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January 2020

Sustainable reading
from the Oeko-Institut

The 2020 emissions gap

What are the next targets?

More energy efficiency! Interview with Christian Noll

Leading the way on climate action

Jan Peter Schemmel
CEO, Oeko-Institut
j.schemmel@oeko.de

Climate change is a headline topic at last – in the media, in politics, in public debate. More and more people are aware that now is the time for bold and urgent action. This awareness is partly the result of the tireless protests by the Fridays for Future movement, but the impacts of global warming, including here in Germany, are also becoming more difficult to ignore.

What might this action look like? It's a question which has sparked a great deal of debate. How high should carbon pricing go? What can be done to increase the refurbishment rate in the building sector? Which transport sector measures are most effective? How can nitrogen emissions from agriculture be reduced? There is considerable controversy over many of these issues – and rightly so, for in my view, the arguments demonstrate that climate action is relevant to all areas of life and to the whole of society. They show that this is, and must be, about modernisation on an ambitious scale.

So I have joined the Oeko-Institut as its new CEO at an exciting time. Before I took up this new role in October 2019, climate issues were a big part of my working life for many years at the Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. When travelling abroad, I often observed how important it is for other countries to see Germany leading the way on tackling climate change. Many local partners are inspired and motivated to see a major industrial nation taking on the challenge of building a sustainable energy future, managing resources more efficiently and thus promoting innovation and economic growth, yet not losing sight of social justice.

However, our position at the top of the climate action leaderboard that we held for so long is slipping – and other countries are starting to notice. Germany is about to miss its 2020 climate targets – and our credibility is at stake. If we are to continue to inspire and motivate other countries, Germany must step up and resume its lead role in protecting the climate. It must take bold action to reduce its greenhouse gas emissions and be sure of reaching its 2030 climate targets, at least. With that aim in mind, we must genuinely and constructively engage in the current debate by focusing on the strategies that are most effective and by working together to find solutions that everyone can then support and implement – no matter how contradictory our starting positions might seem to be. The Oeko-Institut can make vital contributions here: with our studies and analyses, we are showing that effective strategies enable us to make good progress on protecting the climate.

In that spirit, I am delighted to be have this opportunity to support global climate action at the German and European levels to a greater extent in future, and I look forward to many insightful and inspiring conversations and discussions with you about viable and appropriate strategies and policy measures.

Yours,
Jan Peter Schemmel

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Öko-Institut e.V.
Institut für angewandte Ökologie
Institute for Applied Ecology

January 2020 (date of publication of German edition: December 2019) – ISSN 1863-2025
Published by: Öko-Institut e.V.
Edited by: Mandy Schossig (mas), Christiane Weihe (cw)
Responsible editor: Michael Sailer
Translated by: Christopher Hay
Design/Layout: Tobias Binnig, www.gestalter.de – Technical implementation: Markus Werz
Address of editorial office: Schicklerstr. 5-7, 10179 Berlin, Germany
Phone: +49 (0) 30/4050 85-0, Fax: +49 (0) 30/4050 85-388, redaktion@oeko.de, www.oeko.de

Account Details for Donations:
GLS Bank, Bank Code No.: 430 609 67, Account No.: 792 200 990 0,
IBAN: DE50 4306 0967 7922 0099 00, BIC: GENODEM1GLS
Donations are tax-deductible for German income tax purposes.

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"The major potential of energy efficiency is not being tapped nearly enough"

Energy efficiency has the potential to make a major contribution to achieving Germany's climate targets: that makes sense, because energy not consumed generates no GHGs. Germany therefore aims to reduce primary energy consumption by 50% by 2050 compared to 2008 levels; the 2020 target for both Germany and the EU is a 20% reduction. However, this is another missed goal for Germany. So how are we performing on energy efficiency, and why is Germany not making fast enough progress on reducing energy demand? Christian Noll, a co-founder of the German Business Initiative for Energy Efficiency (DENEFF) and now its Managing Director, has some answers.

Mr Noll, from your perspective, how high is the potential of energy efficiency to support the climate targets?

