



*German NGO Forum on
Environment and Development*



Climate and Trade

*Why climate change calls for
fundamental reforms in world trade policies*



HEINRICH BÖLL STIFTUNG
The Green Political Foundation

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The German NGO Forum on Environment and Development was founded 1992 after the UN Conference on Environment and Development. It coordinates activities of German NGOs in international policy processes on sustainable development. Legal representative is the German League for Nature and Environment, umbrella organization of German conservation and environmental protection associations (DNR) e.V.

The Heinrich Böll Foundation's main tenets are ecology and sustainability, democracy and human rights, self-determination and justice. The Foundation places particular emphasis on gender democracy, meaning social emancipation and equal rights for women and men. It is also committed to equal rights for cultural and ethnic minorities and to the societal and political participation of immigrants. Finally, it promotes non-violence and proactive peace policies.

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Introduction

“Save the Earth now – [if compliant with WTO rules]” – this was how environmentalists summed up the conflict between trade and environmental concerns with a T-shirt slogan at the World Summit on Sustainable Development in Johannesburg in 2002. For over a decade, following the founding of the World Trade Organisation (WTO) in 1995, free trade rules seemed to hang like a sword of Damocles over environment and development conferences. New regulations for climate protection or poverty alleviation stood little chance in the face of the liberalisation and deregulation agenda. Worse than this, trade rules had a ‘chilling effect’ on other concerns: any proposal of serious intervention into the free play of the market – to save the planet or promote world justice – was nipped in the bud before it could even be discussed.

But the tide has turned. Free trade, the *credo* of the so-called Washington Consensus, has lost its legitimacy even in the eyes of those who championed it for years. In times of economic and financial crisis, anyone still driven by self-interest to advocate liberalisation, deregulation and privatisation – instead of thinking about political restraints for the market – risks no longer being taken seriously.

Moreover, the WTO is going through a fundamental crisis and has lost much of its political significance. But the fall of one thing is the rise of another: in the meantime, international climate negotiations have become one of the most important forums in international politics. The agenda is no longer confined to the prevention of climate change;

negotiators in climate talks are also discussing the regulatory framework of tomorrow’s economy. Production structures and trade flows will change as a result of regulations for international emissions trading; recommendations for the extensive funding of greenhouse gas prevention and adjustment schemes, as well as global technology cooperation, will determine the future face of the economy.

The chilling effect seems passé. Environment ministers need no longer fear their colleagues from the trade and economic departments. Now trade ministers meet on the margins of climate conferences and discuss how they can contribute to mitigating climate change. Instead of the chilling effect, we are seeing the ‘teasing effect’: climate topics have become a starting point for economic and trade policy issues and a means of drawing attention to them. And demands for a Green New Deal, to mitigate both the recession and the looming climate catastrophe, resound from China’s state-run economy to the bastions of liberal economic policy in the USA and Britain. The question is no longer: “What will climate policy cost free trade?”, but rather, from all sides: “How can climate policy and trade policy pursue common goals?”

Up to now, negotiators at climate conferences have avoided trade policy topics like the plague. There were concerns that broaching such issues would mean contesting the authority of other government departments over their policy areas, that it would overload the agenda of climate negotiations, that it might ultimately create more conflicts

than solutions. In fact, doubts were raised as to whether trade policy and climate policy could ever be reconciled. All the talk of synergy effects and 'win-win' can't hide the fact that the two policy areas follow very different logics, reflect conflicting values and involve different sets of actors.

The fundamental objective of world trade policy is to limit failures in state intervention and policy measures. The aim of trade policymakers, in reducing duties and abolishing non-tariff trade barriers, has been to reduce state interventions so that the hampering of market mechanisms is kept to a minimum. Climate policymakers, on the other hand, seek a response to what they see as the greatest market failure in history: human made climate change. They take it as read that climate change cannot be solved by the 'invisible hand' of the market, and that further externalisation will only compound climate damage. Their aim is therefore to change the general framework of the market through interventions and to regulate the behaviour of market actors. More state or more market? This question fundamentally divides trade and climate policymakers.

Not only when it comes to ecology issues, but also in relation to social justice do climate policy and trade policy take entirely different approaches. Trade policy aims for resources to be allocated as efficiently as possible. Resources are understood to be scarce (since their production entails costs) but in principle infinitely available. The optimal distribution of scarce resources is left to the free market. In contrast, climate policy's first principle is that the atmosphere's capacity is finite. And since the atmosphere is a limited 'resource', the distribution of this resource through emission allowances has taken on great importance in climate negotiations. Policymakers have agreed that this can't take place via the market, but instead accord-

ing to the fundamental principles defined by the United Nations Framework Convention on Climate Change (UNFCCC): countries should pursue climate protection "on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities" (Article 3.1, UNFCCC). For the sake of fairness, the UNFCCC rejected the idea of allocating emission allowances in the most efficient way possible.

These fundamentally different approaches and understandings of the problems can lead to tangible policy conflicts. Trade policymakers, for instance, aim to increase world trade, ultimately to stimulate economic growth. Yet, as chapter 1 of this study illustrates using empirical data, globalisation is in fact fuelling global warming. For climate policy this means a limit on emissions-intensive economic activities and the volume of commercial traffic, as long as transport remains fossil fuel-based. Climate policy needs to put an end to ecologically unsound trade flows and encourage the specialisation of energy-intensive production in places where it can take place in the most climate-friendly way. These changes would result in a form of – at least partial – deglobalisation.

Obviously, this will mean sensitive interventions in the trade policy domain. In view of the conflicting values and aims outlined earlier, the question of how this could take shape politically remains an open one. Can trade policy really become a driver for climate protection? Given the many conflicts of interest, the economically powerful lobby groups and the dependence of entire countries on their exports, this may seem impossible. Negotiators will therefore need to be vigilant about the possible obstacles and conflicts. But at the same time it is vital to work out where there are areas of compatibility and mutual support. Only by paying keener atten-

tion to conflict and consensus can we create the right conditions for a joint debate.

However climate and trade policy may relate to each other in the future, there is no getting around the closing argument of this study: global warming can only be kept under the dangerous threshold of 2 °C if trade flows and world trade policy regulations are fundamentally reformed. Climate policy will need to deal with world trade issues – if not within the next international climate contract, supposedly agreed upon in Copenhagen in December 2009, then soon afterwards. This study is intended as a contribution to that process.

Chapter 1 will discuss the connection between world trade and greenhouse gas emissions. Nearly a quarter of all CO₂ emissions worldwide arise from the production of internationally traded goods. Carbon leakage is occurring through international trade, insidiously but on a large scale, as industrial countries displace greenhouse gas emissions to emerging economies and developing countries. So long as reduction goals do not apply for all developing countries, the result is an increase in total global emissions. This can only be successfully controlled if export-related emissions are made transparent through systematic reporting and taken into account in the future allocation of reduction obligations.

Chapter 2 deals with the question of how trade in climate-damaging goods can be curbed. It goes on to outline the debate over border adjustment measures, concluding that at present it seems unnecessary either in the EU or in the USA to prevent emissions-intensive industries from relocating overseas by imposing a border levy. Instead it is worth asking whether trade sanctions could be an important building block in ensuring the implementation of the climate regime. In order for this to work, trade would not have to be deregulated but fundamentally (re)regulated. In the long term, a trade ban should be considered for goods produced with fossil fuels.

Finally, **Chapter 3** focuses on how to best facilitate the diffusion of climate-friendly products and technologies and introduce them onto the market. This is a central question in the current climate negotiations. Trade policy promotes the liberalisation of trade with environmental goods and services, as well as foreign direct investment, yet this can run counter to the goals of climate protection and energy security. Technology transfer should be expanding the production capacity of climate-friendly industries in all countries of the global South, rather than primarily serving as a 'green export promotion programme' for industrial countries and some emerging economies. Alongside improved technology transfer, an intelligent regulation of foreign investment and intellectual property will be suggested.

1 Globalisation and Global Warming

Port Alegre and Davos – these are the symbolic scenes of the globalisation debates of the last decade. Critics in the World Social Forum see trade liberalisation and the removal of economic barriers as the main drivers behind ecological degradation and social exploitation. Meanwhile, proponents in the World Economic Forum in Davos praise globalisation as a silver bullet, not only for maximising corporate profits but likewise for the fight against poverty and improving ecological efficiency. Which of the two positions is right is a critical question for climate protection. Does globalisation lead to an increase in worldwide greenhouse gas emissions, or does it help prevent them?

Technology effects vs. scale effects – which are winning?

In terms of creeds and political convictions, the conflicting answers are set in stone. Yet even in theoretical, scientific discourse the question has reached a deadlock. Globalisation has different effects on global greenhouse gas emissions, and without an empirical basis it is impossible to fully understand the interplay of these effects and establish the ultimately prevalent trend. The outcomes known as ‘technology effects’ and ‘scale effects’ illustrate the conflicting sides of the debate (cf. Sachs 2000, who cites more effects).

Proponents of technology effects argue that market liberalisation and in-

ternational trade speed up the diffusion of environmentally-friendly technologies. Wind turbines from Germany are exported to Morocco, where they provide climate-friendly energy as an alternative to fossil fuels; fuel-efficient cars from Japan are shipped to America and replace gas-guzzling limousines ‘made in USA’; and foreign investments of transnational companies from industrial countries mean that the most efficient furnaces for steel recovery are no longer in the old production plants in the home countries, but in new branch factories in Brazil, China and India. In fact, particularly in the mining, energy, transport and industry sectors, there are plenty of examples to suggest that national economies that are more open implement resource-efficient technologies earlier, because they have better access to modern technology.

But critics see the volume of trade flows as the weakness of this argument. Technology effects may indeed reduce specific resource consumption, i.e. the resource input per manufactured and traded unit. But resource consumption can nevertheless rise overall if the total volume of economic activity and trade increases – this is what is meant by scale effects. Then any improvements in efficiency due to technology effects are swallowed up by rebound effects. Above all this happens when technology effects lead to cost savings: freed-up funds are reinvested by companies and consumers have more money to spend since efficient products are cheaper, so production and consumption increase. Of

course, such rebound effects do not only occur in the North. Since globalisation redistributes income, investment and consumption grow in the South, too. Ultimately, globalisation causes emission-intensive production and consumer patterns to spread from industrial countries to the rest of the world. Not only do car factories move to the South, so does the wish to drive one's own car and the possibility of doing so. Hence through globalisation, the small number of petrol-guzzling *Ambassadors* that were a common sight on the streets of India and Latin America up to the 1980s have been replaced by a large number of efficient cars – which consume much more overall.

The arguments of the critics and proponents speak for themselves, and both sides can cite numerous concrete examples to support their assertions. But what they have both lacked for a long time is an empirical basis for evaluation. There are now four studies available that have been able to quantify the various effects and weigh them against each other, using econometric models or historical sets of data. Cole and Elliot (2003) calculated the scale effects and the technology effects for gases including sulphur dioxide (SO_2), nitrous oxide (NO_x) and carbon dioxide (CO_2). Their results showed that for SO_2 technology effects outweighed scale effects, but for CO_2 and NO_x it was the other way around. Frankel and Rose (2002) reached a different result for NO_2 , where they found technology effects to predominate. But they concluded that CO_2 emissions rise with increased trade. Likewise Managi (2004), who analysed 63 countries in the period from 1960 to 1999, demonstrates that CO_2 emissions increase with greater market liberalisation. In turn, Heil and Seldon (2001) find in a comparative study of countries that in high-income countries, technology effects predominate, whereas in countries with medium and low incomes, scale effects predominate. This also provides evi-

dence that the emissions-intensive prosperity model from the affluent North is spreading across the rest of the world.

