Chapter 21
Climate Law in Germany

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Abstract Despite its impressive quantity current climate protection law is not suited to solve the climate problem – neither on a global level through public international law nor in the EU or Germany. In Germany, not only the absolute emission levels raise concerns. Relative development, too, is much worse than is often assumed. German climate law is characterized by a variety of rules, although a substantial part (more or less) implements EU law. The – internationally often copied – German Renewable Energy Sources Act (EEG) contains a fixed tariff for renewable electricity similar to a subsidy. In addition to that and to a number of energy efficiency rules, there are a number of legal rules that directly flank the regulatory, financial, and informational regulations on efficiency, sufficiency, and renewable energies. It remains true, however, that renewable energies and energy efficiency do not per se reduce greenhouse gas emissions or replace fossil fuels; in fact there may also be shifts in emissions and fuel transfers to other countries and/or increases in overall energy consumption. These rebound and shifting effects are a common major barrier to effective climate policy, including energy efficiency policy. A completely new cap and trade approach on the EU level (combined with border adjustments) might be the best way to solve these problems.

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21.1 Germany – A Leader in Climate Protection?

Anthropogenic climate change is at its heart a consequence of the release of various greenhouse gases mainly from fossil fuels (related to electricity, heat, fuel and material usage) and land use.[1] Therefore, policies which attempt to combat climate change aim at potentially far-reaching changes in those sectors. Scientific and economic research – which on a global level is bundled in the Intergovernmental Panel on Climate Change (IPCC) – develops statements about necessary reduction targets; those are needed to evaluate the political and legal call for action. They state that, in order to avoid resource wars, huge migration flows, an endangered food and water supply, natural disasters, substantial economic damage and millions of deaths, global emissions' reductions of about 80%, and in the industrialised world of up to 95%, are needed by 2050 on the basis of 1990. One reason for this specific reduction statement for industrialised states is that currently, on a global level, per capita emissions are very unequally distributed: The annual per-capita emissions of an average German still add up to 20–30 times the amount of a person in Sub-Saharan Africa and two and a half times the amount of a Chinese.

Despite its impressive proliferation in recent years, climate protection law is currently not suited to solve these problems – neither on a global level through public international law nor in the EU or Germany. Notwithstanding any details, this is evident from the results of previous attempts. Even though Europe and Germany often claim to be a "leader in climate protection", one German still emits several times the greenhouse gas volume of developing country counterparts; this inequality is even larger with respect to those greenhouse gases already accumulated in the atmosphere. This is all the more noteworthy given that residents of developing countries will be disproportionately affected by climate change. A fortiori, future generations are expected to be greatly injured by climate change without having caused it at all. Total global emissions have increased by more than 40% since 1990.

In Germany, concerns arise not only the absolute emission levels. Relative development, too, is much worse than is often assumed. If (a) the industrial collapse of Eastern Europe in 1990, (b) the relocation of production facilities to developing countries, and (c) the financial crisis since 2008 are eliminated from calculations, emissions in Germany since 1990 have not (starting at a high level) fallen but risen. For the financial crisis will hardly result in a lasting drop in production, including permanent greenhouse gas reductions; and relocation of production only shifts greenhouse gas emissions from one country to another, such as from Germany to China or Malaysia. Therefore, Germany is not the imagined leader in climate

[1] On all topics, questions and arguments of this contribution see in more detail Felix Ekardt, Theorie der Nachhaltigkeit: Rechtliche, ethische und politische Zugänge – am Beispiel von Klimawandel, Ressourcenknappheit und Welthandel (Baden-Baden: Nomos, 2011); Felix Ekardt, Bettina Hennig and Herwig Unnerstall (ed.), Erneuerbare Energien: Ambivalenzen, Governance, Rechtsfragen (Marburg: Metropolis, 2012).

protection – debates, normative standards and technical innovations are impressive, but at the end of the day it comes down to the actual emissions budget.

