eco@work

December 2025

Sustainable reading
from the Oeko-Institut

The future, renewable

Proper regulation Interview with Maria Deutinger

Don’t decelerate – integrate!

Anke Herold
CEO, Oeko-Institut
a.herold@oeko.de

Despite the global renewable energy boom, numerous concerns can suddenly be heard again in Germany: these energies, it is claimed, are too volatile, unreliable, all too costly and anyhow too complex. In defiance of all the sceptics, however, renewable energies now produce the major share of our electricity. They are climate-smart, cost-effective and competitive – and therefore future-proof. And there is plenty more that they can do, but only if decision-makers set the right frameworks and don’t slow the rapid pace of their development – and if they channel reliable, long-term investment into expanding capacity and key infrastructure such as grids and storage solutions.

In September 2025, Germany’s Federal Ministry for Economic Affairs and Energy released a monitoring report on the energy transition and a 10-point plan that could result in some of the vast potential of renewables being left untapped. They assume that electricity demand will be lower than previously predicted and are planning cuts in financial support for solar and offshore wind. In my view, this is the wrong approach. Electricity demand will surge if the German government is to reach its climate targets – for that will require electrification of our cars and heating systems.

Instead of squandering the potential of renewable energies and scaling back production, every effort should be made to integrate them efficiently into the power grid. And that means investing in storage solutions. It also means tackling the expansion of smart grids consistently at last, and installing smart meters in homes and businesses across the board. In combination with dynamic electricity tariffs, they can make an important contribution to balancing electricity supply and demand by rewarding consumers for “grid-supportive behaviour” – which means running the washing machine or charging the electric car when electricity is in plentiful supply.

There is a willingness on the part of consumers, but far too little has been done to exploit it. My friends in Helsinki have been profiting for years from bidirectional charging of their electric cars: power from their e-vehicle batteries is fed back into the public grid when electricity is in short supply, and owners are paid for this service. The Finnish government removed the barriers to this long ago. A similar scheme now exists in France as well. And increasing numbers of e-vehicles are equipped for this. If bidirectional charging were available to German households as well, renewable energies could be integrated far more easily and on an even larger scale into our electricity system – for as I said, they can do much more than we thought, if only we let them.

Yours,
Anke Herold

CONTENTS

Öko-Institut e.V.

Further information on our topics can be found online at www.oeko.de/en/ecowork-magazine

eco@work – December 2025 – ISSN 1863-2025
Published by: Öko-Institut e.V.
Edited by: Mandy Schossig, Christiane Weihe
Responsible editor: Anke Herold
Translated by: Christopher Hay
Design/Layout: Hans Loebermann – Technical implementation: Markus Werz
Address of editorial office: Borkumstrasse 2, 13189 Berlin, Germany
Phone: +49 (0) 30/4050 850, 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 taxdeductible for German income tax purposes.

Picture Credits:
Title: Lubitz + Dorner @ plainpicture.com ; p. 4+8: EyeEm @ freepik.com ; p. 7: huyvinhnhon @ freepik.com; other © private or © Öko-Institut

"The major obstacle does not lie in procedural law"

The law steers the way – including for renewable energies. The legal provisions – from the revised EU Renewable Energy Directive to planning and approval law at federal and regional-state level – are among the factors determining the pace of their expansion. We spoke with Maria Deutinger about the legal framework for the renewables expansion, and about barriers and opportunities for its acceleration. An expert in approval law at Stiftung Umweltenergierecht (Foundation for Environmental Energy Law), she also talks about the often overlooked acceleration potential afforded by substantive law.

Maria Deutinger, which legal provisions have done most to advance renewables?
The legal frameworks are diverse and complex. There are regulations at all levels – from the EU to the municipalities. A key instrument is the European Renewable Energy Directive, or RED for short. It was revised extensively in 2023 in order to further accelerate the expansion. RED III now sets a target of at least 42.5 per cent renewable energy in final energy consumption by 2030 while aiming for 45 per cent.

