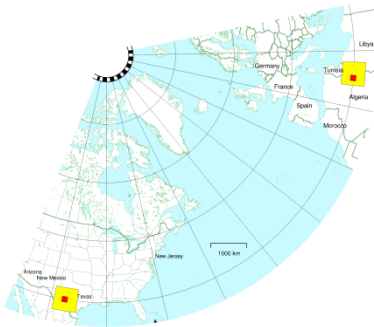




Climate Parliament

How can we trigger a surge of investment in renewable energy?



Each of the yellow squares on this map, covered with solar thermal power stations and photovoltaic panels, could meet the energy needs of 1 billion people consuming at the European level.



Solar thermal power stations, like this one in Spain, use mirrors to concentrate the sun's heat, boil water and drive a steam turbine.



A study by the German Advisory Council on Global Change found that wind energy had the technical potential to produce more than ten times as much electricity as the world uses today.

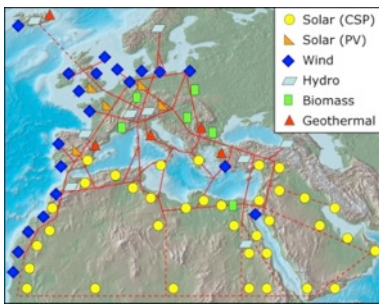
Executive Summary

Around 75% of greenhouse gas emissions are caused by burning fossil fuels. If we're to prevent dangerous climate change, we not only have to protect the rainforests and promote energy efficiency. We need to largely replace oil, coal and gas with the safe, unlimited energy of sun, wind and water. Cars need to run on electricity. Where fossil fuels are needed, the carbon dioxide needs to be captured.

And we need to do this fast. The UK Met Office, one of the world's leading centres of climate science, says that to avoid a 2°C rise in the Earth's temperature, global emissions need to peak in this decade and then reduce by 5% a year.

This is a much faster reduction than most governments even imagine today. But it can be done if we can trigger a massive increase in private investment in renewable energy and carbon capture. The ingredients for success are energy, technology and money, and there's no shortage of any of them.

- **The supply of renewable energy is unlimited.** If we were to harvest in a year the equivalent of the solar energy that reaches the Earth in one hour, it would be more than enough to meet global energy demand.
- **We already have all the technologies we need to harness that energy.** These include wind turbines, solar panels, hydroelectric turbines, geothermal power stations, and solar thermal power stations, among many others.
- **There is no shortage of money,** if we create the right incentives for investors. Just 1% of the money that pension funds invest every year would cover the additional cost of producing the world's electricity from renewables, compared to the cost of coal and gas power stations.



Regional supergrids can enable us to share renewable resources over a wide area to create a 100% reliable energy supply for everyone.



Most villages in developing countries are rich in solar, wind, small hydro or biomass resources. Village mini-grids can enable them to put that energy to work.



Cross-party Climate Parliament groups in the European Parliament and the Indian Parliament, both pictured here, are working to increase public and private investment in renewables. These two Parliaments, like many others, are highly influential in deciding how taxpayers' money is spent.

The question is: How can governments move enough private and public investment into renewables, without driving electricity bills so high that we risk a voter backlash?

Three ways to make it happen

The Climate Parliament (www.climateparl.net) is a global organisation of legislators committed to achieving the energy transition in time to avoid catastrophic climate impacts. To help make sure this happens, we have three objectives.

1. Build smart renewable energy supergrids. Long-distance high voltage direct current (HVDC) cables can enable us to combine many renewable sources across whole regions – especially from areas rich in wind, solar and hydropower. With today's information technology, both local and long-distance smart grids can integrate countless different variable energy sources to efficiently meet fluctuating demand. Meanwhile, village mini-grids can enable the 1.6 billion people who currently haven't as much as a lightbulb in their homes to harness their local energy resources.

2. Strengthen incentives for private investment. To put massive funding into renewables, investors need to know that they will be guaranteed a good price for the energy they produce. Attractive "feed-in tariffs", renewable obligations on power companies, and loan guarantees can all give investors the security they need.

3. Invest 1% of government budgets in renewable energy. One percent of the world's national budgets is roughly \$175 billion a year; today, governments spend less than a tenth of that on renewables. Although \$175 billion is only a small part of the total investment needed, it could well be enough to make a rapid renewables revolution politically and financially viable. Once governments put serious money on the table, investors will know they're serious. Public funds should be used when necessary to control any sharp increases in electricity bills, to provide loan guarantees, and to ensure that we can fund any essential research and smart grid infrastructure which doesn't attract private investment.

A determined network of legislators, working together around the globe, can shift real resources into an energy system which could safely power the world for centuries to come. The switch to renewables will not only reduce the dangers of climate change. It can provide stable energy prices, create millions of jobs, save millions of lives lost to lung disease, and reduce the risk of conflict over resources. It's a goal worth investing in.



From top: Climate Parliament Chairman Graham Watson MEP, UK; Tangarike Reete MP, Kiribati; Dr. Sanjay Jaiswal MP, India; Dora Byamukama MP, Uganda. Our focus on renewable energy was set by a poll on energy priorities in which more than 700 MPs in over 70 countries participated. For more information about our network, visit www.climateparl.net

A network of committed legislators

Over the past four years, the Climate Parliament has organised more than 20 international parliamentary committee hearings on climate, energy and ecosystems. In addition to raising awareness among the MPs, our work has already led directly to a number of Parliamentary initiatives. For example:

- **In Uganda**, members of our network made access to energy the "9th Millennium Development Goal" for the country, and established a new national Energy Fund. So far, more than US\$150 million has been invested in renewable energy as a result, representing more than 2% of the national budget.
- **In India**, members of our group proposed that a joint US-India renewables research programme should be launched, creating a consortium of public and private entities, with seed money from both governments. In November 2010, President Obama and Prime Minister Manmohan Singh signed just such an agreement, with each government contributing \$5 million. The wording of the agreement closely reflected our proposal. Our Indian group is now pressing for more ambitious renewable energy targets for the country.
- **In South Africa**, members of our network played an important role in persuading the government to launch a new renewable energy feed-in tariff system.
- **In the East African Legislative Assembly**, our members have drafted a new law, now in the final stages of adoption, to improve the cross-border management of vital ecosystems such as the Serengeti, Mount Kilimanjaro, Lake Victoria and coastal coral reefs.
- **In the European Parliament**, a cross-party group of MEPs, working with a network of national MPs in EU Member States, is preparing new budget proposals to increase EU support for renewable energy. In December 2010 150 European MPs and MEPs wrote to José Manuel Barroso, President of the European Commission, to press for stronger support for renewables.

This is a crucial moment for Europe, as the EU's spending priorities for the seven-year period 2014-2020 are being decided right now in 2011-12. The EU's annual budget is €120 billion a year. We have an opportunity to increase spending on research and development for renewables, on building a European grid, and on innovative financial instruments to support new energy infrastructure. We can also increase Europe's spending to support renewables in developing countries.



The Parliaments and Congresses of Brazil, Britain, Japan, South Africa, the United States and the European Parliament in Brussels, where the 2011 Climate Parliament Forum will be held.

The Climate Parliament strategy

We are now working on a strategy in which committed legislators can accelerate both public and private investment in renewables. The strategy has three parts:

- **Convene an annual Climate Parliament Forum** bringing together policy-makers, investors, renewable energy companies, major NGOs, foundations and other key stakeholders. The Forum can help us to develop actionable policy proposals, and to build coalitions to help get those proposals implemented. The first meeting of the Forum will be held on **May 26-27, 2011** in the European Parliament in Brussels.
- **Create a cross-party group of Members of Parliament and Congress** in each of the world's largest economies. Each group needs to be supported by one or two full-time staff. Our first such groups are in the European Parliament and the Indian Parliament. We are currently focusing particular attention on Europe and India, as they are both well placed to play a leadership role among developed and developing countries.
- **Reach out to legislators in all parts of the world** through the Internet, helping to spread good policy ideas. To do this, we have created a unique database containing the email addresses of more than 20,000 MPs.

To make sure that legislators can draw on technical advice from across the UN system, we are collaborating closely with the UN Development Programme (UNDP).

Supporting the Climate Parliament

Companies participating in the Climate Parliament Forum are asked to pay an annual membership fee to help cover our costs. The membership fee is £5000/€6000/\$7500 for companies, and £2000/€2500/\$3000 for industrial associations. Companies, foundations or individuals contributing £10000/€12000/\$15000 or more will be permanently listed on our website as Founding Members.

The Climate Parliament has a registered charity in the UK, and a public 501(c)3 charity in the US. Major funders of our work in developing countries include the European Commission and the UK Government. Our work in developed countries is mainly funded by private foundations and individuals.

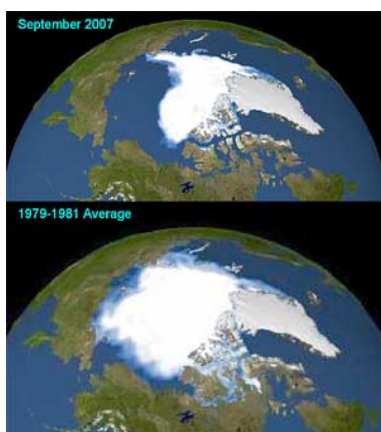
If you or your organisation are interested in supporting our work or participating in the Climate Parliament Forum, please contact info@climateparl.net or Jesper Grolin at +45 38 87 75 75. For more information, visit www.climateparl.net.

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Since the Industrial Revolution, carbon dioxide in the atmosphere has increased by more than 30%.



The Arctic ice cap is shrinking, increasing the solar energy the planet absorbs.

The need for speed

Leading climate scientists are warning that 350 parts per million (ppm) of CO₂ in the atmosphere is the maximum for climate safety. Today, at 388ppm and rising fast, danger signs – from the shrinking Arctic ice cap to acidification of the oceans – tell us that it's time to act. Just to begin reducing the level of CO₂ in the atmosphere, we need to reduce average per capita CO₂ emissions by around 80%, to around 1 tonne per person.