21.2 Fundamentals of German Climate Policy and Nuclear Power Phase-Out

German climate protection law is characterized by a variety of rules, although a substantial part (more or less) implements EU law. However, important parts are independent from EU law, since EU law mainly sets detailed provisions for emissions trading. In all other areas of climate protection, essentially only framework provisions exist on a European Union level.

As at the EU level, energy and climate protection law in Germany is regularly advanced in "packages", e.g. in the federal government's Integrated Energy and Climate Programme of 2007 (IECP).[2] This programme – which is also referred to as the "Meseberg decisions" – was worked out at the federal government's retreat in Meseberg in 2007 and later that year adopted by the Cabinet. Such packages are regularly comprised of a multitude of individual actions concerning existing laws. Another major energy package was adopted in the summer of 2011 after the nuclear catastrophe at Fukushima. Programmatically important is also the quite comprehensive federal government's energy concept which was established in the summer of 2010. It defines the general goal of energy and climate policy to reduce greenhouse gas emissions in the energy sector (i.e. not all greenhouse gases are covered) by 35–40%. In addition, there are sub-goals like the expansion of renewable energies in different subject areas, e.g. in the energy sector to 35% by 2020.

Thus, the various instruments – regulatory law, economic instruments, informational instruments, rules of competition, financial support, etc. – are subject to constant development. There are also bans on technology: It has been widely publicized that, as a result of Fukushima – and after several twists – Germany decided to gradually phase out nuclear power generation. Similarly, so far, carbon capture and storage (CCS), i.e. coal-fired power plants without emissions, has not been legally permitted in Germany. This does not mean, however, that the issue was removed from the political agenda, since the EU's CCS Directive must still be implemented – the respective deadline has already expired. Overall, the debate in Germany is of course often narrowed considerably. It is centred on electricity, compared to heat and fuel. And, with respect to electricity, there is a clear focus on nuclear power, neglecting the removal of fossil fuels.

The strategy of German climate policy is to strengthen renewable energies and energy efficiency. There is no final estimation as to the national and international

[2] For details of all programmes see http://www.bmu.de/klimaschutz/downloads/doc/40514.php (last accessed on 15 February 2012).

long-term need of additional greenhouse-gas-free coal-fired power plants. However, the dominant perception is that radical climate gas reductions like EU-wide minus 95% (excluding effects from production shifts) can be achieved by "purely technical" means. German politics avoid the question whether perhaps sufficiency, i.e. voluntary or forced absolute reduction of resource consumption and climate gas emissions (if necessary by renunciation), rather than only more efficiency – in the sense of more economic use e.g. of energy in relation to a definite result – is necessary. Yet EU emissions trading also includes absolute reduction targets; admittedly weak ones and without a ban on shifting emissions (or the production of goods) to other countries.

21.3 Subsistence for Renewable Energies

The advantages of renewable energies such as (in principle) climate neutrality, creation of new jobs, replacement of finite resources, economic innovation, security of supply independent from unstable regions and resource conflicts, etc. are obvious. This huge potential, however, cannot hide the fact that renewable energy sources often cannot yet compete in the market without some form of assistance. On the one hand, this is due to the partly developing technology, on the other hand, to the fact that conventional fossil fuels such as petroleum, coal, uranium, and natural gas can be offered at supposedly more favourable prices because energy prices do not fully reflect the external costs, such as anthropogenic climate change or the risks of nuclear energy. Accordingly, legal frameworks that support renewable energies are obvious. Currently, those are designed differently in different Member States within a more general European framework. The European framework under the Renewable Energy Directive is known to define only pan-European and national development targets to be achieved in a given period.