What was the role of the Council Regulation on an emergency intervention to address high energy prices, which expired at the end of June 2025?
A very important one. It was a response to the Ukraine war and was intended to greatly accelerate the deployment of renewable energies, with a focus on security of supply. For that, there were numerous instruments that did much to streamline permit-granting processes, such as exemptions from assessment requirements and the modification of species protection assessments. For example, it was no longer possible to refuse permission for a wind power plant on species conservation grounds. This is partly because it could be argued that renewables expansion plays a crucial role in fighting climate change and therefore also, in the long term, in protecting the environment. This has made a major contribution to the acceleration of renewables deployment, especially in Germany.

RED III is intended to embed these simplifications for the long term, with a seamless transition planned. However, the transposition of RED III into national law has not yet been fully completed by most of the member states, which is why infringement proceedings have now been launched against 26 of them.

Why has RED III not yet been transposed into national law in Germany?
We were firmly on track, but after the early exit of the previous government – the traffic-light coalition – the discontinuity principle came into play. This means that all legislative proposals that had not yet been passed by the Bundestag had to be restarted. We are now seeing some movement here. The rules on onshore wind power actually came into force in August 2025 – with provisions almost identical to those developed by the previous government.

Will the delays in transposing RED III put the brakes on renewables?
From my perspective, this will play a less significant role than initially feared. The simplifications under the emergency regulation apply to all plants for which applications were submitted by the end of June 2025. As many people were aware of this regulatory gap, everyone who was able to submitted an application prior to this. And the transposition of RED III came around, or rather will come around, more quickly than expected. The major obstacle lies elsewhere, in my view.

Where exactly?
There are numerous regulations that can impede the construction of renewable energy plants, such as the legislation on species conservation, aviation or heritage protection. There is considerable potential for acceleration here, because many of the requirements of these laws are formulated in very vague terms. Take aviation, for example: the legal position is that there must be no risks to safety. But it does not provide a more precise definition of when this risk threshold is exceeded. This lack of legal clarity makes it difficult for the authorities and applicants to apply the law. Uncertainties can mean that potentially more stringent standards are applied in order to ensure that decisions are legally secure. This makes procedures unnecessarily complex and slows them down.

What could be done to prevent this?
The legislator must clarify exactly what the authorities are required to check. Work is already under way here. For example, in species conservation law, there is already a regulation on the risk of death and injury among breeding bird species at risk of collision around wind energy plants, which has done much to advance the process of standardisation. But this only applies to a very small segment of species conservation law. There is much more work to do here – as well as a great deal of potential.

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

Talking to eco@work:
Maria Deutinger, a lawyer at the Foundation for Environmental Energy Law.
deutinger@stiftung-umweltenergierecht.de

More than half

A renewable electricity system

They are now in the majority – at least, if we look at the electricity system. In 2024, renewable energies covered almost 60 per cent of our electricity demand. There has been rapid growth in the last 10 years: in 2014, their share was only around 26 per cent. So where do they go from here? The aim is for renewables to meet 80 per cent of Germany's electricity demand by 2030. Is this feasible and realistic? And, not least: what must a power system in which renewables play the lead role look like?

The future is electric. Housing, driving, the economy – in a climate-neutral energy system, very little will work without electricity from renewable sources. "If heat pumps and electric cars become the norm, electricity demand will increase considerably. In industry, too, the plan is for more and more processes to switch to electricity. This means that we will need more and more renewable energies to replace fossil fuels such as coal and oil," says David Ritter, a Senior Researcher at the Oeko-Institut. "Power generation from wind and solar will lead the way, as they are currently the most cost-effective options."

FLEXIBILITY OFFERS SECURITY

But if there are no longer any coal-fired power plants that can be ramped up or down as required and renewables – which are less easy to control – take over instead, what will this mean for our electricity system? "On the face of it, it may seem a bit risky to rely on solar and wind. After all, when it's overcast and there's no wind, they can't supply us with power. The only flexibility that they offer is that their output can be reduced," says David Ritter, who is based in the Oeko-Institut's Energy and Climate Division. "So we need to ensure flexibility in other ways so that the balance between generation and consumption is maintained at all times. And if we look at the options here, it no longer seems so risky." Batteries, for one, are a key entry point. "They already work very well and are now available at affordable prices," says David Ritter. "Currently, however, the incentives and therefore their performance are focused too much on individual optimisation and not enough on electricity system needs."

