatejustice.org

Factsheet 23: Confusions about climate change

Here are some reasons why it is hard to think about climate change:

The two meanings of "environment"

Climate change is an environmental issue. This can lead quickly to two confusions.

The first confusion arises because there are two meanings of 'environmental'. It means how things look, but it also means the complex ecological web of life. These are not the same things.

For many people, the environment is the place of beauty. It is a landscape, an unspoiled, wild place. What matters is how it looks and how it makes you feel. So, for instance, you preserve the environment by making sure that an 'ugly' wind farm is not built in a beautiful valley.

Climate change is about the other meaning of environment. Climate change will be destructive for humanity and a large proportion of living species will disappear. This will of course change how things look. But the important thing about climate change is the death and suffering.

So, for instance, you support building a wind farm in a beautiful valley.

There is also a widespread assumption that because climate change is an environmental issue, the trade off for actions on climate change are environmental. If some action is good for stopping climate change, then it has to be compared to the bad consequences it has for other environmental matters.

This is the wrong trade-off. Wars, for instance, have terrible environmental impacts. But no one argues against a war for environmental reasons. They concentrate instead on death, suffering, and which side is in the right. Climate change is like war, not like beauty. It will mean suffering, refugees, floods, droughts, famines, and epidemics. These are the key trade-offs, not natural beauty.

Blaming the unwashed

Another thing that makes it difficult to think about climate change is the common habit of blaming ordinary people for doing nothing about climate change.

Politicians who don't want to act do this. So do company executives who don't want action. And so do many climate activists when people don't listen to them.

But most ordinary people have been told the following about climate change:

"It will be terrible. The only way to stop it is a massive reduction in your standard of living. But you won't do that. You're too greedy. So it's your fault all your grandchildren will die horrible deaths. But even if you did try to do something, there's no point, because other people are all greedy too."

People believe this message. Because they believe it, and it's hopeless, they don't want to hear it. They just want you to shut up and go away.

To engage people, you have to give them possible solutions. And they have to be solutions the person listening to you knows they can help bring about.

The point here is basic trade union wisdom. If workers are not listening to you, it is not because they are apathetic or happy. Maybe it's something to do with how you are talking, or what you are doing, or whether or not they trust you. So it is with climate change.

But with climate change there is also another common, but hidden, assumption. This says that only privileged, well educated people in rich countries are likely to care about climate change.

Workers in the north and most people in the south are too poor to care. Or too stupid to understand, because climate change is a complicated scientific issue. Or ignorant, because they are uneducated, so why explain it to them? Or greedy.

Or poor people are only concerned with survival, so they can't think about the environment. (As if climate change was not about survival.)

Or climate change will be happening somewhere else, and workers only care about this country.

These assumptions are very widespread in discussions of climate change. More often than not, they are unsaid, but you can hear them behind what people are saying. When this happens, it helps everyone if you bring the assumption gently into the open. The people can debate if it's true.

None of this means that many workers are not apathetic, or reluctant to act, or frightened, or selfish. All these things are true, more or less, of all of us. But they are not the starting point for action on climate change. All of us are also more or less caring, brave and selfless. The starting point for action is to understand the complexity of people's reactions, and go for the points that will move them to action.

Long term planning

Another problem with thinking about climate change is that we need action to cope with something in the future.

However, two things need saying about this problem. One is that all the time people do take steady action to cope with the long term. For instance, some people take out life insurance. Some people take out pensions, and unions fight for pensions. People save money in case they lose their job or want to buy a house. People stay in school or college for many years because they think it will get them a better life.

Ordinary people, all the time, make plans that will come to fruition in ten or twenty years. Of these, having children is usually the most important.

So the problem is not really that people cannot act with the long term in mind. It is that politicians and governments often think short term. That means the rest of us have got used to thinking short term when it comes to public policy, while thinking long term about our lives.

The other problem with thinking about climate change long term is that it conceals the short term. In much of the world climate change is here now.

The climate activist Bill McKibben says that every time people speak of the effects of climate change on our grandchildren, they imply that we and our children will be all right. This has two effects. One is to minimise the relationships between climate change and what we are seeing now – floods, drought, hurricanes, tornadoes, rising food prices, and so on. The other effect is to postpone action.

There are three reasons for making action long term. One is 'sunk investment' – the life a plane, a ship or power station is 30 or 40 years. If the rules of energy use change before then, whoever owns those expensive things loses their money.

The second reason is that it is cheaper to do a little bit year by year. Not cheaper for workers or unions – massive action on climate change would mean many more jobs for us. Just cheaper for the rich.

The third reason to postpone action to the far future is that you don't want to take action.

