

Europe's Fair Share of the Climate Challenge

Key Findings

- **For Europe to shoulder its share of the climate challenge and keep the mean global temperature rise below 2 degrees C, emissions of greenhouse gases in the EU27 will need to be 40 per cent lower in 2020 than they were in 1990. By 2050, emissions of greenhouse gases in the EU27 will need to be almost 90 per cent lower than they were in 1990.**
- **According to a scenario prepared by SEI using the Long-range Energy Alternatives Planning system (LEAP), Europe can reduce greenhouse gas emissions by 40 per cent solely through domestic action, without resorting to international carbon offsetting schemes.**
- **Emission reductions of this magnitude require radical improvements in energy efficiency, the accelerated retirement of fossil fuel and a dramatic shift towards renewable energy. Cuts beyond 90 per cent in 2050 might be possible with technologies and measures not yet commercialised today.**
- **The initial cost of this domestic action to tackle the climate challenge in Europe (between 2010 and 2020) is likely to be within the range of 1 per cent to 3 per cent of EU GDP.**
- **Europe's estimated fair share of international obligations to assist developing nations to make a transition to a low-carbon future is a further approximately 1 per cent - 3 per cent of the EU's projected 2020 GDP, around €3 per person per day.**
- **Based on the Greenhouse Development Rights (GDRs) Framework for sharing the climate mitigation burden, the EU has a two-fold climate obligation - mitigation actions in Europe and investment in mitigation internationally, particularly in developing countries.**
- **Using the GDRs Framework, Europe has a total obligation to reduce emissions 103 per cent below 1990 levels by 2020 – in other words, more than its total emissions in 1990.**

Introduction – the climate challenge

Large areas of our world are already experiencing man-made climate change in the form of rising sea levels, melting glaciers, increasingly severe floods and droughts. This in turn causes changes to agricultural patterns, threats to livelihoods, and conflicts over land, water and other resources. These challenges are felt most acutely by precisely those people who are least responsible for causing the problem of climate change and who are least able to adapt to the consequences or act to reduce their emissions. In Europe the impacts of climate change can already be observed in the form of heat waves, disappearing biodiversity and the need for new flood defences to protect low lying countries.

Even while science is unambiguously telling us that even 2°C of warming would be highly dangerous for our planet, many people are rapidly losing all confidence that we will be able to prevent this level of warming, or even far more. But a climate catastrophe can be averted. Doing so demands political leadership and courageous policy initiatives, both of which go well beyond politics as usual.

This brief sets out how Europe can show political leadership: firstly, by undertaking domestic actions to rapidly reduce emissions of GHG, and secondly, by fulfilling its international obligations



Photo: Leo Reynolds

to help other countries address the twin crises of climate change and development, through analysis by the Greenhouse Development Rights Framework (GDRs).

Scenarios for domestic action

We project a baseline scenario, showing what Europe's energy system might look like if current policies are allowed to con-

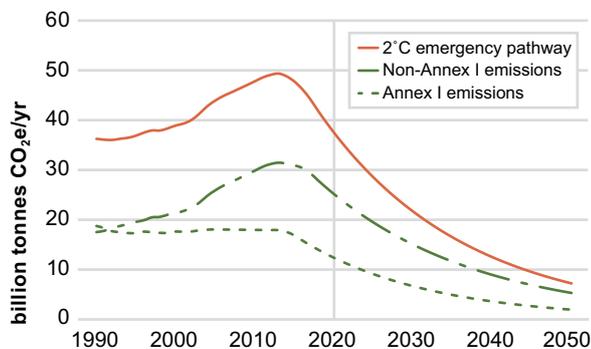


Figure 1: The South's dilemma

The red line shows a global pathway that would preserve a reasonable likelihood of keeping warming below 2°C. It is truly an emergency pathway, reflecting global action sufficiently ambitious to cause global GHG emissions to peak by 2015 and fall to 80 per cent below 1990 levels in 2050. The dotted green line shows Annex 1 emissions declining to 40 per cent below 1990 levels by 2020, and eventually to near-zero levels. The dot-dashed green line shows, by subtraction, the severely limited emissions space that would remain for the developing countries.

continue largely unchanged. In this baseline, energy use and GHG emissions remain relatively stable as improvements in energy efficiency and a gradual transition away from coal - the most carbon intensive fuel - are counterbalanced by significant economic growth.

