The 40% Study: Mobilising Europe to achieve climate justice

The 40% Study

Mobilising Europe to achieve climate justice

Friends of the Earth Europe

2010 2011 2012 2013 2014 2015

Contents

This document is a short guide to a larger piece of work – Stockholm Environment Institute's study 'Europe's Share of the climate challenge: Domestic actions and international obligations to protect the planet' – which was prepared in partnership with Friends of the Earth Europe. This document aims to summarise the main outcomes of the research. It also presents Friends of the Earth Europe's interpretation of the implications of the study for EU policy-making and European society.

The original study can be found online at: **www.sei-international.org** and **www.thebigask.eu**

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Foreword

Mobilising Europe to achieve climate justice

Our society is at a crossroads. If humanity wishes to preserve a planet similar to that on which civilization has developed and to which life on Earth is adapted, we must choose the path to a new type of society.

While consciousness is growing about the catastrophic consequences of choosing the wrong route – the path which continues our wasteful and highly energy intensive ways of living – it is also apparent that the will to change the current trajectory of developed nations, and Europe more specifically, is lacking.

A still from the 'Act Now' film for the Belgian Big Ask.

At a presentation in Brussels in June 2009 Jean-Pascal van Ypersele, vice-chair of the Intergovernmental Panel on Climate Change, noted that even if developed countries act to reduce their emissions by 25-40% by 2020, and global emissions become negative by around 2070, we will still be very lucky to keep the average global temperature rise below 2°C. "Aren't we playing Russian roulette with the climate?" he asked.

Similarly, in the recent film on climate change 'Age of Stupid', British actor Pete Postlethwaite starring as an archivist, looks at Earth from his flooded tower in the year 2055 and asks, "Why didn't we save ourselves when we had the chance? Is the answer because on some level we weren't sure if we were worth saving?"

The challenge that we are facing today is enormous but the changes that would lead us to a decarbonised world can be overwhelmingly positive. The climate mitigation scenario that the Stockholm Environment Institute prepared for Friends of the Earth Europe envisages significant changes to the way we live our lives and organise our communities, but changes that put wellbeing and the futures of our children and grandchildren in the centre.
It envisions a highly-efficient economy powered by renewables. Food habits, transport, industry, housing, and the way we build our cities are all likely to change. Flying less, eating less meat, and reducing consumption in general are all part of this transformation allowing Europe to reduce its carbon and resource footprint without compromising on happiness which can be measured in terms of life satisfaction rather than GDP.

This study describes one possible pathway amongst many for achieving a Europe that is on track to meet its commitments to avert climate catastrophe and is also cleaner, healthier and more socially just than the way we live today. It also gives an estimate of the finances needed to pay back the EU's 'climate debt' to developing countries.

The total costs of this 'climate justice' are high, but are only a fraction of the price we will have to pay if nothing is done to stop climate change. The financial crisis has proven that governments are able to mobilise huge efforts to rescue bankrupt banks, now they must mobilise to rescue the planet.

Magda Stoczkiewicz
Director, Friends of the Earth Europe
December 2009

1.

“If the EU wants to honour its commitment to maintain a safe planet for the next generation, it will only happen if our definition of ‘politically realistic’ gets recalibrated to the reality of the climate and development predicament facing us.”

Stockholm Environment Institute

Climate change impacts include increased flooding, drought and storms.

The scale of the climate challenge facing humanity cannot be underestimated.

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, and the resulting changes to agricultural patterns, threats to livelihoods, and conflicts over land, water and other resources. And climate change doesn’t stop at developing countries’ borders. In Europe the impacts of carbon addiction can already be observed in the form of heat waves, disappearing biodiversity and the need for new flood defences to protect low lying countries. Around the world, these challenges are felt most acutely by precisely those people who are least responsible for causing the problem of climate change and who have least access to resources and technology to adapt to the consequences and to act to reduce their emissions.

For the best chance of staying as far below 2°C average global temperature rise and escaping devastating climate change, developed nations including European Union member countries, must commit to emission cuts of at least **40% at home by 2020**. Rich countries must take drastic action to reduce their emissions, and fast.

At the same time developing countries continue to face a poverty crisis no less severe than the climate crisis. Climate action must be built upon the right and need of these nations to develop – as industrialised countries have done – but this time in a clean, efficient and carbon-free way.

Introduction

Mobilising Europe to achieve climate justice

Europe has the potential to rise to the climate challenge.

Research carried out by the Stockholm Environment Institute (SEI) in partnership with Friends of the Earth Europe shows that the European Union can meet its obligations.

The research investigates the two major ways in which Europe can fulfill its responsibilities and ensure that climate justice is done: by undertaking aggressive domestic actions to reduce its own emissions and fulfilling its international obligations to help other countries address the twin crises of climate change and development.

The study shows what reductions in greenhouse gas emissions are possible in Europe. It excludes offsetting, assumes no new nuclear power and the rapid phase out of existing nuclear power facilities, no carbon capture and storage for fossil-based electricity generation and no use of biofuels.

The scenario points to lower levels of growth in GDP and a society that is less materialistic than 'business as usual' projections about the future, albeit one that is still far richer than today.

The findings prove for the first time that EU wide greenhouse gas emission reductions of at least 40% by 2020 and 90% in 2050 are indeed possible. Cuts beyond 90% in 2050 might be possible with technologies and measures not yet commercialised today.

The following pages summarise SEI's study prepared for Friends of the Earth Europe. It is one possible pathway for putting Europe on track to meet its commitments to avert catastrophic climate change. The picture painted is truly an emergency pathway. The emission reduction path Europe must take is significantly steeper than even the most ambitious of current proposals. The scale of financial and technological cooperation with the developing world is also well beyond what is currently deemed politically acceptable. But here is proof that this scale of action is possible. Europe can deliver its fair share of the climate change challenge.

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Why at least 40%?

The Intergovernmental Panel on Climate Change's (IPCC) fourth assessment report, written by a panel of independent climate scientists, states that a range of 25-40% emission reductions by developed countries would lead to 2.0-2.4°C temperature increase. Yet, the latest IPCC report makes it increasingly clear that the impacts of climate change are taking place faster than expected and are already felt hardest by people in the poorest countries. We are already at a level of 385 parts per million (ppm) of CO_2 concentration in the atmosphere, and many leading scientists such as James Hansen of NASA are now calling for 350 ppm[1] as the level at which CO_2 concentration must be stabilised to stand any chance of meeting the 2°C target. Meanwhile small island developing states are suggesting that a safe threshold should be 1-1.5°C rather than 2°C.

Even if the industrialised world's emissions drop to 40% below 1990 levels by 2020, and then to almost 90% below 1990 levels by 2050, this would consume roughly one-third of the remaining atmospheric space for the world to safely pollute. This severely limits the space available to the developing world. If the industrialised world's emissions were curbed much less ambitiously, it would cast major doubt on the possibility of development for the world's poor.

What is climate justice?