This is part of a series of factsheets on climate change produced by the ITF, www.itfclimatejustice.org

Factsheet 24: Notes for trainers

This sheet gives you advice that may be of use if you run workshops using these notes. The factsheets are designed so you can select one for each training session. People read the factsheet in the group, rather than before they come. Then the group works on and discusses the topic. In general, one sheet should be appropriate for a session of an hour and a half. With two hours, you may be able to use two.

Knowing everything

These notes assume that you have experience in trade union education, but maybe you don't know much about climate change.

Climate change may present some new problems because of the sheer depth and breadth of the subject. You will find that even if you begin working with one factsheet, once the group gets going people will bombard you with all sorts of questions. These are often questions they have been wondering about for some time. You will not know all the answers. The more useful people are finding the session, the more hard questions they will ask.

There are several strategies for dealing with this. The most important is the standard – say 'I don't know'. You may find you have to say this quite often. Don't worry – tell the group that you, and they, are beginning to explore the topic.

The second strategy is complementary. This is to read all of these factsheets before you start using one of them with a group. This is a bit of work – together, they are the length of a short book. We have put them all together on the ITF website so you can do this more easily. You don't need to take notes and understand all the details in each sheet. You just need a sense of the whole subject, and to know where to go back and find out more on a topic.

Then you can print out all the factsheets, and take them to the session with you. If anyone has a question, you can direct them to the relevant factsheet. They can read it during the session, or afterwards – whichever fits your process.

Finally, you can identify further reading that may interest you or people in the group.

Holes in the factsheets

The factsheets don't know everything either. One reason is that most factsheets are only two pages. In writing them, we constantly had to decide what facts, explanations and arguments to leave out. And the field is so vast that there were things in each factsheet we did not understand properly.

Another reason for holes, though, is that the state of knowledge on climate change changes quickly. The climate itself changes. Scientists discover new things, and discover that old things they knew are wrong. People develop better solutions to engineering problems with renewable energy. The politics of climate change changes, nationally and internationally. Unions invent new ways of engaging with climate change. All this means that something in each factsheet, and maybe several things, will be out of date.

Different levels of knowledge in the group

In any training session, some people know more than others, and some people are more confident about speaking than others. As you know, these are not necessarily the same people. This is always a problem for trainers – how to find a way to include the experts without shutting out everyone else.

But it is more of a problem with climate change, because the levels of knowledge and understanding in the group will vary so much.

Probably the best strategy is to identify this problem for everyone at the beginning, and treat it as an opportunity. You can ask who has expertise. Then once they are identified, you can urge them to help everyone else, but not overwhelm them.

There will be two kinds of expertise. Some people will be at home with science and numbers. So from the start, you can ask them to work out how to explain the difficult bits of science and maths to the rest of the group – working in small groups or the whole group. It is likely some people will be shy about admitting this expertise, but you can encourage them.

The other kind of expertise is the person who already knows a lot about climate change. There will be one such person in every group, and often several.

It is an advantage they are there. It indicates that there are union members and activists who have been thinking hard about climate change already. But they can overwhelm the other people in the group. They may also have a strong political agenda, and want to persuade people to it. Again, it is a good thing that there are such people in unions.

One strategy that might help with this problem is to start with 'the circle'. Everyone reads the factsheet. Then you pick someone to speak first. They are asked to point out some part of the material they don't understand, or strongly agree with, or think is important, or disagree with. Then the person on their left speaks next, and the person on their left, until you have gone round the circle. If they want to, people can pass to speak. But when you have gone round the circle once, you go round again. This time only the people who passed the first time can speak.

One advantage to this method is that it makes people feel from the beginning that they have the right to speak. It also enables you to come in at the end of the circle and lay out an agenda for the group – you work through the things people have highlighted. It's not your curriculum – it's theirs.

You can also divide people into smaller groups at this point, to discuss different points. That makes it easier to give the experts another factsheet to read – either so they understand more about that topic, or so that they can summarise it later for the group. You can also put an expert on numbers or science in a small group with people having difficulty understanding those parts.

But you don't have to divide into small groups. It may be that everyone needs your expertise, or that they want to work together.

Then you can bring people back into a larger group. Probably not to report to each other on what their small group did – that usually bores everyone. What will probably work better is to use this later part of the session to discuss the political and union matters raised by the material.

The basics

Factsheets 1 to 4 cover the basics. This is where you should start.

Factsheet 1 covers the basic science of how carbon dioxide (CO_2) warms the climate. Carbon dioxide causes about 60% of total man-made warming. This is the first thing people need to understand. Almost all of the warming that comes from transport is caused by burning CO_2.