Our second mitigation scenario examines the technical feasibility for Europe to achieve its fair share of global greenhouse gas emission reductions in the coming half century - 40 per cent cuts domestically by 2020 and as deep cuts as possible by 2050 relative to 1990 values. The scenario achieves these cuts by a combination of radical improvements in energy efficiency, the rapid phase out of fossil fuels and a dramatic shift toward various types of renewable energy including wind, solar, geothermal and biomass-based combined heat and power (CHP).

This scenario puts Europe on track to meet its commitments to avert catastrophic climate change. It leads to a society that is less materialistic than current "business as usual" projections about the future, but one that is still far richer than today. It also foresees more equality among EU countries on the assumption that addressing the climate crisis will require greater solidarity among nations. Diet, transport, industry, housing, and the way we build our cities are all likely to change to help meet these goals.

Primary energy requirements

Our research shows the dramatic nature of reductions required in overall primary energy consumption. In the mitigation scenario nuclear power is progressively phased out and coal is entirely abandoned by 2035. By 2050 oil consumption is eliminated except for a few key transport sectors (air travel, shipping, buses and road freight). Natural gas also remains in 2050 but is restricted to being used only as a backup fuel for a primarily renewable based electric system. Renewable forms of energy increase their share of primary energy from 10 per cent in 2010 to 22 per cent in 2020, finally reaching 71 per cent in 2050, with onshore and offshore wind offering by far the most potential. Generation from hydro power stays roughly constant, as does biomass consumption. Natural decreases in biomass use in poorer households (because of reduced direct heating from burning wood in stoves) is roughly balanced by increases in biomass use in combined heat and power (CHP) systems.

Household energy demand

Our mitigation scenario sets out decreases in household energy use of 16 per cent in 2020 and 63 per cent by 2050 compared to 2010 through savings from building shell efficiency and increased lighting and appliance efficiency, an annual rate of reduction of 2.5 per cent. Big reductions in energy demand in the service sector - 16 per cent by 2020 and 50 per cent by 2050 compared to 2010 - equate to an annual rate of reduction of 1.7 per cent.

The mitigation scenario assumes that 90 per cent of existing homes are retrofitted (this at a rate of 5 per cent per year would take 18 years) and attain an average heating energy consumption of 27 kWh/m². It would also require a dramatic shift away from the direct use of fossil fuels in buildings in favour of increased use of heat (from combined heat and power), electricity (especially in the form of electric heat pumps) and solar power.

The energy requirements from increased numbers of consumer electronics and appliances can be offset by gains in appliance efficiency, resulting in no net increase in per-household electricity consumption. The mitigation scenario also reflects measures to promote sufficiency, with average home sizes gradually returning to 2005 levels by 2050.

Energy demand from passenger transport

Transportation of people and goods is responsible for 32 per cent of the EU's CO₂ emissions in 2010 and is the sector with the fastest growing emissions. Two important trends help explain this rise: goods and people are traveling further, and they are doing so increasingly by car and lorry rather than by rail. Additionally, passengers are increasingly traveling by plane with flying accounting for 8 per cent of passenger kilometres in 2005 compared to 5 per cent in 1990.

To reduce emissions will take an overall reduction in passenger transport activity, with the significant growth seen in the baseline scenario eliminated after 2020. It will also require significant changes in the modes, technologies and fuels used to provide transport services. Our analysis examined these types of transitions for both passenger and freight transport. For example, for passenger transport our mitigation scenario included the following key trends:

- a large expansion of the rail network (more than double the current infrastructure by 2050), increases in service frequency and quality and that rail becomes fully electrified by 2030 (by 2050, 65 per cent of buses are also electrified);
- 80 per cent of intra-EU flights under 1000 km switch to rail by 2050;