The – internationally often copied – German Renewable Energy Sources Act (EEG) contains a fixed tariff for renewable electricity similar to a subsidy.[3] In addition, it contains some incentives for the coupled generation of electricity and heat from renewable energy sources. According to Section 1 paragraph 2 of the EEG, the share of renewable energies in electricity supply shall reach at least 35% by 2020 and then gradually be increased to 80% by the year 2050. Hereto, the EEG provides anyone who generates electricity from renewable energy sources and feeds it into the grid system for general supply with a claim against the respective grid system operator for the connection of her installation to the operator's grid system, the purchase and transmission of this electricity, as a priority, respectively, and the

[3] Gesetz für den Vorrang erneuerbarer Energien (EEG), available at: http://www.erneuerbare-energien.de/files/pdfs/allgemein/application/pdf/eeg_2012_bf.pdf (last accessed on 25 February 2012).

payment of a statutory minimum tariff (EEG Sections 5 paragraph 1, 8 paragraph 1, and 16 paragraph 1). The EEG minimum tariff is significantly higher than current market prices – e.g. on major trading centres such as stock markets or in bilateral supply contracts – and, in accordance with EEG Section 21 paragraph 2, it is guaranteed for a period of 20 years from the time when the EEG-generator first produces electricity. The respective tariff is determined mainly by the energy sources used. In addition, the time of first energy production as well as, partly, the installation's capacity and location, and other criteria are used. The economic burden on grid system operators which results from the payment of EEG-tariffs is ultimately apportioned via the EEG-surcharge mechanism to the majority of electricity consumers in Germany. First, a grid system operator is obliged to accept electricity, which is fed into the operator's grid system. Second, a grid system operator (unless already being an upstream transmission system operator) shall immediately deliver the electricity to an upstream transmission system operator who in turn is bound by EEG Section 8 paragraph 1 with respect to the grid system operator. According to this scheme, all the electricity which is paid for under EEG tariffs ultimately gets to upstream transmission system operators. The latest major reform once again increased the number of EEG rules and led to a partial revision of the support framework for solar radiation, offshore wind energy, biomass, and direct selling. Still, solar energy, particularly, remains an infinite source of (opposing) demands for new reforms – and that, at least in the long run, will come as a detriment of legal certainty and planning security.

The expansion of renewable energy in the electricity sector as such is perhaps the biggest (and only real) success story of recent German climate policy. Nevertheless, further discussion is necessary. A feed-in tariff system is not always perfectly in harmony with emissions trading (which will be introduced infra). While the latter requires a reduction of overall greenhouse gas emissions, e.g. for the EU, the former results in climate protection preferably by switching to renewable electricity (instead of e.g. increased energy efficiency) within the latter's "greenhouse gas cap." Economists, in particular, assume that this renders the expansion of renewable energies via the EEG meaningless and yet unnecessarily expensive. However, closer investigation reveals that this apparent paradox is very limited; for inter alia feed-in regulations also result in innovations, which is why they need be included in any effective climate protection regime.

It remains true, however, that subsistence for renewable energies does not per se reduce greenhouse gas emissions or replace fossil fuels; in fact there may as well be shifts in emissions and fuel transfers to other countries or increases in overall energy consumption. These rebound and shifting effects are a common major barrier to effective climate policy. For instance, the generation of energy from biomass is highly ambivalent. Often, its greenhouse gas balance is no improvement compared to fossil fuels. Such ambivalence of renewable energies cannot be solved with "sustainability criteria" as recently introduced by the EU for bio-energy imports. Such regulations again potentially fail due to rebound and shifting effects, as well as enforcement problems. I will briefly return to this aspect at the end of this paper.

The Renewable Energies Heat Act (EEWärmeG)[4] which came into force on 01/01/2009 aims to support of renewable energies in the heating market in order to (i) reduce greenhouse gas emissions; (ii) optimise the security of supply by decreasing the dependence on foreign supply; (iii) permanently immunise energy prices against oil and gas price shocks; (iv) respond to the steadily declining availability of fossil fuels; and (v) gain economic and innovative benefits by becoming active "on time." Therefore, the EEWärmeG defines the target to increase the share of renewable energies in the production of heat by the year 2020 to 14% (cf. EEWärmeG Section 1 paragraph 2). Regarding only the replacement of fossil fuels it is to be welcomed that hereto renewable heat under EEWärmeG Section 5 must originate either from solar energy (15%), biogas (30%), certain solid or liquid biofuels (50%) or geothermal and environmental heat (50%). From a climate policy perspective, however, it need be criticised that this only applies to new buildings. With respect to old buildings, there is only an incentive programme[5] with investment subsidies. Moreover, the target for new buildings is far too low. Furthermore, there seems to be a massive enforcement problem resulting not least from the number of individual acts that must be controlled.[6]

In the area of fuel, there is also a law setting biofuel quotas which – as with heat and electricity – again is based only on a very general European law foundation.