Factsheet 4 explains the basic science of the other causes of human-made warming. This sheet is quite detailed and covers a lot of territory. It is probably best not to use this in the group, but to give it to people at the end to take home with them.

Factsheet 2 explains the physical effects of a changing climate – how it leads to storms, floods, droughts, heat waves and fires.

Factsheet 3 will not make sense unless people have read sheet 2. Factsheet 3 explains why our unequal societies turn floods, storms and drought into famine, refugees, epidemics and war. It gives the reader an idea of what it will be like to live through serious climate change.

Once people have the basics – Factsheets 1, 2 and 3 – under their belts, you can start almost anywhere with the other factsheets. But none of the rest of it will make sense unless they understand how climate works and what it will do to humanity.

How to cut CO2 emissions

Factsheets 5 to 12 cover different ways of cutting emissions of CO2 – almost all of the warming emissions from transport are CO2 from burning oil.

Factsheet 5 provides a general overview of all the ways that we can cut CO2 emissions, not just in transport.

Factsheet 6 is about making electricity from renewable energy. This is important to transport because the key to large reductions in transport emissions is renewable electricity for railways and smaller trucks.

Factsheets 7 to 12 deal with ways of cutting emissions in different transport sectors. If you have a group of people all working in one sector, it makes sense to use that factsheet. Maybe a few people could also try a second factsheet, perhaps the general one or a sheet from another sector, and share that with the group.

You may have people from several sectors – perhaps road freight, buses and aviation. Then you can split them into smaller groups. Each group reads the factsheet for one sector. They read, discuss and understand that sheet. Then they explain it to the other groups, and listen, and compare.

An alternative is to get people to read different sheets, but all stay in one group to discuss them. An advantage to this method is that people discover, and discuss, the similarities in reducing emissions in different sectors. You may also want to have one or two people read the Factsheet 10 on Changing Cities, which provides a different approach from the other sheets.

Controversies

Factsheets 13 to 19 all deal with 'Controversies' where there is disagreement in the union movement and beyond. You can start anywhere in these controversies, **except** you need to read Factsheet 13 on Carbon Taxes before Factsheet 14 on Carbon Trading and Offsets.

You might consider using these sheets in a different way in the group. They refer to controversies, and the people in the group are union members and activists. They may well have to argue these matters at real union meetings and conferences. So a debate might fit, and it may produce a lot of energy in the room

One form of debate would be that they all read the factsheet on the topic. Then you give them a resolution to debate. They split into pro and anti groups and prepare their arguments. Then a formal debate begins. One person on each side speaks for two minutes. Two or three other people on each side then take turns for 90 seconds each, making arguments and rebutting the other side. You keep a tight eye on the watch, and cut them off.

This raises the energy. If people know each will only have a short time, they can also divide up the arguments between them beforehand.

With enough people in the group, you can tackle two topics and have two debates at the end, with everyone learning from both.

You may also want to ask two to four people to listen to the debate. Tell them their job will be to

comment at the end of the debate – not on who was right, but on what gets missed out, hidden and simplified by the process of debate. Everyone will learn from that.

It is a good idea if people take the opposite side in the debate to the one they really hold. This will help to diffuse ugly feelings in the room. Also tell the participants that arguing the other side is the best way to find out what the strengths of the argument are on the other side, and to sense the weaknesses in your own arguments. This is true – it makes you a better debater, because you understand the issue better.

The rest

Factsheets 20 to 22 cover what action unions have taken about climate change, and what they could do in future.

Factsheet 23 is about Confusions – some of the reasons people find it hard to think about climate change. It is not intended as the basis of a session. Rather, it's for you to read and use to inform your training work. Then, if you listen carefully, you will hear some of the confusions covered in this sheet. You can then explain that confusion to the group, or refer them to the relevant part of this factsheet.

Moralism

'Moralism' is another possible pitfall in training on climate change. Moralism is not morality. Strong moral commitment is healthy. Moralism is when you use morality to make other people feel small or worthless.

It is easy to fall into when training about climate change. This is because climate discourse in general is saturated with moralism. If you care deeply about the future of the Earth, you may fall into it too.

It's a mistake in working with trade unionists too. Many trade unionists are deeply moral people. But working class people around the world have an acute ear for moralism. They have felt it used against them many times, particularly in school. They do not like that feeling, or the assumption of superiority that goes with it.

The code word for 'moralism' in climate discourse is 'care'. The way to recognise moralism in yourself is to notice when you have a feeling that someone in the group does not 'care'. If you open your mouth at that moment, moralism will come out of it. Probably it's best to sit and listen for a bit, or ask someone else what they think.

This is part of a series of factsheets on climate change produced by the ITF, www.itfclimatejustice.org