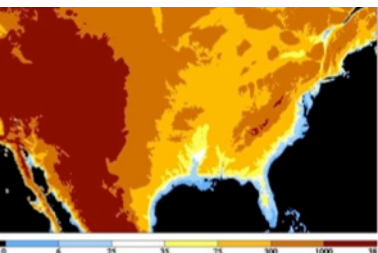
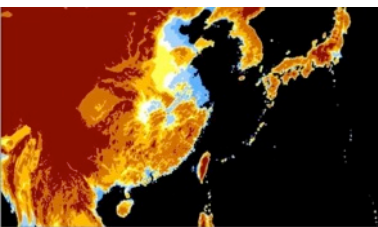
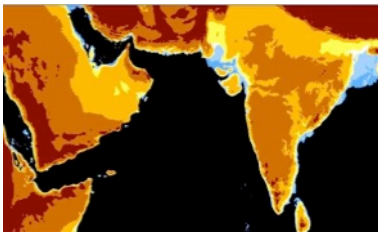
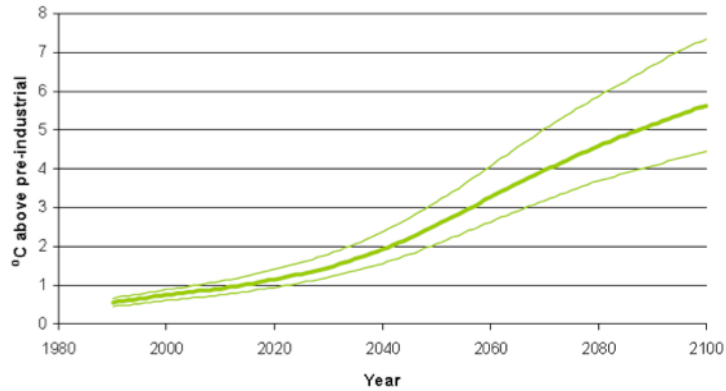
The Hadley Centre of the UK Met Office says that to have a better than 50% chance of limiting global temperature rise to less than 2°C (the agreed goal of the G20), we need emissions to peak within this decade and then reduce by around 5% a year. That would get us close to 1 tonne per person in 30 years. Even at that pace, we will only begin to lower atmospheric concentrations of CO₂ by around the middle of this century – when we will finally be emitting less than the planet can absorb.

Failure to act means a steady increase in devastating storms, floods, droughts and forest fires. The graph on the next page from the Met Office shows their projection of the planet's likely temperature rise in this century if we continue on the "high emissions" pathway that we are now on. They believe we are on course to increase the temperature by 4°C by around 2070. If we do so, they



According to the insurance giant Munich Re, weather related disasters have more than doubled in the past 30 years. The insurance industry, and climate scientists, expect a continuing increase as the planet warms.

say, we can expect a 30-40% drop in rice, maize and wheat yields in the tropics, which means famine across the globe. Some areas, such as the Mediterranean region, which are already short of water will become steadily drier, and eventually desertify. We would risk losing most of the rainforests and melting the Arctic tundra, releasing massive amounts of CO2 and methane – and driving global warming even faster.



With a sea level rise of 25m, the blue areas will be below sea level.

According to a NASA study, the last time the planet was 3°C hotter, the sea level was 25 m higher. Since the amount of water on the planet is exactly the same today, they say, and water either freezes or runs downhill, there is no reason to believe that this will not happen again. In other words, if we put the planet's temperature up 3°C, the blue areas on these maps are likely eventually to be inundated by the rising seas. These areas are home to hundreds of millions of people. Such a large rise in sea level might take centuries, but the Met Office graph suggests we are probably on course to hit 3°C by the 2050s.

Why renewable energy?

Renewable energy adds no carbon to the atmosphere. And it has other attractions as well. The shift to renewables, powering not only our current electricity needs but also electric cars and home heating, would make every region energy self-sufficient. This would greatly reduce the risk of conflict over energy resources. It would create millions of jobs, and save millions of lives that are lost every year to lung disease from pollution from chimneys and exhaust pipes. And because the fuel is free, the price of energy will only go down, as the technologies improve.

Two other key technologies for combating climate change are carbon capture and nuclear energy. The public appetite for nuclear power has somewhat reduced after Fukushima. Terrorists flying a large plane into a power station could do just as much damage as a tsunami, and nuclear materials



One study calculated that if the whole world were powered with nuclear energy, supplies of uranium would run out in less than 7 years.

in the hands of terrorists could pose an even greater threat. The costs of nuclear power are substantial, especially if insurance is included. And nuclear power relies on a finite supply of uranium. Nuclear power is already playing a role in reducing carbon emissions and will continue to do so for some time to come, but it probably does not offer a long-term global solution to the energy problem.

Carbon capture may play an important role in the years to come. Some industries, such as steelmaking, still have no good alternative to coal, and it is essential that we capture the carbon emissions they produce. If existing fossil fuel power stations, cement factories etc can be fitted with carbon capture technology, it can help to bridge the gap between today's fossil economy and the future renewable economy. While questions have been raised about storage of carbon dioxide underground, in terms of both safety and the sheer underground space available, there are innovative new technologies emerging for re-using captured carbon as fuel.

Even with carbon capture, however, coal and gas power stations do not offer a long-term global solution. They will still rely on finite supplies of fossil fuels from often unreliable suppliers, and the cost of the fuels will only rise over time.

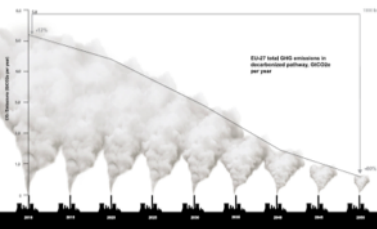
Spikes in the price of oil are widely predicted in the coming years as global supplies peak. Some experts believe that even coal reserves are not nearly as large as most governments think. They are certainly not large enough to support the whole of humanity at a reasonable standard of living for many years into the future, if we should succeed in lifting the world's poor majority out of poverty.

This raises another risk for countries that pursue a non-renewable energy path. Within 20 years or less renewable power will almost certainly be cheaper than other sources, as many hydropower dams are today. So investing in new fossil fuel power stations may saddle companies with "stranded assets" and countries with uncompetitive power prices.

In 2010 the European Climate Foundation released a landmark study, carried out by McKinsey and Company, Imperial College, KEMA, Oxford Economics and other leading consultants, entitled *Roadmap 2050: a practical guide to a prosperous, low-carbon Europe* (www.roadmap2050.eu). The authors describe several different energy pathways by which the EU could achieve its stated goal of an 80% reduction in greenhouse gas emissions by 2050. The pathways make heavy use of renewable energy,



Petrol cars kill more people through lung disease than road accidents.



The EU aims to decrease its carbon dioxide emissions by 80% by 2050.



In some areas, new marine technologies like tidal power can make an important contribution.

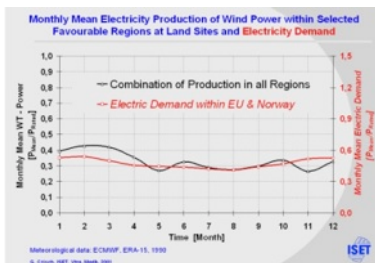
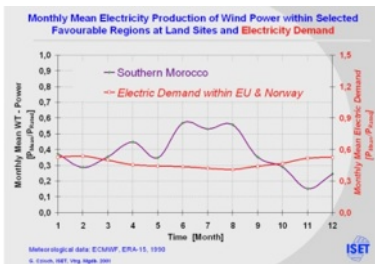
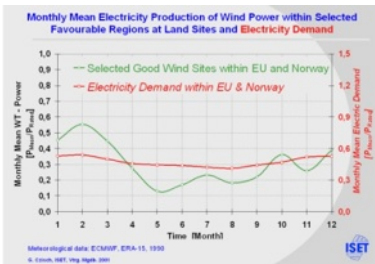
combined with varying amounts of carbon capture and storage (CCS) and nuclear. One pathway is 100% renewable. They reached the striking conclusion that by 2050 the shift to sustainable energy could be saving Europe €350 billion a year – or as much as €1500 per household!

In March 2011 the European Commission produced a similar study entitled *A Roadmap for moving to a competitive low carbon economy in 2050*. The Commission estimates that over the next 40 years energy efficiency and the switch to renewable energy sources will reduce the EU's fuel costs by an average of €175-350 billion per year. These savings will roughly match the increased investment needed to put the new clean energy system in place. The fuel savings will be greater still if the cost of fossil fuels rises very sharply.

Whereas coal, oil, gas and uranium will become steadily more scarce and expensive, renewable energy will last as long as the sun shines. But is there enough renewable energy to power the whole world forever?

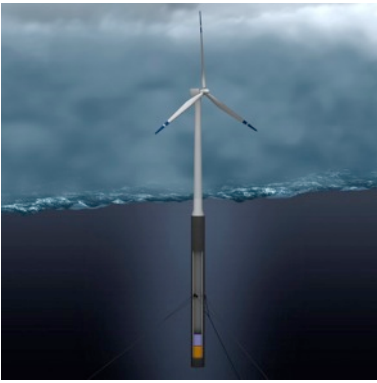
Can we really power the world with renewable energy?

There are many interesting new technologies to pursue – wave and tidal power, enhanced geothermal energy using heat from hot rock below the earth's surface, or biofuels from agricultural waste. All of them should be encouraged and supported and have a role to play in different parts of the world. But important though they are, it is unlikely that any of them will be able to produce power on the scale we need in the near future.



Shared over a wide area, wind can provide a reliable energy supply. These graphs show how, while the wind drops in Europe in summer, it rises in Morocco. Combine the two, and the supply closely matches European electricity demand (the red line.)

Cambridge Professor David MacKay, now the chief scientific adviser to the UK's Department for Energy and Climate Change, did some revealing calculations in his book *Sustainable Energy – Without the Hot Air*. Even if all the world's cropland were devoted to energy crops, it would produce, if equally shared among the world's population, just 28% of the energy per capita that an average citizen of Europe consumes – and for this dubious benefit, most of humanity would starve to death. Even if wave power machines were placed along all the world's ocean coastlines, it would give each of us just 0.4% of the energy consumption of the average European. Even if all the world's major tidal power sites were developed, it would contribute even less than wave power. Geothermal power is unlikely to contribute much more than 6% in the near future.



Floating wind turbines have the potential to produce far more energy than the world consumes today.

So how can we switch the world to renewables? The three sources that between them can produce literally unlimited energy to power the world now and in the future are wind, solar and hydropower.

Wind energy is already expanding rapidly around the world, and the cost is becoming competitive with fossil fuels. Wind in one place is variable, but if we harness wind over a wide enough area and share it through supergrids, we can have a relatively stable supply.