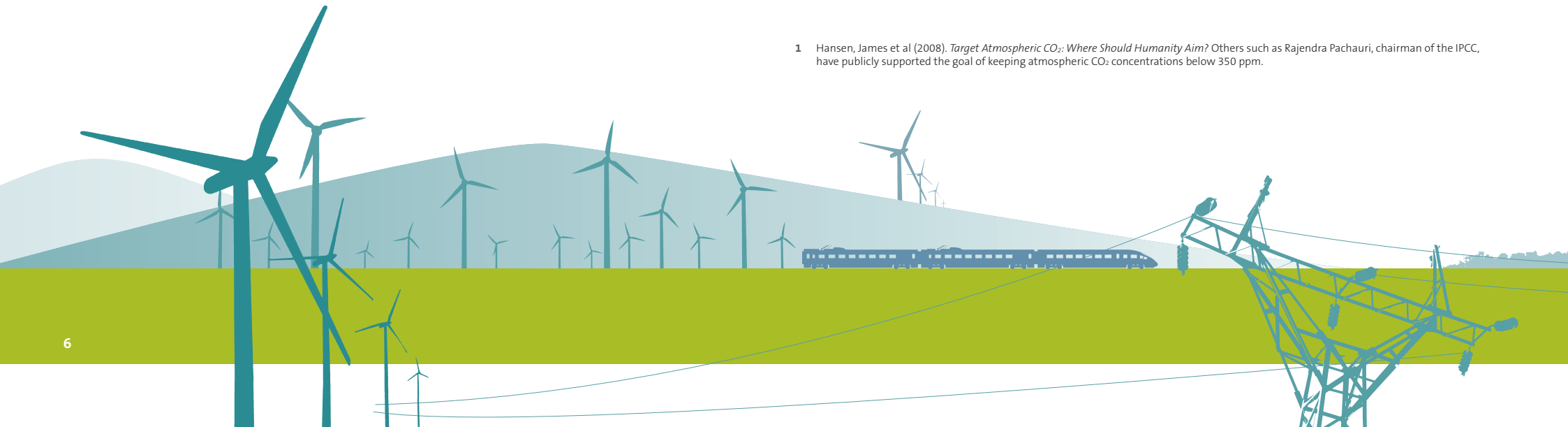
Climate justice will be achieved when those responsible for the climate crisis mitigate it and support efforts to increase resilience to the impacts of climate change. Industrialised countries must be the ones to reduce their consumption and control of the world's resources, and they must do this through real solutions rather than false ones which continue to privilege the minority of the world's population.

Climate justice demands that developed countries make deep emission cuts at home while also providing adequate finances for mitigation in developing countries. For Europe the sum of these efforts is equivalent to Europe's total mitigation obligation which the SEI study calculates using a burden-sharing approach developed by SEI and EcoEquity known as the Greenhouse Development Rights (GDRs).

The GDRs framework is explicitly designed to safeguard the right to and need for development. It aims to ensure that global emissions are cut with the urgency called for by the climate crisis and that countries' right to development is protected. It achieves the latter by defining burden-sharing among nations in a manner intended to shield those individuals that fall below a specified 'development threshold' from the costs of the climate transition.

According to the GDRs the EU's total mitigation obligation amounts to 103% greenhouse gas reductions below 1990 levels by 2020 – far more than any target considered by the European Union for 2020. Clearly, this figure is only meaningful if it is understood as a two-fold obligation to, on the one hand, undertake mitigation domestically and, on the other, invest in mitigation internationally.

1 Hansen, James et al (2008). *Target Atmospheric CO_2: Where Should Humanity Aim?* Others such as Rajendra Pachauri, chairman of the IPCC, have publicly supported the goal of keeping atmospheric CO_2 concentrations below 350 ppm.



Background

Mobilising Europe to achieve climate justice

Why have certain options been excluded?

In the SEI study nuclear power is phased out because of concerns about the safety of nuclear generation and the ability to safely dispose of and store nuclear waste over very long time scales, as well as its potential for contributing to the proliferation of nuclear arms. Nuclear power is too costly a source of electricity relative to other generation options.

Coal-fired generation coupled with carbon capture and storage (CCS) is excluded as it is unproven whether it can be commercialised rapidly enough given the urgency of phasing out existing fossil fuel plants. A more general concern is that the promise of CCS could lead to a new generation of so-called 'CCS ready' coal-fired power plants which once built will lock society into carbon-intensive power generation.

Offsetting emissions through the Clean Development Mechanism is excluded from this scenario because it is an excuse for developed countries not to make the necessary emissions cuts at home. Offsetting is seriously delaying the economic transformations urgently needed for Europe to decarbonise. The majority of the projects under the Clean Development Mechanism of the Kyoto Protocol are not additional and thus no real emissions reductions are achieved.[2] Many projects have devastating social and environmental impacts in developing countries.

First generation crop-based biofuels do not feature in the scenario as most studies concur that they generally increase greenhouse gas emissions, especially when emissions from land-use changes to meet new demand are taken into account. The modeling also excludes so called 'second generation' biofuels, a term used to describe a wide number of potential technologies. Whilst these technologies need to be assessed on a case-by-case basis, serious questions are raised regarding the sustainability of the feedstocks that might be needed, land-use implications, and the economic viability of any large scale use.

Areas for further review or investigation

The estimates of the SEI study are production-based estimates of the emissions occurring within the borders of the EU. They all exclude 'embedded emissions' – those occurring in other countries in order to manufacture goods consumed in the EU. Their exclusion does seriously underestimate the emissions for which Europe's citizens are responsible and could be the subject of additional research.

SEI excludes offsetting but it includes one non-domestic measure after 2030 which is solar-based electricity from international sources, in the Middle East or North Africa. While it is worth exploring this option because of its big potential, Friends of the Earth Europe believes it should only be exploited if it first ensures sufficient energy access and economic benefits for local communities. It must be avoided that such large scale projects lead to the type of corruption and governance problems that have historically been associated with oil, hydro and other large energy schemes. The options of increasing solar-based electricity in European Mediterranean countries should also be explored.

In the area of waste management, the study focuses on the climate benefits of preventing biodegradable materials, such as food waste or paper, from ending up in landfill. In most cases, recycling materials is much better for the climate as it avoids the emissions associated with the extraction and processing of raw materials. However, these emissions will in many cases occur outside the EU, for example in aluminium plants. As explained above these embedded emissions have not been taken into account by SEI. In order to reduce total global emissions European governments should focus on preventing waste as the priority, and on maximising recycling.

In the area of agriculture the study did not examine the climate benefits from agro-ecological practices neither did it include the embedded emissions from farming livestock such as cattle ranching nor animal feed (mainly soy).

2 Schneider, Lambert (2007). *Is the CDM fulfilling its environmental and sustainable development objectives?*

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3.

3.1 Development of emissions by 2020 and 2050 in the EU 27 – baseline versus mitigation

The study 'Europe's Share of the Climate Challenge: Domestic Actions and International Obligations to Protect the Planet' prepared by the Stockholm Environment Institute (SEI) in partnership with Friends of the Earth Europe is a detailed, sector-by-sector, analysis of a cost-effective pathway to reach 40% domestic emission reductions in the EU by 2020 and deeper reductions of 90% toward 2050.

The baseline scenario is a projection of what Europe's energy system might look like if current policies are allowed to continue largely unchanged. This 'business as usual' scenario is built upon detailed historical energy statistics for all 27 member countries of the EU published by the International Energy Agency (IEA).[3]

The mitigation scenario is one possible pathway for Europe to achieve its fair share of global GHG in the coming half century. It is a technically feasible pathway. The scenario achieves these cuts by radical improvements in energy efficiency, the phase-out of fossil fuels and a dramatic shift to renewable energy.

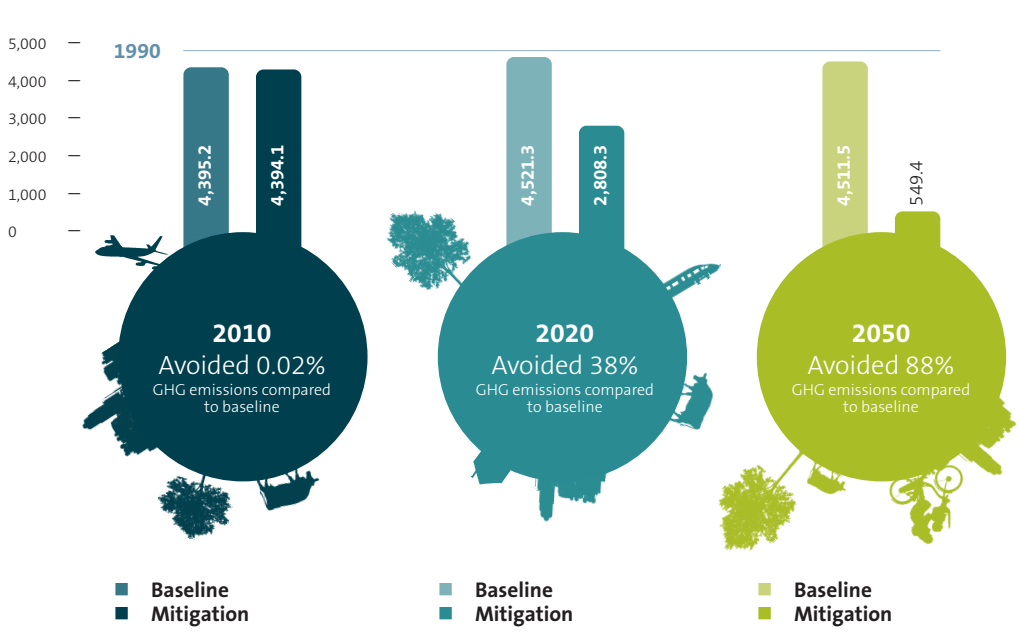
In the mitigation scenario the carbon footprints of individual citizens in Europe decrease dramatically and become more equal so that by 2050 the average per capita emissions reach about 1 metric tonne of CO_2 equivalent per year – around 8 times lower than today.