Following years of inconclusive theoretical trench warfare, these studies mean there is finally concrete data available allowing us to draw a line under the debate for the time being. They confirm the view that the rapid increase in greenhouse gas emissions worldwide in recent years and decades has not just taken place in an age of unbridled globalisation by coincidence. Nor has it been solely caused by internal factors in countries. The expansion of markets and trade relations evidently fuels climate change.

Carbon leakage: displacement of emissions to Southern countries

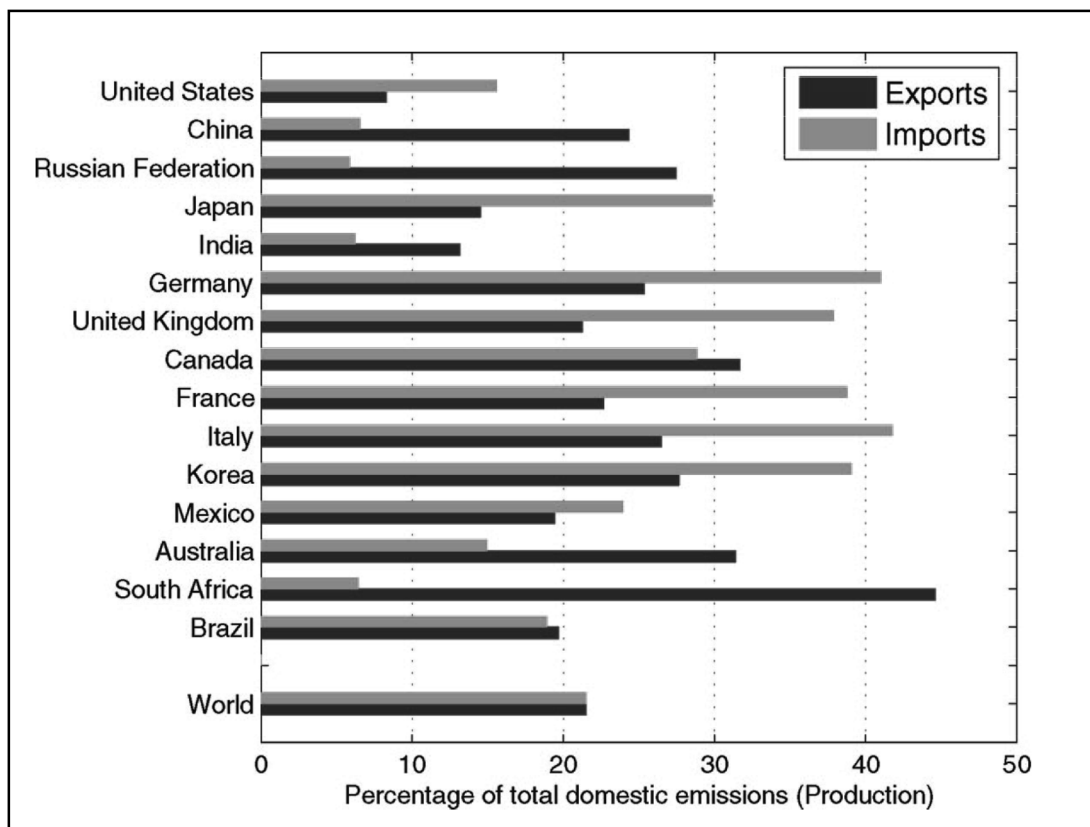
The comparative study by Heil and Seldon (2001) makes it clear that globalisation can have different effects on emission levels depending on the country. Evidently, affluent countries that already have high emission levels are less susceptible to scale effects. In these countries, national income increases with market liberalisation and increased trade. Yet unlike in poorer countries, this is not necessarily accompanied by a rise in national emissions. One reason for this lies in the international distribution of labour, which leads many countries in the North to import more and more industrial products from the South, since their own economies specialise in services and knowledge-intensive products. As a result, their emissions fall. In turn, emissions rise in a number of Southern countries, not only because of increased national demand, but also due to increased production for exportation. Admittedly it is still the case that more energy-intensive goods – chemical products, iron, steel – are traded from North to South than the other way around (World Bank 2007). But this may soon change. Countries in East

Asia, above all China, are already net exporters of energy-intensive goods today. What is more important is that quite simply the volume of exports from the South, even of less energy-intensive products such as dolls, T-shirts, or iPods, is leading to carbon leakage.

Several studies provide compelling evidence of this trend with figures. They show that industrial countries are importing 'virtual emissions' from developing countries – this term can be used for emissions arising from the production of an export product, even if these emissions are no longer contained in the product itself. It is calculated that in 2001 the EU imported goods with virtual emissions amounting to some 992 megatons (Mt) CO₂, whereas only 446 Mt CO₂ emissions arose from the production of exports within the EU. Thus the EU displaced over 500 Mt CO₂ emis-

sions overseas – whilst, incidentally, in monetary value the imports and exports balanced out (Bang / Hoff / Peters 2008). Likewise for OECD countries it can be shown that virtual emissions from importation are significantly higher than emissions from export production (Ahmad / Wyckoff 2003). A third study examines the data for each country committed to emission reduction targets under the Kyoto Protocol (Annex B countries). It shows that these states export about 2.8 gigatons (Gt) of virtual CO₂, but import significantly more at 3.6 Gt. In total, 24.5% of the consumption-related CO₂ emissions of these countries arise overseas. As Figure 1 shows, virtual emissions from imports in several countries – including Germany, Britain, Italy and France, but also South Korea – make up more than a third of total domestic emissions (Peters / Hertwich 2008).

Figure 1: Virtual emissions as a percentage of total domestic emissions in 2001 (Peters / Hertwich 2008).



The Intergovernmental Panel on Climate Change (IPCC) estimates the potential scope of carbon leakage from industrialized countries to developing countries to be between 5 and 20 percent. This means there is considerable potential for increased carbon leakage in the EU, which has up to now been displacing about 5 percent of its emissions. Companies and trade unions in energy intensive sectors generally use this as an argument against tough climate policy in the EU. They argue that climate policies would increase production costs and make companies less competitive. There is therefore a risk that production would relocate to countries with less stringent requirements, and domestic products might be supplanted by imports. If the EU were to independently pursue an ambitious climate policy, so the argument goes, the result would be profit losses and job cuts; in fact it would be the end of industrial production in this part of the world. If it nevertheless does come to the introduction of climate policy measures, like for example the ecological tax reform in Germany or the EU emissions trading scheme, the risk of carbon leakage is used as an argument at least to secure exceptions for energy-intensive companies. This line of argument has often been successful. But does it square with the truth?

Relocation of production due to climate policy measures?

From the description above, it is clear that a creeping relocation of production is taking place. Are climate policies a key cause of this? Even on a theoretical level we may point out that the choice of a production site is never solely dependent on environmental regulations, but is also influenced by a number of other factors such as the cost of energy, property and labour, as well as access to commodities and markets. After an evaluation of numerous studies on the subject, the Stern report concluded that

at most, climate policies with cost effects can give the few industries that are actually energy-intensive a reason to relocate abroad, since their energy or emission costs are a decisive factor in the choice of location. But only a small number of these industries are in global competition or have international production processes or mobile manufacturing plants. The majority of them are competing mainly within regional trade areas, like the EU, not globally (Stern 2007, Chapter 11).

Meanwhile several studies have done empirical research into which sectors and industries could actually suffer competitive losses due to climate policy measures with cost effects (de Bruyn et al. 2008; Hourcade et al. 2008; Graichen et al. 2008; also World Bank 2008; OECD/IEA 2008). The findings were particularly revealing with regards to the EU emissions trading scheme. With certificates now being auctioned, this may well be one of the climate policy measures with the greatest cost impacts worldwide. The studies conclude that depending on the EU country only one to two dozen sectors would experience appreciable cost increases due to the auctioning of certificates. However, for many of these sectors trade takes place mainly within the EU and imports from foreign suppliers do not represent any serious competition. Moreover, in sectors with the highest CO₂ costs, trade with countries outside the EU is particularly low. And in the cases of cement and limestone, for instance, trading intensity is additionally limited by high transport costs, especially if use does not take place near the coast. As a result, there is less than a handful of sectors where a risk of relocation exists because of the EU emissions trading scheme. In Germany these are the crude iron and crude steel, chemical fertilisers, paper, cardboard and aluminium sectors as well as the other inorganic chemicals sector. Together these sectors make up less than 1 percent of Germany's gross domestic

product and represent just a fraction of German jobs (Graichen et al. 2008).

Finally, competitiveness concerns over the introduction of climate policies seem even less significant when we consider that as a rule, relocating production to emerging and developing countries only makes sense for companies as a long-term investment. Based on the current climate negotiations it already seems likely that from 2012 emerging economies will have to introduce effective measures for climate protection, as will all other developing countries later.

This much must be recognised: the displacement of emissions from North to South will probably continue to increase. But in the future as now, this may have its main causes in market liberalisation and worldwide economic integration, rather than in individual climate policy measures. There is evidence to support this – not least, the fact that even within the EU, which has taken a leading role in climate prevention, climate protection measures with real cost effects have only been implemented in the past few years, whereas carbon leakage has been taking place for much longer. Therefore, a narrow definition of carbon leakage – like that of the IPCC, which only takes into account emissions that are displaced as a result of climate policies – is not far-reaching enough to adequately register the scale and causes of this development.

Territorial reporting: a problem of method

The displacement of emissions from North to South is of great significance for climate policy. Due to the method for reporting emissions, it is becoming a real problem. The Framework Convention on Climate Change (UNFCCC) takes a territorial approach to reporting: only emissions arising from produc-

tion and consumption within a country are recorded. Emissions arising elsewhere during the production and transportation of imports are taken into account there. Accordingly, the reduction targets of the Kyoto Protocol for industrial countries only relate to emissions arising in their territories. As long as no adequate reduction or limitation commitments exist in the USA or in emerging countries, industrial countries do not have to take any responsibility for their increasing importation of virtual emissions.

Because territorial reporting does not take carbon leakage into account, it makes it easier for industrial countries to reach their reduction goals. The most striking example of this is Britain. Whereas in 1990 Britain imported virtual emissions amounting to 110 Mt CO₂ equivalents, in 2006 the value had risen to 620 Mt CO₂ equivalents. This means that virtual emissions from imports had risen by about 19 percent since 1990. But since Britain only reported emissions arising in its own territory to the UNFCCC, they were able to proudly announce that they had reduced their emissions by about 16 percent since 1990. This reduction of territorial emissions was a mere 150 Mt CO₂ equivalents (Helm / Smale / Phillips 2007; Wiedmann et al. 2008; Druckmann et al. 2007).