Extremely high. It plays a key role – a point emphasised, incidentally, by the International Energy Agency (IEA) in its World Energy Outlook in late 2018. According to the IEA, energy efficiency could save more than one-third – 37%, to be precise – of energy-related GHG emissions.

How would you describe Germany's energy efficiency performance to date?
Mediocre. Despite some progress, its major potential is not being tapped nearly enough. We still have a long way to go to reach the 2020 target of using 20% less energy overall compared with the 2008 level. The estimates indicate that we are likely to achieve 10-11%. And the situation is unlikely to improve with the measures described in the Climate Action Programme for the pathway to 2030.

Why are we performing so badly?
The problem is that energy efficiency is still not taken seriously. Unlike the renewables expansion and greenhouse gas emissions reductions, energy-saving targets are non-binding. And of course, let's not forget that energy efficiency is a highly complex issue that cuts across all sectors, from transport and buildings to industry. That's why a cross-sectoral strategy is needed. This was announced in the coalition agreement, but did not feature in the climate package. Effective policy measures also need to be delivered more vigorously.

Which measures in particular?
It depends on the mix. Carbon pricing might be a good starting point. A rise in fossil fuel prices creates an incentive to reduce consumption of these fuels. However, 10 euros per tonne, which has been proposed as a starting price, is unlikely to produce the desired effect. Other market barriers will also have to be removed. In the building sector, for example, the public authorities should lead by example and apply ambitious energy efficiency standards to new buildings. We are also expecting tax benefits for building renovation to have positive effects; a new scheme is due to start soon and could be used to motivate owner-occupiers, in particular, to modernise their properties. In industry, faster write-down could help. And there is still plenty of scope in energy services. Sadly, both these aspects are missing from the climate package.

Could you explain in more detail?
A market stimulus is needed for energy services; in other words, for professional energy efficiency counselling or, indeed, contracting, which would involve an external provider developing and implementing efficiency measures. The right frameworks must be put in place. At present, local heat solutions, for example, face major legal obstacles as soon as a road cuts through a residential area.

Is there any good news on energy efficiency?
Certainly. One example is the KfW support scheme, which is improving the standard of renovations and new builds. And the standards for electrical appliances under the EU's Ecodesign Directive are some of the most effective climate policy measures overall. On balance, though, we are not where we could and should be.