In many areas, the potential of onshore wind farms is limited by space constraints, and they often encounter stiff local opposition. But as we move offshore, and especially once we can scatter cheap, floating wind turbines across the seas, there is no limit to the electricity they can generate.

Likewise with **solar power**. If we combine solar photovoltaic panels on rooftops with large-scale solar power stations in deserts and drylands, we could generate all the energy we need.



The small square on this map, 150kmX150km, covered with solar power stations, could generate all the electricity that Europe produces today from all sources.

A total area of solar panels and power stations 600 km x 600 km, if installed in deserts or drylands, would provide enough power to give 500 million people the average American's total energy consumption, which is the equivalent of 250 kwh per day. It would give 1 billion people the average European's consumption, which is half of that per person. And it would provide the average Chinese citizen's energy consumption to 3 billion people, almost half the world's population. Of course, the solar panels and power stations should not be built in one place, but should be widely distributed.

Solar energy can be harnessed using three main technologies. The first is rooftop solar water heaters. The second is photovoltaic (PV) panels. The cost of PV is falling by more than 15% with every doubling of installed capacity. If we continue to expand the solar industry, there is growing agreement that this will make it cost competitive with coal and gas within no more than five years. Indeed, in sunny places with high electricity costs, such as Italy, solar has already reached "grid parity."

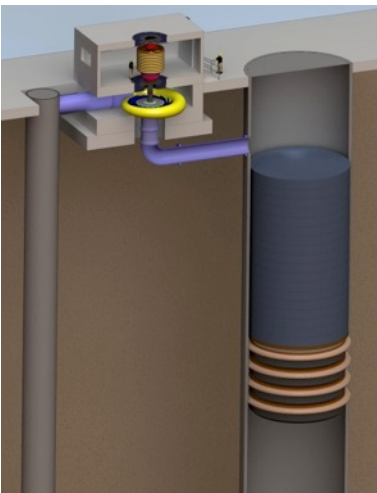


Spain's Andasol solar thermal power plant stores heat in these two tanks of molten salt, and can keep on boiling water to generate electricity for seven hours after dark.

The third technology is solar thermal power, also known as "concentrating solar power" or CSP. This uses mirrors to concentrate the sun's heat, boil water and drive a conventional steam turbine. CSP has the advantage that heat can be stored during the day to generate power at night, or at times of peak demand. A growing number of solar thermal power stations are being built in Spain and the US, with India now entering the race.



Energy from variable sources such as wind and solar can be stored until it's needed by pumping water uphill. This is done in hydroelectric lakes, like this one in France, or by pumping seawater uphill into a coastal reservoir, like this one in Japan.



A US company called Gravity Power has developed an ingenious solution for pumped storage. A heavy piston sits in an underground cylinder. Energy is stored by pumping water into the bottom of the cylinder, raising the piston. When energy is needed, the piston pushes water back through the turbine, generating electricity. This can be done anywhere, won't spoil anyone's view, and offers a simple way to store unlimited amounts of energy.

Each of these three solar technologies has an important role to play.

The other crucial renewable technology is **hydropower**, which can balance fluctuations in wind and sun, and provide energy storage. For traditional hydro, in which a river flows through a dam, the International Energy Agency estimates the total global potential at some 8000 twh per year, which if shared among the world's people works out to 3% of the average European's energy consumption.

If, however, we use the widespread technology of "**pumped storage**" to store wind and solar power until it is needed, there is no limit to its potential. In pumped storage, water is pumped uphill into a reservoir, and around 75% of the original energy is recaptured when the water runs back down through the same turbine. This is the only energy storage method used on a large scale today. It normally involves two reservoirs, one below the other. It can also be done by pumping water between two lakes at different altitudes. The Gravity Power technology pictured on this page doesn't even require mountains; it can be done equally well in flat areas. If we have enough energy storage, fluctuations in wind and sun can be smoothed out.

The need for energy storage or backup power stations to balance those fluctuations, and for long-distance transmission lines, can be significantly reduced if we use local **smart grids** for what is known as "demand response". If there is a temporary drop in wind speeds in your area, or clouds block the sun, a smart meter in your home can briefly switch off your freezer or water heater, or stop charging your electric car for an hour. According to the *Roadmap 2050* study, demand response can reduce the need for investment in backup power and inter-regional transmission by some 25%.

Ships, aircraft and trucks may need to use **biofuels** for now. But even they can be powered by renewable electricity. For example, they could be redesigned to run on **hydrogen**, which can be produced using electricity to electrolyse water. The hydrogen can be burned in jet engines or fed into fuel cells to drive electric motors. All this technology exists today, and the costs are falling. Indeed, the latest hydrogen fuel cells are now cheap enough to be price competitive as a way to power cars.



Vehicles can be powered by renewable energy, using electricity either to electrolyse water and produce hydrogen for hydrogen fuel cells (like the one that powers this bus), or feeding the electricity directly into a battery (like the one that powers this car.) Electric transport is much cheaper per kilometre or mile than petrol-driven transport. The cost of electricity to drive a car 100 km (about 60 miles) is roughly €2.



High voltage direct current (HVDC) power lines can move energy over thousands of kilometers with very little loss.

Most of our other machines can be powered directly from the grid, or by batteries that recharge from the grid. The main workhorses of the future that will produce the electricity will be sun, wind and water. Can the whole world be powered by renewable energy? Easily. In fact, as fossil fuel supplies run low, it is in the long term the *only* thing that can power the world.

The next question is: How can governments make the shift to renewables happen, and make it happen fast? In the next section, we describe three essential steps that the Climate Parliament is advancing.

How can governments ensure a renewable future?

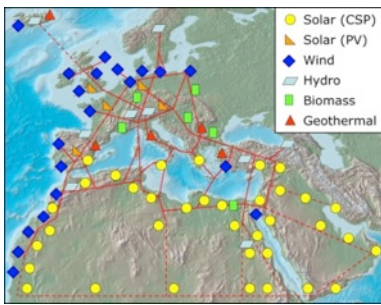
1. Build smart grids large and small

When people switch on the light, they want the electricity to work without fail. A renewable energy supply must be as reliable as our existing power stations. To combine widely dispersed and variable renewable energy sources into a 100% reliable power supply, we need new grid infrastructure.

Long-distance transmission lines spanning whole regions and continents can enable us to harness wind over a wide area for a stable supply, transmit solar power from sunny to cloudy areas, and balance fluctuations in wind and solar power with hydro, geothermal and biomass energy. Smart grid technology can enable us to match power from highly dispersed renewable energy sources to fluctuating demand in all parts of the region.

Continental supergrids can be built piece by piece, like a Lego set. Countries can begin putting cross-border interconnectors in place without waiting for a regional plan to be agreed. In Europe, this is already happening on a small scale, as each new interconnector brings benefits in terms of energy trading and security of supply.

We not only need new grids, but we need to make sure the economy can be powered from the grid. Charging points at parking places and battery exchange facilities at service stations are needed for a switch to electric vehicles powered by renewables. Gas or oil boilers to heat buildings must be replaced with electric radiators or heat pumps. Local smart grids and smart meters can enable us to adjust demand in order to match minor fluctuations in supply, thus minimising the need for long-distance transmission. We should generate as much renewable energy as possible



This map illustrates how a smart supergrid could combine the major clean energy resources of the Europe-Mediterranean region.



The *Roadmap 2050* study's estimate of the long-distance transmission required once Europe has reached 60% renewables, measured in gigawatts.



Long distance power cables, following the same route that telecoms cables now take, could combine solar power from the deserts of Australia and China, wind in the China Sea, geothermal power in Indonesia, and hydropower in the mountains, into an essentially unlimited power supply for East and Southeast Asia.

locally, including at the rural village level, with supergrids bringing in the rest.

The *Roadmap 2050* study looked at the grid requirements for the shift to renewables in Europe. The study found that in each scenario for decarbonising the power supply the transition could be achieved more cheaply and reliably with a regional European smart grid.

The study also found that Europe could be powered by 100% renewable energy if the long-distance transmission cables are extended across the Mediterranean to bring in additional energy from solar thermal power stations and wind farms in North Africa. Modern high voltage direct current (HVDC) cables can transmit energy over thousands of kilometres with very little loss, and they work well under water.

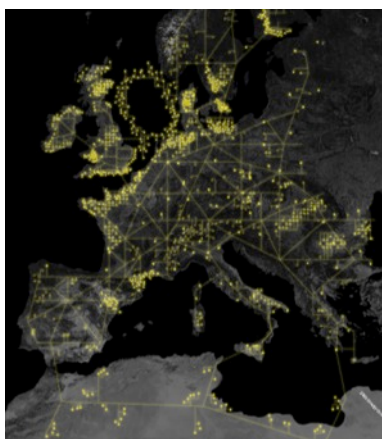
With a smart supergrid, fluctuations in supply in a single country can be balanced with energy from elsewhere. When the Northern winds drop in the summer, they can be balanced by Mediterranean sun. When the sun wanes in the winter, the strong winter winds of the Northern seas can make up the difference. The massive hydroelectric resources of Scandinavia and the Alps can balance short-term fluctuations in both, and help to meet high winter demand.

The same applies in other regions – North and South America, the Indian subcontinent, Sub-Saharan Africa and East Asia.

Whether we generate our energy from large-scale wind farms and solar power stations, or small-scale renewable technology – and in fact we need both – we can meet our energy needs most efficiently by sharing our resources across borders.

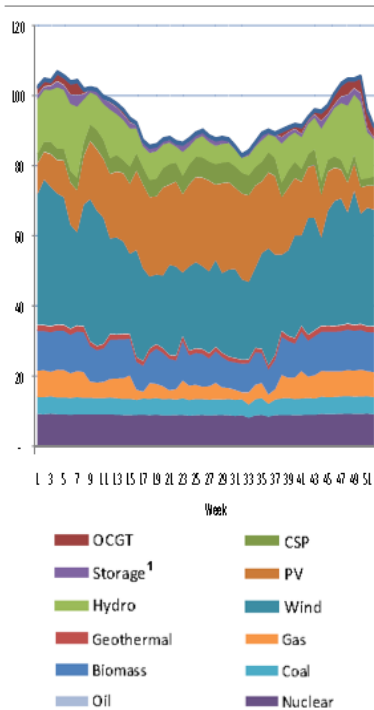
Indeed, without the long-distance power lines linking to offshore wind farms and solar power stations in the desert, it would be very difficult to shift to 100% renewable energy. To take the example of Europe again, the formidable Professor MacKay looked at the region's renewable resources.