21.4 Energy Efficiency and Sufficiency

Perhaps energy-efficient building renovations, i.e. measures in the area of heat which save resources and protect the climate by increasing efficiency (and using renewable energy), offer the greatest potential in one single area for climate protection in OECD countries; after all, buildings are responsible for more than a third of Germany's greenhouse gas emissions. At the same time, climate protection through the refurbishment of buildings is economically viable not only because of long-term results from climate change but also because of mid-term energy prices and energy security issues. Old buildings are of special importance. This is due to the large number of old buildings and the likely gradually dropping demand for new housing

[4] Gesetz zur Förderung Erneuerbarer Energien im Wärmebereich (Erneuerbare-Energien-Wärmegesetz), available at http://www.erneuerbare-energien.de/files/pdfs/allgemein/application/pdf/ee_waermeg.pdf (last accessed on 25 February 2012).

[5] Cf. Richtlinien zur Förderung von Maßnahmen zur Nutzung erneuerbarer Energien im Wärmemarkt, 20 February 2009, http://www.bafa.de/bafa/de/energie/erneuerbare_energien/index.html

[6] On many topics of energy efficiency law see also Thomas Schomerus et al., *Rechtliche Konzepte für eine effizientere Energienutzung* (Berlin: Erich Schmidt Verlag, 2008); Martin Winkler, *Klimaschutzrecht* (Münster: LIT Verlag, 2005); Cimin Keyhanian, *Rechtliche Instrumente der Energieeinsparung* (Baden-Baden: Nomos, 2008).

as a result of demographic development in Germany. Furthermore, old buildings require significantly more heat than new ones.

Consequently, since coming into effect on 8 July 2010, the revised EU Energy Performance of Buildings Directive (EPBD) defines (at least in the mid- and longer term) quite relevant energy efficiency standards for new buildings and significant alterations.[7] This includes methods for calculating the efficiency of buildings and a commitment to provide high standards for the refurbishment of old buildings. By the end of 2020, the zero-energy house standard applies to all new buildings. Beyond that, the EPBD is of course primarily informational; Member States shall comprehensively report on the steps taken (and they shall introduce any regulations as well as targets at all), and citizens will receive energy certificates as an orientation for all buildings. In Germany, these European requirements are specified by the Energy Conservation Act and the Energy Saving Ordinance (EnEV),[8] which try to boost energy efficiency in the building sector. In two steps, the EnEV requires a considerable increase in energy efficiency for new buildings as well as for old buildings where there are significant alterations, though only under much lower standards (EnEV Section 9). As with the EEWärmeG, the problem remains that with respect to new buildings existing potential is not fully used and that regulation regarding old buildings is incomplete.

In the EU and in Germany, a variety of energy efficiency regulations for technical equipment exist in addition to those concerning buildings. For some time there has been a German federal regime for some types of equipment and for motor vehicles – the Energy Consumption Labelling Act – as well as the Energy Consumption Labelling Ordinance and the Energy-using Products Act.[9] In addition, there is a Combined Heat and Power Act which attempts to promote the combined generation of heat and electricity through (weak) incentives. Furthermore, following the British example, on 29 September 2000, the German Energy Agency was founded by the Federal Ministry of Economics and the Bank for Reconstruction. Its task at the federal level is to take care of improvements in energy efficiency in households, businesses, and public administrations, as well as of the use of renewable energy sources, and to provide information.

