

Act

There is, ultimately, no substitute for action – once you have thought about what you want to do and how you are going to do it. And taking action to work towards climate neutrality can unlock potential you may not realise you possess. Mention climate change to a lot of people, and the instant response is often a sort of paralysis. If they know what they need to do they probably have little idea how to do it, or whether they can even make a start. So one clear message to give them is that there is something they can do, that it is both worth doing and do-able, and that they can do it without waiting for anyone else.

Nor need you look very far to find a starting point. Carbon alone is embedded in almost everything we use, or do, and the other main greenhouse gases are involved in the production and consumption of many parts of life that we take for granted (see the first chapter of this guide for a reminder). So you can probably make progress towards a more climate-neutral way of life every minute.

But, at the risk of stating the obvious, some things are more worthwhile than others, and some steps you decide to take will make more sense at one point than at others. To be specific, there is a logical way of acting that will yield the largest dividends most quickly, a sequence that is worth trying to follow:

- ➔ For the most effective results, the biggest bang for your buck, you will need to focus at first on whatever makes up the biggest chunk of your emissions. Over time the proportions will change, and other sources may become more important.
- ➔ Wherever you can, avoid using or consuming anything that will increase the GHG emissions for which you accept responsibility.
- ➔ Where possible choose the option that will let you actually reduce them, for example by increasing the efficiency of your activities.
- ➔ Do not let yourself be locked into a familiar way of doing things when something better comes along. Keep an open mind regarding the potential of new technologies.

➔ After you have reduced as much as you can, offset your emissions. Offsetting is sometimes seen as **a charged and contentious issue**, but it may

Some say that offsetting lets you off the hook, discourages action of those who can afford to pay for their climate sins but who also happen to be in many cases those with the biggest climate impact. Consequently, the energy intensive structures remain, climate conscious innovations receive less support and behaviour patterns do not change. On the other side, climate neutrality is hardly possible without the option of offsetting. And the atmosphere eventually does not care where the GHG emissions come from. So considering that for activities such as flying or cement production no large scale low-emission solution is in sight for the near future, it may be a good idea to utilize the money those businesses generate for helping such cases where efficient technology exists, but is not affordable to those who are responsible. It also allows also to disseminate climate neutral possibilities to those who may not have resources. Under the premise “First reduce what you can, then offset the remainder”, the different aspects are combined in order to yield the most benefits for all parties concerned, i.e. everyone.

be a valid option.

Think too about what it will be easiest to do, not that you will be able to do everything easily – you will not – but because it may make sense to start with the simpler steps before launching yourself onto something more ambitious. It is relatively easy, for example, to take action that will affect you alone, and less easy if what you do is going to have an impact on your employees, or shareholders, or voters. It is easier to act when there is some sort of support you can call on: if your government encourages people to produce renewable energy by paying them for the surplus they can supply to the national grid, you may well be tempted down that route yourself. But if there is little practical support for renewables you may well feel it is a step too far for you until things change.

Start with free options and work up to more expensive options later. If you think you should replace your city’s public transport system with less-polluting vehicles but cannot see how to afford it, then go for something you can afford that will take you in the same direction: encouraging cycling, perhaps, by making it safer on the city streets, or integrating the various urban transport systems so that one ticket will be valid on bus, tram, train and metro (and if that seems blindingly obvious, it is still a daring innovation to city planners in some industrialized countries).

Follow the "3Rs":
Reduce
Reuse
Recycle

Consumer

- ★ ★ Buy high-quality, long lasting products
- ★ Consult reputable eco-standards or consumers' associations before buying
 - Choose local products
 - ★ Choose seasonal products
 - ★ Try organic products
 - ★ Drink tap water
 - ★ Reduce meat consumption
 - Avoid shrimps
- Choose products with limited packaging

Resident

- Daily deeds
- Take showers instead of baths ★
 - Turn off electric devices when not using them ★
(make sure they don't remain in stand-by mode)
 - Turn off the light when leaving a room ★
 - Sort your garbage
 - Collect rain water for the garden ★
 - Choose low energy bulbs ★ ★
 - Put a lid on pans when boiling water ★
 - Run washing machines during slack hours
- Energy efficiency at home
- Improve insulation (windows, roof, walls) ★ ★
 - Replace very old electric devices ★ ★
 - Use water-saving tap inserts ★
 - Use water-saving shower heads ★
- Planning to become an owner?
- Choose collective instead of individual building ★
 - Choose ecological material, locally extracted and manufactured ★ ★
 - Choose renewable energies ★ ★