Smart management of electricity consumption is also important. "This includes postponing electricity usage – for example, by charging e-vehicles overnight when overall demand for electricity and therefore the price are lower than in the evening." In order to set this in motion, variable electricity tariffs are needed, says David Ritter, with prices varying over the course of the day. "All suppliers should now have these in their portfolio. However, there is still a major lack of transparency around precisely how this works, and this creates a lot of uncertainty for consumers." To support the transition to a power system with even higher renewables shares, gas-fired power plants will also be required, he says, in order to balance out consumption peaks. In the long term, these plants can then run on hydrogen from renewable sources. "However, hydrogen should only be used if other power generation technology options have been exhausted, due to the very high costs and major energy losses associated with its production."

A NEW DESIGN

Another important step, from David Ritter's perspective, is to rethink the existing design of the electricity market and establish new frameworks so that supply and demand are aligned as

efficiently as possible and investment in production and flexibility options is guaranteed. "Renewable energies have become the most affordable power generation technology. The task now is to ensure a reliable and stable power supply, which means establishing controllable capacities such as storage facilities and load management, with active steering of energy consumption." And another important point: renewable energies should manage without government subsidies for the most part and be financed mainly via the electricity market. "A key issue here is whether the merit order will still work in a renewable electricity system." The merit order is the pricing mechanism in the German electricity market. It determines the order in which power plants feed their electricity into the grid – the supplier with the lowest marginal costs is added first, with other power plants following until electricity demand is met. The price is then determined according to the last power plant to be brought online and hence by the most expensive form of generation.

The Oeko-Institut's study on "Future-proof electricity market design for Germany" shows that the existing market design and the merit order concept also work for renewable energies, but the design can be improved. "A key point is how flexibilities can be incentivised to support the system. For example, flexibility options in households are currently used solely to optimise their own consumption – which mainly means photovoltaic battery systems, charging stations for electric vehicles and heat pumps. But that is too short-sighted," says David Ritter. The flexibilities should be aligned with the needs of the electricity market and power grids, he says: "This can work with dynamic electricity tariffs so that when there is a plentiful supply of renewables-generated electricity, low prices are passed on to final consumers. It can also work with time-variable grid charges that are based on network load."

The project team also discussed options for ensuring adequate funding for renewable energies in future. "Contracts for Difference – abbreviated to CfDs – could be a key mechanism here. They guarantee a fixed price for generated electricity. If the generator receives less than this fixed price in the market, the consumer pays the difference; if the generator receives more, the surplus goes to the consumer."

DISTRIBUTING COSTS FAIRLY

In a project for the German Environment Agency (UBA), which will run until 2026, the Oeko-Institut and the Stiftung Umweltenergierecht (Foundation for Environmental Energy Law) are exploring what can be done to accelerate the expansion of renewable energies, particularly photovoltaics and onshore wind. "We are identifying obstacles standing in the way of expansion and proposing suitable measures. One question, for example, is how to boost ground-mounted photovoltaic systems and how the permit-granting framework for these systems and wind energy plants can be further developed. We are also looking at ways to speed up the designation of sites for wind energy."

Within the project framework, a paper entitled "Distribution of the Grid Costs of the Energy Transition" looks at how these costs can be shared more equitably. "The starting point is a decision by the Federal Network Agency to redistribute the additional costs associated with the connection of renewable energies to the electricity grid. There are, currently, regional differences in electricity grid charges. Someone living in an area where a high proportion of renewables is fed into the grid pays higher grid charges. This unfair burdening of electricity consumers by region is not sustainable or compatible with an increasing renewables share. We therefore analysed three options for further developing the grid fee structure." Grid charges for feed-in are one possible starting point. "This reduces the charges but does not address regional inequalities," says David Ritter. He is also critical of transformation-linked grid charges, which ease the burden on regions with a high proportion of renewable energies. "The underlying procedure would likely be too complex." The researchers therefore conclude that uniform national grid charges are required.