The following pages describe developments in some selected sectors where big changes will happen. Please note that the SEI study looks in detail at more sectors.

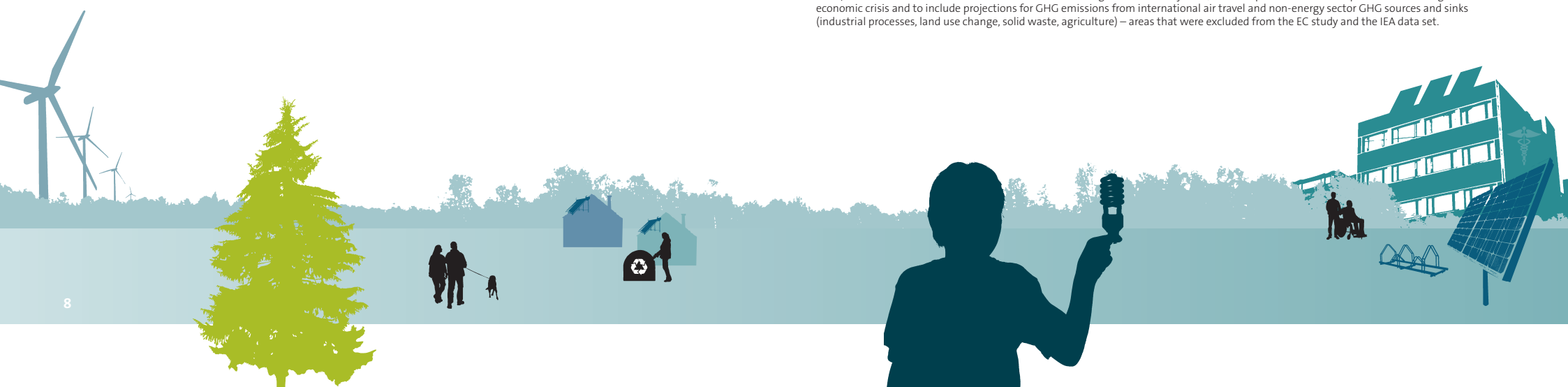
Figure 1: EU 27 GHG emissions in the two scenarios

Includes both energy sector and non-energy sector emissions of CO_2, CH_4 and N_2O. Does not include high GWP gases (HFCs, PFCs, SF6)

Million Metric Tonnes CO_2 Equivalent



3 This includes historical trends, a variety of national level studies, and the European Commission's own baseline energy projections to 2030 (EC, 2008). Information from these sources has been further augmented and adjusted, for example to reflect the impact of the recent global economic crisis and to include projections for GHG emissions from international air travel and non-energy sector GHG sources and sinks (industrial processes, land use change, solid waste, agriculture) – areas that were excluded from the EC study and the IEA data set.



Domestic actions for Europe

A summary of the outcomes of the SEI study ‘Europe’s share of the climate challenge’

3.2 Primary energy requirements

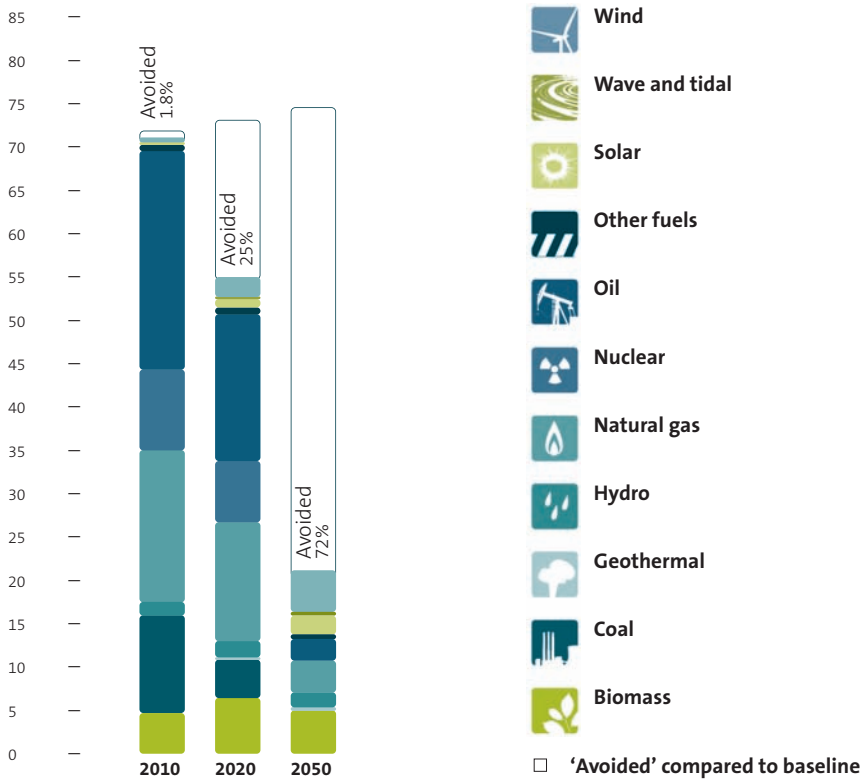
The research shows that dramatic reductions in overall primary energy demand can be made in Europe. Total primary energy requirements are reduced from around 71,000 Petajoules in 2010 to 55,000 Petajoules in 2020 and 21,000 Petajoules in 2050. These huge reductions are a result of drastic energy efficiency improvements and fuel switching measures on both the demand and the supply side.

In the mitigation scenario nuclear is progressively phased out, while allowance is made for some countries such as France where a longer timeframe (up to 2050) would be needed. Coal is entirely removed by 2035. By 2050 oil consumption is eliminated except in a few key transport sectors (air travel, shipping, buses and road freight). Natural gas also remains in 2050 but is restricted to being used as a backup fuel for a primarily renewable based electric system. The remaining primary requirements in 2050 are all different types of intermittent renewables. Renewable energy increases its share of primary energy from 10% in 2010 to 22% in 2020, reaching 71% 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 heating by burning wood in stoves) are roughly balanced by the increases in use in combined heat and power (CHP) systems.