On the move

- Leisure traveler
- Travel less and closer ★
 - Limit flying
 - Limit car use
- Driver
- Replace very old cars ★ ★
 - Avoid SUVs ★
 - Limit your speed ★
 - Drive with fluidity ★
 - Respect pedestrians and bikers
- Commuter
- Use your car only if no other option and in that case organize carpools ★
 - Bike or walk ★
 - Use public transport ★
- Business traveler
- Make sure your travel is necessary
 - Use video conferencing ★ ★
 - Choose a neutral way to travel when possible
 - Use public transportation ★

Source: UNEP / GRID-Arendal, 2008.

All actors towards a climate neutral society

- ★ Initial investment necessary
- ★ Savings to be done

Two stars indicates a necessary initial investment but savings in the long term (energy bill decrease for example).

Citizen

- Voter
- Activist
- Elected representative

- Stay informed
- Spread the word
- Get involved
- Turn your concerns into a vote

Individual

Parent

Educate your child to save energy and resources

Professional

- Capital providers Invest in renewable energies
Invest in low emission sectors

- Assess GHG emissions of your organization ★ ★
- Invest in improving its energy efficiency ★ ★

- Production lines
- Low life-cycle emission material and equipment
- Packaging choices
- Transport choices
- Waste management
- Energy use and recovery
- End-of-life production management (take-back, dismantling and recycling options)

All workers
Employees
Executives

Advocate for green procurement ★
(green office / green workshop practices)

CEOs

If sitting at a desk

- ★ Turn your computer off when you leave (even during lunch break)
- ★ Switch off printers and copy machines at night (make sure they don't remain in stand-by mode)
- ★ Print only when necessary

Sectors

Materials
Energy
Building

Agriculture
Transport

Working fields directly impacting climate change

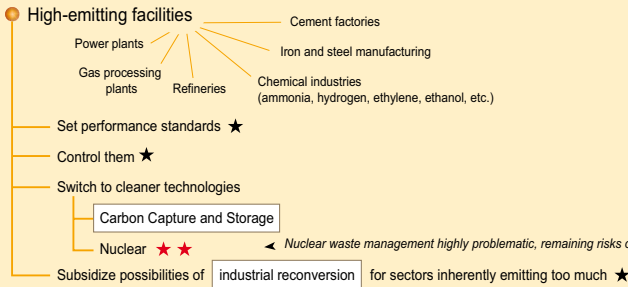
Waste management
Water management

Local authorities (city councils, public services, administrations)
International organizations (NGO, United Nations)
Media

Professions

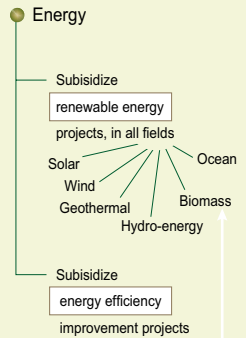
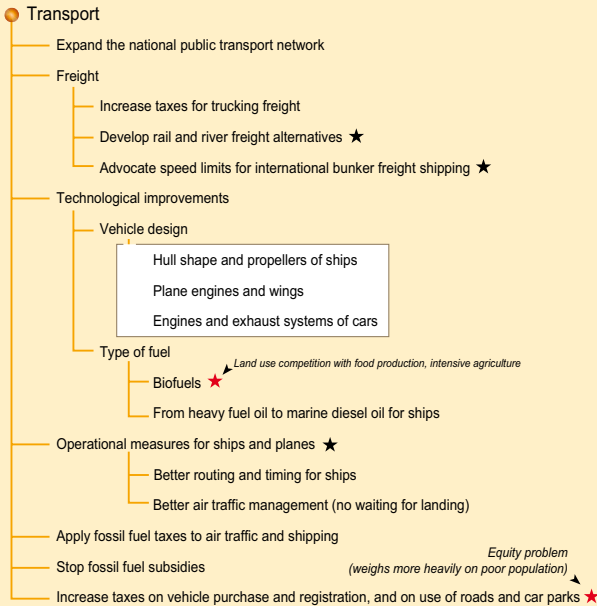
Raw materials suppliers (extraction, timber)
Manufacturer
Builder
Architect
Farmer
Forester
Carrier
Researcher
Engineer
Designer
Production designer