In addition, Germany is part of the EU emissions trading system; its greenhouse gas reduction targets include incentives to the participating industries for greater energy efficiency, but theoretically also for sufficiency. The Emissions Trading Directive is transformed into German law through a German Greenhouse Gas Emissions Trading Act, a Project Mechanisms Act, an Allocation Act, and an Allocation Ordinance. The German Emissions Trading Authority is responsible for

[7] On details see Schomerus et al., supra, note 6, at 127 et seq.

[8] Verordnung über energiesparenden Wärmeschutz und energiesparende Anlagentechnik bei Gebäuden (Energieeinsparverordnung), available at: http://www.enev-online.org/enev_2009_volltext/index.htm (last accessed on 25 February 2012).

[9] For an overview of existing German energy law see Wilfried Erbguth and Sabine Schlacke, *Umweltrecht* (Baden-Baden: Nomos, 3rd edition 2010).

all administrative activities concerning emissions trading. Of course, from 2013, the importance of purely national standards will clearly be reduced for emissions trading due to the then more intense level of European regulation regarding reduction targets, auction duties, etc. However, the reduction targets even for emissions trading are certainly insufficient to achieve existing climate targets. Moreover, they do not avoid the effects of shifting into other countries.

In addition to this EU ETS, there is a German "environmental tax", which – just like emissions trading – aims at providing incentives for efficiency and sufficiency through an additional burden on prices. Hereto, the German electricity and fuel tax under the Electricity Tax Act and the Energy Tax Act[10] surcharges fuel and electricity primarily to consumers; the manufacturing sector, however, is partly exempt through a reduced tax rate (StromStG Section 9a), because it is assumed to be covered in particular by the (rather modest) EU ETS. The German environmental tax, however – paralleling EU ETS frictions – is currently so low that there is only a limited effect on ingrained behaviours (such as picking up rolls at the nearest bakery with your own car). Furthermore, as with the EU ETS, the lack of long-term tax rate increases and a strong reduction for the manufacturing sector show adverse results. Another concern is the favourable treatment of coal and nuclear power over natural gas; only natural gas is levied with an additional tax on fuels under the energy tax act (in addition to the environmental tax). Moreover, with regard to the regional and sectoral approach what has been said about the EU ETS applies analogously.

The tax reduction for the manufacturing industry (StromStG Section 9a) leads to another issue: currently, a variety of regulations in the industrialised countries even subsidise a non-sustainable behaviour. In Germany, this effect results from explicit subsidies, e.g. for German coal mining, as well as tax reductions. In addition to the manufacturing sector e.g. the company car privilege (which encourages individual transport and large cars), the distance flat expense (which supports transportation and production energy consumption as well as land use, cf. Income Tax Act Section 9 paragraph 1 number 4), the tax exemption for aviation gasoline (which favours a (due to altitudes) particularly climate-damaging use of fossil fuels, cf. Energy Tax Act Section 27), etc. Many other benefits can be found for example in the field of conventional agriculture which often proves little sustainable regarding biodiversity, climate, and energy. Moreover, there are indirect subsidies for various activities by not charging their external costs like damages on climate, forests, etc. In November 2008, the Federal Environment Agency calculated 42 billion Euros of environmentally harmful subsidies in Germany every year through direct payments or tax benefits. This was only referring to federal measures; states and municipalities are barely taken into account.

[10] Energiesteuergesetz (EnergieStG), available at: http://www.gesetze-im-internet.de/energiestg/index.html (last accessed on 25 February 2012).

21.5 Planning Law and Energy Law

In addition, there are a number of legal rules that directly flank the regulatory, financial, and informational regulations on efficiency, sufficiency, and renewable energies. Of great importance is the Energy Management Act. It compliments the EU energy law directives, demands a liberalised energy market, and provides, inter alia, priority access for renewable electricity.