Figure 2: Primary energy requirements by fuels in the mitigation scenario

Avoided energy from baseline

Thousand Petajoules



2010 2011 2012 2013 2014 2015

3.3 Energy demand in passenger transport

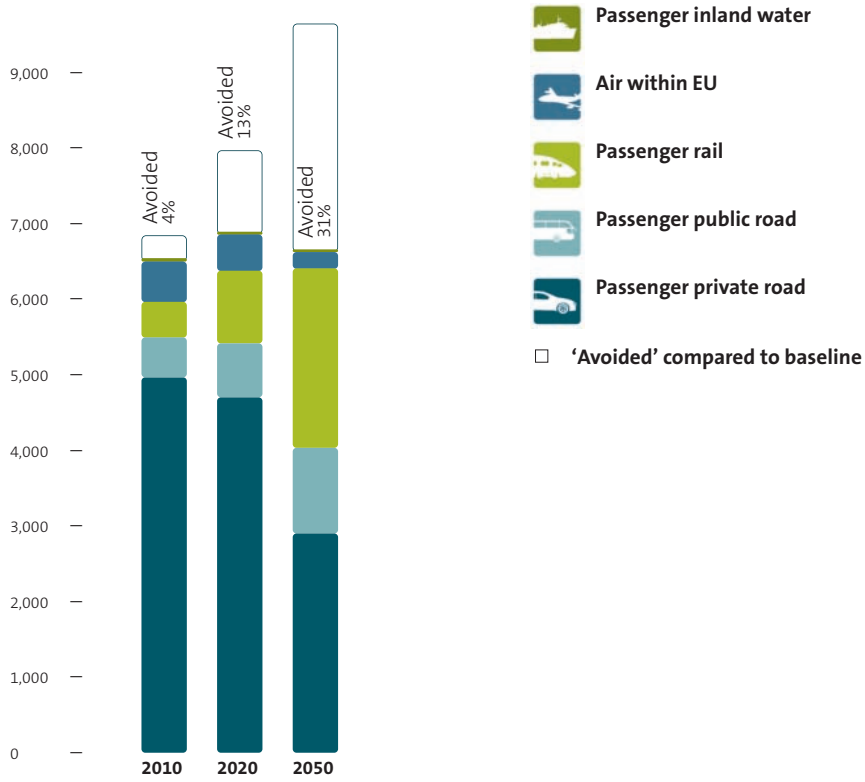
Transportation of people and goods accounts for 32% of the EU's CO_2 emissions in 2010 and is the sector with the fastest growing emissions. Two important trends help explain this rise: goods and people are travelling further, and they are doing so increasingly by car and lorry rather than by rail. Additionally, passengers are increasingly traveling by aeroplane with flying accounting for 8% of passenger kilometres in 2005 compared to 5% in 1990.

In order to reduce emissions an overall reduction in passenger transport activity is needed compared to the baseline scenario. The mitigation scenario eliminates the significant growth in the baseline scenario after 2020. This is partly explained by lower overall levels of economic activity and the beginning of a transition to a more sustainable and less travel-oriented future, including more virtual meetings, reduced transit distances in urban areas, and increasing numbers of trips by foot or by bicycle. Significant modal shifts – away from private road and air travel and toward rail travel – further reduce emissions. The share of passenger cars decreases from around 75% in 2010 to 69% in 2020 and 43% in 2050. Passenger rail increases from 8% today to 14% in 2020 and 35% in 2050. The proportion of air travel within the EU remains roughly constant at 7% in 2020 but falls to 4% by 2050.

Figure 3: Passenger km by transport sector in the mitigation scenario

Avoided passenger km from baseline

Billion passenger km



Figures 4 shows that transport energy use is dramatically reduced in the mitigation scenario due to reductions in overall activity, shifts to less energy intensive modes (rail over road and air travel) and the introduction of much more energy efficient and much less carbon intensive technologies such as electric vehicles and fully electric rail travel. Note the growth in the reliance on electricity and the significant decrease in oil consumption, but no growth in the use of biofuels. The graph excludes international shipping energy use.

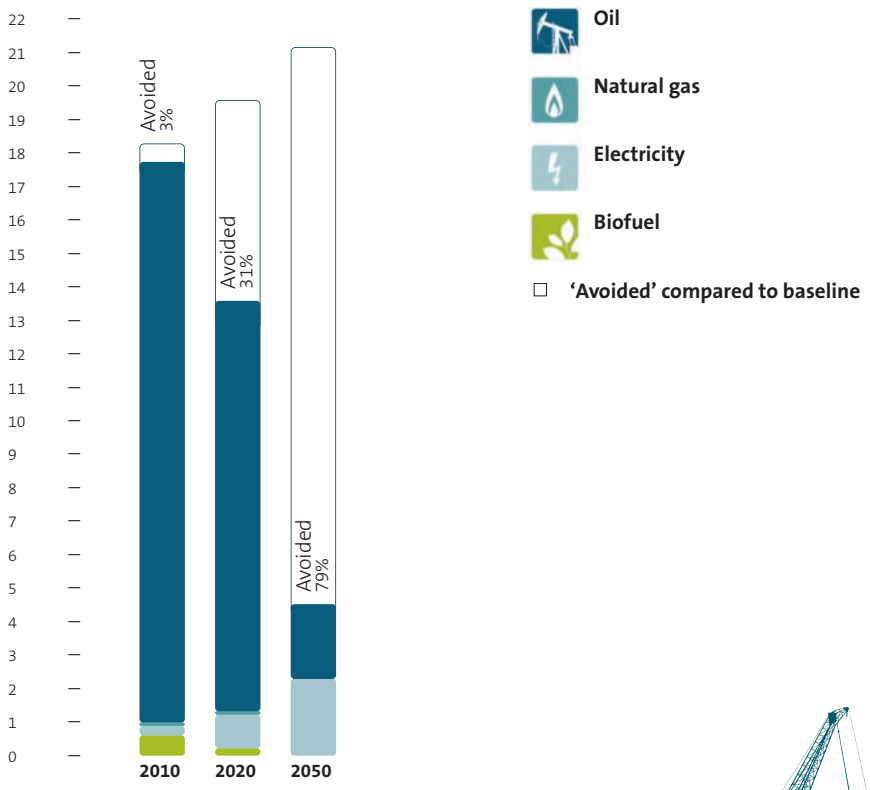
To bring about these dramatic shifts in passenger transport the mitigation scenario includes the following:

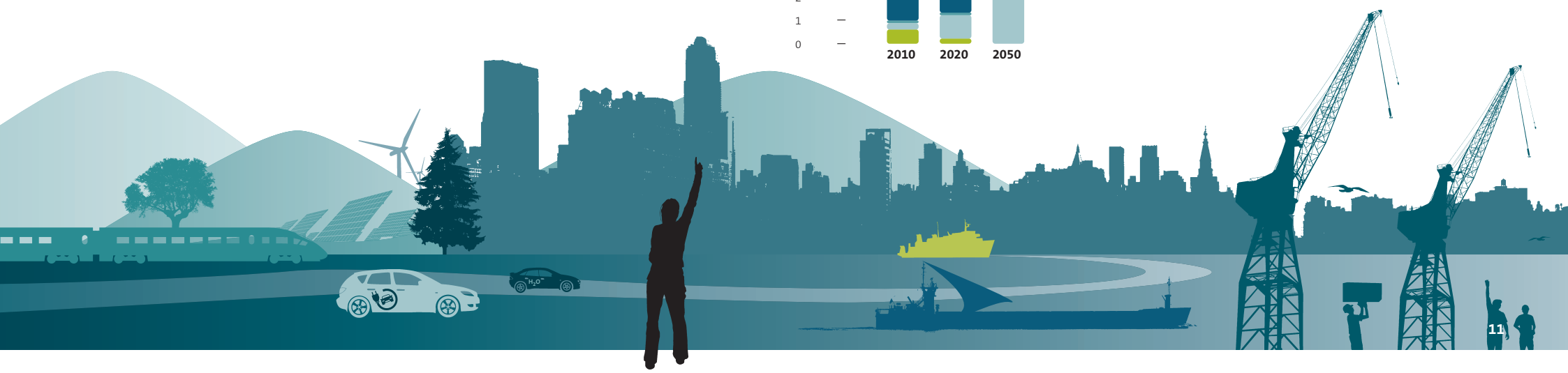
- a large expansion of the rail network (more than double the current infrastructure by 2050). Furthermore, by 2050, 80% of intra-EU flights under 1000 km switch to rail. Fast, safe, comfortable and convenient trains in the future make rail travel preferable to cars or aeroplanes for most journeys
- if manufacturers are required to phase-out larger engine vehicles, implement rapid hybridisation and electrification of vehicles, and consumers retire older cars at a moderately accelerated rate, the stock of vehicles in 2020 could be approximately 21% hybrids, 2% electric vehicles, and 77% internal combustion engines. By 2050, virtually all cars on the road could be fully electrified
- the energy intensity of traditional cars becomes about 30% less by 2020. This is a significantly more aggressive target than the current EU regulations on CO_2 which foresee only a 19% decrease in energy intensity for new vehicles by 2015 compared to current values
- rail becomes fully electrified by 2030, and by 2050 65% of buses are electrified.