Even if we cover with wind farms 10% of the land in the 1/5 of Europe that has big enough wind-speeds, double Europe's hydroelectric facilities, install wave power machines along the entire Atlantic coastline, harness tidal power in all suitable locations, and cover all south-facing roofs in all areas south of the UK with a combination of solar water heating and solar photovoltaic panels, MacKay calculates that we would only generate some 25% of Europe's current energy consumption. Geothermal and



Another artists's impression of a Europe-Mediterranean smart grid which would combine the region's vast resources of wind and sun with its many other renewable sources.

80% RES pathway



This graph from the *Roadmap* study shows how sun, wind, hydro and other renewable resources can complement each other across the seasons to meet demand.

biomass energy can only add a small amount to this in the near term. To make up the difference, we need massive investment in offshore wind farms, and in large-scale solar power stations both in Europe and North Africa.

We must also ensure that the 1.6 billion people who currently don't have as much as a lightbulb in their home can have access to clean energy to power their development. Most of them live in rural villages far from the national grid, but at the same time they live in areas rich in renewable energy resources from sun, wind, water and biomass. They need **village mini-grids** so as to harness that energy.

Renewable energy grids can be financed from a combination of public and private funds. Parliaments need to change the mandates of electricity and grid regulators so that where the private sector is ready to make the full investment, they can charge user fees to recoup the costs. Transmission lines and grid technology which may not be sufficiently profitable in the short term to attract private investors can be built by public-private partnerships or simply funded by governments and development agencies. Just as governments pay for road and rail networks, so they should be ready to help pay for the smart electricity networks on which our future depends.

Either way, in each country the Parliament or Congress has a key role to play if we are to put the new smart grids in place with the necessary speed.

2. Strengthen investment incentives

A second key role for governments and parliaments is to create stronger incentives for private investment in renewables, while ensuring that household electricity bills don't rise too high. The bulk of the investment we need has to come from banks, pension funds and other private sources, but legislation backed by public money can play a key role in giving investors the security they need.

Three proven ways in which investment can be encouraged are "feed-in tariffs", renewable energy obligations on power companies, and loan guarantees or project bonds.

Feed-in tariffs, which guarantee a good price for renewable energy fed into the grid for years to come, have been shown in many countries to give investors and householders the certainty they need to build new wind turbines, solar power stations, rooftop solar panels and other clean energy technologies.



Germany's renewable energy feed-in tariff law was drafted by just a handful of members of the Bundestag. This shows how even a small group of committed legislators can make a big difference.



Simply ensuring that all lightbulbs are energy-savers can reduce energy costs significantly.



Britain is rapidly expanding offshore wind using a version of renewable obligations on power utilities.

The German feed-in tariff system provides a good example. A few years ago, a small group of members of the German Bundestag drafted a new renewable energy law, establishing attractive prices for energy from a variety of renewable technologies. The legislators faced stiff opposition from big power companies, but pushed the law through. The result: within a few years more than half of the world's total surface of photovoltaic panels was deployed in Germany, and the country had become a major player in the global wind industry.

At the regional level, feed-in tariffs and other subsidies need to be arranged internationally so that renewable energy production is supported when energy is transmitted across borders, just as it is when it is produced and consumed within one country.

Any rise in energy bills resulting from feed-in tariffs can be controlled partly through incentives or requirements for greater energy efficiency in machines, electrical appliances and buildings – starting with the humble lightbulb. Additional energy cost increases during the transition should be covered in part from government budgets, climate bonds or the sale of carbon permits. This may sometimes involve subsidising feed-in tariffs, as some governments do, rather than passing all the costs on to consumers. (More information on feed-in tariffs can be found in the Energy Resources section at www.climateparl.net, and at our joint website with the World Future Council, www.futurepolicy.org.)

Feed-in tariffs, which encourage investment, can be combined with "**renewable obligations**" for power companies, which if properly enforced could ensure overall reductions in emissions. For example, to help meet that UK Met Office requirement that emissions reduce by 5% a year, power utilities in rich countries could be instructed to do exactly that – by switching 5% of their fossil fuel power supply to renewables every year. Most governments today would find this speed of transition unthinkable, but if the scientists are right we had better start thinking about it.

The Climate Change Committee which advises the UK Government has recently said that the Government needs to get involved in simply signing power purchase agreements with renewable producers, rather than leaving matters to the market.

Loan guarantees, in which governments or public banks (such as the European Investment Bank) share part of the risk of renewable energy investments, can significantly reduce interest rates and therefore the cost of the energy. Most of the costs of wind, solar or hydropower are upfront capital costs. The price of the capital is thus crucial. The



Geothermal and biomass power plants are excellent for meeting peak demand or balancing wind and solar.

European Commission is now proposing to use a small part of its budget to provide an EU guarantee for project bonds for major infrastructure projects such as long-distance grid connections. This is one good way to reduce interest rates and increase investor confidence.

The Commission estimates that for every €1 it puts into an escrow account to guarantee project bonds, it can stimulate €20 in private investment. Thus if the EU were to spend €1 billion a year on bond guarantees to help build a European grid, it might be able to trigger €20 billion a year in investment.

To avoid hardship for the world's poorest citizens, developed countries should contribute towards the additional costs of clean power for all in developing countries. Richer governments should thus contribute part of their 1% to help strengthen investment incentives in developing countries. Europe must play a leading role in this, since some 55% of global development assistance comes from Europe.

Supporting renewables in developing countries is important for everyone, because if the transition to renewables does not include rich and poor countries alike, it will be impossible to achieve the rapid reductions in global emissions that we need. The aim should be that, with assistance from richer nations, new generating capacity in developing countries should be renewable. Fossil fuel power stations should be replaced with renewables as they come to the end of their lives.



International development bodies such as the World Bank should reallocate funds away from fossil fuel pipelines and towards electricity grids and renewable energy, including small scale projects such as this mini-hydro scheme.

In the long run, because the fuel is free, getting our energy from sun and wind, or biomass and geothermal heat, can save us a lot of money. For a limited period while the new renewable energy infrastructure is built, electricity costs will rise. The rise in costs for households and industry should be strictly limited, to ensure that the energy transition does not cause hardship to poorer citizens or engender widespread public opposition. Which brings us to the third key role for parliaments.

3. Invest 1% of government budgets in renewable energy

What could be done with 1% of national budgets, and might it be enough to trigger the private investment we need? We crunched some numbers.

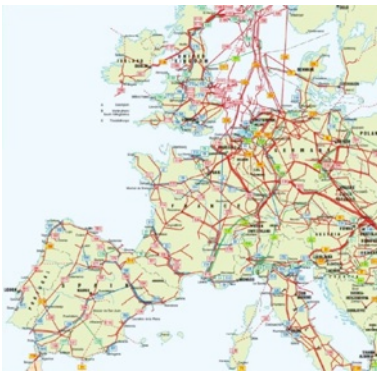
The key question politically is: If the world shifts to renewable energy, what will happen to peoples' electricity bills along the way as the new wind turbines, photovoltaic panels, solar power stations and grids are being installed?



For some years the price of electricity will rise while the new renewable energy infrastructure is being built.



Some of the needed long distance transmission lines may have to be built as public-private partnerships.



The "supergrid" of European gas and oil pipelines pictured here was paid for partly by public funds. We need to do the same now for renewable energy.

All governments fear a voter backlash, stoked by hostile sections of the media, if they allow electricity bills to rise too high or too fast. That fear is one of the main reasons why most governments, even those that understand the risks of climate change, are not yet pushing ahead with renewables as fast as they should. (Another major reason, of course, is very effective lobbying by some fossil fuel companies.)

In the *Roadmap 2050* study, McKinsey's calculations for the 100% renewable scenario took into account among other things the cost of building all the generating capacity, the new long-distance grid connections, the increased demand for electricity if we switch cars and building heating to electricity, the energy efficiency measures that we can easily take, and the major savings that would be achieved by using free renewable energy rather than expensive fossil fuels. There would be big savings on transport, as an electric car is cheaper to drive than a petrol car. But they found that, unless there are sharp rises in the costs of coal and gas, the price of electricity in 2020, if Europe shifts towards 100% renewables, could be roughly 20% higher than in a business as usual scenario. After that, the price of electricity in the renewable scenario would gradually decline. The price difference at the peak is likely to be even greater if the transition takes place as quickly as the UK Met Office is urging.

Put another way, if the very substantial up-front capital costs of building the new renewable infrastructure are entirely paid by private capital, the entire cost will be passed on to consumers in their monthly electricity bills. In the long run, renewables will save us money as their costs steadily drop, but for just 10-20 years there may be an increase in bills for households and industry.

Using McKinsey's numbers, we went on to make a very rough estimate of the total *increase* in electricity costs if we switch the world to renewable energy by 2050. Our reasoning is that, while circumstances differ in different parts of the world, the shift to renewables requires much the same kinds of investment in all major regions of the world. Indeed, most of us will use the same technologies built by the same manufacturers. While Europe benefits from good wind resources, much of humanity lives closer to the equator, and therefore has better solar resources, but every region will harness both wind and sun. The costs may be bigger or smaller in different regions, but the order of magnitude will be the same. Much more work needs to be done on such calculations, but with this simple approach of "scaling up Europe" we can at least get a general idea of the costs involved.



Investing 1% of government budgets in renewables could reduce the *increase* in electricity bills by between a third and a half, thus significantly reducing public resistance to the renewable energy transition.

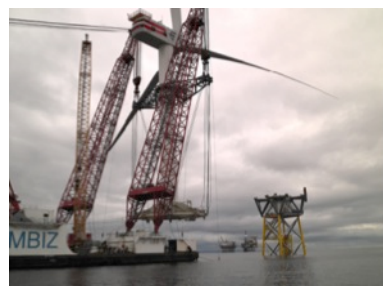
We include more detail on our calculations in Appendix 2. The conclusion is that 1% of national budgets amounts to roughly one third of the total increase in electricity costs as we shift to wind and solar power. In other words, simply by investing 1% of budgets in the transition to renewables, we could reduce the price increase for consumers by at least a third. If these funds come from reallocating within existing budgets, no increase in taxation is required.