Not many industrial countries have been able to reduce their domestic emissions since 1990 like Britain. On the contrary, emissions have risen in most countries despite their Kyoto Protocol obligations. At best, these countries may be able to reach their Kyoto goals by purchasing additional certificates or emission allowances from other countries. For many countries, the need to take action would be even more pressing if their displaced emissions were taken into account. For instance, under the Kyoto Protocol Italy needs to reduce

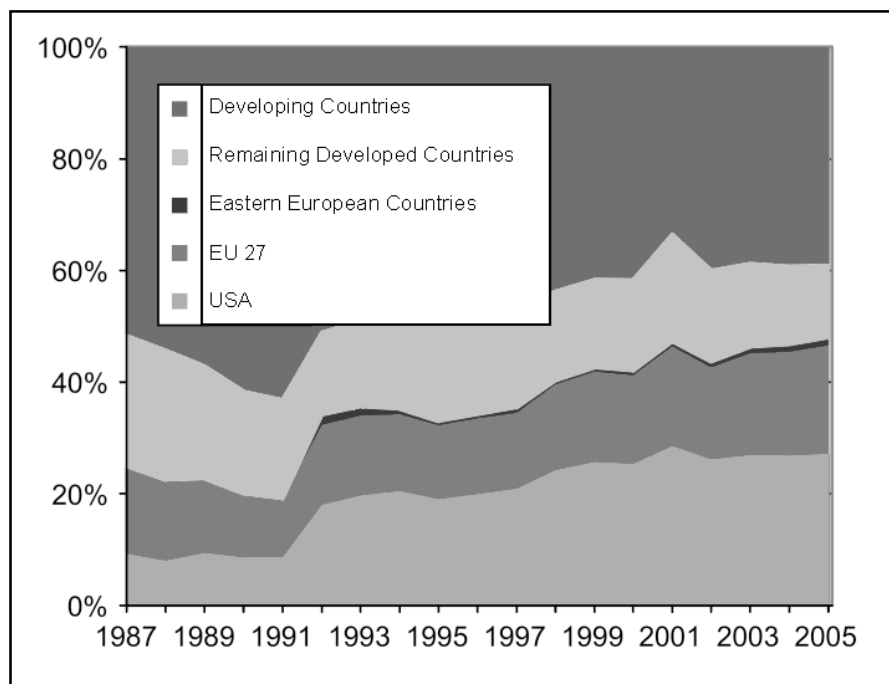
its 1990 emissions by 6.5 percent by 2010. But not only did its domestic emissions rise by nearly 10 percent by 2006, in addition, virtual emissions from imports more than doubled between 1991 and 2002. Only a minority of these virtual emissions actually arise from Southern countries, but this proportion is growing particularly fast (Mongelli et al. 2006). A similar trend is apparent in other industrial countries, such as Finland (Maäenpää / Siikavirta 2007) and Denmark (Munksgaard / Pedersen 2001). In total, the USA imports the most virtual emissions worldwide (Weber/Matthews 2007; Peters/Hertwich 2008).

Whilst carbon leakage makes it easier for industrial countries to meet their Kyoto targets, it undermines the overall goal of effectively reducing global emissions. For so long as reduction targets or at least limitation targets do not exist in emerging and developing countries, the displacement of emissions from industrial countries means nothing

less than an increase in total global emissions. In the Copenhagen climate agreement that is currently being debated, this problem will prevail, since most developing countries will still have no absolute emission limitations for 2013 onwards.

As a solution to the competition problems with developing countries, where for the time being emissions standards are less strict or non-existent, sectoral agreements are being discussed. These could for instance be used to establish universal efficiency standards for energy-intensive sectors worldwide. Yet, as mentioned, the displacement of emissions is a problem concerning all sectors, not just energy-intensive sectors. Sectoral agreements can prevent carbon leakage in each of the sectors they address, but not the leakage occurring in all other sectors. Carbon leakage will therefore continue to undermine the goal set within an agreement for 2012 onwards if nothing changes about the

Figure 2: Proportion of export-related CO₂ emissions from China to destination countries and regions in 2005 (Weber et al. 2008)



way emissions are reported and the responsibility countries taken for carbon embodied in trade.

Moreover, territorial reporting makes emerging and developing countries less willing to commit to their own emission obligations in the mid- to long term. In doing so these countries would be accepting responsibility for emissions that, due to exportation, may be at least partially allocated to consumers in industrial countries. Above all, China and Russia – but also South Africa and several other emerging economies in the South – export virtual emissions on a large scale. In 2001 about 28 percent of Russia's total domestic emissions arose through export production, whilst in South Africa it was even higher at 45 percent (Peters / Hertwich 2008). China's export-related emissions in 2005 made up a third of its total domestic emissions, which at 1,700 Mt CO₂ was the largest quantity worldwide. This is seven-and-a-half times the 230 Mt of virtual CO₂ emissions exported by China in 1987. As Figure 2 shows, almost two thirds of these were exported to industrial countries, particularly the USA (27%) and the EU (19%). The largest single items were not energy-intensive goods, but electronic products (22%), machines (19%), metal products (13%) and textiles (11%) (Weber et al. 2008; earlier studies: Wang/Watson 2007).

Shared responsibility for export-related emissions

International climate policy will inevitably have to deal with carbon leakage in the future. As early as 2001, following the USs' final withdrawal from the Kyoto Protocol, Canada pointed out that a considerable proportion of its export-related emissions serve the USA, but put a one-sided burden on Canada's reduction goal. Nevertheless, at the time their proposal that virtual emissions should be subtracted from their domes-

tic emission reduction commitment through 'Energy Export Credits' was wholly inappropriate. As an industrial country, Canada has absolutely no right to have the incremental costs for emission reduction in its exportation sector financed by the USA or any other country. However, if emerging and developing countries are to be included in the regime of legally binding reduction targets, this will be a more fundamental problem. The progressive tertiarisation of the economies of the North, coinciding with the catch-up industrialisation of the South, would have long-term structural disadvantages for the latter. After all, since the 1992's UNFCCC, industrial countries are under an obligation to cover the incremental costs of climate protection measures in developing countries.

What can be done within the framework of climate negotiations? As a first step the obligation to report under the UNFCCC needs to be broadened to include the disclosure of virtual emissions from imports and exports. If in the future emerging and developing countries also take on reduction commitments, a principle of shared responsibility could be defined: industrialised countries would then have to take on partial responsibility for the export-related emissions of their Southern trade partners and support reduction activities in these countries. Not only the UNFCCC and the Kyoto Protocol, but also the Bali Action Plan, which has been reached in the 2007 climate conference and now forms the basis for the current negotiations over the Copenhagen climate agreement – specify that reduction activities in the South are conditional on the transfer of technologies and finances. A clause on shared responsibility for export-related emissions could be appended here as a provision for further-reaching support from industrialised countries for reduction measures in the exportation sector of emerging and developing countries. This might

in turn significantly increase their willingness to commit to their own obligations in future climate agreements.

A principle of shared responsibility for export-related emissions would have ground-breaking implications for trade policy. Suddenly trade politicians would not just be thinking about where their countries had comparative cost advantages, but also where they had 'comparative emissions advantages'. They would therefore support a focus on all those sectors where they could produce with particularly low greenhouse gas emissions compared with other countries. World trade has now become too greenhouse gas-intensive for the international distribution of labour to be solely orientated to production costs; after all, over 20 percent of all CO₂ emissions from industrial production arise from products that are internationally traded (Peters 2008). In addition, there are the emissions arising from the transportation of these goods. For instance, the transportation of German imports and exports around the world produces more greenhouse gases than the total transportation of goods within Germany (German Federal Office of Statistics 2007).

The contribution of trade policy should be to subject foreign trade relations to a climate check. One step would be to specialise energy-intensive production in places where it could take place with particularly low emissions, as part of an ambitious climate policy. Equally, the internalisation of external costs would mean that the unnecessary globalisation of commodity flows and production chains would become unprofitable. Why should a pair of jeans made of Kazakh cotton be spun with Swiss machines in China, then dyed in the Philippines with dye from Germany, sewn up with lining and buttons from Italy and France and finally be end-processed in Greece? Such trade currents are absurd as regards climate policy, and could be curbed using a wide range of tried-and-tested instruments – from an increase in transport costs, to taxes and duties, to the inclusion of international transport in emissions trading, to emission standards for imports – to a fixed trade restriction on climate-damaging products and services, which will be discussed in the following chapter.

2 Trade Policies against Climate Offenders

From individual consumption to international policy, the reflex is the same. Chocolate that exploits cocoa farmers in Ghana? The worse choice ethically, compared to Fairtrade chocolate. Exporting arms to crisis zones? Policy should prohibit it. Precious stones from civil war regions? The WTO would support an importation ban. Trade in endangered species? Banned by international agreements in the 1970s. Now the climate crisis draws near, and the same question is being asked: shouldn't trade in climate-damaging goods also be curbed?

But the problem is more complex than almost all the other problems cited. Fossil fuels have been the basis of the worldwide economy since the Industrial Revolution. Almost all goods and services are full of greenhouse gas emissions in one form or another. As a result, clear trade sanctions are difficult. Only individual products that are particularly climate-damaging could be prohibited. For most products that remains unthinkable as yet. Instead, standards for a better greenhouse gas balance would be effective; other products would be made more expensive, causing their production and consumption to decrease. In principle, trade policy is a suitable point of departure for such measures. For when certain goods and services can no longer be traded between countries, or only under particularly climate-friendly conditions, this will soon be reflected by changes in production and consumption.

A border adjustment for climate protection...

In a series of international environmental contracts, trade policy measures have proved an important building block in improving the effectiveness of these agreements. This was the case, among others, in the Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora, which restricted trade in endangered animal and plant species, as well as in the Montreal Protocol, which aimed to protect the Ozone layer. The Montreal Protocol lists all the chemical substances that endanger the Ozone layer and prohibits trade in these substances, according to country-specific schedules. Firstly, the trade prohibition creates an incentive for governments to ratify the protocol, preventing countries from dragging their heels – those that have not joined the Protocol are basically excluded from trade by member states. Secondly, it increases the pressure on participating countries to keep to their schedules and speed up the process of discontinuing the production of substances that damage the Ozone layer. Member states can no longer come out with the argument that they anticipate competitive losses compared with countries that continue to produce hazardous substances at low costs. Thus the trade sanctions in the Montreal Protocol are considered one of the most important factors in the success of the agreement (The Ozone Hole 2007).

In climate policy, the instrument of a border adjustment has been discussed for many years; this could take various forms, from border adjustment tariffs, or border tax adjustments, to emissions standards for imports, to the inclusion of importers in a national emissions trade. Essentially, a border adjustment can be used to pursue two climate policy goals. Firstly, it makes it possible for countries to pursue an ambitious climate policy even when other countries are pursuing less far-reaching goals. For instance, the border adjustment would mean that in the country with the ambitious climate policy, tariffs were imposed on imports from other countries, in proportion to the higher production costs at home. This prevents competitive disadvantages. And secondly, since this means that countries without an ambitious climate policy are no longer at a trading advantage, the border adjustment could contribute to more and more countries adopting a proper climate policy and joining international climate protection efforts. But are these climate policy concerns the real motivating factor behind the arguments for introducing a border adjustment?

One look at the current discussion shows that this instrument is not being discussed primarily as an element of climate protection policy. Instead, its supporters are discussing it as an instrument of industrial policy and competitiveness policy to mitigate the consequences of climate policy for greenhouse gas intensive companies – ultimately with the goal of protecting these companies from the necessary structural changes.

...or for the protection of US industry?

The introduction of a border adjustment is being considered particularly seriously in the United States. There, in just the past years, various draft bills

proposing a border adjustment have been submitted both in the Senate and to Congress – for example, the Low Carbon Economy Act (2007), the Climate Security Act, the Investing in Climate Action Protection Act, the Climate MATTERS Act (all 2008) and the American Clean Energy and Security Act (2009) (Jordan-Korte/Mildner 2008; Asselt/Brewer/Mehling 2009). All these drafts are primarily concerned with introducing a border adjustment because of imports from emerging countries. Widespread anxiety in the USA about competition from these countries, particularly from China, was one of the main reasons behind Ex-President Bush's categorical rejection of the Kyoto Protocol in 2001; ultimately, in accordance with its basic principle of "common but differentiated responsibility", the Protocol only stipulates binding reduction obligations for industrial countries in the commitment periods up to 2012, not for emerging and developing countries.

In the bills proposed, no tariffs on imports were suggested; instead, importers would have a special role to play in the planned emissions trading scheme in the USA. The Climate Security Act from Senators Boxer, Lieberman and Warner gave the most detailed reasoning to date of this border adjustment (Lieberman/Warner 2008). Importers from countries that have not introduced comparable climate policies would purchase international reserve allowances. Proof of these reserve allowances would authorise you to trade as an importer on the US market.