Figure 4: Transport energy demand by fuels in the mitigation scenario

Avoided energy from baseline

Thousand Petajoules





2010 2011 2012 2013 2014 2015

3.4 Energy demand in households

Decreases in energy use in households of 16% in 2020 and 63% by 2050 compared to 2010 are achievable according to the study. This is an annual rate of reduction of 2.5% per year. These savings can be made through opportunities including building shell efficiency and increased lighting and appliance efficiency.

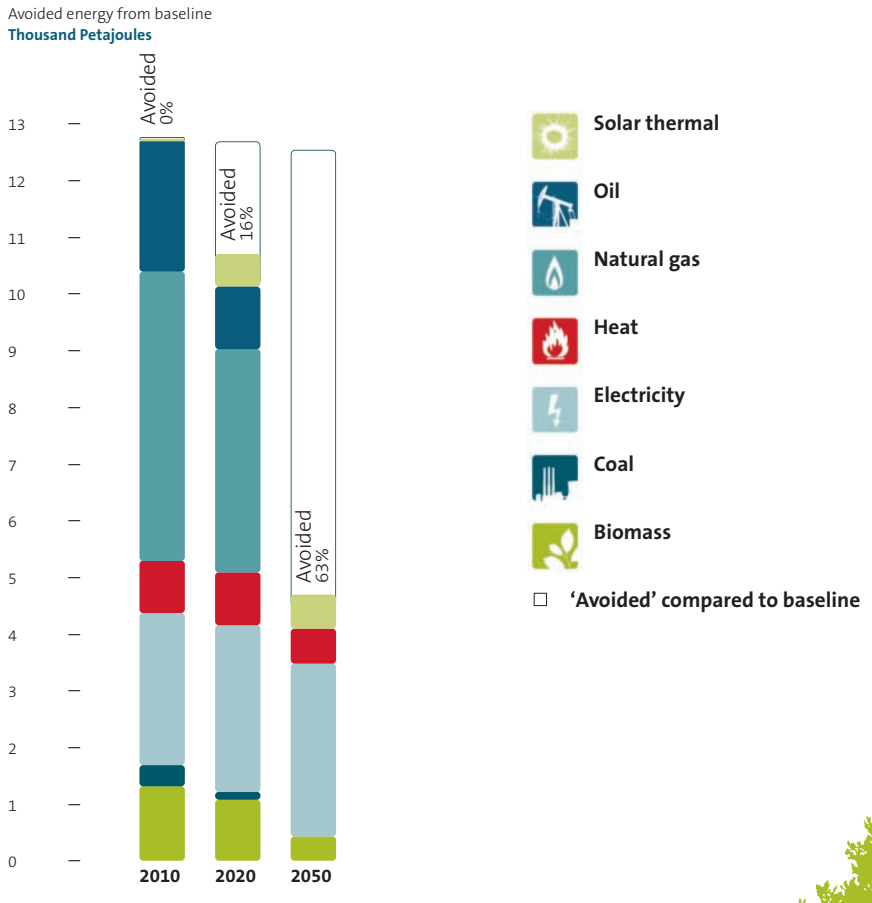
The mitigation scenario assumes an aggressive effort to decrease energy consumption for heating and achieve close to 'passive house' standards in new housing. 90% of existing homes are retrofitted in this scenario – this is at a rate of 5% per year and would take 18 years. It would also mean a dramatic shift away from the direct use of fossil fuels in buildings (currently about 75% of energy use for home heating) in favour of increased use of heat (from combined heat and power), electricity (especially in the form of electric heat pumps) and solar power.

More and more consumer electronics and other appliances foreseen in the future, would be offset by gains in appliance efficiency and result in no net increase in per-household electricity consumption for electronics.

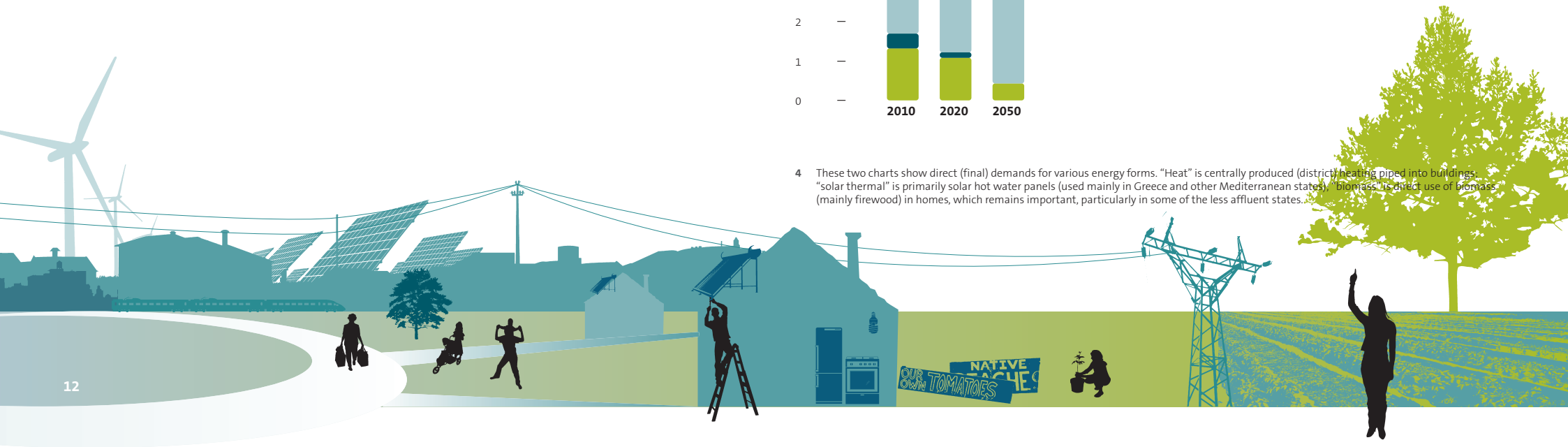
More equality in households around Europe can also be witnessed in the mitigation scenario. After a trend for bigger and bigger homes, average home sizes gradually return to 2005 levels by 2050 – which would be 87m^2, about the level currently observed in Finland.

The graph shows the energy consumption avoided versus the baseline scenario – in other words the overall efficiency gains possible in the household sector by 2020 and 2050.

Figure 5: Household energy demand by fuel in the mitigation scenario[4]



4 These two charts show direct (final) demands for various energy forms. "Heat" is centrally produced (district) heating piped into buildings; "solar thermal" is primarily solar hot water panels (used mainly in Greece and other Mediterranean states); "biomass" is direct use of biomass (mainly firewood) in homes, which remains important, particularly in some of the less affluent states.



3.5 Agriculture

Agriculture is responsible for energy and non-energy related emissions. Energy demand for agriculture is less than 2.2% of total final energy demand in the EU and few studies of GHG mitigation address agricultural energy use in any detail. For this reason this sector was not examined in detail in the SEI study.

Most emissions from agriculture are non-energy emissions resulting from fertilizing fields which generates emissions of nitrous oxide (N_2O), and farming livestock which generates emissions of methane.

Strategies to reduce emissions from agriculture therefore focus primarily on fertilizer and livestock practices within Europe. In addition to these technical measures, a less meat-intensive diet in Europe would contribute to reduced GHG emissions and allow people to be healthier. The mitigation scenario assumes that by 2020 the average European has switched to a diet which is approximately 60% less meat-intensive than today. This healthier level of meat consumption would result in reduced direct methane and N_2O emissions from livestock and fewer N_2O emissions from fertilizing crops for animal feed inside and outside Europe.