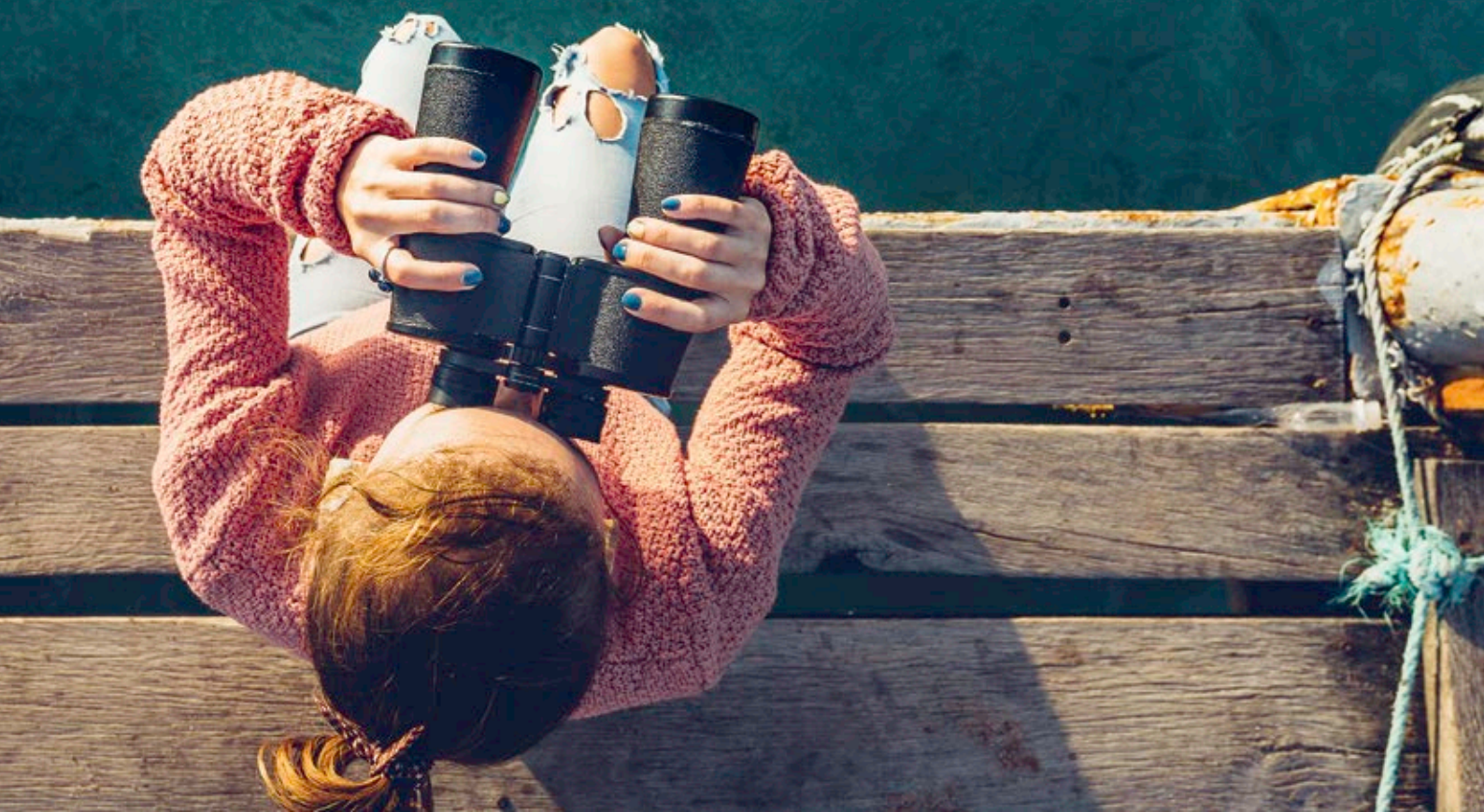
Thank you for talking to eco@work.
The interviewer was Christiane Weihe.

Talking to eco@work: Christian Noll, co-founder and Managing Director of the German Business Initiative for Energy Efficiency (DENEFF).
christian.noll@deneff.org

The 2020 emissions gap

Germany will miss its climate targets

2020 is a milestone year for climate action. By then, significant emissions reductions should have been achieved: Germany's target, for example, is to cut its greenhouse gas emissions by 40% compared with the 1990 baseline. However, Germany is about to miss its climate goals – not by a narrow margin, but by as much as up to 7%. Even the Climate Action Programme 2020, adopted in 2014, cannot close the emissions gap. But what has caused this gap, and which policy measures are needed to ensure that Germany achieves future targets? The Oeko-Institut is working on various projects to find answers to these questions.



"How wide will the emissions gap actually be? We probably won't be able to answer that question until spring 2021," says Dr Ralph O. Harthan, a Senior Researcher in the Oeko-Institut's Energy and Climate Division. "Various factors could still come into play so that emissions decrease more sharply than expected." One of these factors is the cost of emitting one tonne of carbon dioxide (CO_2) under the EU's Emissions Trading System (EU ETS). "The price varies considerably: in mid-July 2018, for example, it was holding steady at around 16 euros, but by July 2019, it had climbed to 29 euros," he explains. "If carbon prices are high, electricity generation from lignite becomes more expensive. If the price of natural gas falls at the same time, this has an impact on the energy mix and therefore on greenhouse gas emissions as well." But the emissions gap is also weather-dependent. "If we have a warm winter, we move a little closer to our climate targets. However, in my view, the difference is unlikely to amount to more than 1-2%. A particularly cold winter could have the opposite effect. And then there's the development of the economy – that has an impact on emissions as well."