In fact, we should be able to reduce people's bills by more than that. If some of those government funds are used in ways that reduce risk for investors (for example, through attractive feed-in tariffs or loan guarantees) then the interest rates that banks charge for renewable energy investments will fall significantly. As noted earlier, a big part of the cost of renewable electricity is interest payments to banks. By reducing interest rates, we can achieve a further reduction in the costs of the global energy transition.

One percent of the budget would achieve just as much in developing countries as it would in richer nations. In India, even 0.10% of the Union Government's budget over 20 years would be enough to equip each of the country's 95,000 un-electrified villages with a renewable energy mini-grid. That mini-grid could be powered by enough renewable energy to meet the basic electricity needs of every household.

Investment of an equivalent amount (another 0.10% of the Union Government's annual budget) could create new renewable energy power plants with a total capacity of 30 GW. That would provide enough electricity to power health centres, schools and local council offices in each of over 600,000 villages of India. In a nation where close to 40% of the citizens and 65% of the schools have no electricity, this would be a major achievement.

In short, 1% of national budgets would make an enormous difference to the speed at which the new renewable energy infrastructure gets built. It could reduce the increase in the price of electricity by 1/3 or more, and it would enable governments to smooth out any sudden price spikes along the way. Combined with incentives for private investment in which any cost increases are shared between consumer and government, it might even be enough to trigger all the private investment we need, without triggering a public rebellion over electricity bills. And not least, it could help to bring energy for development to 1.6 billion of the world's poorest people who have no access to electricity today.



A small fraction of pension fund investment would cover the additional capital costs of meeting future demand with renewables rather than coal and gas.

Intriguingly, the 1% government target is matched by a similar statistic from the private sector. To power the world largely from renewables within two or three decades,



Research on new technologies like wave power or new thin-film solar PV products like this one should be a top government priority.



While diplomats in the climate negotiations (above) try to negotiate our way out of the climate problem, the legislators should pursue a parallel track: to build our way out of the climate problem.

the *additional* capital costs to build the new generating capacity is in the order of \$10 trillion, compared to the capital cost of traditional coal power stations. That amount would be provided if the world's major pension funds made an additional 1% of their investments in renewables over ten years. If 1% of government budgets, combined with incentive programmes, could trigger 1% of pension fund investment, that might just be enough to solve the fossil fuel problem.

Increased public funding will also enable us to undertake some important research projects, or build some key grid connections, that simply might not be sufficiently profitable at first to attract private investment without government as a partner.

Indeed, **research and development** has to be a top priority for government spending in this area. Until we reach the point where sun, wind and water are the cheapest energy sources on earth, there will always be a temptation to choose dirty but cheaper sources. Even while we are rolling out today's technologies around the world, we should be pushing for constant improvements. The day is fast approaching when renewable technologies such as wind turbines or advanced solar panels can produce electricity more cheaply than coal or gas, and when that day comes the transition to clean energy will be completed very quickly. In the 1940s, the US government created a small city full of scientists to build an atom bomb – and years of work got done in months. We should do the same now for the technologies we need to save the planet.

A fair way to share the effort

An informal common target among legislators of 1% of budgets could also help to solve another political dilemma. It would represent an interesting approach to the problem that has plagued the climate talks for 20 years – how to share the effort of solving the climate problem among the world's nations?

If everyone spent at least that amount, the bulk of the funds would come from the budgets of large, rich nations or regions. But to find one percent of the budget for renewable energy is about as challenging in a small, poor country as in a big, rich one. A percentage target is a simple way for everyone to pull their weight.

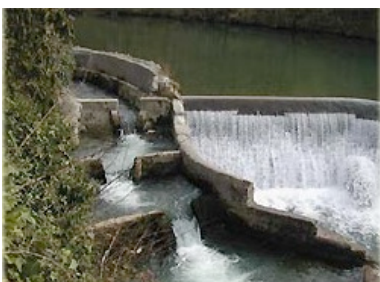
Of course, each country should make renewable energy a budget priority in any case, for the benefits it will bring to the nation, regardless of what others are doing.



If we switched fossil fuel subsidies to renewable energy for 20 years, it would cover most of the extra costs of powering the world from renewables rather than fossil fuels.



Building a new energy system will benefit each country at least as much as building new roads.



Small scale renewable energy projects that don't compete with food production could become a major source of income for the world's farmers.

How much do governments spend today on renewable energy?

The US President is publicly committed to strong action on climate change. The US Government, meanwhile, spends around 0.03% – 1/3333rd – of its annual budget on support for wind, solar, hydroelectric, biomass and geothermal energy combined – a figure comparable to India's. By contrast, 44.4% of the Federal budget is devoted to current military spending or to repaying loans taken to fund military expenditure in the past.

According to its National Audit Office, the British Government spent £42.8 million in direct spending on renewable energy in the 2008-09 budget. That is 0.007% - 1/14,000th of the budget. As in many other countries, renewables do receive "off-budget" subsidies paid for by electricity consumers, such as feed-in tariffs or renewable energy obligations on power utilities. But while the amount it spends is set to rise from now on, with the new Green Investment Bank and other measures, the Government's strong political commitment to climate action is still not yet matched by a really strong budgetary commitment.

The Indian Environment Minister recently said that climate change was a greater threat to India than to any other nation in the world. Yet the Government of India spends 0.02% – 1/4500th – of its budget on renewables, while spending more than 200 times that amount on the military.

We could go on, but the picture is clear enough.

Where could the 1% come from?

Funds could be reallocated from areas such as:

Fossil fuel subsidies. These subsidies were around \$557 billion for 2008, including both direct government spending and "off-budget" subsidies such as tax breaks, according to Bloomberg New Energy Finance.

Road building. For a limited period, building electricity networks, which can help to solve the climate problem, may need to take priority over building road networks, which make the problem worse.

Farm support. Rather than traditional farm support, some of these funds could be reallocated to helping farmers produce renewable energy from small-scale wind and hydro, and from solar panels on the roofs of farm buildings.



The Climate Parliament's Chairman is Graham Watson MEP. Graham was previously Leader of the European Liberal Group, which brings together Liberal parties from across Europe. He Chairs the European Parliament Delegation to India, and is closely involved in relations with China.



These international parliamentary hearings in East Africa and the Caribbean were part of a series of more than 20 to review policy options. The hearings have already led to significant results. For example, our two meetings in East Africa have led to an Energy Fund being established in Uganda which now channels some US\$50 million a year into renewable energy.

Military expenditure. The world's governments spend a total of around 8% of their combined budgets on the military. Today, climate change and dependence on unreliable fossil fuel supplies are among the most serious security threats of all, but they receive only a small fraction of the funding that goes on tanks and fighter planes.

Remember, this reallocation is only needed for a limited period. Once the new grids have been built, and the cost of renewables has fallen, the renewable energy industry will need little or no help from governments.

Although 1% of national budgets is a modest target, it would represent a major increase in the level of real government commitment to solving the climate problem. In the next section, we outline how the Climate Parliament plans to help accelerate the shift to renewables.

The Climate Parliament's programme

The Climate Parliament is a global forum helping legislators to solve the problems of climate and energy security.

Our work on renewable energy investment has grown out of a **poll** of more than 700 national legislators in over 70 countries, and a series of 23 **international parliamentary committee hearings**. In each hearing, legislators from different countries have examined policy options on renewable energy and energy efficiency. Through this series of meetings, and visits to national capitals, we have built up a **network** of legislators in different parts of the world who understand both the dangers of climate change and the potential for renewable energy.

We are now launching an effort in which legislators will press their governments to give top priority to building the new grids, strengthening investment incentives and reallocating public funds towards renewable energy. Because it is critical that governments put some real money on the table, we are starting by focusing in particular on national budgets and the EU budget.

While the expenditure by each government will benefit its own country first, the combined target figure of \$175 billion a year can also be seen as creating a global budget to protect the planet. The "budget process" to allocate these funds requires action in as many as possible of the world's 200 different national parliaments and governments, hopefully combined with action in state legislatures as well.

Our strategy involves a combination of three key elements:

1. The Climate Parliament Forum.

Many of the decisions that will determine the fate of the Earth in this century will be made by Members of Parliament and Congress. But to ensure that the policies they advance will unleash the maximum amount of private investment, the legislators need to work closely with business leaders, development agencies and other key stakeholders. To make this happen, we are launching a high-level dialogue through the Climate Parliament Forum.

The first meeting of the Forum will be held on May 26-27, 2011 in the European Parliament in Brussels. The Brussels conference will address the question: how can a limited amount of public funding best be used to leverage private investment in renewables?

The Forum, which is by invitation only, will convene three broad groups who together could bring about a worldwide transition to renewables. They are:

- **Members of Parliament and Congress, national Ministers, European Commissioners and Government policy experts**, who have the power to create new laws and budgets.
- **Private investors and public development agencies** – bilateral, EU and UN – who have the money, and **renewable energy and grid construction companies**, who have the technology to make the renewables revolution happen.
- **Major citizen groups, foundations and opinion leaders in the media**, who can build public support.



Climate Parliament field trips, from top: a visit to a solar power station in Spain by Members and staff of the European Parliament; a visit by legislators from island nations to a hurricane-proof wind farm in Vanuatu; and a visit by some very wet legislators from forest nations to a rainforest conservation project in Costa Rica.

Companies participating in the Climate Parliament Forum are asked to pay an annual membership fee to help cover our costs. The membership fee is £5000/€6000/\$7500 for companies, and £2000/€2500/\$3000 for industrial associations. Companies, foundations or individuals contributing £10000/€12000/\$15000 or more during 2011 will be permanently listed on our website as Founding Members.

As funding permits, we will also continue to organise international parliamentary **committee hearings** to keep building up the network of committed legislators. Our hearings are often combined with field trips to solar power stations, wind farms, and small-scale village renewable installations. The MPs leave better informed about the dangers of climate change, and aware of the vast potential of renewable energy around the world. Many of the Parliamentary actions reported in this paper, and others that can be found on our website, were carried out by MPs after returning from one of our hearings.



The Climate Parliament home page at www.climateparl.net.

2. Internet outreach to legislators

The Climate Parliament has a unique database containing the e-mail addresses of more than 20,000 Members of Parliament and Congress. This enables us to communicate with any country, region or language group at the touch of a button.