Environmentalist
Journalist
Decision makers (capital providers, developers, CEOs, elected representatives)



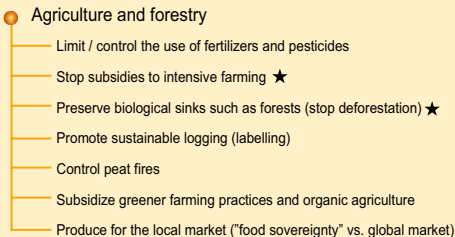
- Set clear priorities in Research and Development allocation of funds

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- Awareness-raising / educational campaigns

- GHG assessments of public sector and local authorities



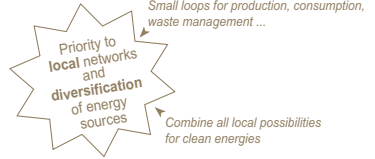
Political choices

- ★ Controversial
- ★ Needs international coordination

- Ratify the Kyoto protocol
 - > Commit to reduce national emissions
 - Enforce national reduction targets
 - Take part in international coordination programmes to reduce emissions (in transport, industry, etc.) ★
 - Offset unavoidable emissions ★
 - Planting trees (carbon sinks)
 - Finance clean development projects in non-Annex I countries ★

Carbon sequestration capacity of vegetation to attain in a few decades

★ "Greenwashing"



Local / City scale

Construction

- Establish sustainability requirements for buildings
- Subsidize the construction of ecobuildings
- Subsidize existing building improvements
- Promote local and ecological building materials
- Set public buildings as an example

Waste management

- "Less waste" policies
 - Support ecodesign projects (easy dismantling and recycling)
 - Support takeback campaigns
 - Organize sorting and recycling of waste
- Energy recovery from waste
 - To heat buildings
 - To run industrial processes

Urban planning

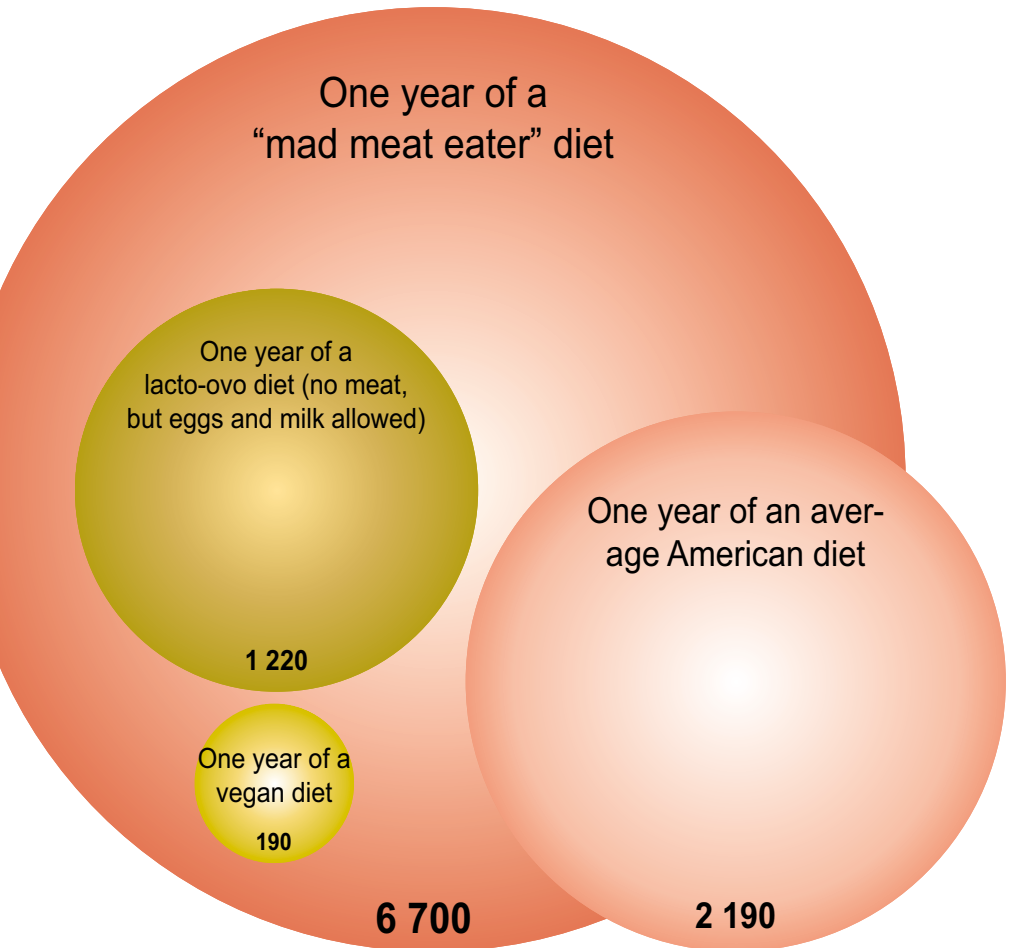
- Limit urban sprawl
 - Subsidize collective housing in city centres
 - Subsidize the rehabilitation of unused or insalubrious buildings in city centres
 - Discourage real estate speculation in city centres
 - High housing tax for non-occupied building (office space in particular)
 - Use city and or state pre-emption rights to acquire land or buildings in town centres, for allocation to affordable collective housing
 - Make this goal a priority in official urban planning documents
- Control and limit the use of cars in city centres
 - Develop pedestrian zones
 - Develop bicycle lanes and parks
 - Build car parks on city outskirts, close to public transport nodes
 - Widen pavements, making them easy for everyone to use (handicapped, strollers, etc.)
- Decentralize and multiply service hubs (reducing the need for travel)