For more than 20 years, the Oeko-Institut has regularly produced projection reports for the German Environment Agency (UBA) which assess the impacts of climate measures to 2020 and beyond, including whether they will be enough to achieve the target Germany has set itself, namely to cut emissions by 40% compared with 1990 levels. For the 2019 projection report, the researchers working on the "Policy Scenarios IX" project compiled the figures in collaboration with the Fraunhofer Institute for Systems and Innovation Research (ISI), the Institute for Resource Efficiency and Energy Strategies (IREES) and the Thünen Institute. "The With Measures Scenario (WM), which projects the impact of all the existing and adopted policies and measures, shows a 33.2% reduction by 2020 compared with 1990 levels, with GHG reductions of 41.7% and 44.3% predicted for 2030 and 2035, respectively," says Dr Harthan. However, this does not take into account land use, land-use change and forestry (LULUCF) or international air transport and shipping. Currently, at the end of 2019, the 40% target seems to be more achievable again. This is due to recent developments such as the drop in power sector emissions as a consequence of very low gas prices; the high price of carbon allowances; and good wind conditions. However, the situation could change very quickly: less wind and a cold winter could send emissions soaring again.

A RANGE OF FACTORS AND POLICY RESPONSES

There are many reasons why Germany is likely to miss its climate targets, according to the Oeko-Institut's expert, and they cut across all sectors. "Take transport: emissions from this sector are actually expected to rise by 2020 compared with the 1990 baseline," he says. "The building sector is another area of concern: not enough action has been taken here for years." *(For detailed insights into the factors behind the lack of climate action in various sectors, see "Climate targets for 2030 – on the right track?" on p. 6.)*

It was clear some years ago that with its existing package of measures, Germany would miss its climate targets. This prompted the German Government, in December 2014, to adopt the Climate Action Programme 2020, which lists some 110 policy measures across all sectors and areas for action: from the power sector to industry and private households, transport and agriculture. These measures are intended to produce further emissions reductions of 62-78 million tonnes of CO_2 equivalent (CO_2e) compared with the 1990 baseline.

Since 2016, the Oeko-Institut has regularly reviewed the effectiveness of the Climate Action Programme, most recently in the 2018 stocktaking report (Quantifizierungsbericht) produced in collaboration with the Fraunhofer ISI on behalf of the German Environment Ministry. "Each policy measure is briefly described and assessed in the report, along with an update on progress," Dr Harthan explains. The policy measures reviewed include the introduction of competitive tendering for energy efficiency, an incentive scheme for the purchase of electric vehicles, a heating optimisation programme, development of combined heat and power generation, further roll-out of LEDs, development of the HGV toll, and use of waste heat in industry. "The contributions that the various policy measures can make to the climate targets differ considerably, of course. For example, the mitigation potential of a programme to improve the efficiency of heating systems amounts to 0.12-0.22 million tonnes of CO_2e. Developing combined heat and power generation can save 3-4 million tonnes of CO_2e, while efficiency networks for companies, with clear targets, can achieve reductions of 2.73-3.89 million tonnes of CO_2e."

Even so, the Action Programme will fail in its bid to close the emissions gap. At best, the Oeko-Institut's expert predicts a reduction between 41.6 and 53.6 million tonnes of CO_2e. To ensure that policy measures have a greater impact in future, it would be sensible, in his view, not only to subject them to continuous review but to tighten them up if they fail to achieve the desired emissions reductions. "And of course, it is important not only to look at the measures themselves but also to consider ambient conditions, such as the economic trajectory, any rise in transport demand, and fuel price levels," says Dr Harthan. "By taking into account these general conditions, along with successes and failures to date, lessons can and should be learned for future climate policy measures, either in individual sectors or across industries, and this should happen on an ongoing basis." In his view, this would be a significant step towards effective climate change mitigation – along with bold and urgent action. "We need to recognise that the time for watching and waiting is past." After all, the next milestone year – 2030 – is fast approaching.

Christiane Weihe

Climate targets for 2030 – on the right track?