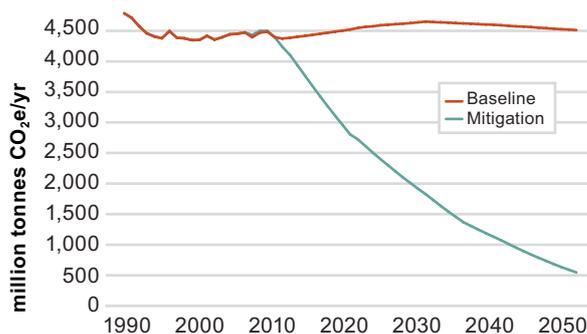
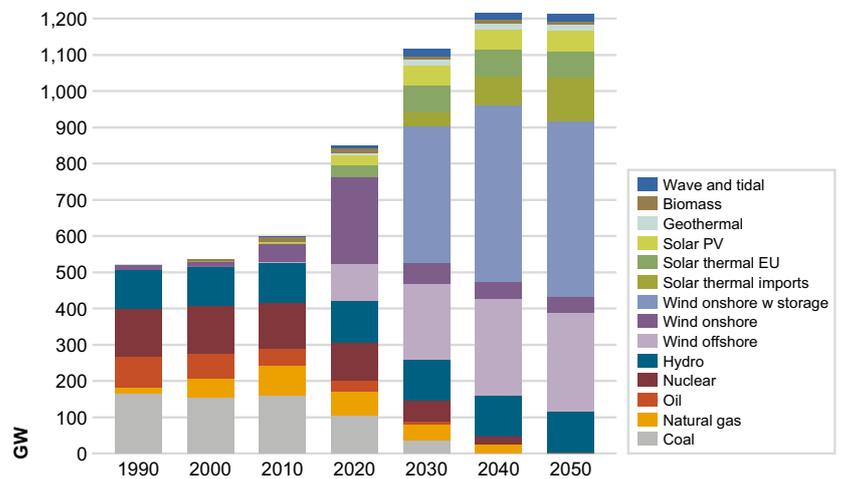


Figure 2: EU27 GHG emissions in the two scenarios

Includes both energy sector and non-energy sector emissions of CO₂, CH₄ and N₂O. Does not include high GWP gases (HFCs, PFCs, SF₆)

Figure 3: Electric generation capacity in the Mitigation scenario

Because of the shift to intermittent renewable forms of electric generation, the capacity of the electric system will need to grow by a factor of over two, from around 600 GW in 2010 to 850 GW in 2020 and 1200 GW in 2050. These figures do not include the capacity of CHP systems. In the first 10 years of the scenario standard intermittent renewables (without built-in storage) can be added to the system. In the later years of the scenario there will be an increasing need for renewable systems with some form of storage. We assume that wind farms can be upgraded to include this storage after their initial build date.



- offsetting any increases in personal travel by technologies such as virtual meetings, reduced transit distances in urban areas, and increasing number of personal trips by foot or by bicycle;
- consumers shift to hybrid and electric cars as soon as they become available and the retirement of older vehicles is accelerated, so that by 2050, virtually all cars on the road are fully electrified;
- the energy intensity of traditional cars becomes about 30 per cent less energy intensive by 2020, a significantly more aggressive target than the current EU regulations on CO₂ that foresee only a 19 per cent decrease in energy intensity for new vehicles by 2015.

Agriculture and meat consumption

Energy demand from agriculture is less than 2.2 per cent of total EU energy demand. Opportunities to increase efficiency in irrigation pumps, motors, and other agricultural machinery could yield 16 per cent reductions in energy use by 2020 and 35 per cent by 2050. Savings can also be made by moving from oil- and diesel-using equipment to electric-power by 2050.

Most emissions from agriculture are non-energy related, such as methane from livestock and nitrous oxide through fertilizing fields. In addition to new practices and technologies, a less meat-intensive diet in Europe could contribute to reduced GHG emissions and allow people to be healthier. Our mitigation scenario assumes that by 2020 the average European has switched to a diet approximately 60 per cent less meat-intensive than today, resulting in reduced direct methane and N₂O emissions from livestock and fewer N₂O emissions from fertilizing crops for animal feed.

A more sustainable and equal Europe

The mitigation scenario recognises that levels of resource-use cannot continue to expand indefinitely and that it is possible to live well without an ever continuing growth in consumption. While society would be less materialistic than “business as usual” projections about the future, it would still be far richer than today. Modest reductions in overall GDP growth assume that Europe starts acting upon the need to live sustainably within the overall carrying capacity of the planet. Specifically, total EU-27 GDP grows by a factor of “only” 1.6 from 2008 to 2050 in the mitigation scenario versus the factor 1.8 growth seen in the baseline.

The mitigation scenario also addresses the issue of equity. Reducing GHG emissions by almost 90 per cent by 2050 will require a concerted mobilisation in every EU country. Achieving this in an environment where differences between rich and poor countries continue to widen will be exceedingly challenging. For this reason we assume significant fiscal or other appropriate policies are put in place to help bring about more equal income levels among the countries in Europe.