Public transport

- Expand the public transport network
- Run a reliable, regular service (timetables, punctuality)
- Make it affordable (subsidies, reduced prices)
- Make it easy for everyone to use (handicapped, strollers, etc.)

Source: *Mitigation of Climate Change*, Working Group III, Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007.

Think about whether you should start by acting directly to reduce or, if possible, eliminate GHG emissions, or whether you might do better to use indirect means. If you are in government, perhaps, you can take direct action by increasing taxation on motorists who drive large “gas-guzzlers”. But equally, and perhaps more constructively, you could leave them well alone, and instead reduce taxation on those who try to be frugal with their emissions.



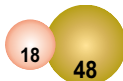
In this way there are many things each of us, and many of the groups we belong to, can do to have an indirect impact on reducing emissions. For example, consumers will push producers by the choices they make, and businesses can require their suppliers to provide them with climate-friendly products and services. At the same time cities can provide the infrastructure to get around town to find products in the most climate efficient way. Many potential decisions stem from political choices – individuals will follow market forces (e.g. decisions on home insulation, for instance, will be based on affordability, incentives and disincentives); business leaders are increasingly keen to have a political framework in which to operate.

It is crucial to be aware of how we influence others. We should remember that when we act and make sure our own record is exemplary before trying to teach others lessons. Particularly if we want any credibility.

Furthermore, what might seem insignificant in a global perspective may well considerably reduce your personal climate impact. In other words, your small contribution may only be a drop in the ocean, but all of our efforts taken together will definitely help to alleviate the GHG burden on the atmosphere.

The Credit Suisse bank aims to achieve climate neutrality by 2009. Three-quarters of its CO₂ emissions come from the energy used to run its offices, so it has made a gradual switch to renewable power supplies, and is replacing oil and gas heating with heat pumps or district heating. In 2007 it was able to disconnect more than 2 000 of its servers, 10 per cent of the total. The waste heat generated by the computers used by Credit Suisse staff at its Zurich office is diverted to heat nearby offices and homes. Its Hong Kong offices use network PCs without hard disk servers, which can cut electricity consumption by 20 per cent. In 2006 the bank's use of video conferencing was 30 per cent up on the previous year; it encourages staff to use trains rather than planes for short journeys, and has begun working towards using carbon-neutral flight tickets. By 2006 the bank's Swiss operations were GHG-neutral, with some of the saving achieved by buying carbon offsets.