The exemption clause shows who this measure is really aimed at. Countries taking comparable measures for emission reduction, as well as the least developed countries (LDCs), and all countries that generate less than 0,5% of global greenhouse gas emissions, would not be affected by the border adjustment. So those affected are the larger developing countries (like India) and all emerging countries, such as China and Brazil.

Since the only decisive factor is supposed to be the 'comparability' of other countries' climate policy and emissions development, according to the Climate Security Act there is no need to take into account how climate-friendly or climate-damaging the production of certain import goods is in comparison to American competitors. This can lead to absurd results. For instance, steel imports from certain factories in Brazil and India, which are more energy-efficient than the most efficient facilities in the USA, could nevertheless be discriminated against because no comparable climate protection measures had been introduced in these countries, or because Brazil's and China's domestic emissions were on the rise.

It is also notable that the concept of 'comparability' will not be defined by the UNFCCC, which applies the principle of countries' differentiated responsibilities and respective capabilities (Article 3.1 UNFCCC). Rather, comparability will be defined by a US select committee, the International Climate Change Commission. However, the Climate Security Act stipulates that prior to the introduction of a border adjustment, discussions must take place with the countries affected by it. But so long as no clear criteria are imposed on the committee about how to define comparability, this could pave the way for biased discrimination between trading partners.

It is also revealing that reserve allowances for importers will be dealt with completely independently of domestic certificates, so that they have no influence on the price and the availability of certificates for companies at home. But the creeping displacement of emissions from North to South that is taking place (see chapter 1) will lead to a creeping increase in the demand for reserve allowances from importers – and accordingly, US companies will need fewer domestic allowances. In short, this regu-

lation inflates the US emission target and runs counter to global climate protection.

That industry concerns, rather than climate policy considerations, lie behind the US discussion about a border adjustment is also shown by the reaction of the US Government to a possible border adjustment in the EU. An EU resolution in 2005, after the Kyoto Protocol had finally come into force, called for border adjustment tariffs for all non-participating countries in the Kyoto Protocol (European Parliament 2005). In particular, this was intended to address the non-participation of the USA – but not that of emerging countries, all of which had in fact ratified the Kyoto Protocol. The discussion provoked strong reactions at the time from the US Government as well as from several developing countries. Susan Schwab, the then United States Trade Representative, warned that the USA would refuse to accept any tariffs introduced on American goods as a result of its position in climate protection discussions. In response to proposals for carbon taxes from EC President José Manuel Barroso in 2007, Schwab was critical once again, stating that climate and the environment should not be used as an excuse to close markets (Euraktiv.com 2008).

Reactions from the new US Administration under President Obama are expected to be milder. Yet his government, too, is under great pressure to secure a majority in the Senate and in Congress for climate protection policy, without being able to count on comparable measures in China. Even a progressive US administration is far from being able to introduce an emissions trading scheme if it goes against the interests of senators. Various commentators therefore find it rather unlikely that under the Obama's government, an ambitious US emissions trading scheme without a border adjustment will be capable of winning a majority (cf. Asselt/Brewer/

Mehling 2009). Indeed, in the American Clean Energy and Security Act of March 2009, a provision made for a border adjustment, which has not been included in earlier drafts, finally had to be included after heated discussions in the House of Representatives.

A wavering course in the EU

Unlike the discussion in the USA, the proposal by the European Parliament in 2005 was intrinsically motivated by climate policy, as opposed to industrial policy: the border adjustment was intended to make the then US Government back down on the Kyoto Protocol. But the proposal met with disapproval within the EU. Elements of the Commission feared that a border adjustment would increase tensions in EU / US relations and that it could also undermine support from those political and economic circles in America eager to further transatlantic cooperation in the field of climate protection. EU Trade Commissioner Peter Mandelson questioned the WTO-consistency of a border adjustment and even said that it was wrong as a 'punitive measure', since ultimately it was not illegal for the USA to deviate from the Kyoto Protocol: "[A 'climate' tariff] would be highly problematic under current WTO rules and almost impossible to implement in practice. I also suspect it would not be good politics. Not participating in the Kyoto process is not illegal. Nor is it a subsidy under WTO rules. How would we choose what goods to target? China has ratified Kyoto but has no Kyoto targets because of its developing country status. The US has not ratified, but states like California have ambitious climate change policies"(Mandelson 2006).

However, since competitiveness concerns and the protection of European industry have been pointed out more strongly in the debate, this disapproval has suddenly turned into a general will-

ingness to consider a border adjustment. In January 2008, EC President Barroso announced his wish to solve competitiveness problems in European industry arising as a result of climate policy requirements (Euraktiv 2007). France has been requesting the introduction of border adjustment tariffs for a long time and mainly wants it in order to quell concerns from Europe's heavy industry, which is in constant opposition to emission reduction policies (AFP 2007). The French Government has asked the EC to draw up a proposal for the border adjustment measures and has announced it will submit its own proposal by 2011 at the latest, should no consensus have been reached by then (MEEDDAT 2008).

In the first draft of guidelines for the reform of the EU Emissions Trading Scheme, which plan for a large proportion of allowances to be auctioned from 2012 onwards, the Commission suggested two possibilities: either importers of carbon-intensive products should be obliged to purchase emission allowances; or certain sectors or sub-sectors in the EU should continue to have allowances allocated to them free of charge. However this would only be decided in 2011, when a report analysing the competitive effects comes out (European Commission 2008). In the most recent version of the guidelines, however, free auctioning was chosen. This makes it clear that a border adjustment is no longer being used in an attempt to make the USA or other countries cooperate with ambitious climate protection measures.

Instead, industrial policy motivations dominate in the EU as well. Germany and the UK already stated clearly in the course of 2008 that they favour free allocation and would resist measures that are tantamount to trade restrictions. Without waiting for the results of the report analysing possible competitive effects, German Environmental Minister

Gabriel called for “energy-intensive industries which are included in emissions trading but in particular compete internationally, [to] continue to receive the necessary CO₂ allowances free of charge”. “In my view, this should apply to steel, aluminium and cement production” (Gabriel 2008). The position of Germany and Great Britain is shared by several economic associations and enterprises. The Alliance for a Competitive European Industry, BusinessEurope (2008), UK Steel (2008) and German Chemical Industry Association (VCI) (2008) all want free allocation for industries exposed to international competition, unless an international agreement is reached that puts the same burden on industry outside Europe.

To be sure, it is true that a free allocation of allowances is the more pragmatic solution when it comes to introducing a complex border adjustment – particularly since this would only be necessary for a few sectors and subsectors. But from a climate policy perspective, free allocation is a worse solution. It will mean that European companies have far fewer incentives to improve their emissions record. In contrast, the auctioning of allowances, alongside a border adjustment, would give both domestic companies and importers an incentive to cut down their emissions. Given this, it is no surprise that environmental NGOs such as Friends of the Earth (2002), Greenpeace (2007), and the European Environmental Bureau (Hontelez 2007) have all called for the introduction of a border adjustment. On the part of unions, the European Trade Union Confederation (2008) has spoken in favour of introducing “eco-tariffs” – but, again, primarily to compensate European companies and secure jobs in Europe. But this kind of reasoning would be risky for the current UN climate talks. In particular, the export-strong emerging countries have made it clear that they will not tolerate protectionism motivated by climate policy. So propos-

als motivated by competitiveness policy could be counterproductive for the climate negotiations, which are otherwise cooperative.

Is a border adjustment compatible with WTO law?

Environmental measures that directly intervene into trade are often suspected of violating the regulations of the General Agreement on Tariffs and Trade (GATT) and the World Trade Organisation (WTO). Academic discussion is especially concerned with this question. Since the beginning of the 1990s, scholars have produced almost innumerable publications evaluating the compatibility of environmental measures with trade law (for an overview, see Neumann 2001; Santarius et al. 2003). The bottom line is always the same: it depends firstly on how exactly a measure is designed, and secondly on how the WTO Dispute Settlement Body interprets the abstract WTO regulations in each individual case.

Likewise, the discussion over a border adjustment is accompanied by the question of whether this instrument can be reconciled with the WTO regulations, or whether it might lead to a case before the WTO Dispute Settlement Body. Several studies have reached the same conclusion: it depends on how exactly the border adjustment is designed. Theoretically, a border tax adjustment and the proposal that importers at the border must purchase emission allowances are both reconcilable with WTO law (e.g. Biermann/Brohm 2005; Cosbey/Tarasofsky 2007; ICTSD 2008a; World Bank 2008; German Federal Environment Agency 2008). But the answer remains speculative because there has not yet been any ruling on border adjustments from the WTO Dispute Settlement Body, which might exercise a restrictive interpretation of the WTO regulations. More important, as

will be shown with many questions below, it might be that the right design would be so complicated in practice that ultimately the border adjustment's WTO-compatibility would be doubtful.

Seven open questions are decisive. The first question about any form of border adjustment is whether it is part of a regulation which includes domestic companies in its application, or one that applies only to importers. Any measure that simply makes market access harder for importers, without affecting domestic suppliers equally, is more likely to be considered a tariff increase or non-tariff trade restriction, and therefore to be irreconcilable with the market access principle of the GATT. If, on the other hand, a border adjustment is introduced as a measure that ultimately aims to create the same conditions for importers and domestic companies, the chances increase significantly.

If a measure applies both to domestic companies and importers, the second question is: will importers be in a worse position than domestic suppliers? The guiding principle encompassed in the GATT national treatment clause is that overseas suppliers may not be burdened either directly or indirectly with taxes or other measures that do not apply to domestic suppliers to the same extent or are not equivalent to domestic measures in their effect. Meanwhile, any energy or CO₂ tax introduced in the home country that would then be applied to importers as a border tax adjustment, and likewise any emissions trade that would also require importers to purchase allowances, must be strictly compliant with this principle.

Then the third question follows: is the border adjustment directed at specific products, or at the conditions under which the products were produced in the country of origin? Whether the handling of imported products may be differentiated according to production processes

is undoubtedly one of the oldest questions in the debate over the compatibility of environmental law and trade law. In specific cases, it asks whether import products such as steel, aluminium and cardboard ought to be subject to a border levy because they had been produced more emission-intensively in the country of origin than in the home country. Meanwhile, there is widespread agreement in academic literature that this is possible in principle – not least because of several settlement cases in which the WTO Dispute Settlement Body categorically approved differentiation according to production methods (Wofford 2000).

But then there is the most difficult question: is the method used abroad to assess production processes firstly, objectively sound, and secondly, the same as the method used in the home country? Again, in academic literature there is widespread agreement that the type of border adjustment with the best chance of fulfilling this requirement would be one that based each product on detailed information about the greenhouse gas intensity in the production, including detailed information about the greenhouse gas intensity of all intermediate and ancillary products, which can come from third countries. But this would obviously necessitate a vast and highly complex data collection process. Many developing and emerging countries do not even provide rudimentary emission records in relation to production processes yet, let alone information on ancillary products from third countries. What would constitute a reliable basis for setting the border tax rate or the number of allowances importers have to purchase?

The handling of various cases in the WTO suggests that instead of collecting exact data about the greenhouse gas intensity of a specific production process, it might be WTO-compatible to take generalised benchmarks or roughly cal-

culated values as a basis. The benchmarks could for instance be oriented to the best available technology (see WTO 1996). But even then, separate benchmarks would need to be calculated for different industrial sectors and subsectors. The cost of data collection would still be enormous. The above-mentioned Climate Security Act from the USA takes a different approach: it plans to base the border adjustment either on the existing climate policies in the country of origin or on development of emissions there, but not on specific production processes. It is therefore very likely that the Climate Security Act would not be WTO-compliant on this point (Asselt/Brewer/Mehling 2009). It remains to be seen whether the American Clean Energy and Security Act currently under discussion in the US Senate, takes on a more waterproof approach. If the border adjustment were to take the form of a tax (as suggested by several countries in the EU), as opposed to an obligation to purchase allowances, there would be the problem making the border tax proportional to the EU Emissions Trading Scheme: the rate of border tax for importers would need to reflect the cost of allowances for EU companies. For according to the WTO, importers must not be more heavily burdened than domestic companies.