In the field of renewable energies, municipalities may also apply planning-specific legal instrumentalities. In addition to the call for further individual and business action, municipalities are a frequent addressee of a "climate change policy from below." In sum, despite many discourses, approaches, and lots of thinking, the results in this area, again, are too small to achieve existing climate targets; at the same time, the issue inevitably hangs in the air whether under a situation of global economic competition a global problem can be approached locally.

From an administrative law perspective, municipalities mainly have opportunities but no obligations regarding climate protection – given the often limited motivation of administration, politics, and citizenship this leads to predictable outcomes. The classical control mechanism available to municipalities for a variety of objectives is land use planning. In addition, the law of street use (StVO Section 45) offers ways to direct individual transport and thus to reduce it: through measures such as parking management, noise control, reduction of road construction or the establishment of traffic-free zones.

Development plans decide on the admissibility of construction projects and the design of buildings. If a municipality wants to ensure a sustainable energy supply in its area, it can require specific energy supply or corresponding construction measures (e.g. the installation of solar panels). This of course leads to the general question whether, e.g. climate protection, can be a permissible objective of land use planning. Since its amendment in 2004,[11] Building Code Section 1 paragraph 5 and 6 explicitly states that land use planning contributes to environmental protection also considering its responsibility for climate protection in general. This visibly manifests the intention of the legislature to promote climate protection more firmly on the local level. In this sense, the legislative materials clarify that this in particular also includes "global" and not only regional or local climate protection. In this regard, however, legal practice stumbles upon Building Code Section 1 paragraph 3 (and Building Code Section 9 paragraph 1) which states that land use planning must have an "urban" reference. Therefore, it is partly assumed that determinations must not be made only on the basis of general energy considerations, to save energy or to protect the global climate, but that they rather require a justification on the basis of urban characteristics and the local situation. However, this is doubtful for two reasons. First, this view is incompatible with Section 1 paragraph 5 sentence 2 of the

[11] Gesetz zur Anpassung des Baugesetzbuches an EU-Richtlinien, 20 July 2004 (BGBl I p. 2424).

2004 Building Code ("general climate protection"). Second, in the end, local climate protection has "never" the potential to specifically prevent a local e.g. flood – because climate change is a global problem. But if that is the case, anyway, and yet "general climate protection" is a target, a local reference cannot be required; for it would be rendered meaningless.

Municipal building planning is particularly important for the provision of land necessary for electricity and heat installations. While, for instance, photovoltaic systems are preferably erected on roofs and thus mostly in town, wind power or biomass installations are primarily site-variable outer space projects because unlike geothermal and hydroelectric power plants they are not linked to geographical or geological land characteristics. Power generation plants using renewable energy sources are therefore often subject to licensing requirements under construction and immission control laws. For example, this has been outlined elsewhere regarding bio-energy, including existing reliefs. The legislature, however, has learned from the negative experience with wind turbines and therefore established in Building Code Section 35 paragraph 3 the planning law option to regionally and nationally direct the spread of Building Code Section 35 paragraph 1 numbers 2–6 projects, thus including biomass facilities. Consequently, the local practice should control the creation of such installation and thus any ambiguities through allocation plans. Determinations in allocation plans favouring renewable energy sources can also be used for inner regions, i.e. the inner city urban areas inside of towns and villages (Building Code Sections 30 and 34).

21.6 Power Lines and Energy Storage

Renewable energy sources for electricity and heat can often be produced locally, but they are not equally available all the time. Against this background, it is undisputed that especially for electricity many new lines must be built and power storage technologies must be improved. However, the details to what extent one or the other should happen are heavily debated.[12]

Basically, under German law there is a system of obligations and incentives for the development of networks. According to Energy Management Act Section 11 paragraph 1, operators of energy supply systems shall "operate a safe, reliable, and efficient energy supply system and, as needed, develop it to the extent it is economically reasonable." This expansion obligation is oriented on the (long-term) demand and is subject to economic reasonableness. For transmission system operators, the

[12] On this topic see Felix Ekardt and Justus Wulff, Energiespeicherung und Energieleitungsbau als Governance- und Rechtsproblem, 115 Jahrbuch des Umwelt- und Technikrechts (2012), forthcoming.