Running a European freezer for a year



Running a US freezer for a year

CARBON SINKS AND SEQUESTRATION

The opposite of a GHG source is a GHG sink. A sink is any process, activity or mechanism that removes a greenhouse gas, an aerosol or a precursor of a greenhouse gas or aerosol from the atmosphere.

Natural sinks for CO₂ are for example forests, soils and oceans. It is also possible to enhance naturally occurring processes or use modern technology to remove CO₂ from the atmosphere and store it in reservoirs. The uptake of CO₂ in a reservoir, whether natural or artificial is also called carbon sequestration.

Biological sequestration in forests

The role of forests in carbon sequestration is probably best understood and appears to offer the greatest near-term potential for human management. Unlike many plants and most crops, which have short lives or release much of their carbon at the end of each season, forest biomass accumulates carbon over decades and centuries. Furthermore, forests can accumulate large amounts of CO₂ in relatively short periods, typically several decades. **Afforestation and reforestation** are measures that can be taken to

Afforestation refers to establishing forest by natural succession or planting trees on land where they did not formerly grow. Reforestation means re-establishing forest, either by natural regeneration or by planting in an area where forest was removed.

enhance biological carbon sequestration. The IPCC calculated that a global programme to 2050 involving reduced deforestation, enhanced natural regeneration of tropical forests and worldwide re-afforestation could sequester 60–87 thousand million tonnes of atmospheric carbon, equivalent to some 12–15 per cent of projected CO₂ emissions from fossil fuel burning for that period.

As one of the countries in the CN Net, Costa Rica is focusing on its considerable potential for using forests to become climate neutral.

Geological sequestration beneath the Earth's surface

The second option, carbon capture and storage (CCS) has been discussed for decades as a possible way of solving the climate crisis. As it stands, it

Carbon **sequestered** annually by
100 sq m of forest preserved from
deforestation

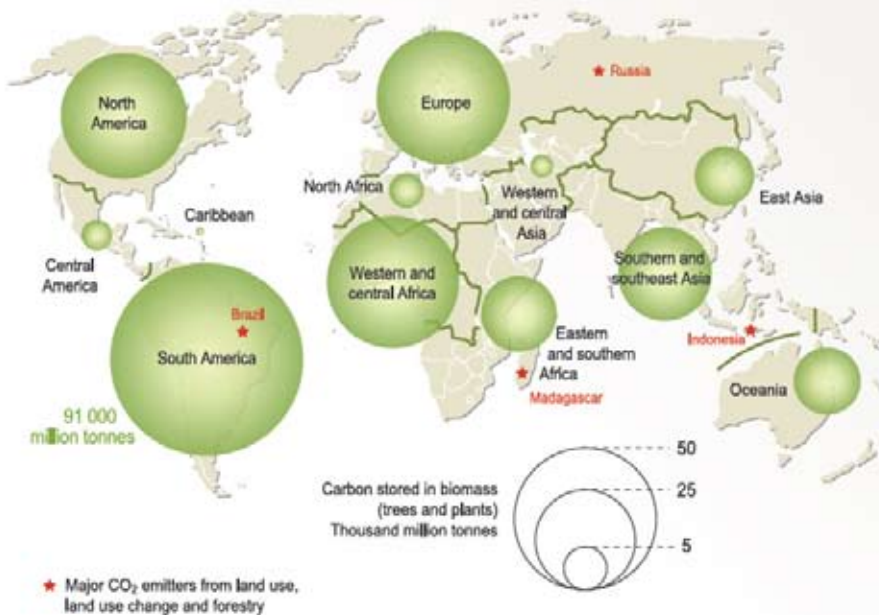
3 500

involves capturing CO₂ emissions and storing them in geological formations that originally contained fossil fuels. CO₂ emissions, for example from fossil fuel combustion, are captured and deposited beneath the Earth's surface in depleted oil and gas wells, deep coal seams or aquifers (subterranean zones of water-bearing rock or sand). There are three basic technologies: absorption (take-up of a gas into the interior of a solid or liquid), adsorption (the gas is taken up in the form of a layer on the surface of a solid), and gas separation membranes.