If, however, the USA or the EU requests an exemption from WTO regulations, arguing that the border adjustment relates to the protection of “exhaustible resources” or “human, animal or plant life”, two other questions would follow. The sixth question would then be: does the border adjustment lead to arbitrary discrimination against the country of origin? Firstly, it must be ensured that in introducing a border adjustment, the USA or the EU take into account the local conditions in the country of origin and, for instance, do not put an undue burden on poor countries compared with rich countries. In other words, if the border adjustment is used to seek an

exemption from the WTO regulations, then a wider interpretation of the most-favoured-nation clause will be applied than in the fifth question. Secondly, it must be ensured that the USA or the EU have held adequate negotiations with the relevant countries before the introduction of the border adjustment – and, if necessary, have also allowed a sufficient period for adapting to the border adjustment.

The more crucial and seventh question would, however, be: is the border adjustment really a necessary measure in order to preserve the climate and to protect the atmosphere’s absorption capacity? In the event of a dispute, the USA or the EU would need to make a convincing argument that no alternative climate protection measures were available that could deliver the same ecological benefits with fewer disadvantages for importers. Whether this would be successful is questionable. Under no circumstances would the WTO acknowledge the main motivation driving the discussion of the border adjustment in the USA and the EU currently: that ultimately, domestic industry should be protected from competitive losses.

The future: a trade ban on goods produced with fossil fuels

The question of whether the instrument of the border adjustment is in principle compatible with WTO law can be summed up like this: in order to be granted an exemption from WTO regulations, the border adjustment needs to be established as being sufficiently essential for climate protection. Failing this, in order to avoid conflict with the WTO principle of national treatment, the border adjustment must have a solid basis in data, including data on the greenhouse gas intensity of production processes in the country of origin: or, at the least, it must be based on differentiated benchmarks for the relevant sec-

tors and subsectors. So it is not impossible to create a WTO-compatible border adjustment, but it would involve considerable expense and effort.

Another question is whether the expense is worthwhile, for the small policy benefits. This has been strongly called into question by empirical studies which found that, if at all, a border adjustment would only be necessary to protect a very small number of sectors and subsectors from migration and relocation (see Chapter 1). So all investigations seem to indicate that the best solution would be a common solution to competitiveness concerns in a multilateral agreement. However, that would not mean a resolution allowing countries to introduce a border adjustment. Firstly, such a solution would mean that emerging and developing countries entered into reduction activities in the short-term, and reduction obligations in the mid- to long-term period. Then, stringent climate policies would be introduced in these countries, too, reducing the incentive for companies to migrate south. As a second solution, the introduction of sectoral agreements for individual energy-intensive sectors exposed to international competition has been discussed at a multilateral level. Then, the same standards would apply worldwide for iron and steel companies, for instance, or for aluminium concerns, regardless of where they were produced and independent of the national reduction obligations in that country.

In the mid- to long term, we should consider whether a further-reaching regulation of trade in climate-damaging goods and services could be beneficial. It has already been pointed out that in many environmental agreements, trade sanctions have been very effective in guaranteeing fulfilment, as in the Montreal Protocol and the Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora, as well as the Stockholm Convention on

Persistent Organic Pollutants, and the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. But for climate policy there is (still) the problem that almost all imports and exports are full of greenhouse gas emissions, meaning that at this point in time it would seem very visionary to introduce bans. But how far could trade sanctions make sense for climate policy in the long term?

This option starts to look more feasible if we are reminded of the drastic need for reduction: by 2050, industrial countries need to have cut their CO₂ emissions by a tremendous 90% compared to 1990 levels. In developing countries, too, a considerable reduction will need to take place – some 60% – if global warming is to be kept below the dangerous threshold of two degrees Celsius with sufficient probability (Meinshausen 2006; Baer/Mastrandrea 2006). In order not to exceed a maximum warming of 1.5 degrees, which has been called for by over 100 countries, by now the majority of contract countries in the UNFCCC, then even more drastic reductions will be necessary. But how can this actually be achieved – cutting nine tenths or more of emissions in industrial countries? Once again, to underline the scale of the challenge, this can be looked at the other way around: who or what can still be emitting, if we are to reach this low level? Certainly, we can attain drastic emission reductions through a wholesale shift from power generation to renewable energy sources. Furthermore, drastic reductions can be realised through increased efficiency in all sectors. All in all, this might make it conceivable that 50% or even 70% of emissions could be cut in industrial countries, roughly speaking. But to cut the last percentages needed to achieve a reduction of nine tenths, other measures would definitely be required.

In certain sectors, the reduction potential may be restricted by sheer physi-

cal or technological factors. Therefore, several sectors would have to become as good as 100% CO₂-free in order to achieve an overall reduction of 90%. The industrial sector may offer a starting point. For industry appears as the sector in which steep emission reductions could be most rapidly achieved. Efficiency measures and the transfer to renewable energy are not only easier to administrate, and often more cost-efficient, but also easier to implement politically than for instance in the transport sector, or less costly than in the housing sector. Also, many more climate-friendly innovations have been developed in this sector, whereas these are still overdue in the transport industry, for instance.

As soon as countries make real efforts to make industry production CO₂-free, a gradual trade ban on products that are still produced using fossil fuels will no longer seem far off the political agenda. Introducing a gradual trade ban on fossil fuel goods could contribute considerably to countries achieving CO₂-free production. Unlike in the case of a border adjustment, importers would simply have to present a certificate of production with renewable energy

sources. Complex calculations setting the emissions intensity and costs of domestic production against overseas production processes would not be necessary.

Obviously the process of implementing a gradual trade ban should not begin in 2050 – by then the minus 90% goal must already have been reached. The measure should be consolidated over the next 10 to 15 years and could then be gradually introduced, earlier for some production processes than others. In the current debate, many still want a border adjustment as a means of protecting the emission-intensive production of certain products. All these products – aluminium, steel, iron, cardboard, paper – would eventually have a trade ban imposed on them, assuming they were not produced CO₂-free. A trade ban for goods produced with fossil fuels would strengthen production in locations with direct access to energy sources such as water power and geothermal energy, and elsewhere it would speed up the shift from fossil electric power to renewable electricity in production processes.

3 Trade Policies for Technology Transfer

There are two main goals driving climate policy: effecting the shift from fossil-fuel-based energy and speeding up the transition to a solar economy. The scale on which global greenhouse gas emissions must urgently be reduced means that it will not do to pursue these goals separately or one by one. It will not be enough for international climate policy from 2012 onwards merely to formulate reduction targets. Alongside such targets, climate policy must lay the foundations for a technological revolution. This includes the rapid extension and diffusion of renewable energy sources and low emission or zero-emission technologies. And this revolution will have to take place everywhere, both in industrial and developing countries, if we are to avert climate chaos. But what is the best way to promote innovations in climate protection technologies and introduce them onto the market?

Liberalisation of trade in environmental goods...

One possible way to advance the diffusion of climate-friendly technologies would be to promote trade in them. In the current round of WTO negotiations, the rapid liberalisation of environmental goods and services is being discussed. The negotiations aim at “the reduction or, as appropriate, elimination of tariff and non-tariff barriers to environmental goods and services” (Paragraph 31(iii), Doha Declaration). This is meant as a way of bringing trade

goals and environmental goals into line with each other. The liberalisation of environmental goods is credited with having a ‘win-win-win’ potential for companies, consumers and the environment: it should speed up trade, leading to an increase in the diffusion and use of environmentally-friendly technologies and at the same time cause prices to sink for companies and consumers. Environmental goods would be cheaper and therefore stand a better chance on the market against climate-damaging alternatives (World Bank 2008). There were also proposals aimed specifically at climate-friendly goods. But overall, the WTO negotiations have reached a dead-end. Among other things, no agreement has been reached about which environmental goods and services should now be liberalised (Santarius 2008d).

Economic theory is relatively clear that following liberalisation, trade in environmental goods and services would increase (e.g. Stern 2007). In an econometric evaluation of 18 developing and emerging countries in the sectors of wind power, solar energy, clean carbon technologies and efficient lighting products, the World Bank showed that trade in these products would increase by up to 7% following full liberalisation. If non-tariff barriers were abolished in addition, it could increase by up to 14% (World Bank 2008).

Nevertheless, academics disagree on whether liberalisation is really an important condition for the diffusion of cli-

mate-friendly technologies and their introduction onto the market in practice – or whether other factors are more important. The question is: if the liberalisation of trade were an important condition for the diffusion of climate-friendly technologies, forerunner countries in climate protection wouldn't have to wait for the outcome of the WTO negotiations. They could lower their tariffs at any time. But as of now, no country even of those which are seen to be serious about climate protection had done this. Instead several countries have shown how wind power and solar energy can thrive at double-digit rates of growth, without tariffs being further reduced. Liberalising environmental services and goods might cause production costs and therefore overall economic costs to sink further. But liberalisation doesn't seem to be a necessary condition for the rapid diffusion of technologies.

This is borne out by the facts. Trade in 40 goods proposed as particularly climate-friendly by a group of countries in the WTO has almost doubled in the three years between 2002 and 2005 (World Bank 2008). This growth is well above average compared to overall global trade, and it also applies to trade between industrial and developing countries, although tariff rates for these products are still comparatively high in many countries with low and medium incomes. The trade growth of 7-14% predicted by the World Bank after the abolition of tariffs looks small by comparison.

Furthermore, another study casts doubt on the theoretical assumptions and the rather sweeping statements of the World Bank study; a reliable regression analysis found demand for environmental goods to be extremely inelastic in response to a tariff decrease. Out of a list of 151 products, only two were responsive to tariff decreases, including trade in renewable energies. But even here the elasticity of demand in re-

sponse to a tariff decrease was very low: a 1% tariff decrease lead on average to an increase in trade of just 0.15% (Jha 2008). So this study also suggests that tariffs don't represent a significant obstacle to the spread of climate-friendly technologies. Instead, the study's regression analysis reveals something less surprising: the empirical link between demand and GDP is much more decisive. In other words, countries with higher spending power trade more than poor countries. In fact, the biggest obstacle to trade in climate-friendly technologies is that most developing countries simply lack the market for these products. This is further supported by the fact that in many developing countries with low tariffs, there have been no signs of higher demand for climate-friendly technologies (ICTSD 2008c).

Aside from these theoretical pitfalls, there is a great risk that in practice the WTO negotiations may fall short of their goal. Many governments favour liberalising trade in environmental goods in order to pursue economic interests, rather than ecological goals. As a result, it is almost impossible to separate export interests from the discussion on which technologies are environmentally and climate-friendly. After Brazil suggested ethanol as an environmental good that should be eligible for trade liberalisation, the EU in turn suggested biodiesel – despite the fact that biodiesel production in Europe has a questionable climate benefit. Katar even suggested gas or gas-fired power stations as environmental goods, because less CO₂ is emitted in the burning of gas than of oil and coal (Cosbey/Tarasofsky 2007, p. 18; ICTSD 2008a, p. 39). No party so far suggested that hard coal was also an environmental good, because it's cleaner than brown coal. But it's clear that the negotiations over liberalising trade in environmental goods can arouse economic greed, which runs counter to climate protection.