BARRIERS TO WIND

On behalf of Elektrizitätswerke Schönau, a municipal electric utility, experts from the Oeko-Institut also looked in detail at the expansion of wind energy in Baden-Württemberg and how it can be accelerated. "In Baden-Württemberg, the photovoltaics share is growing, but wind energy expansion has stalled for the last five years. We investigated the reasons for this and explored ways of overcoming barriers." The project team carried out a data and literature analysis and surveyed wind energy project developers. "We found that the main factors behind the slowdown are lengthy site identification and permit-granting processes, high rents and rising costs." The researchers therefore recommend, first and foremost, reviewing whether designated sites can genuinely be used for wind energy. In some cases, for example, owners do not wish to rent out the sites, or the commercial operation of a wind energy plant there is simply impossible. "These sites must, of course, then be replaced by other sites that are suitable." It is also important, says David Ritter, to overhaul the auction process

for sites in Baden-Württemberg's state-owned forest to simplify procedures for regional and community projects. "The aim is to give projects that have a convincing strategy a chance, not only those that promise the highest rent." Furthermore, from the project team's perspective, there needs to be better cooperation between the relevant authorities and project developers, which also requires better trained staff.

Although renewables are now in the majority, numerous obstacles standing in their way still have to be removed. "But this will pay off because nowhere is decarbonisation as straightforward as it is in the electricity sector." What's important, then, is not only maintaining the current momentum but driving it forward. "Electrification needs to pick up more pace in the demand sectors, namely industry, transport and heating. With the right frameworks in place, renewables are certainly up to the challenge now and in future."

Christiane Weihe

David Ritter was already focusing on renewable energies while studying at the University of Karlsruhe – and still does so today at the Oeko-Institut, which he joined in 2012. In the Energy and Climate Division, he works on expansion strategies and financing options for renewables in the electricity sector. A graduate in Electrical Engineering and Information Technology, he also analyses decentralised flexibility options, among other topics.
d.ritter@oeko.de

Where should they go?

Sites for renewable energies

By 2032, 2 per cent of Germany's land area – amounting to a good 700,000 hectares – must be designated for wind energy. By contrast, it would take just 0.3 per cent of the Federal Republic's land area to meet the requirement for ground-mounted photovoltaics (PV) by 2030. Are enough sites available? Where are they located and how can user conflicts be addressed? And another question: how can renewable energies be distributed fairly across the regions?

It's enough, the researcher says. What she means is that there are enough sites for the expansion of wind and solar energy. Enough to achieve their respective targets. "With ground-mounted photovoltaics, there are a great many sites that are not affected by major user conflicts and are perfect for hosting solar plants – alongside railway tracks or motorways, for example," says Dr Marion Wingenbach, a Senior Researcher in the Oeko-Institut's Energy and Climate Division. But there are also countless opportunities to site photovoltaics on agricultural land. This is revealed in the study on "Potential sites for agriphotovoltaics", conducted by the Oeko-Institut as part of the EmPowerPlan project, which is funded by the German Federal Ministry for Economic Affairs and Energy. In the study, the Oeko-Institut, together with the Institute for Futures Studies and Technology Assessment (IZT) and the Reiner Lemoine Institute, explores how the expansion of renewable energies can be managed in a regionally just, systemically meaningful and socially compatible way. "Agri-PV is a good option for mitigating site usage conflicts with the agricultural sector as it allows shared use. The PV modules are installed above or between the cultivated areas." In the study, the Oeko-Institut quantified the potential for expansion. "For example, we found that there is high potential in vine, fruit and vegetable growing. In fact, systems that are installed at height can protect the crops – from hail, for example – at the same time. In Germany, synergy effects such as these can be observed across a total area of more than 400,000 hectares." What's more, sites with low or intermediate soil quality are particularly suitable for agri-PV. "Here, we're talking about a potential area of almost four million hectares."