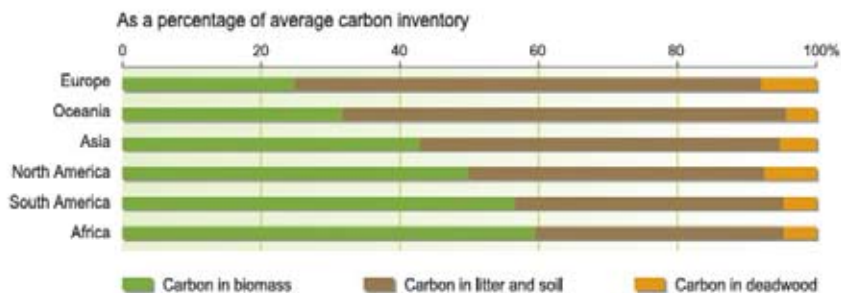
Ocean sequestration beneath the surface

The ocean can hold enormous quantities of CO₂ because unlike most atmospheric gases it reacts with water to form carbonate and bicarbonate greatly enhancing its solubility. It is estimated to hold about 38 000 Gigatonnes of dissolved inorganic carbon (DIC). In comparison, the world's total fossil carbon reserves, including conventional and unconventional deposits of oil, natural gas and coal, are estimated at about 6 500 Gigatonnes of Carbon (GtC), so if all of them were burned and the CO₂ sequestered in the deep ocean, the DIC content would only increase about 17 per cent to 44 500 GtC.

Carbon stored by forests



Distribution of carbon inventory

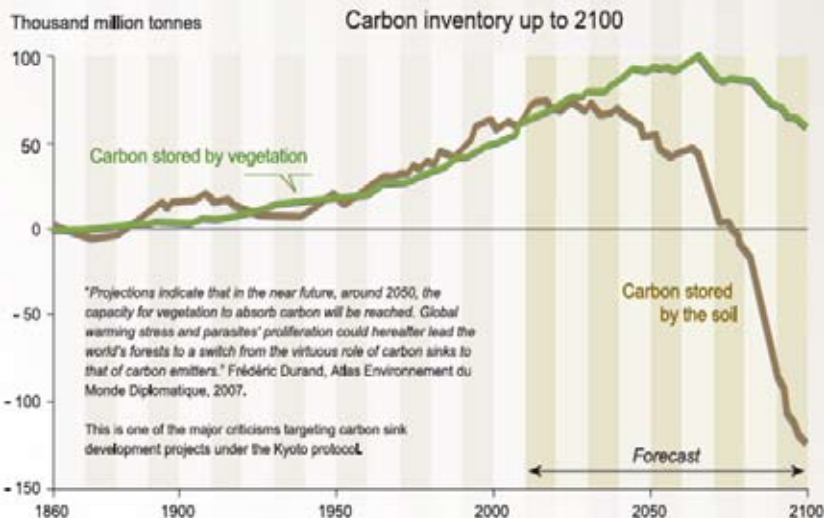


Carbon inventory

"Forests play a vital role in the global carbon cycle, storing roughly half of the world's terrestrial carbon (Millennium Ecosystem Assessment, 2005). When forests grow, they withdraw carbon dioxide from the atmosphere and sequester it in trees and soil. When they are destroyed or degraded, much of this carbon is released, either immediately if the trees are burned or more slowly if the organic matter decays naturally."