general development obligation is specified in Energy Management Act Section 12 paragraph 3 which states that they shall permanently ensure the ability of the system to meet the demand for transmission of electricity and contribute to the security of supply, in particular through adequate transmission capacity and reliability of the network. In Germany, according to Energy Management Act Sections 11 paragraph 1 and 12 paragraph 2 the cost of expansion is regulated under an incentive regulation ordinance. The concept of regulating incentives with its differentiated ways of apportioning network expansion costs to electricity customers offers a monetary incentive to network operators to take advantage of cost savings and thus reduce inefficiency. However, so far, these long established basic rules could only modestly promote network expansion.

In terms of a broader approach, therefore, the German energy policy 2011 includes another reform. The legislative package of the summer of 2011 includes measures, as the Grid Development Acceleration Act (NABEG) which in essence amends the Energy Act in order to reduce the duration of planning and licensing processes and to ensure greater acceptance of network expansion among the people. Hereto, a future federal technical planning is envisaged, which shall be conducted by the Federal Network Agency in coordination with the states concerned. A result of this planning shall be a federal network plan which will identify the nationwide necessary route corridors and reserve them for the construction of highest voltage transmission lines. However, it remains to be seen whether this will stimulate a rapid network expansion. Regarding the creation of energy storage, so far, there have been only sporadic incentives.

21.7 Climate Change Legislation at the State Level

There has long been a debate in Germany whether, in addition to classical instruments of, e.g. regulation, information, subsistence, land use planning, charges, and market certificates, explicit climate target systems would be useful as a kind of climate protection framework. At the federal level, however, such a concept could not yet gather a majority. Nevertheless, at the state level, such a regulation is currently sought after in North Rhine-Westphalia and Baden-Wuerttemberg.

Generally, state policy is related to climate protection in multiple ways. The lack of a clear result of climate policy on a public international, European and federal law level which would be suited to achieve the given climate objectives raises the question whether regional units such as the states need to give impetus or even fill this existing gap. In any case, state approaches to climate change are valuable experiments for higher regulatory levels. Even if in the foreseeable future an effective global and European climate policy should evolve, e.g. through certificate markets or additional charges, it still remains dependent on certain supplements including measures of state land use planning. Thus, in a federal state like Germany, this results in a strong call for the single states.

21.8 Structural Deficits of German Climate Policy

Why is the overall effect of all the legal climate protection instruments that were introduced above on reducing greenhouse gases so little? In short, the answer is (a) that the instruments' targets are not strict enough, (b) that there are enforcement problems, and (c) that mere "technical solutions" without any behavioural changes are insufficient to achieve absolute emission reductions because of rebound effects and (d) shifting/displacement effects. More specifically: Renewable energy sources are clearly important for an effective climate policy. The same applies to energy efficiency: food, clothing, building heat, consumer electronics; energy lurks in all things. And light bulbs or cars could often be many times more efficient in their production and operation. However, efficiency alone is not enough to permanently satisfy the growing European and global hunger for electricity, heat, and fuel with wind energy, geothermal energy, solar energy, and hydropower. For instance, some metals, from which solar panels are built, will soon be in short supply. Therefore, absolute energy consumption must be limited.

However, this cannot be achieved by simply making any car or any device slightly more efficient, while at the same time cars are getting bigger and more numerous because Germany, Europe, and the world are getting richer. And who wanted to tell the Chinese that they cannot live like us? Neither can energy-efficient homes per se solve our climate and energy problem, if their living space is getting bigger and we use the money saved from heating to acquire flights to remote vacation locations. And even if energy were infinite: building materials for cars and airplanes are clearly not. And nor is energy, at any rate.