3.6 Electricity demand per sector

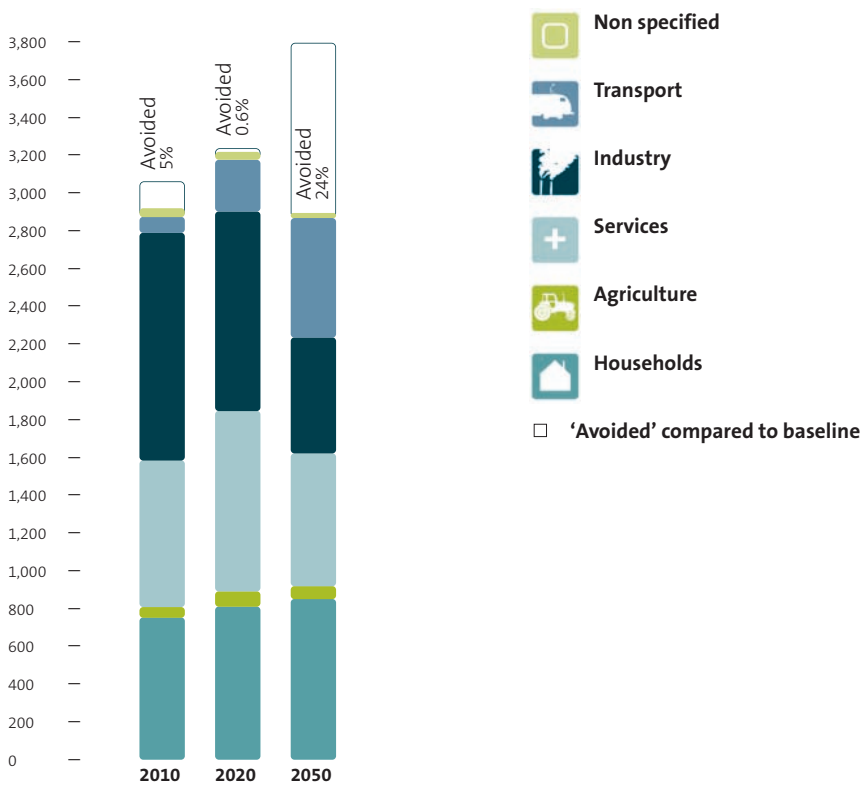
Increases in consumption due to electricity replacing the direct use of fossil fuels in many sectors is balanced by decreases due to efficiency. After 2020 more large gains in efficiency lead to an overall decrease in electricity demand in spite of the rise of electric vehicles and other electric technologies.

In the household sector, the mitigation scenario shows electricity consumption growing by 8% in 2020 and by 14% in 2050 compared to 2010 as increased incomes and increased appliance ownership outweigh better efficiency. In industries, major efficiency gains would enable electricity consumption to decrease by 12% in 2020 and by 49% in 2050 compared to 2010. In transport, electricity consumption soars, increasing by 219% in 2020 and by 606% in 2050 compared to 2010, as electric vehicles and electrified rail travel become the norm. Overall, electricity demand increases by 6% in 2020 and by 24% in 2050 compared to 2010.

Figure 6: Projected electricity demand by sector in the mitigation scenario

Avoided electricity from baseline

Terawatt-hours



2010 2011 2012 2013 2014 2015

3.7 Electric generation

Figure 7 shows the development of electric generation in the mitigation scenario. Coal, gas, oil and nuclear power are quickly phased out with generation from renewable sources rapidly expanding to meet requirements.

In the mitigation scenario the generation mix shifts dramatically as coal and nuclear plants are rapidly decommissioned and large amounts of renewables are introduced. All coal is retired by 2035 and all nuclear power by 2050. Wind (including onshore wind with storage) increases its share of the generating mix from only 3.3% in 2010 to 22% in 2020 and 55% in 2050. Solar increases its share from close to zero in 2010 to 2.5% in 2020 and 15% in 2050. The share of electricity from CHP decreases from 19% in 2010 to 14% in 2020 and 11% in 2050. However, by 2050 CHP is fully biomass based with the amounts required remaining well in the limits of sustainably available biomass.

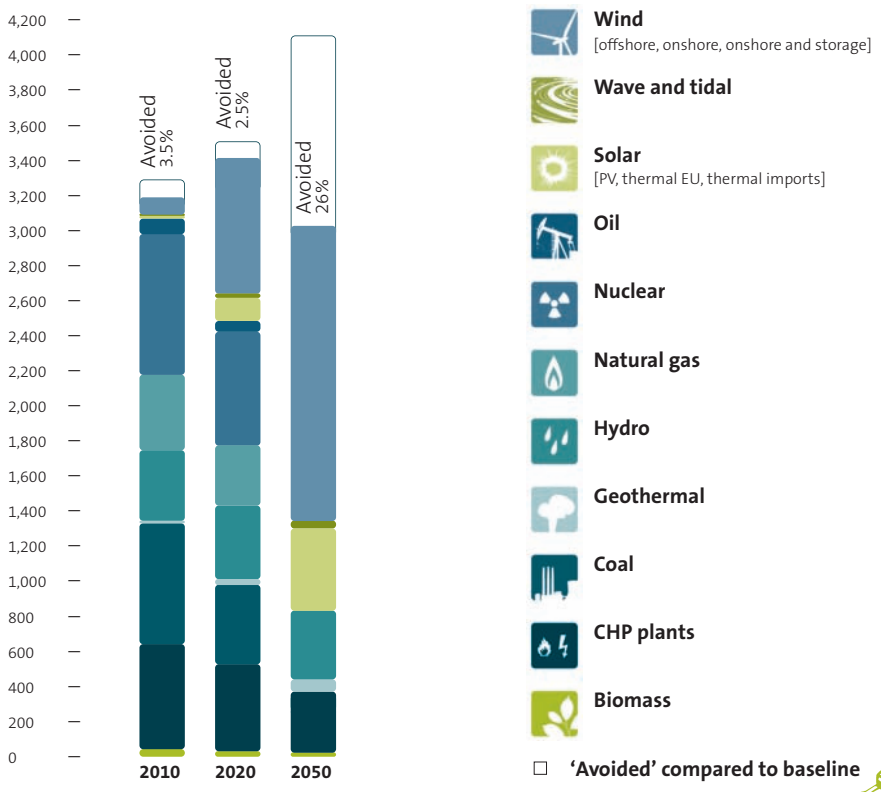
Electric generation in the mitigation scenario is similar to the baseline scenario up to 2030, in spite of huge improvements in energy efficiency on the demand side. This is due to the overall electrification strategy whereby localised combustion of fossil fuels is eliminated wherever possible.

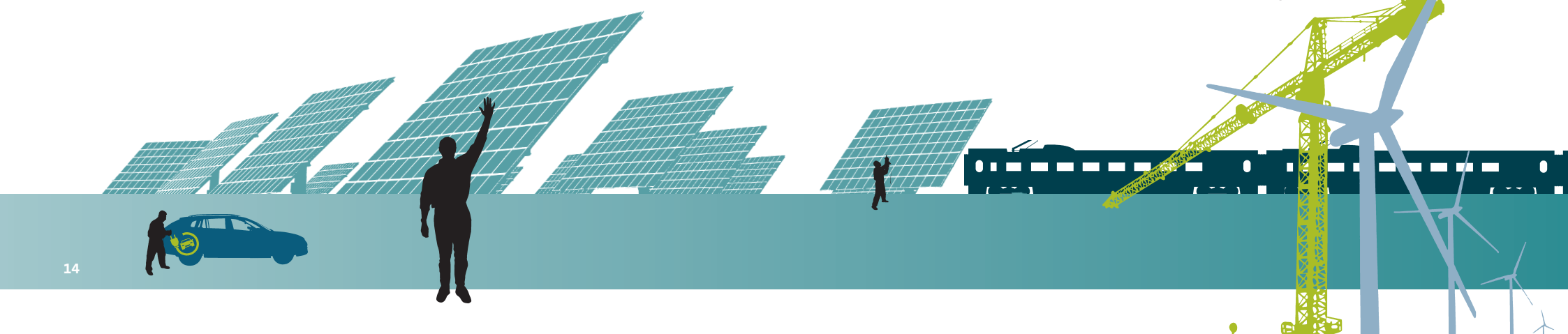
After 2030, efficiency measures become dominant so that overall levels of generation decline slightly.