Resources permitting, we will produce a series of several compelling 5 minute videos on the need to accelerate renewable energy, the 1% target, renewable energy grids, and investment incentives. The legislators will receive an email from a colleague containing a link to the video, giving us the opportunity to "speak" directly to far more lawmakers than we would be able to meet.

Attached to the email, and on our website, will be a Legislative Action Kit with draft parliamentary questions and resolutions, a press release, and where possible model legislation. The Action Kit will give MPs all the information they need to take an initiative in their own Parliament. In some political systems, Members of Parliament and Congress can introduce legislation directly, while in others they need to focus on persuading Ministers to do so.

We will also send out regular e-mail bulletins, and maintain a news section on our website, enabling legislators to share ideas, information and success stories. This is crucial to the whole project. A single legislator in a Parliament working on these issues can feel like a lonely voice. We know from past experience that as part of a global network with the potential to make a real impact, the legislators feel empowered, and will therefore invest greater effort in the task. It is also important to help ensure that the minority of politicians who are genuinely committed to leadership on this issue receive recognition for their work.



The Climate Parliament group in the European Parliament meeting to discuss budget strategy.

3. Cross-party groups with dedicated staff in key Parliaments

To move budget amendments and other legislative proposals in a national Parliament, there is no substitute for face-to-face interaction with MPs by Climate Parliament staff, preferably based nearby.

We already provide staff support for Climate Party groups in the Indian Parliament and the European Parliament, and we have shown that this can achieve a real impact. As funding permits, we aim to do the same in as many as possible of the world's major economies. This means putting a National Director plus one Programme Officer some or all of the following capitals: Abuja, Beijing, Berlin,

Brasilia, Brussels, Cape Town, Delhi, Jakarta, Kampala, London, Madrid, Paris and Washington DC. (While Cape Town is not a capital, it is the seat of the South African Parliament.)

The staff in these capitals would work mainly with their national legislators, but would also be responsible for supporting initiatives within their regional organisation. For example:



In the Ugandan Parliament, our MPs have channelled US\$150 million into renewable energy projects.

- **Abuja**, Nigeria, also covering ECOWAS.
- **Brasilia**, Brazil, also covering MERCOSUR.
- **Brussels**, Belgium, covering the European Parliament and the Belgian Parliament.
- **Cape Town**, South Africa, covering SADCC.
- **Jakarta**, Indonesia, covering ASEAN.
- **Kampala**, Uganda, covering the EAC.
- **New Delhi**, India, covering SAARC countries.

In the developing countries, we are now forging a close partnership with the **United Nations Development Programme**, which has an office in virtually every developing country. UNDP will give MPs direct access to technical advice from within its own global network of experts, and also from other UN agencies, when they are developing legislative initiatives.

The job of our national staff will be to help the MPs get organised, to identify opportunities for Parliamentary action, and to liaise with UN advisors. They will work for, and report to, the group of interested MPs in their Parliament, in which all major parties will be represented. The priorities for their work will be those outlined earlier in this paper:

- **Building supergrids** and village mini-grids.
- **Strengthening investment incentives** such as feed-in tariffs, renewable energy obligations on power companies, and loan guarantees.
- **Promoting the target of 1% of national budgets** devoted to renewable energy.

We have focused our attention to begin with on India and Europe, one major developing country and one developed region, for a number of compelling reasons. The next two sections go into more detail on each.

India



A Climate Parliament group in the Indian Parliament is already actively promoting legislative and budgetary measures to promote renewable energy.

The first reason for focusing on India is quite simply that the energy pathway India chooses will in itself have a profound impact on the future of humanity. Almost half of the projected growth in global emissions in the coming decades is set to occur in India and China combined.



Our Climate Parliament group in India proposed an India-US joint clean energy research programme. During Obama's 2010 state visit to India, he and Prime Minister Singh signed an agreement to launch the programme.



This solar-powered mini-grid has brought clean, reliable energy to the Indian village of Rampura.

Second, India has world-class engineers, low production costs and lots of sun. It could become a world leader in solar power, particularly in solar thermal power stations. The Indian company Suzlon is already a major player in the global wind industry.

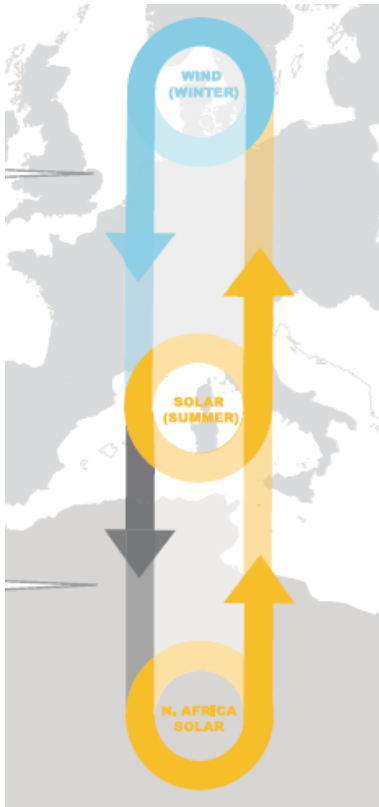
Third, hundreds of millions of rural Indians have no access to reliable electricity. India is a good place to pioneer new approaches to building renewable energy mini-grids at village level. The same policy ideas could be rolled out across other parts of the world where large numbers of people live in rural villages far from the national grid.

Our two staff in New Delhi, working with an excellent group of MPs, have already made a good start. In addition to their success already mentioned on **the India-US clean energy research agreement**, they are working to:

- **Promote the concept of payment for ecosystem services for forest protection.** The PES approach is now being tested in the heavily forested Indian state of Himachal Pradesh. This was triggered by a hearing we held in Costa Rica, which enabled MPs to learn about that country's remarkable success in halting deforestation through legislation on payment for ecosystem services. There is now interest in Nepal, Bhutan, Bangladesh and the Indian central government in replicating the Himachal Pradesh model elsewhere in the region.
- **Promote a more ambitious national renewable energy target**, and press for more resources from the national budget to implement the target.
- **Press for the replacement of diesel generators** with renewable energy solutions for 150,000 rural health centres.
- **Propose that the large areas of abandoned mines** be used for community-based renewable energy projects.
- **Produce a roadmap for developing the rich potential of India's Northeast region** for small hydro and biomass energy.
- **Convene a dialogue on renewable energy** between MPs, officials, academic experts and the renewable energy industry in India.

Europe and the EU Budget

Europe not only accounts for more than 10% of global greenhouse gas emissions, but is in a key position to provide global leadership on the climate issue. Given the considerable political resistance in the US Congress today, among the developed countries only Europe has both the



The *Roadmap 2050* vision of shared energy resources should become a flagship project for the EU.

size and the political commitment to fundamentally change the market for renewables.

Indeed, it already has. Much of the expansion of the markets for wind and solar power in recent years has been the result of attractive feed-in tariffs in Germany, Spain and other European countries. This in turn has helped to bring down the price of these technologies. The cost of solar photovoltaic energy, for example, has been doubling by some 15% with every doubling of global installed capacity.

Europe also has the resources to accelerate research and development on solar, wind and other renewable energy technologies, which can further reduce the cost of clean energy for everyone. And the European Union has already committed itself to building a supergrid which can integrate renewable energy sources across the whole region. If Europe can move quickly down this road, others will follow.

Our European network

We already have an active cross-party group in the European Parliament, led by our Chairman Graham Watson and including some 30 MEPs. We have also identified MPs who are keen to work with us in a number of European national parliaments, including those of Belgium, Britain, Denmark, Finland, France, Germany, Ireland, the Netherlands, Norway, Portugal, Spain, Sweden and Switzerland.

The EU budget process

In September 2010, a meeting was held in Brussels of our European Parliament group, where it was decided to launch an effort to reallocate funds within the €120 billion EU budget towards renewable energy.

The EU budget is unlike national budgets, as it doesn't have to cover big ticket items like defence, education and welfare. The EU already spends roughly 1.5% of its budget on renewables, and we believe it should spend at least 5% – reflecting the fact that climate and energy are among the issues at the top of its agenda.

We have a major opportunity today to achieve a big increase in public investment in renewables, which can in turn leverage a much bigger increase in private investment. During 2011-12, new priorities will be set for the next seven-year EU budget cycle. The Multi-Annual Financial Framework (MFF), in which these priorities are laid out, will govern the budget for the years 2014 to 2020.



A working dinner for MEPs during a Strasbourg plenary session. A few months later we were back in the same room for a dinner meeting with Climate Commissioner Connie Hedegaard and 6 MEPs to discuss the EU budget.



Key players, from top: the European Parliament, its influential Budget Committee, and the European Council of Ministers.



From left, Climate Parliament Secretary-General Nick Dunlop, Graham Watson MEP, EU Development Commissioner Andris Piebalgs and his advisor Stina Soewarta before a meeting in Strasbourg in January 2011 to discuss renewable energy in the EU development budget. Both Mr Piebalgs, and Commissioner Hedegaard at a meeting the evening before, expressed their readiness to give us their continuing input as we prepare proposals for introduction into Parliament.

Legislators are in a key position to influence the budget. The MFF is drafted by the European Commission, and MEPs can use their informal influence with Commissioners to have an input into the drafting. The European Parliament will also express its views formally in the coming months in a report on future budget priorities. The Council of Ministers will then work on the draft, in consultation with the European Parliament. National MPs can encourage their Ministers to support proposals for budget reform. The final MFF must then be approved by the European Parliament.

In parallel with the Multi-Annual Financial Framework, the Commission must draft a series of "Basic Acts" which provide more detail on how funds in each area of the budget will be allocated. These, like the annual budgets which follow year by year, must be agreed by the Council of Ministers and the European Parliament in a process known as "co-decision."

Each European Parliament Committee has a real input into its part of the budget, and the Parliament's Budget Committee, is particularly influential. The process culminates in a meeting in which 27 national representatives and 27 MEPs must agree on the final shape of the budget. In that meeting, each MEP weighs the same as a Member State.

The Climate Parliament's budget proposals

Last December, we sent a letter to José Manuel Barroso signed by 150 MEPs and national MPs from all major parties, calling for a major increase in resources for renewable energy in future EU budgets. Having consulted widely, we are now focusing on four steps which, taken together, would mean the EU devoting at least 5% of its budget (some €6 billion a year) to renewable energy and new grids. The four steps are:

1. €2bn for Research and Development

The European Union has adopted a **Strategic Energy Technology plan** (known as the SET plan), requiring an additional investment in R&D and demonstration of €50 billion over the next 10 years. It covers R&D on all the major renewable technologies, plus smart grids, CCS and nuclear. There is just one problem: nobody has contributed any extra money for it whatsoever. It was hoped that national governments would contribute substantially, but this hasn't happened.