...versus cooperative technology transfer

Developing countries have repeatedly stated that for them, the abolition of tariffs is not the most important instrument for the diffusion of climate-friendly products and technologies. The transfer of know-how, capacity building, technical assistance and financial support for the introduction of technologies are more important to them. Academic studies also suggest that the abolition of tariffs only speeds up the diffusion of those goods that are at the last level of the innovation chain, i.e. goods that are ready for the market. For technologies at an earlier innovation level – i.e. technologies that are not ready for the market or not yet competitive in terms of price – initiatives such as knowledge exchange, joint research and development and incentive programmes are more effective. Nor is liberalisation the best way to stimulate continued innovations in low-emission goods and technologies; instead, common standards and incentive systems – such as subsidies – are more effective for this (De Conninck et al. 2007; Ott et al. 2008). If, however, liberalisation aims to abolish not only tariffs but also non-tariff barriers, this could render the introduction of standards and incentive systems for climate protection difficult or even impossible.

Knowledge transfer and capacity building are particularly important when technologies have to be adapted to suit specific sites. For instance, without technical adaptation, even world market leading wind turbines from Germany are unsuitable for introduction into Mongolia with temperatures of up to minus 50 degrees Celsius. That is why foreign companies seek cooperation with local firms, to improve their products together. Liberalising trade, however, could mean that national industries are displaced and only a few suppliers are successful worldwide. The adaptability and diver-

sity of research and production development may suffer as a result. The 'global suppliers' would need to differentiate their product range so well that they could cater to every possible national and regional particularity. If not, improved efficiency in trade will be bought with inefficiencies in climate protection.

There is also the fact that liberalising renewable energy technologies may be counterproductive for countries' energy security. The abolition of tariffs will encourage a stronger international division of labour, making countries dependent on overseas products and services for their energy recovery. The incontrovertible advantage of renewable energies – that through short production chains they can reduce dependency on energy imports (Scheer 1999) – would be lost. If the production of wind power, bio-gas energy and solar installations takes place in international supply chains that branch out in all directions, then the current dependency on oil will simply be replaced by a dependency on overseas semifinished elements and know-how.

Furthermore, local or national production is often more climate-friendly because it reduces the volume of traffic, whereas increased world trade in climate-friendly goods and services will lead to a higher volume of traffic. The long-distance transportation of goods will only have a positive global climate impact if products can be produced in places with significantly lower emissions. That may well be the case for several agricultural products, or for instance for the aluminium industry in Iceland, which carries out its energy-intensive production with geothermal energy in a comparatively climate-friendly way (although it still results in unacceptable damage to the ecosystems and agriculture there). But for the majority of environmental goods from the producing industries – from solar panels to smart meters to energy-efficient refrigerators

– it is not clear why producing them in, say, Belgium should release fewer greenhouse gas emissions than in Bali or Bolivia.

The bottom line is that abolishing tariffs could slightly speed up the diffusion and use of goods that are ready for the market. But there are disadvantages as regards both climate protection and energy security. In light of this, liberalisation should not be multilaterally prescribed for all countries to the same extent; rather, it should remain a national decision. However, there could be a multilateral climate protection requirement obliging countries to enforce the use of the best possible technologies. But in implementing this, governments should remain in a position to achieve the best possible balance of market liberalisation and national production for their specific country. The proposal from Brazil, of negotiating liberalisation using a ‘request-offer’ process, whereby countries can offer a specific liberalisation commitment for each individual sector and can request the same in turn from their trading partners, would be compatible with this requirement; as would the proposals from India and Argentina, to introduce temporary liberalisation that is tied to specific projects, along the same lines as the Clean Development Mechanism (CDM) (cf. ICTSD 2008c).

If anything, the international community could call for a tariff abolition to accompany finance transfers to support the development of production capacities for climate-friendly goods and services in Southern countries, along the lines of the planned Copenhagen Agreement. For finance transfers for the production of goods that are partly dependent on imports should not be skimmed through high tariffs and narrowed in their effect. Liberalisation of this kind should be discussed alongside other issues like transfer measures and standards. The appropriate forum for

this would not be the WTO, but the UNFCCC or the Kyoto Protocol, the United Nations Environment Programme (UNEP) or the recently founded International Renewable Energy Agency (IRENA).

How both North and South can benefit

The topic of technology transfer is already central to climate talks today – it may even become a ‘deal breaker’. Various emerging and developing countries, in particular China, have already made it clear that their agreement on other topics depends on important decisions about technology transfer. The G77 nation group and China have laid the groundwork for this: their success in the negotiations at the climate conference in Bali in December 2007, since referred to as the ‘Bali Balance’, was to insist that developing countries would only undertake their own climate efforts if industrial countries supported them in it by providing adequate finances and technologies. Support from the North for the South had in fact already been decided upon in the UNFCCC of 1992, and again in the Kyoto Protocol of 1997 – but on a voluntary basis, and the necessary funds were never specified. As a result, hardly any funds flowed. Developing countries are no longer prepared to rely on well-meaning promises and the voluntary goodwill of industrial countries, only to be fobbed off with a couple of million for investment in clean technologies. The IPCC and the Stern Report calculated that it would take billions, if not hundreds of billions, of dollars annually to finance the transition to a solar economy in developing countries (Stern 2007; IPCC 2007).

The ‘Bali Balance’ was seen by industrial countries as a bitter pill; a necessary if also considerable sacrifice to move the South towards participation in climate protection. But the tables are

beginning to turn. They have already seen their chance to make considerable profits from technology transfer. Many technologies are developed and manufactured in the North. Technology transfer has created a new business field, and export industries for climate-friendly products could get a huge boost from it. This kind of 'green export promotion programme' seems to have appeared almost on-cue in times of financial crisis and economic recession. And patent fees would guarantee that revenue flows back to the North, if products are produced there.

There are actually several industrial countries that, as exporters, are profiting from the growing international market for environmental goods. German companies are world leaders in this market. With a share of 16% of the world market and an export volume of 56 billion Euros, in 2006 (and in previous years) they came top place, ahead of competition from the USA and Japan (UBA 2008). Likewise in the goods from the abovementioned list of 40 especially climate-friendly goods, Germany occupies a prominent place; but emerging countries are also among the chief exporters, for instance China, Indonesia, Malaysia and Mexico. The USA are still net importers of these (ICTSD 2008a). But it is not unlikely that Obama's new government will pursue a win-win strategy of technology promotion in developing countries: not only to move China and other emerging countries towards emission reductions, but also to kick-start the underdeveloped US climate protection industry into action. In the end, technology transfer – which for fairness' sake was originally intended to serve those countries that don't yet have the production capacity for climate-friendly technologies – might provide more benefits for export nations than for developing countries.

Linking technology transfer with export promotion has become a key vi-

sion by the German government. In its Memorandum on Ecological Industry Policy, the Federal Environment Ministry presented a strategy to combine ecological goals with economic interests and to reposition the German economy in the global division of labour "as a producer of efficiency, exporter of infinite energy, guarantor of global environmentally sound mobility, a competence centre for public services provision and waste and wastewater disposal, in general as a global provider of environmental technology and services for the 21st century" (BMU 2006; cf. BMU 2008). This restores the positive image of Germany as 'export world champion' and paints it green. But the question arises, is it really sustainable, both in social and ecological terms, for Germany and other industrial countries as well as China and some other export-strong emerging countries, to supply the rest of the world with climate-friendly technologies?

From an ecological perspective, the same arguments follow that were raised earlier against liberalising trade: the energy security of many countries, particularly in the South, is weakened by their dependency on product design, know-how, and the range of technologies being developed in export nations. Likewise, the increased volume of traffic will be counterproductive in many cases, if German firms deliver to Chile and Chinese firms deliver to the Horn of Africa.

There are also arguments to suggest that export leadership from a few countries is socially problematic as well. Of course export countries profit from other countries buying their goods. For them, exportation creates jobs, optimises corporate profits and stimulates overall economic growth. Not only in Germany, but also in China, the orientation of exportation has also become a central factor for job security and for the integration of the millions of immigrant

workers who flood into the urban centres from rural regions. On the other hand, export countries take jobs away from buyer countries. Every job that depends on an export could also lead to a job in the import country if the good was manufactured there. Should billions be mobilised at a multilateral level for a type of technology transfer that creates an export boom for a few countries in the name of climate protection, while the majority of countries get nothing? Evidently, the question for a win-win-strategy should really be: how can we organise a broad international cooperation that will bring advantages for companies in industrial countries, but at the same time will help to build up a corresponding industry in Southern countries?

However, focussing on export promotion as a centre goal can create a problem of economic security – at least if this perpetuates imbalances in the terms of trade. Above all, poorer countries have to struggle with chronically negative trade balances; many of them cannot even raise sufficient foreign currency for essential import goods like medicines or food. But nor is the North secure: the financial and economic crises in Mexico in 1994, Asia in 1997/1998, Argentina after 1999 and currently in the USA and worldwide were all caused to a large extent by instability in the trade balance. For this reason, every trade policy strategy – even the strategy for technology transfer, which would after all reduce oil, gas and coal imports – is problematic if it aims to make a large number of import countries dependent on a few export countries in the long term (Santarius 2008a and 2008b).

Of course import countries cannot set up their own production of climate-friendly technologies overnight. So temporarily, it makes sense for Germany and other export countries to stand by as suppliers of modern technologies – not only for the transfer of know-how that

has already been developed, but also initially to supply physical products. And provided that alongside these exports, foreign currency is also transferred, to prevent negative balances in Southern countries, acute problems will be avoided. But if the genuine goal of, say, the Ecological Industry Policy in Germany to facilitate the development of local production capacities elsewhere through exports, and not just to guarantee the market position of German companies, then it would need to have an exit strategy in mind. German export promotion would then include a clearly limited timeframe, one that included a withdrawal date for the allocation of sponsorship, and the promotion of exports would need to be tied to the proviso that knowledge transfer and capacity building must always take place for the trade partner.

Even idealists will find it hard to believe that, individually and of their own accord, countries will combine an export offensive with an exit strategy. So long as tangible economic interests govern technology transfer and trade in climate-friendly technologies, no export country is going to withdraw unilaterally from the world market. For this reason, we must ensure at the multilateral level that technology transfer does not deepen uneven trade relations and burden developing countries with greater dependency.

This is absolutely a task for climate policy. For ultimately, technology transfer should be about rapidly building up production capacity in developing countries. This is the only way that these countries, with all their capacities, can be integrated into the innovation offensive for greenhouse gas-free technologies which is urgently needed worldwide; it is the only way to achieve local production and the best possible adaptation of technologies to specific locations so as to maximise green house gas reductions; it is the only way that cheap

products can rapidly be exported from developing and industrial countries to other developing countries; and it's the only way that countries can become independent in generating renewable energies, improving their energy security.

The goal of developing a self-sufficient climate protection industry in as many countries as possible evident in the fact that for a while now, the climate negotiators have talked of "technology development", and no longer just "technology transfer". It's time to deliver on this "technology development". Otherwise there is a risk that the billions spent on technology transfer will end up in a gigantic North-South-North stream of capital. Then the result of all these finance transfers might simply be that developing countries buy more from export-strong industrial and emerging countries.

Climate protection innovations are global public goods

Many developing countries believe that it is because of various forms of intellectual property, patents in particular, that they have been trapped in long-term dependency on industrial countries. This is why it sparked off widespread criticism in development policy when intellectual property rights were first adopted by the WTO with its "Agreement on Trade-related Aspects of Intellectual Property Rights" (TRIPS) in 1995 (cf. Khor 2001; Chang 2002). In the discussions about technology transfer, developing countries are asking for a development-friendly regulation of intellectual property rights, to ensure that no new dependencies arise from the expansion of production capacity for climate and energy technologies.