Power plants – the high potentials

What are the climate targets for 2030?
The target for the power sector is to reduce emissions to 175 million tonnes of CO_2e by 2030. The target for industry is a reduction to 140 million tonnes of CO_2e. This means a reduction of up to 62% for the power sector and up to 51% for industry. The major share of energy sector emissions come from power plants; the figures for industry include industrial power plant emissions as well.

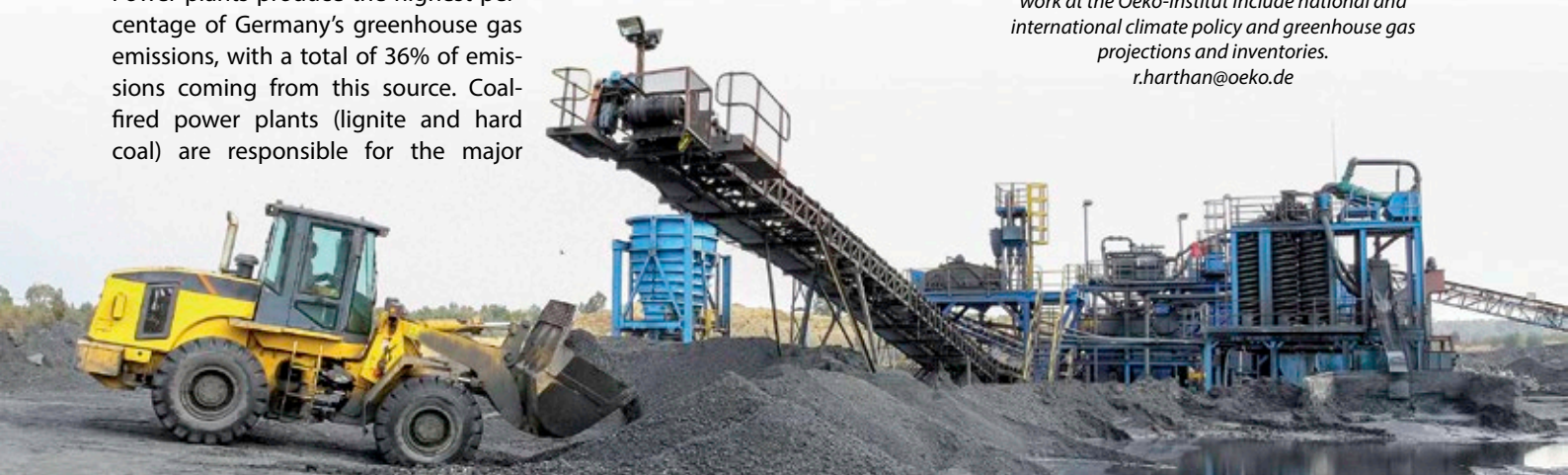
How is this to be achieved?
Coal and renewable energies are the two main starting points. For example, Germany's Coal Commission recommends reducing coal-fired power generation capacity to a maximum of 9 gigawatts (GW) from lignite and 8 GW from hard coal by 2030. Renewable energies are to meet 65% of Germany's electricity demand by 2030. The carbon price under the European Union's Emissions Trading System also affects electricity production by pushing up costs for high-emission – particularly coal-fired – power plants.

How is the power sector performing at present?
Power plants produce the highest percentage of Germany's greenhouse gas emissions, with a total of 36% of emissions coming from this source. Coal-fired power plants (lignite and hard coal) are responsible for the major share – 70% – of these energy sector emissions. Renewable energies covered 38% of electricity consumption in 2018. However, the renewables expansion has stalled, largely due to a lack of acceptance among some population groups, inadequate provision of land for wind energy generation, and bureaucratic obstacles. A distance rule requiring turbines to be sited at least 1,000 metres away from residential areas, as proposed by the Federal Ministry for Economic Affairs and Energy, would make matters worse.

Which practical measures are needed now?
A study entitled Assessment of the environmental, social and economic impacts of the sector targets for 2030 of the Federal Government's Climate Action Plan 2050 shows how the power sector can reach its 2030 climate targets. The study, conducted by the Oeko-Institut and five project partners on behalf of the German Environment Ministry, maps out pathways for achieving the targets in relevant fields of action. For the power sector, the study emphasises the need for a substantial reduction in electricity generation from coal and for faster expansion of renewables, mainly wind and solar. Development of infrastructure, such as electricity grids and storage capacities, is also important, as is more flexible operation of combined heat and power (CHP) systems.