NOT CONFLICT-FREE

Siting conflicts can still arise, of course. "On top of that, the sites are not yet being utilised to an optimal extent. As a rule, it is the project developers who offer landowners the opportunity to lease their sites. It would be much better for local authorities to manage site selection, because as things stand, what can happen, of course, is that highly fertile, high-yield land disappears under solar cells." Clear guidelines enabling local authorities to prioritise sites for diverse forms of use – including renewable energies – would therefore make sense. "The guidelines should include criteria for dealing with issues such as user conflicts with agriculture, proximity to a grid connection and also the potential for dual use."

WHAT IS FAIR?

Another key point of relevance to renewables expansion and site availability is fair distribution across Germany's federal states and regions. What might a regionally just, systemically meaningful and socially compatible distribution of renewables in Germany look like? To facilitate debate about this issue, the Oeko-Institut is now providing baseline data with two studies on "Justice in renewables expansion", also produced within the EmPowerPlan framework. Here, the researchers define various aspects of justice and propose a methodology for applying them and addressing diverse perspectives. "Part of this, for example, is that the expansion should be evenly distributed with

regard to the available sites, that the focus is on regions with high electricity demand, and that the burdens on the public are evenly spread," Marion Wingenbach explains. "Of course, there are different views on what fair distribution means. Our approach enables these various perspectives to be captured systematically and channelled into spatial planning. It takes both technical and social issues into account." What's more, using the datasets, "sites of consensus" can be identified where the various conceptions of justice overlap; these should be used first for the expansion. The project team's work also enables low-conflict sites to be identified and planning priorities to be made visible. "In the case of wind energy, for example, system costs and import requirements differ considerably according to which distribution principle is selected – this shows that some forms of justice are systemically more advantageous. With ground-mounted PV, on the other hand, there is barely any difference, and this offers scope to give greater weight to aspects such as local participation or landscape conservation." The datasets are publicly available and can be used for distribution analysis.

HIGH FORESTS, OLD INDUSTRIES

The project "Planning transition through the transdisciplinary integration of regional and socio-cultural factors in the development of local energy transition measures" (PlanTieFEn) explores how energy transition measures can be implemented at the regional level. For the project, the Oeko-Institut is running participatory planning laboratories in three model regions in Baden-Württemberg, North Rhine-Westphalia and Mecklenburg-Western Pomerania. "The aim is to identify different local identities, regional planning cultures and renewable energy potential and, on this basis, to develop and test regionally adapted instruments," says Marion Wingenbach. "We look at how regions would construct renewable energy plants themselves independently of regulatory frameworks, which specific needs they have and how the regions differ from each other."

The study found, for example, that perceptions of new projects are very strongly influenced by previous experiences of transformations and that regional identities in rural areas often centre on landscape features. "Early communication and participation are also important, with consideration of regional identity and genuine engagement with opportunities for co-creation." For example, in the Black Forest Highlands (Hochschwarzwald) – Dr Marion Wingenbach's home region – the natural and cultural landscape, such as forested mountains and open meadows, is highly significant. The Ruhr region, by contrast, is characterised by dense construction and high settlement pressure, as well as an industrial culture that has been shaped by fossil fuels. "Here, the challenge is to integrate this into a renewable future. The regions are highly diverse, and so too are their pathways towards renewable energies." PlanTieFEn is conducted in cooperation with ILS Research gGmbH and the Institute for Climate Protection, Energy and Mobility (IKEM) together with numerous stakeholders from the planning sector and wider society and is funded by the German Federal Ministry for Economic Affairs and Energy.

RENEWABLES AT HOME

Countless sites for renewable energies also exist on our rooftops and balconies. "Solar plays a key role in this context – around two-thirds of Germany's photovoltaic capacity is installed here," says Dr Marion Wingenbach. At the same time, the addition of new capacity is more difficult to steer here, which is why sites for ground-mounted photovoltaics are also required. "But I am optimistic that rooftop and balcony-mounted PV will remain a strong contender, not least because more and more of Germany's regional states are introducing a solar energy requirement for new residential buildings."

Christiane Weihe

How can renewable energies be integrated into the energy system? What is important for acceptance in the context of the transformation of the energy infrastructure? And how do socio-ecological factors influence the expansion of power plants? These are just some of the questions explored by Dr Marion Wingenbach in the Energy and Climate Division, which she joined in 2019.
m.wingenbach@oeko.de