Figure 7: Electric generation by fuels in the mitigation scenario

Avoided electric generation from baseline

Terawatt-hours





3.8 A more sustainable and equal Europe

Modest reductions in overall GDP growth reflect the assumption that Europe and the wider world start acting upon the need to live sustainably within the overall 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 1.8 times growth seen in the baseline.

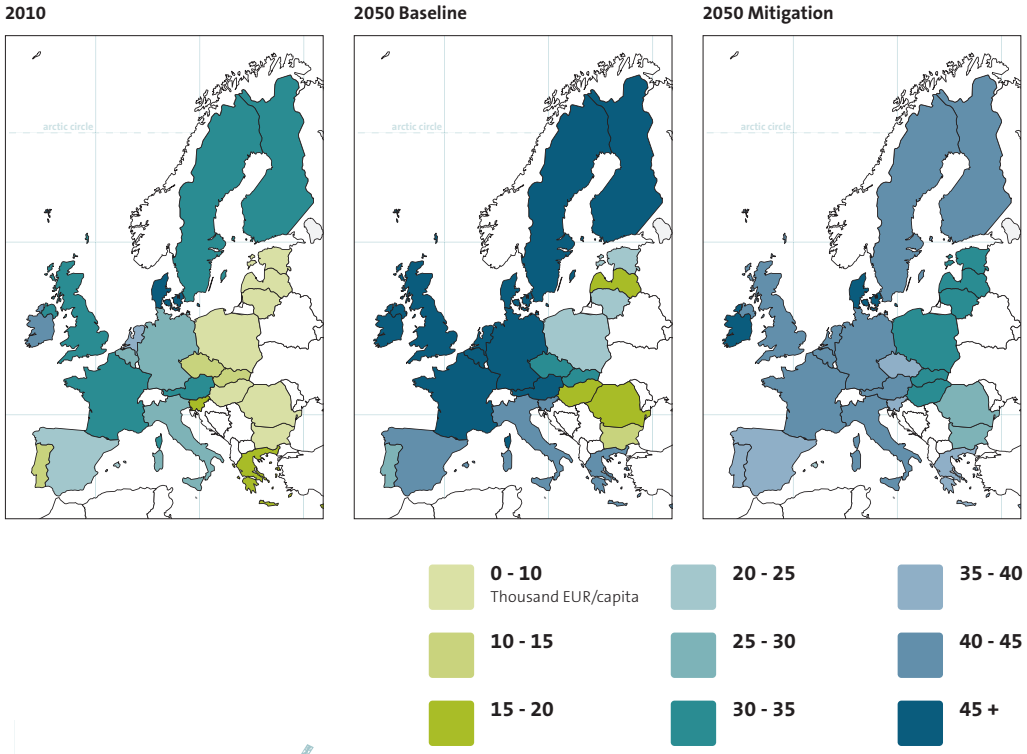
The mitigation vision also addresses the issue of equity. Reducing GHG emissions by 90% by 2050 will require a concerted mobilisation in every EU country. Achieving this in an environment where differences between rich and poor countries are widening even further will be exceedingly challenging. For this reason the mitigation scenario also assumes different patterns of growth from the baseline scenario. It assumes that significant fiscal or other appropriate policies are put in place to help bring about more equal income levels among the countries in Europe.

Figure 8 shows how if current policies continue unchanged the gap between average incomes in Europe widens in absolute terms in spite of faster growth rates in new member states. While incomes grow from 2010 in both scenarios, the baseline map clearly shows how countries have diverged in 2050 in terms of average incomes, while the second mitigation map shows a much more equal Europe. Here the average EU income rises gradually from today’s value of about €24,000 to €40,000 in 2050.

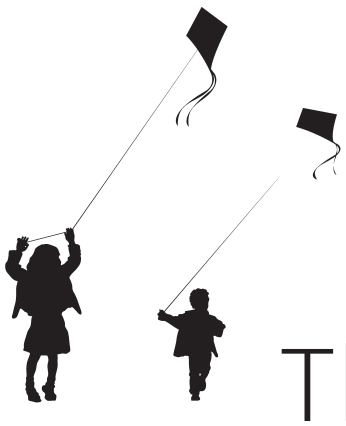
It is worth noting that while the mitigation scenario describes EU-wide reductions in GDP relative to the baseline, this still translates to substantial increases relative to today. Higher GDP cannot by any means be assumed to imply greater human welfare, especially given that income is quite poorly correlated with welfare in wealthy nations.[5] So, while the mitigation scenario might have slightly lower economic consumption than the baseline scenario, it can still be assumed to enjoy higher welfare through positive lifestyle changes such as more leisure (non-working) time, better health, and greater opportunities for satisfying social connnections.[6]

Figure 8: Average incomes across Europe in 2010 and 2050 in the baseline and mitigation scenarios

These maps illustrate the differences in average income levels among countries in the two scenarios.
Thousand EUR/capita



5 Diener and Suh, 2000
6 Layard, 2003, 2005; Kahneman et al, 1999



4. The costs of Europe's fair share

While SEI's study is not intended as a detailed economic assessment of the costs of achieving 40% cuts in Europe's emissions by 2020, it does give an initial partial[7] calculation of the costs of the scenario. Estimating the future costs of technologies and fuels is difficult even over a fairly short time frame as is shown by failures to predict the most recent fluctuations in oil price.

The total Net Present Value (NPV) of the mitigation scenario relative to the baseline scenario comes to €1.94 trillion. This value is about 1.7% of Europe's cumulative discounted GDP between 2010 and 2020 (€111 trillion) in the mitigation scenario. This is a partial and uncertain estimate that is highly sensitive to estimates of costs (particularly fuel costs) – a fuller calculation would more likely yield a result of about 2% of the EU's cumulative discounted GDP.

This is consistent with another SEI report on the economics of 350ppm published recently[8] in which the authors state that, "much more ambitious reductions in emissions required to reach 350ppm CO_2 might have net costs of 1 to 3 percent of world output."

The same SEI report on economics says that, "military spending is greater than 2.5 percent of GDP in 68 countries around the world... It is difficult, therefore, to believe that we are unable to remove this amount from current consumption in order to defend against a remote but dangerous threat to our way of life. On the strength of a different narrative about potential dangers we already do so, year after year."

This value can also be compared to estimates of the costs of not acting to protect the climate. The Stern Review on Climate Change,[9] perhaps the most authoritative source in this regard, estimates that losses to global GDP will amount to at least 5% but perhaps more than 20%. Moreover, delay in implementing significant GHG reductions is likely to increase these costs.

The calculations also suggest that the EU needs to commit to meeting its international financing obligations, which based on the GDR analysis would likely be between €150 billion and €450 billion in 2020 depending on the overall global costs of mitigation.[10] This corresponds to between approximately 1.1% and 3.3% of the EU's projected GDP in 2020 of €13.6tn. Between 2010 and 2020, steadily increasing amounts of financial and technological resources should be provided to support and enable the climate transition in developing countries, reaching the €150bn to €450bn range in 2020. This is an average of less than €3 per person per day. As stated above the costs to reduce emissions within Europe between 2010 and 2020 are also considerable. But here again, once broken down to a daily expenditure the overall mitigation costs in the EU are no more than around €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. These amounts are insignificant compared to the economic, environmental and human losses if action is not taken.

It is worthwhile noting that the SEI mitigation scenario does not take into account economic benefits of early action. Increasing job creation, health benefits and avoided costs from energy savings and energy efficiency are all part of this. Recent reports such as the Employ RES study conducted on behalf of the European Commission, say that the implementation of the EU's renewables target will create about 410,000 additional jobs. Similarly, a Greenpeace and European Renewable Energy Council report says that investment in renewables and energy efficiency would create seven times more green jobs over the next ten years than would be lost in the coal and nuclear sectors in Europe.