Nothing is more urgent than accelerating the development of technologies such as floating wind turbines, cheaper



The advanced Andasol solar power plant in Spain was built with a combination of EU research funds and private investment.

solar panels and highly efficient solar thermal power stations, so that renewable energy can achieve price parity with fossil fuels as quickly as possible. The EU needs to take the lead, and commit €2 billion a year to the SET plan, with much of the remaining €3 billion coming from private investment.

In fact, this is already the formal position of the European Parliament as expressed in a resolution in July 2008. Both the European Parliament and national Parliaments now need to insist on this funding target.

2. At least €1 bn in Assistance for Renewables and Grid Connections in the EU's Low-Income Regions

Of the nearly €50 billion in "structural funds" committed annually to promote development in the EU's less affluent regions, at least €1 billion and preferably more should be devoted to investments in the renewable energy sector and in cross-border grid connections.

3. €2bn for Innovative Financing Mechanisms for Grids and Renewables

In a recent *Roadmap for moving to a competitive low carbon economy and 2050*, the Commission states:

"Additional public-private financing mechanisms are key in order to overcome initial financing risks and cash flow barriers. Public finance through innovative financing instruments, such as revolving funds, preferential interest rates, guarantee schemes, risk-sharing facilities and blending mechanisms can mobilise and steer the required private finance."

The Commission is proposing to include funding for such financial instruments in the MFF to help build new European infrastructure, and this is to be welcomed. But current indications are that the amounts available for building a European grid and major renewable energy projects will not be sufficient to make a big difference to our chances of completing the energy transition within the timeframe that climate science demands. We should press for at least €2 billion a year to be allocated to innovative financial instruments for clean energy, with the funds divided equally between investments in electricity transmission infrastructure and in renewable energy generation capacity.

Such mechanisms will reduce the cost of capital for investments in low-carbon infrastructure, and will generate much more private investment. For example, the Commission estimates that each euro devoted to project bond guarantees can stimulate as much as €20 in private investment. This is an extremely effective use of public



An undersea HVDC cable laid by this ship now enables Norway and the Netherlands to share wind and hydropower. With only a small part of its budget the EU could accelerate the construction of links like this across the region.



Mauritius used a feed-in tariff to start generating more than 20% of its electricity from sugarcane waste.

International support for feed-in tariffs, loan guarantees and other mechanisms could make a big difference in accelerating the roll-out of renewables across the developing world.



Graham Watson has so far questioned José Manuel Barroso, President of the Commission, twice in the Parliament on these issues – first on the Roadmap 2050 Report, and later on EU bonds for infrastructure projects such as a European grid. Members of our group will arrange a meeting with Mr Barroso later this year to discuss our budget proposals.

money, as it simply goes into an escrow account and the public purse is only affected if projects fail. The EU could even make a profit, as companies receiving an EU bond guarantee typically pay a fee for it.

4. €1bn of the EU's Development Assistance Budget should Support Renewables in Less-Industrialised Countries

The same *Roadmap* remarks that **“if no firm global action is taken against climate change, temperatures might increase by more than 2°C already by 2050, and more than 4°C by 2100.”** Most future growth in emissions will take place in developing countries, and unless those countries choose low-carbon growth, Europe's efforts to reduce greenhouse gas emissions will have a limited impact. Fortunately, as the provider of some 55% of the world's development assistance, Europe is in a position to make a big difference to the choices made by developing country governments. Both EuropeAid and national development agencies should invest heavily in the same kinds of financing mechanisms in developing countries as the EU is proposing within Europe.

The Climate Parliament will be promoting these proposals strongly at the EU and national levels over the next two years. And we will promote similar proposals, as appropriate for each part of the world, in every Parliament where we can raise the resources to form a group and put staff in place.

An opportunity to make a difference

There is wide agreement among both governments and scientists that greater effort is needed to promote clean energy. The question, as always, is: Who pays?

While most of the funding for the new renewable energy infrastructure needs to come from private investment, legislation and public funding have a crucial role to play in catalysing that private investment. And governments can take on some tasks which private companies might not be ready to undertake.

Every government budget and every law, in the end, must be approved by Parliament, and every Parliamentarian is a player in that process. The Climate Parliament network can make a difference as governments decide their real level of commitment to solving the climate problem.

In fact, legislators are the one group who have all the levers they need to control global warming right now. In a sense, it is true to say that the fate of the planet will be determined in the Parliaments and Congresses of the world.



The Climate Parliament's India Director Dr. Sanjay Kumar together with Rajiv Pratap Rudy MP, Convenor of the official Parliamentary Forum on Global Warming and Climate Change. Sanjay Kumar has taken long term leave from the Ministry of Environment to work with the Climate Parliament. He has a doctorate from Cambridge University, and last served in the Ministry as Deputy Inspector-General of Forests.

No other organisation is working with legislators around the globe to mobilise resources for new renewable energy grids and incentives, or for accelerating R&D for wind and solar power. This is the task the Climate Parliament has set itself. It is a vital task if we are to control climate change in time.

This is a moment in history when we urgently need our elected representatives at every level to come together and launch bold new initiatives. We need new measures to increase investment in renewable energy much faster than most governments yet envisage. And we need governments to match their talk about climate change with real money on the table. On these issues, there is still far too little cooperation among the world's legislators. The Climate Parliament can make a potentially important contribution to solving the climate crisis before the problem quite literally runs out of control.

For more information, please contact info@climateparl.net, or visit www.climateparl.net.

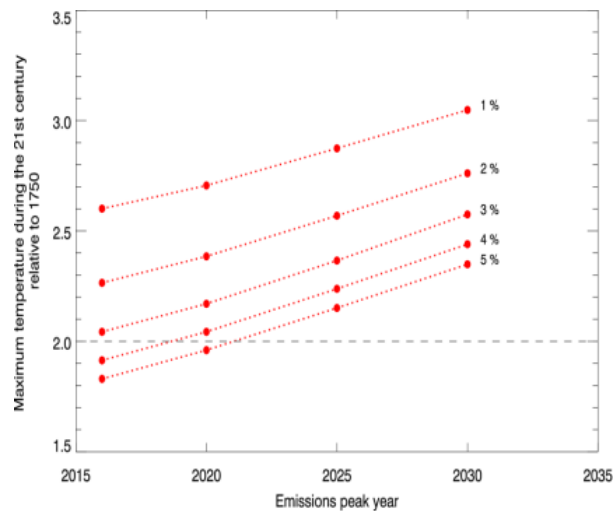
Appendix 1: The need to accelerate the shift to renewables

This graph from the UK Met Office underlines the speed at which we need to switch to renewables. Each red line represents different possibilities for the percentage annual reductions in global greenhouse gas emissions after the year in which emissions peak. The horizontal X axis shows the peak year, and the vertical Y axis shows the likely temperature increase in this century that will result from whatever peak year and percentage annual reduction that we finally achieve.



The price of failure: storms, floods, droughts, forest fires, accelerating species extinction, rising seas and declining food production.

What it shows is that to have a better than 50% chance of limiting global temperature rise to less than 2°C (the agreed goal of the G20 nations), we need global emissions to peak within the next 10 years and then reduce by around 5% a year. That would reduce emissions by some 75% in 28 years. Even if we continue at that pace, we will only begin to lower atmospheric concentrations of CO₂ by around the middle of this century – when at 1 tonne per person per year we will finally be emitting less CO₂ than the planet can absorb.

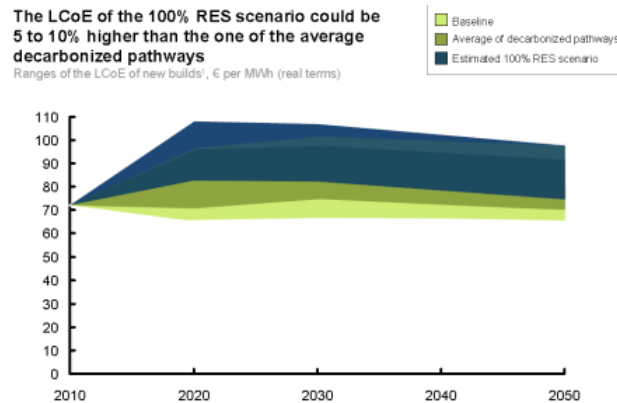


To achieve global emissions reductions at this speed, aiming to get average per capita emissions down to around 1 tonne of CO₂ per year, the rich countries would need to move even faster. For the US to go from 20 tonnes per capita to 1 tonne means a 95% reduction, and for a European country to reduce from 10 tonnes to 1 tonne means a 90% reduction. Developing countries, many of whom are already well over 1 tonne per capita, would need to reduce their emissions much more gradually, while meeting their growing energy demand from renewables.

Appendix 2: What 1% of government budgets could achieve

We have referred throughout this paper to the study carried out by McKinsey and other for the European Climate Foundation, entitled *Roadmap 2050: a practical guide to a prosperous, low-carbon Europe* (www.roadmap2050.eu).

McKinsey's calculations for its 100% renewable by 2050 scenario found that the price of electricity in 2020 could be roughly 20% higher than in a business as usual scenario – which they call their “baseline” scenario. After that, the price of electricity in the renewable scenario would gradually decline as a result of economies of scale and technology improvements. Their conclusions are summarised in this graph.



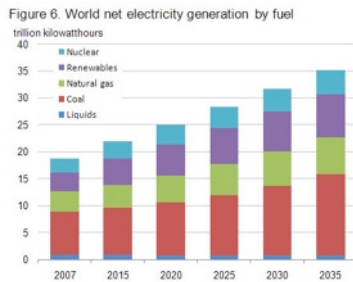
The *Roadmap* study looked at how to achieve the EU's stated aim of reducing emissions by 80% by 2050. If we are to achieve the 5% annual global reductions that the UK Met Office says is needed, Europe needs to make the transition to renewables even more rapidly than that. This would mean that the price difference after the first ten years of the transition process could be greater still.