Therefore, absolute emissions limits are necessary. Prescriptions and prohibitions which, e.g., require more efficient products or houses cannot achieve this goal: Growing prosperity partly consumes those efficiency gains (rebound effect). Moreover, the vacation example shows that energy consumption and greenhouse gas emissions are often easily shifted to other countries, other resources or other activities in response to regulatory prescriptions and prohibitions (shifting/displacement effect). Regarding climate and energy supply, it is no good to save energy in this country but let cell phones and cars be produced in East Asia. Even fewer cars would not help, if they were replaced by more flights.

Especially the controversial bio-energy leads to shifting and displacement effects. For it conserves fossil fuels but consumes potential food, water, and soil in a starving world. Moreover, land use and especially conventional fertilisers – such as for bio-energy plants – are in themselves a climate problem. Therefore, as mentioned supra, in terms of climate protection large-scale industrial bio-energy is often not better than the use of fossil fuels; especially when large areas of grassland are destroyed, e.g. through the destruction of Amazon rainforest for the production of Western animal feed and bio-energy export crops. Neither can this issue be solved by bans such as the EU's sustainability criteria ("no bio-energy plants in the rain forest"); though the EU might currently try. However, the enforcement of such provisions in the proverbial Amazon region is doubtful. Moreover, new displacement

effects are looming: energy plant crop growers might fulfil these requirements in order to continue selling their bio-energy into the EU – and instead grow animal feed and cosmetics raw materials for the West at the same area which perhaps have been grown out of the rain forest before.

Ultimately, rebound effects and shifting/relocating effects can only be solved by a climate policy that provides for an overall cap on energy and land consumption.[13] But this can only be achieved through a charge on fossil fuels and land use instead of single products' regulations. If we do not want to create new shifting effects, this need be established at the highest possible level. Therefore, a global charge or an entirely new global emissions trading is advisable, as described in my first article in this volume. For the moment, however, this is likely to remain visionary.

But there is a real politically feasible alternative which could make the EU, for the first time, become a real and not primarily rhetorical "climate leader." Hereto, existing EU ETS had to be expanded to a primary energy emissions trading. Unlike previous approaches, this would cover all emissions – at least if land use is also included in the ETS or (if the enforcement were too difficult) it is levied with higher charges. The control of the few existing primary energy companies would be simple and much less bureaucratic than complex detailed rules like bans or regulations on a variety of products. The effects of shifts to other countries could be avoided by allowing all non-European States to participate in the system. In case of States reject the offer, border adjustments for exports and imports are introduced in relation to those countries. This avoids the effects of shifts and creates a pressure to commit to a worldwide charge. At the same time, the ETS could then (unlike now) be linked to slowly and gradually increasing reduction targets. For competitive disadvantages in comparison to other States are meant to be avoided by the border adjustment. Furthermore, for the same reasons, a full auction of emissions certificates could then easily be introduced.

Energy companies and farmers would pass the slowly rising cost of the new primary energy ETS to consumers. Electricity, heat, and fuel from fossil sources would thus gradually become more expensive. Efficiency and renewable energy sources would be more attractive. But there would also be absolute energy savings since the charge on fossil fuels would persistently increase. And rebound and shifting effects would be eliminated, because fossil fuels and land use were covered in all areas of life. A number of other energy and climate protection schemes, such as the regulatory regimes for thermal insulation, could in turn be abolished.

The ETS revenues could compensate the socially weaker in the EU and especially the developing countries for higher energy prices and those climate change

[13] On details of the following ideas see note 1 and Felix Ekardt and Antonia von Hövel, "Distributive Justice, Competitiveness, and Transnational Climate Protection: 'One Human – One Emission Right'", 2 *Carbon & Climate Law Review* (2009), 102; Felix Ekardt and Andrea Schmeichel, "Border Adjustments, WTO Law, and Climate Protection", 6 *Critical Issues in Environmental Taxation* (2009), 737.

damages that have partly already occurred, until the transition to renewable energies is complete. At the same time, the world would realise that the fossil trail of the West cannot be repeated. However, a more effective climate protection law requires an interaction of political and legal standards. On the part of the citizens these factors require a process of learning and ability to learn. Whether this can be started in time, likely remains an open question.