In a study for Agora Energiewende, entitled Introducing emissions trading systems for non-ETS sectors, the Oeko-Institut points out with regard to carbon pricing that integrating further sectors such as transport or buildings into emissions trading would be a lengthy and complex process. The project team therefore advocates adding a carbon levy to the energy tax: this is a quicker and easier option, so the climate benefits will start sooner. *cw*

Dr Ralph O. Harthan graduated in energy and process engineering and in industrial pollution control. He obtained his doctorate at the University of Leipzig (Faculty of Economics and Management Science) in 2015. His areas of work at the Oeko-Institut include national and international climate policy and greenhouse gas projections and inventories.
r.harthan@oeko.de



Germany has set itself clear targets for progressing towards climate neutrality. However, since it is likely to miss its milestone goal for 2020, the focus has now shifted to 2030. This is clear from the Climate Protection Act, adopted in October 2019, and the Climate Action Programme 2030. Germany's goal for 2030 is to cut greenhouse gas emissions by at least 55 per cent of the 1990 level. This means that emissions have to fall to 562 million tonnes of CO_2 equivalent – the maximum permissible level – compared with 1,248 million tonnes CO_2e in 1990.

In order to reach this target, major contributions will be required from the energy sector, industry, transport, the building sector and agriculture. But when it comes to climate action, how well are they performing at present, and what action is needed so that they achieve their 2030 sector targets? The Oeko-Institut is working on a range of projects that aim to answer these questions.

Buildings – the immovables

What are the climate targets for 2030?
By 2030, the building sector is to reduce its emissions by 66-67% to 70-72 million tonnes of CO_2e compared with the 1990 level.

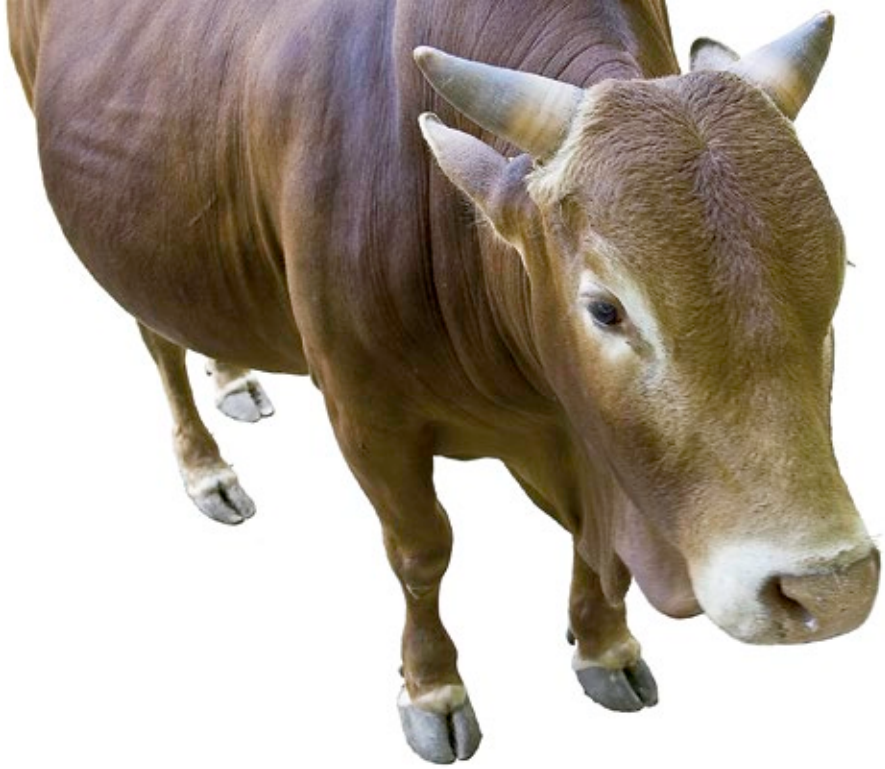
How is this to be achieved?
Key starting points for climate change mitigation in the building sector are, currently, the expansion of support programmes, and carbon pricing. For example, funding programmes to support the renovation of buildings and promote the use of renewable heating systems will be overhauled and additional resources made available; the German Government is also introducing tax relief for renovations. In addition, there are plans to put a price on carbon emissions from heating systems to increase the costs of using fossil fuels, such as heating oil and natural gas.