From an ecological point of view, it is also feared that intellectual property could be an obstacle to the rapid spread

of climate-friendly technologies; after all, over the next ten years we need to set the course for unprecedented leaps in technology – a technological revolution, in fact – if we are to avert dangerous and irreversible climate change. The objection is that, particularly in Southern countries, patent fees could be an impediment because they raise the price of climate-friendly products, meaning they stand an even worse chance against 'fossil fuel competition'. There are two important questions: do patents hinder the rapid diffusion and use of climate-friendly products and technologies? And: do they hinder the development of independent production capacities in the South?

Perhaps the two questions are in tension with one another. On the one hand it can be argued that patents provide an incentive for the development of products and international trade in them. Companies can refinance their production using patent fees, and the profits from the fees give them an incentive to continue investing in research and development and thereby keep developing technologies with lower and lower emissions. Put simply, the argument is: no patents, no technological progress. On the other hand, critics object that intellectual property rights hinder the free exchange of information and therefore also hinder the transfer of know-how to other producers. 97% of all patents worldwide are held by actors in industrial countries; this restricts research, development and innovation in developing and emerging countries. The gap widens between industrial and developing countries in terms of knowledge and the pace of the 'technological revolution' in the South is slowed down (Oh 2000; Hoekmann et al. 2004).

But are these considerations, from both sides, really relevant in practice to the transfer of climate-friendly technologies? As yet, there are no extensive impact assessments available. In an analy-

sis by the UNFCCC Secretariat of over 15 obstructions and market access barriers, patents came last on the list (UNFCCC 2007). Initial empirical studies show that for solar energy, wind power and agrofuel technologies, the impact of patents on technology transfer in developing countries is low (Barton 2007). Inadequate funding and high investment costs are more significant obstacles. Furthermore, on its own, the dissolution of patent protection wouldn't necessarily facilitate the use of these technologies; companies may still lack the know-how and technical capacity to introduce the relevant technologies (Cosbey 2007). However, some studies have found that patents are one of the factors preventing developing countries from having access to the newest technologies (Ockwell et al. 2007; Ockwell 2008).

It is also safe to assume that the number of applications for patents in the field of climate technologies and energy technologies is going to rise dramatically in the future. This will mean that intellectual property becomes increasingly significant, not only in climate policy terms but also economically. The question of how relevant patents are may seem very different when viewed in light of the future rather than the past. It is therefore no wonder that countries such as China which complain of underdeveloped technology transfer are not calling for the regulations on intellectual property to be softened; this would jeopardise China's own ambitions of consolidating its leading competitive position in climate-friendly technologies and safeguarding itself against competitors in the long-term. Nevertheless, in climate talks China and some developing countries, including India, Indonesia, Cuba and Tanzania, have requested a full clarification of the significance of intellectual property rights to technology transfer, calling for solutions to be developed where necessary if they are shown to be obstacles in important sectors (ICTSD 2008b).

One possible solution that was discussed was for developing countries to be granted compulsory licences for climate-friendly technologies. This would oblige patent owners from industrial countries to authorise companies in developing countries to use their patents. But on closer inspection, it is unclear how effective this proposal would be. According to the WTO TRIPS agreement, certain requirements must be fulfilled in order to be able to issue a compulsory license. Anyone seeking a licence would need to have tried unsuccessfully to obtain a licence from the owner of the trademark. If we are talking about a few individual patents, this is certainly feasible. But in the case of climate-friendly technologies, there are thousands if not tens of thousands of patents that could be relevant. Over 170 patents are necessary for the building of an offshore wind farm alone (Hütz-Adams/Haakonsson 2008). It would be a considerable expense in terms of administration and policy to allocate compulsory licenses for the whole range of technologies relevant to climate policy. At most, this would only be feasible for a few basic technologies, such as central renewable energy technologies.

But even then it must be proven that the compulsory licence is strongly enough in the public interest to justify an intervention in patent rights. To demonstrate this, a direct link must be found between a 'national emergencies' or 'other circumstances of extreme urgency'. In the discussion over AIDS medication, this link could be plausibly argued: here, there is a certain amount of medication and a country with a high disease rate that is actually dependent on being able to provide its population with this medication at a low cost, for the protection of public health. But in the case of patents on certain solar panels or wind turbines, it would be harder to prove that a patent was impeding a country's progress in preventing climate chaos, since there are still countless other

technologies (and also economic sectors) that could be brought to bear for the effective prevention of emissions.

So, whilst the allocation of compulsory licences may be a solution in a few cases, it is no comprehensive answer to the problem. Furthermore, compulsory licenses only deliver on the ecological aim of enforcing the spread of climate-friendly technologies. They don't provide a solution to the development policy aim of building up independent national production capacities. Compulsory licences can only be issued on a temporary basis. And ultimately, they don't solve the problem of inadequate financial power, which is the greatest obstacle faced by developing countries – the WTO stipulates that patent owners must be compensated for the compulsory licence with 'adequate remuneration'.

Meanwhile, for the support of countries with inadequate financial power, a different proposal looks interesting. Its application would be extensive: an international fund could cover the patent fees for companies in developing countries. For instance, as suggested by the Group of African States in the current climate talks, a Multilateral Technology Acquisition Fund could buy or pay patent fees that were requested by companies in the South (ICTSD 2008b). This would comply with the UNFCCC (Article 4.3) goal of industrial countries bearing all the incremental costs for developing countries from increased climate protection efforts. But this proposal, too, only fulfils one of the abovementioned conditions: it meets the ecological goal of rapidly spreading technologies. But it falls short of the development policy goal of ensuring that no new dependencies are created.

This is why we need to consider a further-reaching intervention into patent rights. It is likely that following the current climate negotiations, considerable

sums of money are earmarked for research into climate-friendly products and their development and demonstration. If public money is to be invested into the research and development of new climate and energy technologies, then the state could maintain a public influence on the intellectual property rights arising from this research (cf. 2007, p. 500). This was also suggested by the Executive Secretary of the UNFCCC, Yvo de Boer (quoted in Hütz-Adams/Haakonsson 2008, p. 18).

A concrete example of how public access to new technologies can be combined with an incentive for continued innovations from academics and companies is an Insurance Fund for Climate Protection Technologies (cf. Maskus/Reichman 2005; Third World Network 2008). Such a fund could be set up within the Copenhagen Agreement. All researchers and developers of technologies classified as relevant to the adaptation to climate change and the reduction of greenhouse gases would be obliged to make their findings accessible through this fund. Research and development that was not mainly achieved through public sponsorship would always be financially compensated by the fund. At the same time, inventors would have assurance that their innovations would only be used for the purpose of climate protection; where necessary, a time limit on third party use could be imposed. The innovations would be recorded in a central register, making them easier for Southern and Northern companies to use. Companies could make use of these innovations for a fee or even for free, if the fund was bolstered by public money. In the long term, a strategy should also be developed for the fund to conduct its own research sponsorship alongside meeting the demand for technologies. The fund would simultaneously be an information exchange, a safeguard for inventions and a springboard for climate and adaptation technologies. And innovations aris-

ing from the fund would be available to human beings as a global public good.

Investment governance for a vital climate protection industry

In order to guarantee the development of local production capacities in developing countries that will be independent in the long term, it is essential to have intelligent management and governance of foreign investment. Mobilising increased private economic investment is one of the core issues of the climate talks on technology transfer. For it is obvious that even billions from public funds will not be sufficient to heave the whole of the South onto a climate-friendly development path. Rather, the public funds will provide a starting point and serve as leverage to mobilise a larger amount of private capital and channel it into climate-friendly investment objects. In fact, there will only be a technological revolution in climate-friendly products and technologies if the private sector acts in self-interest and doesn't depend on public funds in the long-term. The same is true for the transfer of technologies and know-how in developing countries: only if the private economy is present with its own interests and capital will a really large transfer be able to take place.

Several countries in the climate negotiations, above all, Australia, Japan, Canada, Russia and the USA, have questioned the sense of pouring large amounts of public capital into technology transfer and want all the funding to come from private investment instead. 'Market, not state' is their motto – and, at the same time, a good excuse to get out of a substantial state commitment. However, even those states that see the deployment of public funds as essential would acknowledge that by far the largest amount of investment should come from private foreign direct investment in developing countries, and not from pub-

lic development aid. To this extent, there is a wide consensus among policy-makers, NGOs, academics and even companies that the greatest part of technology transfer, including knowledge transfer and capacity building, must be undertaken through the market. At the same time, though, it is clear that this will only work as a climate protection programme if the state first of all provides a start-fund and secondly prescribes the appropriate framework.

The central and overarching question is therefore: what would the right framework look like, that first of all generates increased foreign investment, secondly guarantees that these are climate-friendly and thirdly contributes to the development of a vital national climate protection industry in the global South? It is clear that this would necessitate a stringent regulation of investment flows.

In many Southern countries and at the level of international economic and trade agreements, frameworks for the supervision of foreign investment are absent – often because these countries were advised for decades to deregulate their investment policy to entice foreign investors. But what is even more problematic is that certain aspects of the General Agreement on Trade in Services (GATS), the WTO Agreement on Trade-Related Investment Measures (TRIMS), not to mention hundreds of Bilateral Investment Treaties (BITs) and investment agreements (e.g. the NAFTA), obstruct the active governance of foreign investments. For instance, most BITs actually lay down the rights of companies to establish themselves abroad, buy up local companies and be able to obtain work visas for foreign employees. Conversely, measures for a policy regulation of foreign investments are made harder by these agreements or in extreme cases are even prohibited – for instance, foreign investors are granted the opportunity to lodge complaints about expropriation or lost profits, if a

government introduces a climate protection measure (for a detailed explanation see Miles 2008; Werksman/Baumert/Dubash 2003).

Meanwhile, most countries were fooled into believing that deregulating foreign investment or participating in a bilateral or regional investment agreement would attract investments on a fairly large scale. Around three quarters of all worldwide foreign investments flow into industrial countries, where the requirements for investors are often higher than in developing countries; more than 80% of the quarter that flows into developing countries is concentrated in just 12 countries of medium income, and half of it is in China (Zarsky 2005; VENRO 2007). For most countries, deregulation has brought nothing: they have hardly attracted any foreign capital, but it does make it harder for governments to steer the few investments there are in order to make them as environmentally friendly and useful as possible for the local economy. However, it can't be denied that there is a certain tension between on the one hand, generating investments and on the other hand, strict regulation. It is therefore important that we always discuss the three necessary conditions together, as a package: how to achieve sustainable, locally embedded, and more investments.

In order to ensure climate protection, it should be a minimum requirement that foreign investments (and national investments, for that matter) are subjected to a climate impact assessment. Part of the assessment of how environmentally friendly the investment is, a process which is standard in many countries today, could be to scrutinise the effect of the investment on the country's emissions development. Countries should subject foreign investments to a thorough climate check and only approve them following a solid positive evaluation; for instance, showing that the planned project would contribute to the

country's climate protection goals. This should apply to investments in energy- or emissions-intensive sectors as soon as possible, and in the longer term to investments in all economic sectors.

To guarantee the development of a vital climate protection industry in Southern countries, other instruments is necessary. On the one hand, we must avoid a situation where foreign companies are only present locally to peddle their products, which are manufactured elsewhere. On the other hand, we should strive for a strong interconnection between foreign investors and domestic companies, which would create incentives for companies to really deliver know-how and contribute to the development of an independent production capacity. There are three potential policies for implementing these goals.