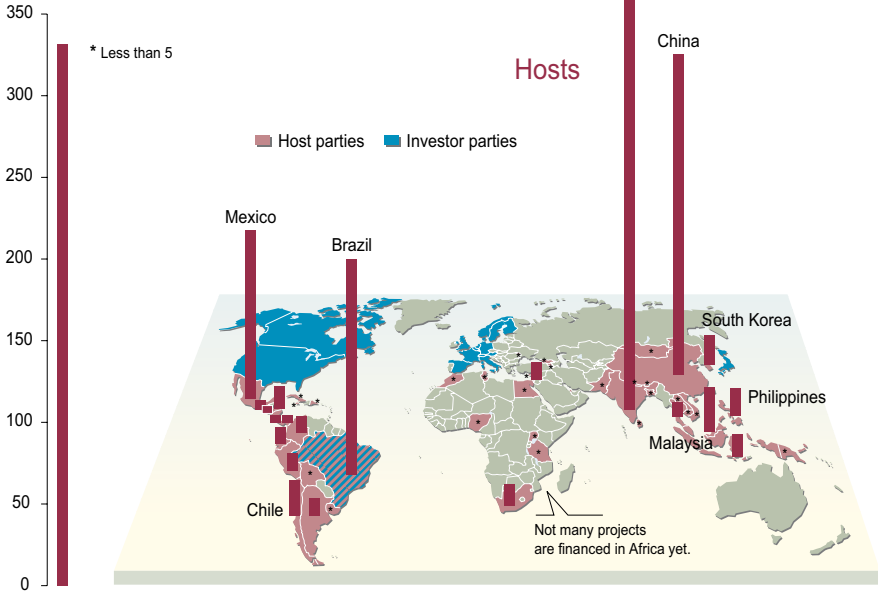
EarthTrends Update, April 2008.

Sources: Atlas Environnement du Monde Diplomatique, 2007; Global Forest Resources Assessment 2005, United Nations Food and Agriculture Organization (FAO); Hadley climate research unit, 2007; World Resources Institute (WRI), EarthTrends Environmental Information Portal, 2008; World Resources Institute, Climate Analysis Indicators Tool, 2008.

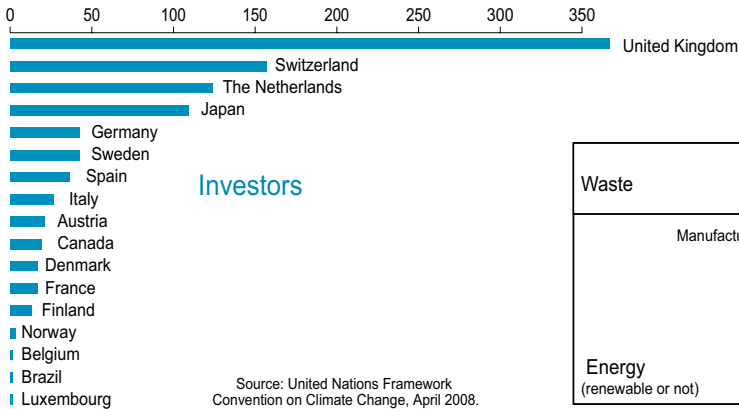


Registered projects implemented under Kyoto's "Clean Development Mechanism"

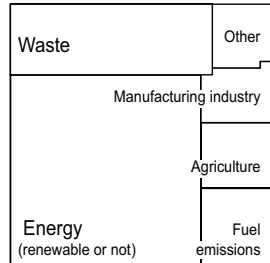
Number of projects by host parties



Number of projects by investor parties



Scope



Source: United Nations Framework Convention on Climate Change, April 2008.

There are two main ways of storing CO₂ in the oceans: by capturing it and injecting it into the ocean at depths of 1 000–1 500 metres, and by enhancing natural ocean uptake of CO₂. There are natural processes that, together, gradually remove CO₂ from the surface of the oceans and deposit it at greater depths.

The IPCC has estimated that some 40 GtC could be stored in depleted oil wells, some 90 GtC in depleted gas wells and some 20 GtC via enhanced oil recovery. Global carbon emissions in 2000 were 6 GtC which means that, at present levels, about 25 years' worth of global emissions could be stored in this way. However, capturing and compressing CO₂ requires a great deal of energy and would increase the fuel consumption of a plant equipped with CCS. The cost of CCS depends on the cost of capture and storage which in varies according to the method used. The IPCC estimates that the cost of storing one tonne of CO₂ in a geological formation ranges from US\$0.5 to 8, plus an additional US\$0.10 to 0.30 for monitoring costs. Ocean storage cost estimates vary between US\$6 and 30.

A Norwegian company, Statoil, has been successfully sequestering about 1 million tonnes of CO₂ a year since 1996. It is using the Utsira formation, a saline aquifer located 800 metres below the sea bed, beneath its Sleipner West gas production platform in the North Sea.

Statoil has calculated that the Utsira formation could store some 1 000 million tonnes of CO₂ a year – roughly equivalent to the current total of CO₂ emissions from all of the EU's electric power plants for the next 600 years.