In 2050, overall EU-wide incomes are lower than in the baseline scenario, but still substantially higher than today. Meanwhile overall levels of welfare can be much higher, reinforced by positive lifestyle changes such as more leisure (non-working) time, better health, and greater opportunities for satisfying social connections.

Costs of obligations at home and abroad

The challenge to achieve 40 per cent domestic cuts and to adequately finance mitigation in developing countries is considerable and equates to a total mitigation obligation for the EU (according to the GDRs Framework) of 103 per cent GHG reductions below 1990 levels by 2020 — far more than any target considered by the EU. Clearly, this requires a two-fold obligation to undertake mitigation domestically and to invest in mitigation internationally.

Our calculations suggest that the EU’s international financing obligations, based on the GDRs analysis, would be between

This policy brief has been prepared by Charlie Heaps and Jane Webb and is based on the findings from the November 2009 SEI report ‘Europe’s Share of the Climate Challenge: Domestic Actions and International Obligations to Protect the Planet’ by Charles Heaps, Peter Erickson, Sivan Kartha, Eric Kemp-Benedict. SEI produced the report in partnership with Friends of the Earth Europe, with financial support from the European Commission, European Climate Foundation, the Swedish International Development Cooperation Agency (Sida) and the Ministry for Environment Netherlands.

Carbon capture and storage (CCS) for fossil-based electricity generation, biofuels for transportation, and nuclear power facilities were not considered in the scenario. These constraints on the scenario were specified by the co-funders of the report, Friends of the Earth Europe.

€150 billion and €450 billion in 2020 depending on the average cost of mitigation, or approximately 1 per cent to 3 per cent of projected 2020 GDP in the mitigation scenario. The wealthier EU-15 member states would be responsible for the overwhelming majority of these costs (more than 95 per cent). This works out to an average of less than €3 per person per day.

Similarly the costs to reduce emissions at the European level, to decarbonise our economy and to implement fundamental infrastructural and technological changes between 2010 and 2020 are also considerable (likely within the range of 1 per cent to 3 per cent of EU GDP). But here again, once broken

down to a daily expenditure the overall mitigation costs in the EU are about €2 per person per day.

Even the upper end of these two cost ranges would still be less – and possibly much less – than the cost of inaction. The Stern review on climate change, perhaps the most authoritative source in this regard, estimates that losses to global GDP from climate change will amount to at least 5 per cent but perhaps more than 20 per cent. Thus the costs of the actions analyzed in our report are small compared to the economic, environmental and human losses that the world will face if urgent action is not taken.

Recommendations

Major political mobilisation for an emergency pathway

A major mobilisation is required to meet the climate challenge and deliver the mitigation scenario. We have the technology. The economic costs are bearable. It is only the lack of political will that prevents Europe from assuming a position of global climate leadership.

Climate protection framework and leadership from EU

The climate challenge must become the guiding principle in all EU policy making, from housing to transport, and from agriculture to energy generation. The EU would need to adopt an overarching “climate protection framework” comprised of well-coordinated measures that can rapidly deliver meaningful emission cuts. Measures should be decided at EU level to ensure legally binding implementation at national level, with member states introducing strong national climate legislation regulating GHGs emissions in all parts of the economy.

Annual targets and EU-wide compliance mechanism

Annual targets will make it easier to measure progress towards medium and long-term emission reduction and ensure that these cuts start happening rapidly enough for global emissions to peak in the next five years. They will also create a positive and stable context for investment, allowing long term planning and innovation and ensuring a smooth transition to an environmentally, socially and economically sustainable economy. We need national compliance mechanisms to place appropriate sanctions on government departments, regions and sectors that fail to meet their targets, and an EU-wide compliance mechanism to penalise countries that fail to meet national targets.

Urgent EU-wide package of policy measures and targets

Package includes:

- an ambitious binding target for renewable energy;
- ambitious targets for energy savings across all sectors;
- international financial obligations of between €150 billion and €450 billion per year in 2020;
- the binding phase out of nuclear, coal and oil fired power generation as soon as possible;
- an overall GHG or carbon tax to create a stable environment for investment in renewable energy development and infrastructure; and,
- EU-wide feed in tariffs for renewable electricity and research and development in electrification from wind.

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Stockholm Environment Institute
11 Curtis Avenue
Somerville, MA 02144-1224
USA
+1 617 627 3786



sei-international.org

Authors:

Charles Heaps, Jane Webb
charlie.heaps@sei.se

Further Information:

Robert Watt
robert.watt@sei.se
+46 709 675808