Firstly, a sit-here-to-sell-here policy could ensure that foreign companies, i.e. multinational concerns, are only allowed to sell their climate-friendly technologies to a particular market if they also produce there (Hines 2000; Woodin/Lucas 2001). In other words, their market access would be dependent on having production branches in that country. In all those places where import substitution is a realistic option, a policy like this would contribute to the development of domestic production capacity. In this way, developing countries could benefit from the advantages that the main leading technology companies from abroad have to offer, including international technology transfer and the spread of information. At the same time, the activities of these companies would become embedded in the local economy, increasing the potential of the domestic value added.

Secondly, local sourcing policies could be a useful way of strengthening local suppliers and the national production capacity. Local sourcing policies could make foreign companies obliged

to buy from domestic suppliers whenever possible. Companies would have to link up with local processing firms and sell to domestic vendors and retailers. It could also be stipulated that they should use local services whenever possible. Companies could also be compelled to support local cooperative partners and service providers through training, to contribute to local capacity-building.

Thirdly, joint ventures in the climate and energy sectors could be prescribed, so that know-how from foreign companies became anchored in the country. In countries like China, which made systematic use of this regulation in the past, this has contributed significantly to the development of know-how and technical competence in the country (Berrah et al. 2007).

If investments that are subjected to rules of this sort are supported by funds from the North – and large financial transfers for this kind of purpose are currently being discussed in the negotiations for the Copenhagen Agreement – then this might finally mean that despite strict regulation, new investment currents would be generated. A geographical key to the allocation of public support could also make foreign investment flow into those countries that have been excluded up until now. Furthermore, it is worth thinking about a stricter regulation, along the lines of the Clean Development Mechanism (CDM): investments in Southern countries receive more or less support, depending on how far they really contribute to the reduction of emissions. The existing international institutions of the CDM wouldn't necessarily need to be used for this – instead, countries could set up their own regulations for foreign investment, with their own rules on the authorisation and monitoring of investment processes.

Alongside these proposals for national regulation of investment to further

climate protection and the development of national production capacity, another option is a multilateral or regional course of action. For example, the Energy Charter Protocol on Energy Efficiency and Related Environmental Aspects could be reformed and extended, which would help its member states to reduce negative environmental impacts from energy production and to introduce energy-efficient measures (www.encharter.org). Another option would be to introduce policies in relation to specific (interregional) cooperation projects. An example of this would be investments from the EU in North African and Middle East countries, to install a SuperSmartGrid over the borders of the Mediterranean. This type of SuperSmartGrid could help EU countries to achieve a full solar energy supply within a few decades through the use of energy from sun-rich regions south of the Mediterranean. Simultaneously, it would advance the sustainable economic development of North African countries and the development of climate-friendly industries there.

Proposals for this are already on the table. In 2003, the Trans-Mediterranean Renewable Energy Cooperation (TREC) was founded by the Club of Rome, the Hamburg Climate Protection Concept and the Jordanian National Energy Research Center. It proposed the transfer of solar and wind energy generated in desert regions to Europe (www.desertec.org/de). This is a good initiative in terms of climate protection and energy security. But as yet the development and trade policy aspects have been largely ignored. In order to prevent North African countries from simply becoming exporters of solar energy from large concentrated solar power stations that are run by European companies – in short, in order that the colonial pattern of resource exploitation is not perpetuated in the name of climate protection, the initiative will need to integrate development-friendly regu-

lations of trade and investment into its concept.

To promote a balanced mix of larger concentrated solar power stations and wind farms and smaller, decentralised solar power or solar-thermal plants for domestic use in North African countries, the energy partnership will need not only to regulate energy imports and exports, but also to include the transfer of know-how about renewable technologies. Furthermore, it should stipulate that the building, operation and maintenance of the power plants, as well as

the marketing of the energy, improve domestic value added. In the early stages, the partnership should also include assistance to universities and research institutions for the training of engineers and skilled workers. It is only through a combination of joint ventures in investment *and* local capacity building *and* favourable trading conditions that North African countries will be in a position to build up an independent industrial and service sector for renewable energies, diversify their economies and, with the help of a solar economic structure, generate sustainable wealth.

Summary of main findings

This study demonstrates that the imminent danger of climate change necessitates fundamental reforms in world trade regulation. The decades-old aim of liberalising trade between countries and creating a free world market runs counter to climate protection. What used to be controversially debated has now been empirically proven: the expansion of markets and trade relations fuels climate change (chapter 1). Transnational product chains, which fan out the production of one product to a dozen or more locations across the world, may lower business costs – but in most cases, they also create a volume of traffic that is crazy in climate policy terms. Rather than helping this kind of globalisation to flourish through further liberalisation, trade policy should subject world trade flows to a climate check. For one, it would make sense to specialise the production of energy-intensive goods in places where particularly low-emission production is possible. In addition, the internalisation of external costs would make the unnecessary globalisation of commodity flows and production chains less profitable. Evidently, this will require a radical reform of existing world trade regulations.

To achieve this, though, more needs to be done than just pointing the finger at trade policy. Climate policy, which has consistently avoided trade policy topics up to now, will also need to undergo reform in order to make trade policy work for climate protection. Next, climate policy will need to address the fact that globalisation is leading to a creeping displacement of emissions from industrial countries to developing and emerging countries. It has been

shown empirically that this is not down to climate policies in industrial countries with cost impacts that cause companies to migrate. Rather, there are structural reasons behind it. Because Northern countries are turning into service economies, whilst Southern countries are catching up with industrialisation, worldwide production of all kinds of goods is gradually relocating to emerging and developing countries. Still, these goods are still mainly consumed in industrial countries. The EU has already displaced over 500 Mt CO₂ overseas – an amount equal to the combined emissions of France and the Netherlands. Altogether, industrial countries with reduction obligations under the Kyoto Protocol (Annex B countries) have displaced a quarter of their consumption-related CO₂ emissions overseas.

The displacement of emissions from North to South is extremely relevant to climate policy. So long as no reduction targets or even limitation targets exist in emerging and developing countries, the displacement of emissions from industrial countries means an increase in total global emissions. Moreover, territorial reporting makes emerging and developing countries less willing to commit to their own emission obligations in the mid- to long-term. In doing so, they would be accepting responsibility for emissions which, due to exportation, are at least partly the responsibility of consumers in industrial countries. To overcome this dilemma, the UNFCCC should broaden its reporting requirements to include information on export- and import-related emissions in the short term. In the longer term, and particularly if emerging and developing countries take on reduction commitments, a

principle of shared responsibility needs to be thought through. Industrialised countries could then take partial responsibility for the export-related emissions of their Southern trade partners and provide separate support for reduction activities in these countries (chapter 1).

Furthermore, climate policy needs to get better at actively intervening in trade policy. New forms of trade regulation must be considered. One possibility that has been discussed so far is a border adjustment to tax importers of energy-intensive goods, or require them to buy certificates of an existing domestic emissions trading scheme (chapter 2). This would enable countries to pursue an ambitious climate policy without losing competitiveness. However, it is evident from the discussion both in the USA and the EU that proponents are calling for a border adjustment less for climate protection reasons and more as an instrument of industrial and competition policies that weaken climate policy measures for greenhouse gas-intensive companies and ultimately aim to protect companies from the necessary structural changes. Quite apart from that, the discussion over the possible compatibility of a border adjustment with the basic principles of trade law in the WTO shows that to introduce it would necessitate a complex data collection process and expensive bureaucracy.

Therefore, instead of a border adjustment, we should consider whether a trade ban on climate-damaging goods and services could be beneficial in the long term. In a series of international environmental contracts, such as the Montreal Protocol, the Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the Stockholm and Basel Conventions, trade policy measures have proved an important building block in improving the effectiveness of these agreements. But for climate policy there is (still) the problem that almost

all imports and exports are full of greenhouse gas emissions, meaning that currently it would seem absurd to introduce bans. In the longer term, however, a trade ban on goods produced with fossil fuels is imperative. If by 2050 we are really going to reduce emissions in industrial countries by 90%, then several sectors will need to be close to CO₂-free within one to two decades from now. As soon as countries make real efforts to make industry production as CO₂-free as possible, a gradual trade ban on products that are still produced using fossil fuels will become feasible. It would speed up the shift to production processes that use renewable energies. And, unlike with a border adjustment, no complex calculations would be necessary; importers would simply need to present a certificate of production with renewable energies (chapter 2).

Reforms in trade policy and climate policy are also necessary for the diffusion of renewable energy technologies and climate-friendly products. One possibility, currently being discussed in the WTO, would be an improved trade liberalisation of environmentally and climate-friendly products and services (chapter 3). But, as has been shown, this brings disadvantages in terms of climate protection and energy security. Trade liberalisation might speed up the diffusion of goods that are ready for the market, but it won't create an incentive for the development of ever-improving low-emission technologies. Furthermore, liberalisation could be counterproductive for countries' energy security, since it is conducive to the international division of labour and higher market concentrations. As a result, it will reduce dependency on oil, gas and coal, only to replace it with new dependencies on overseas know-how and technologies. In contrast, regional or national production is not only more energy-secure, but often also more climate-friendly, as it reduces traffic volume. An ambitious climate protection strategy will therefore prioritise technology development and transfer –

through capacity building, knowledge transfer and joint research and development – over liberalisation.

This kind of technology transfer is currently being discussed in the international climate talks. One of the ideas being discussed is to supply billions annually to cofinance the shift to climate-friendly technologies in Southern countries. Because most developing countries do not yet have their own climate protection industries, there is a risk that these funds could work to the advantage of a few industrial and emerging countries as a ‘green export promotion programme.’ Instead, it should be used for building up independent production capacities in the South. This is the only way that these countries, with all their capacities, can be integrated into the innovation offensive for greenhouse gas-free technologies that is urgently needed worldwide. It’s also the only way for them to achieve the best possible adaptation of technologies to their specific geographical and social circumstances. Of course, temporarily, it makes sense for export countries to stand by as providers of modern technologies, including exports in hardware and physical products. But it must be ensured at a multilateral level that large investments in technology transfer don’t serve to deepen uneven trade relations, entangling developing countries in new dependencies.

To advance the diffusion of independent production capacities in Southern countries, we should aim towards a climate-specific regulation of intellectual property rights. The urgency with which climate-friendly technologies must be introduced worldwide means that knowledge of climate protection innovations should no longer be seen as private intellectual property – instead, they should be global public goods. Fees on existing patents proven to be a barrier to the rapid diffusion of technologies in developing countries should be covered by international finance. For future climate protection innovations – in particular for

those supported by public funds – an Insurance Fund for Climate Protection Technologies should be considered. The fund would release such innovations from any claim to intellectual property rights. It would put inventions that were relevant to climate protection in the public domain and make them useable through a central register. As part of this, the fund could charge a fee for commercial use and compensate the inventor (chapter 3).

In addition, foreign investments need to be intelligently monitored. Up to now, bilateral and regional investment agreements have essentially aimed to deregulate investments and at the same time to protect foreign investors. It is high time to create a framework to make foreign investment genuinely work in the interest of climate protection. Three goals must be pursued simultaneously: in order to ensure that (foreign) investment processes are useful to climate protection, they should be subjected to a thorough climate impact assessment; to avoid a situation where foreign investors are only present locally in order to peddle their finished products, we should introduce sit-here-to-sell-here policies, clear obligations to engage in joint ventures and local-sourcing policies; and if investments are subject to these sorts of regulations, they must be supported by capital from the North to generate new investment streams. A geographical ratio for the allocation of public support could also mean that foreign investments are allocated to formerly excluded countries for climate protection purposes (chapter 3).

For too long, international climate policy and trade policy have pursued conflicting goals, apparently undeterred by one another. Time has come for both fields of policy to confront each other. Only a joint discussion of how trade policy could contribute to climate protection can bring us closer to meeting the almost inconceivable challenge of switching to a solar economy within two generations.

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