How is the building sector performing at present?
Overall, the building sector is responsible for around 25% of Germany's carbon emissions. Numerous properties have already been modernised, but there is too little emphasis on comprehensive renovation of roofs and exterior walls, for example. A major challenge is meeting the remaining energy demand for heating and hot water from renewable sources – at present, there is a lack of strategic planning of the future supply here.

What practical measures are needed now?
The Oeko-Institut's study for the German Environment Agency (UBA), entitled Climate-neutral building stock 2050, shows that comprehensive building renovation and increased use of renewable energy are needed for effective climate action in the building sector. In the study, which was produced in collaboration with the Fraunhofer Institute for Solar Energy Systems (ISE), the project team also emphasises that appropriate policy measures are needed if climate change mitigation efforts in the building sector are to have an impact. From the Oeko-Institut's perspective, it is not enough simply to make funding available for renovation of buildings. Efforts must also be made to ensure that this funding is accessed and deployed for the proper purposes. Ambitious emissions standards for buildings are required, along with mandatory replacement of outdated heating systems. Funding should be limited to renovation schemes that support the long-term goal of a climate-neutral building stock. In addition, carbon must be priced at a level which provides effective incentives for homeowners to carry out renovations.

Furthermore, in its policy paper The role of skilled craft workers in energy transition in the building sector, the Oeko-Institut points out that increasing the refurbishment rate in the building sector is contingent on enough skilled labour being available to carry out the work. As a rough estimate, at least 100,000 additional skilled craft workers are required in the relevant trades, along with programmes to support the entry of the newly skilled into these occupations. As this shows, bold climate action in the building sector also creates jobs. *cw*

Physicist and energy management expert Dr Veit Bürger is Deputy Head of the Oeko-Institut's Energy and Climate Division (Freiburg), where his research focuses on various aspects of climate change mitigation in the building sector. For example, in addition to developing and assessing policy instruments for the sustainable transformation of the building sector, he works on support mechanisms for increasing the use of renewable energies in heat generation.
v.buerger@oeko.de



Agriculture – the special one

What are the climate targets for 2030?
By 2030, agriculture is to reduce its emissions by 31-34% to 58-61 million tonnes of CO_2e compared with the 1990 level.

How is this to be achieved?
A key focus of efforts to boost climate action in agriculture is to reduce methane and nitrous oxide emissions. Carbon dioxide, by contrast, accounts for only a small percentage of emissions from agriculture. Emissions reductions can be achieved by improving the use of fertilisers, so that less excess nitrogen is released to the environment. This means reducing mineral (nitrogen) fertiliser inputs and using natural fertilisers instead, such as slurry and manure, both of which are agricultural by-products. The use of slurry as an energy feedstock and more organic farming also have an important role to play. A problematic issue, however, is reducing digestive emissions from livestock, mainly cattle; although this is the subject of research, a technical solution is not yet within reach.

How is agriculture performing at present?
Climate change mitigation in agriculture works differently than in other sectors as achieving zero emissions is impossible here. The mitigation target is therefore less ambitious. In 2017, emissions from agriculture, including energy-related emissions, stood at 73.1 million tonnes of CO_2e – down from 89.8 million tonnes in 1990. The significant reductions in GHG emissions since 1990 can be attributed mainly to the shrinkage of livestock herds after German reunification. Fermentation of liquid manure has resulted in further reductions. However, little progress has been made on reducing the release of excess nitrogen, which poses a problem not only for the climate but also for water, air and biodiversity.