Of course, if peak oil and peak coal theorists are correct, the price of fossil fuels may rise so fast that the renewable scenario rapidly becomes the cheaper option. But since this is difficult to predict, McKinsey used the fairly conservative projections for fossil fuel prices of the International Energy Agency leading up to 2030, and then assumed no further increases after that.

Using McKinsey's numbers, we went on to make a very rough estimate of the total *increase* in electricity costs if we switch the world to renewable energy by 2050. Our reasoning is that, while circumstances differ in different parts of the world, the shift to renewables requires much the same kinds of investment in all major regions of the world. It is hardly precise, but with this approach of

“scaling up Europe” we can at least get a general idea of the costs involved.

Looking ahead 10 years, we took the projection of the Energy Information Administration (EIA), in the US Department of Energy, for world electricity consumption in 2020. Projecting current trends, with no rapid shift away from fossil fuels, the EIA foresees the world using some 25,000 TWh of electricity in 2020. We have included here their “business as usual” projections for electricity growth from different sources. If the price of electricity in 2020, during a transition to 100% renewables, might be around 20% higher, this translates into an *increase* in the order of €16 per MWh. The total increase in the world's electricity bill in 2020 might therefore be around €400 billion, or US\$560 billion.



Government budgets will be bigger in 2020, but if we take today's figure of \$175 billion for 1% of national budgets, this amounts to roughly one third of the total increase in electricity costs. Thus by investing 1% of budgets in renewables and new grids, we could reduce the price increase for consumers by at least a third.

In fact, as we mentioned earlier in this paper, we should be able to reduce people's bills by more than that. If some of those government funds are used for measures such as loan guarantees, then the interest rates that banks charge for renewable energy investments will fall significantly. By reducing interest rates, we can achieve a further reduction in the costs of the global energy transition, perhaps even halving the increase in electricity bills when prices are at their highest point.

In addition to reducing prices, public funding can make possible the more long-range, speculative research on things like new photovoltaic materials, which could in time dramatically lower the costs of renewable energy. It could also ensure that all the new grid connections we need get built as quickly as possible, though public-private partnerships.

Perhaps most important of all, a serious financial commitment from governments will convince banks and pension funds that the renewable energy revolution is finally about to happen – and that they need to be part of it.

Appendix 3: Climate Parliament Trustees and staff

Trustees

Graham Watson MEP, Chair of the Climate Parliament

Graham Watson, Leader of the Alliance of Liberals and Democrats for Europe (one of the biggest groups in the European Parliament), is one of the co-founders of the Climate Parliament.

Graham was the Liberal candidate for President of the European Parliament in the last election. He is currently Chairman of the Parliament's India Delegation, and serves on the Foreign Affairs Committee.

After heading the private office of UK Liberal Party Leader David Steel, Graham spent six years as an advisor to the chief executive of HSBC, one of the world's largest banks.

A member of the European Parliament since 1994, Graham has served as Leader of the UK Liberal Democrats in the Parliament, and as Chairman of the Committee on Justice and Home Affairs. He was Editor of The Parliament magazine. He has published a booklet about the supergrid proposal, with contributions from a number of MEPs.

Lord John Alderdice

John Alderdice is a Liberal Democrat peer from Northern Ireland. Before joining the Lords he was Speaker of the Northern Ireland Assembly. He was responsible for establishing the new Assembly following the Northern Ireland peace accord. Lord Alderdice took his seat in the House of Lords in 1996.

After the May 2010 UK General Election, which resulted in a Conservative-Liberal Democrat coalition government, Lord Alderdice was elected by his colleagues to the newly created post of Convenor (Chair) of the Liberal Democrat Parliamentary Party in the House of Lords. He also serves as Co-chair of the Liberal Democrat Parliamentary Health and Social Care Committee.

Lord Alderdice served as President of the Liberal International, and is involved in conflict resolution efforts in many parts of the world.

Lord Peter Archer

A distinguished British Labour MP from 1966 to 1992, Peter Archer was Solicitor General from 1974 to 1979 and Shadow Secretary of State for Northern Ireland from 1983 to 1987. After leaving the Commons he received a life peerage as Baron Archer of Sandwell.

Lord Archer has a long history of campaigning on justice and peace issues, and in 1998 introduced the legislation which finally abolished the death penalty in the UK for all remaining offences. He is President of the One World Trust, of the World Disarmament Campaign, and of the Fabian Society.

Lord Tim Bell

Lord Bell is a Conservative peer and prominent advertising and public relations executive. He worked in advertising and PR companies before helping to found Saatchi and Saatchi in 1970. During his time as International Chairman of the Saatchi and Saatchi, it became the world's largest advertising agency. He then set up Lowe Bell Communications in 1987 and became Chairman of Chime Communications in 1994, which includes Bell Pottinger.

Both at Saatchi and Saatchi and with his own agency, Lord Bell has played a key role in successive Conservative election campaigns, including all the successful campaigns of Margaret Thatcher. He is widely seen as one of the people most responsible for Mrs Thatcher's electoral success, and as a founder of the modern PR industry. He was knighted in 1990 and was made a life peer as Baron Bell of Belgravia in the City of Westminster in 1998.

Lord Bell has served on the boards of many charities, and was a founder of Comic Relief, one of Britain's biggest development charities. He advises the chairmen of many of Britain's leading companies and organisations, as well as foreign heads of state and international business leaders and politicians.

Ana Maria Gomes MEP

Ana Gomes represents the Socialist Party of Portugal, one of the countries with the strongest commitment to renewable energy. In the European Parliament, she is a member of the Committee on Foreign Affairs, Vice-Chair of the Subcommittee on Security and Defence, and a member of the ACP-EU Joint Parliamentary Assembly dealing with relations with the African, Caribbean and Pacific nations.

She was Portuguese Ambassador to Indonesia from 1999 to 2003, and other postings included Tokyo, London, and the UN in New York and Geneva, where she played an active role on human rights issues.

A lawyer by training, Ana served for four years as Diplomatic Advisor to the President of Portugal. She was a delegate to the Middle East peace process during Portugal's EU presidency in 1992.

Satu Hassi MEP

Satu Hassi is a Finnish MEP representing the Green League. She has substantial experience of European level-decision making, notably due to her position as Minister for Environment between 1999 and 2002. During the Finnish EU presidency, in the second half of 1999, Satu acted as President of the Environment Council.

Satu was a Member of the Finnish Parliament for 13 years until her election to the European Parliament in June 2004. At the time of her election to the European Parliament, she was Vice-Chair of the Committee on Environment of the Finnish Parliament. In July 2004 Satu was elected Vice-Chair of the Committee on the Environment, Public Health and Food Safety in the European Parliament.

An electrical engineer by training, Satu brings to the task something that few MPs can boast: an understanding of exactly what goes on inside an electricity generator.

Sirpa Pietikäinen MEP

Sirpa Pietikäinen represents the Finnish Moderate Party, which belongs to the European People's Party (Christian Democrats) in the European Parliament. She is a member of the Committee on Economic and Monetary Affairs, and a member of the delegation to the EU-Turkey Joint Parliamentary Committee.

Sirpa was Finland's Minister of the Environment from 1991 to 1995, and played an active role in negotiating the UN Climate Convention. From 1983 to 2003 she was a member of the national Parliament of Finland.

She was Chairwoman of the World Federation of United Nations Associations (WFUNA) from 2000 to 2005, and Chaired the Finnish UN Association for eleven years. She is a board member of IDEA, the International Institute for Democracy, and a Member of the board of the major Finnish company Kone Oy.

Sirpa serves as a Negotiation Institute project coordinator and instructor in negotiation theories at the Helsinki School of Economics and the University of Joensuu. Like Graham Watson and Anders Wijkman, she was among the co-founders of the e-Parliament, and is also a member of our international Council.

Key staff members

Nicholas Dunlop, Secretary-General

Nick Dunlop is co-founder and Secretary-General of the Climate Parliament. He served for ten years as the first Secretary-General of Parliamentarians for Global Action, an international network of legislators concerned with global problems. In the 1980s he designed and launched the Six Nation Peace Initiative, which brought together the Presidents and Prime Ministers of Argentina, Greece, India, Mexico, Sweden and Tanzania in a group to work on ending the Cold War. For this work he was a co-recipient of the first Indira Gandhi Prize for Peace, Development and International Cooperation, an annual award presented by the President of India.

More recently, Nick was Executive Director of the EarthAction Network, which consisted of over 2,000 citizen groups in more than 160 countries working together to generate political will to solve global problems. Working with celebrities such as the actor Leonardo DiCaprio and the rock band Crosby, Stills and Nash, he has helped to increase public attention to major problems such as climate change and desertification. He has also served as a Consultant to the Administrator of the United Nations Development Programme on relations with national parliaments. Nick is a citizen of New Zealand and Ireland, and is based in England.

Jesper Grolin, Executive Director

Jesper Grolin has been working on the e-Parliament initiative from its earliest days, and manages the day-to-day work of the organisation. For six years Jesper was an External Lecturer at the Institute of Political Science of the University of Århus, followed by a further six years at the Danish International Study (DIS) Program. For three years he was a postgraduate researcher at European University Institute in Florence, Italy. From 1990 to 1996 he was a full time Political Advisor to Greenpeace

International, working on forests, biodiversity and Baltic Sea issues. More recently he worked as an Assistant Research Professor at Copenhagen Business School.

Among other roles, Jesper has acted as Coordinator of the Network for Environmental Sociology within the European Sociology Association, served as a Visiting Lecturer at the School of Business, Bodø, Norway and the University of Lund, Sweden, been a Member of the Planning Committee of Denmark's Greening of Industry Network, and a Member of the Danish Council for European Politics. He is based in Copenhagen.

James Corre, Programme Officer

James graduated from the University of Oxford in 2005 with a research degree (M.Phil) in Development Studies, having conducted original research on the subject of international NGO interventions in conflict zones of Sri Lanka. He has also done work for development, human rights and environmental NGOs: Oxfam (UK), Sarvodaya (Sri Lanka), People and Planet (UK), Collectif Urgence Darfour (France), Students for Development (UK) and the International Crisis Group (Belgium). This background in campaigning and advocacy work has provided a solid grounding in the work of international organisations. He joined e-Parliament early in 2008 after a brief editorial stint for the United Nations Development Programme. He speaks French and basic Sinhalese. He also has a BA (Hons) in Theology and Religious Studies from the University of Bristol and pursues a strong interest in the interface between spirituality and social and political engagement.