7 The estimate is partial in that it only includes estimates of measures for some demand sectors. It includes estimates for households, services and transport and avoided fuel costs but it does not include the industrial, agriculture and non-energy sectors. On the supply side it includes estimates of capital and operating maintenance costs for electric generation and for transmission and distribution but does not include costs or benefits in the CHP and refining sectors.
8 The Economics of 350: the Benefits and Costs of Climate Stabilization (Ackerman et al., 2009)
9 The Stern Review on the Economics of Climate Change, (Stern, 2006)
10 This has been calculated in terms of two plausible average cost levels for emission reductions in 2020, €50/tCO_2eq and €150/tCO_2e.

5. Policy recommendations

Mobilising Europe to achieve climate justice

Europe can cut its domestic emissions by 40% by the year 2020, and 90% by 2050 compared to 1990 levels. In addition, by paying its fair share of the international mitigation obligation, it will live up to its historical responsibility for causing climate change. Justice can be done. Dangerous climate change can be averted. But the scale of the political challenge facing the European Union cannot be underestimated – a massive, brave shift in policy, and determination from EU politicians is needed and we need to **ACT NOW.**

Yet current EU climate and energy policies do not give promising signals that such a major shift in policies is to come. They are rather characterised by weak or nonexistent targets, failure to mainstream climate measures into other areas, reliance on hypothetical offsetting of emission reductions instead of cutting emissions at home, and a lack of public financing and technology for poor countries. In short, everything to put us on track to far overshoot 2°C increase in global temperatures.

Introducing incentives to tackle the climate challenge must be a guiding principle in all EU policy making, from housing to transport, and agriculture to energy generation. The EU must design a holistic 'climate protection framework' including all the various – existing and additional – measures needed to deliver the necessary emission cuts. Such a framework can ensure that member states introduce strong national climate legislation regulating greenhouse gas emissions in all parts of the economy at the national level. These laws would ensure that emissions are brought down at home year-by-year with the speed that is needed.

Governments must be obliged to pay their fair share of the costs to support developing countries to tackle climate change and to adapt to its consequences. This will require a greater sense of social justice and a framework to address the issue of equity internationally and within Europe, encompassing disparities both between and within EU countries.

Friends of the Earth Europe's pan-European climate campaign – the Big Ask – is calling for:

- **national climate laws with legally binding targets for annual emission cuts across all sectors**
- **direct penalties for EU member states which do not reduce their emissions year by year**
- **the EU to deliver its fair share of the finances and technology needed by developing countries to tackle climate change.**

Annual targets will make it easier to measure progress towards medium and long-term emission reductions 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.

National compliance mechanisms are needed to place appropriate sanctions on government departments, regions and sectors that fail to meet their targets. An EU-wide compliance mechanism is needed to penalise countries that fail to meet national targets.

The following are some examples of broad climate and energy policy recommendations as well as some specific policies and measures for individual sectors which would need to be coherently integrated in the overarching framework. These measures should be decided at EU level to ensure legally binding implementation at national level. This overview is not intended to be comprehensive, but gives some examples of the type of policy changes needed.

5. Policy recommendations

Mobilising Europe to achieve climate justice

Overarching climate and energy recommendations

- a domestic greenhouse gas emission reduction target of at least 40% by 2020 with emissions declining at more than 5% annually from 2012 onwards
- an ambitious binding target for renewable energy in line with the 40% target
- an ambitious overall target for energy savings across all sectors in line with the 40% target
- the binding phase out of nuclear, coal and oil fired power generation as soon as possible
- international financing obligations of between €150 billion and €450 billion per year in 2020
- current EU structural and cohesion funds allocations, and the post 2013 EU budget and cohesion policy, to earmark significant amount of funding for climate mitigation and adaptation measures, and mainstream these through conditionalities and green public procurement
- an overall GHG or carbon tax to create a stable environment for investment in energy savings and renewable energy
- regulations to reduce consumption and subsidies to promote the reuse and recycling of materials
- support for public awareness activities on the need for changes in consumption and lifestyle.

Transport

- an ambitious binding sub-target for energy savings and GHG emissions in transport in line with the 40% target
- a fossil fuel and kerosene tax and redirection of direct and indirect subsidies to expand and improve public transport and invest in electrification
- phase-out of EU public financing for the construction of new road and aviation infrastructure and significant increases in financial support for rail and mobility management systems
- reduced energy intensity of car fleets by 30% by 2020 compared to current levels and progressive phase out of combustion cars through aggressive vehicle performance and technology standards
- progressive electrification of vehicles by 2050 and rail by 2030
- an infrastructure plan ensuring that rail network is more than doubled by 2050
- regulations ensuring that all electric vehicles and rail run on renewable electricity.

Buildings

- an ambitious binding sub-target for energy savings and GHG emissions in buildings in line with the 40% target
- EU funds to be made available immediately for energy saving measures in every household or at least secure upfront capital
- an overarching framework to streamline different sets of legislation on energy performance in buildings and energy efficiency of appliances
- improvement of the Energy Performance in Buildings Directive to ensure ‘passive house’ standards for all new buildings by 2015 and retrofits for nearly all buildings at a rate of 5% per year.

Agriculture

- an ambitious binding sub target for energy savings and GHG emission reductions from agriculture in line with the 40% target, in particular to set ever-tightening standards on emissions from fertilizers and livestock, and to reduce emissions caused by the production of animal feeds outside Europe
- reform of the EU’s Common Agriculture Policy to develop a new food and farming policy for Europe that shifts political and financial support away from climate unfriendly intensive agriculture towards sustainable farming, based on agro-ecology and the support of biodiversity.

Industry

- an ambitious binding sub-target for energy savings in industry in line with the 40% target
- EU ETS cap in line with the 40% target with 100% auctioning of allowances and the auctioning revenues used 100% for climate finance
- EU ETS to exclude offsetting (CDM projects) and free allowances
- no expansion of the EU ETS to other Annex I carbon markets or Southern countries
- incentives to shift towards less fossil intensive techniques and research and development in alternative processes for energy intensive sectors such as cement, steel and chemicals.

6. Conclusions

Mobilising Europe to achieve climate justice

“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.”

Stockholm Environment Institute

The challenge to achieve at least 40% domestic cuts and to adequately finance mitigation in developing countries must not be underestimated. Indeed a major mobilisation is needed to achieve the societal shift described by the SEI scenario and called for by Friends of the Earth’s Big Ask campaign. But economic costs and technical feasibility can no longer be an excuse for politicians to stand still. The message of the SEI research is clear – emissions reductions of at least 40% below 1990 levels within Europe by 2020 can be achieved. And the pathway to these cuts can be one which does not include international carbon offsetting schemes, phases out nuclear power facilities, and does not resort to carbon capture and storage (CCS) for fossil-based electricity generation or agrofuels for transportation. But political will needs to be recalibrated to the scale of the challenge and to the action science and moral responsibility says Europe must take.

The change needed will not happen spontaneously. It will require brave political leadership and a major mobilisation of effort of a perhaps unprecedented level. And this mobilisation needs to start immediately so that global emissions can start to decline in the coming decade.

Europe and the developed world is still very far from doing what is needed although the technological opportunities are waiting to be exploited and the economic costs are eminently bearable. It appears to be only the lack of political will that prevents Europe from rising to the challenge of achieving climate justice.

Friends of the Earth Europe campaigns for sustainable and just societies and for the protection of the environment, unites more than 30 national organisations with thousands of local groups and is part of the world's largest grassroots environmental network, Friends of the Earth International.

www.foeeurope.org

Friends of the Earth's climate campaign, the Big Ask, brings together 18 countries across Europe all with the same big ask; that their governments commit to reduce carbon emissions, year on year. Every year. The 'big ask' is that European Union member countries make legally binding commitments to make year-on-year cuts in emissions equal to a 40% reduction of EU-wide domestic emissions by 2020. The campaign also calls on European countries to provide their fair share of the finances needed for developing countries to tackle climate change and to adapt to its consequences.

www.thebigask.eu

The 40% Study

Mobilising Europe to achieve climate justice