What action is needed now?
Reducing nitrogen emissions is a key step towards more effective climate change mitigation. From the Oeko-Institut's perspective, however, this requires stringent monitoring of, and mandatory evidence-based reporting by, agricultural enterprises. In order to cut emissions from livestock, everyone should make a contribution by eating less meat and dairy products, leading to a reduction in herd sizes. Information and pricing are key policy instruments here. In addition, policy-makers must ensure that herd sizes are properly regulated; otherwise, meat and dairy surpluses will simply be exported.

In the study Quantifying measures proposed by German civil society on the potential for GHG reductions in agriculture to 2030 on behalf of Climate Alliance Germany, the Oeko-Institut calculates the potential contributions that the various measures can make to climate change mitigation. For example, cutting meat consumption by 48% would yield a total saving of 7.3 million tonnes of CO_2e, provided that herd sizes are reduced accordingly. Cutting excess nitrogen to 50 kg per hectare through the use of farm slurry in place of mineral fertilisers and developing organic agriculture would save 5.4 million tonnes of CO_2e. Increasing the fermentation of liquid manure in existing biogas plants would cut emissions by 0.9 million tonnes of CO_2e. *cw*

Kirsten Wiegmann works on climate change mitigation in agriculture and land use. A geoecologist and energy management specialist in the Oeko-Institut's Energy and Climate Division, she develops strategies to support the transition to sustainability. As a Senior Researcher, she was involved in producing the Integrated Climate Protection Plan Hesse 2025 and in updating the State of Baden-Württemberg's Integrated Concept for Energy and Climate Protection.
k.wiegmann@oeko.de

Transport – the troublesome one

What are the climate targets for 2030?
By 2030, the transport sector is to reduce its emissions by 40-42% to 98-95 million tonnes of CO_2e compared with the 1990 level.

How is this to be achieved?
According to the German Government's Climate Action Plan 2050, alternative propulsion systems – primarily electromobility – and public transport have a key role to play, along with cycling, walking and rail.

How is the transport sector performing at present?
Thus far, transport has made a zero contribution to climate change mitigation: its 2018 emissions were equivalent to the 1990 level. In both years, the transport sector produced 163 million tonnes of CO_2e. It is also responsible for noise and air pollution, as well as large numbers of road accidents and fatalities. Its continually high emission levels have multiple causes, including the ever-increasing number of vehicles and a rise in the volume of road freight, along with a heavy reliance on fossil fuels.

What action is needed now?
According to the study Climate change mitigation in transport – action to achieve the sector's target, produced by the Oeko-Institut and the International Council on Clean Transportation (ICCT) for Agora Verkehrswende, the 2030 climate targets for the transport sector are achievable. However, this will require numerous and, in some cases, radical measures. The European emission performance standards for new passenger cars, light commercial vehicles and HGVs have a crucial role to play. Also important, according to the study, are measures that support modal shifts, such as development of public transport and rail freight infrastructures, along with efforts to improve quality of life in urban areas. Simply promoting green alternatives – the strategic pillar of most current transport policies – is not enough to reach the targets. Significant modal shifts can only be achieved through a mix of support and regulation, so additional national measures for the internalisation of external costs are also important. That means carbon pricing of fuels, vehicles and their usage. This would create leverage for targeted promotion of low-carbon modes of transport, such as e-mobility.

For a genuine transition to sustainable transport, an adequate supply of renewables-generated electricity must be available to power the expansion of e-mobility. The study also underlines the importance of prompt planning and implementation of policy measures for more climate change mitigation in the transport sector, as infrastructural expansion, modernisation of vehicle fleets and changes to the law have relatively long lead-in times.

cw

Dr Wiebke Zimmer is the Deputy Head of the Oeko-Institut's Resources and Transport Division, specialising in a wide range of sustainable mobility issues. She has a degree in chemical engineering and a PhD in physics. Her areas of expertise include developing strategies on CO_2 emissions reductions in the transport sector and providing consultancy services to policy-makers and businesses. She is also involved as an independent expert in Working Group 1 of the National Platform Future of Mobility (NPM).
w.zimmer@oeko.de