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729

Claudia Kemfert



DIW Berlin

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for Economic Research

**The "Bali Convention":
Flexibility of Targets and Instruments Inevitable**

Berlin, September 2007

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The “Bali Convention”: Flexibility of Targets and Instruments Inevitable

Berlin, September 2007

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Abstract

The Kyoto Protocol is one first important step towards a global greenhouse gas emissions reduction strategy. In order to avoid irreversible climate changes and huge economic damage, not just some but all of the responsible nations should agree on a joint proposal to reduce emissions. Sharing the burden fairly would mean that those nations with high emissions per capita should reduce them more than countries with low emissions per capita. However, a fair burden sharing should also take into account early action and economic and social conditions. Most of the countries, especially those with high economic growth, fear large economic losses if emissions reduction targets are very high. Especially fast-growing nations such as China and India suspect negative consequences if climate policy takes a dominant role. The post-Kyoto negotiations can only be successful if flexibility of targets and instruments is considered. The next UN climate conference, at the end of 2007 in Bali, is an important starting point for a so-called “Bali Convention”. This convention should take into account different emissions reduction options and flexible emissions reduction targets. Germany’s Chancellor Merkel supports a world per capita emissions target; Europe should find soon a fair burden sharing between the EU member states and start negotiations with 30 % emissions reduction in order to make clear how serious EU is to reduce emissions. The APEC nations favour an energy intensity reduction target. The emissions intensity of a nation can be reduced if CO₂-free technologies are widely applied. Nations with a large share of CO₂ emissions resulting from high fossil-fuel usage or high methane emissions from energy production or agriculture usually favour flexible indexed targets. The “Bali Convention” should define such flexible targets to take into account national conditions and visions. It is most important that countries agree on binding targets, either concrete emissions reduction targets or indexed targets such as emissions intensity or per capita emissions. The key to success is flexibility of targets and instruments.

1 Introduction

Today’s society faces, like no generation before it, two main challenges: first, to guarantee secure and affordable energy supply; and second, to reduce and abolish environmental and climate harm caused by energy consumption. Over 80% of today’s primary energy consumption comes from non-renewable fossil fuels, such as coal, oil and gas. If we do not change our behaviour, the share of fossil-fuel resources in the future will remain as high as it is today. As

the major oil and gas reserves are located in few areas of the world, importing countries would become more vulnerable to supply disruptions and energy price shocks. Furthermore, fossil-fuel consumption causes CO₂ and greenhouse gas emissions and therefore climate change. The future energy mix should not be under-invested in vulnerable and dirty but clean, clever and competitive. Secure, reliable and affordable energy resources are fundamental to sustained economic development. The threat of disruptive climate change, the erosion of energy security and the world's growing demand for energy all pose major challenges for decision makers. To meet these challenges and transform our energy system, better use of existing technologies will be required, along with significant scientific innovation to spur the adoption of new energy technologies. Therefore, urgent action is needed to rapidly advance available energy efficiency and low-carbon technologies and practices. Basic science and energy research funding has been declining in the public and private sectors for the past several years. Additional funding is critically needed to develop a sustainable energy future. Research priorities encompass inter alia photovoltaics, carbon capture and sequestration (CCS), biofuels and hydrogen generation, storage and use.

The largest share of CO₂ emissions is caused by fossil-fuel combustion for energy production and transportation. Methane is also produced by the energy (gas exploration) sector as well as by agriculture. In order to reduce emissions, fossil fuels need to be replaced by CO₂-free energy technologies, energy efficiency needs to be improved considerably, and more sustainable energy and agricultural production procedures need to become standard. As energy security, competitiveness and the effect on climate cannot and should not be separated, future policy options should combine all aspects. Europe as the first nation in the world has taken the lead in combining concrete targets for energy and climate policy (European Commission 2007). Europe intends to cut emissions by 20% by 2020 compared with the 1990 level and to increase the share of renewable energy by 20% in the same time period. However, Europe intends to reduce even 30 % of their emissions if other nations are willing to accept climate policy commitments. It is important that Europe demonstrates the willingness and ability to cut emissions drastically. The Kyoto protocol needs to be fulfilled, the emissions trading scheme needs to be improved and a fair burden sharing needs to be implemented. Europe can convince other nations to agree on any kind of climate commitments only if Europe is willing to reduce 30 % by 2020.

Future climate policy negotiations should take into account joint initiatives and national activities. The Kyoto Protocol comprises concrete and binding emissions reduction targets. However, it only covers a few nations and contains only very small emissions reduction targets. The APEC nations¹ have agreed to reduce energy intensity by 25% by 2030 and acknowledge the importance of low- and zero-emissions technologies. The APEC initiative intends to increase forests and land use options and to implement adaptation strategies (APEC 2007). The USA never ratified the Kyoto Protocol but joined the APEC initiative and proposed to actively coordinate future efforts towards a post-Kyoto agreement. Australia intends to define a certain share of low emissions technologies like renewable energy and carbon capture and sequestration (CCS) coal technology.²

2 The Kyoto Agreement: From Hero to Zero?

The Kyoto Protocol came into force in 2005, after Russia ratified it in November 2004, and it expires in 2012. The Protocol intends to reduce greenhouse gas emissions by 5.2 % compared with the 1990 level of emissions by the commitment period 2008–12. The main intention of the Kyoto Protocol is to reduce emissions by concrete and binding emissions reduction limits on more than 55 countries covering more than 55% of total world emissions. High-income countries such as the EU, Japan and Canada have committed themselves to reducing emissions by binding emissions cuts, upper-middle economies such as Russia and Ukraine have to stabilise 1990 emissions and lower-middle and low-income economies such as China and India have no emissions reduction target. The USA never ratified the Kyoto Protocol. The Kyoto Protocol allows for flexible mechanisms such as an emissions trading system between the industrialised countries, the Clean Development Mechanism (CDM) and Joint Implementation (JI). Both CDM and JI allow for project transfers between industrialised and developing nations to reduce greenhouse gases.

Europe allocated national emissions reduction targets by a burden-sharing rule (see Figure 1). At the beginning of 2005, the European Union launched an emissions trading scheme (the

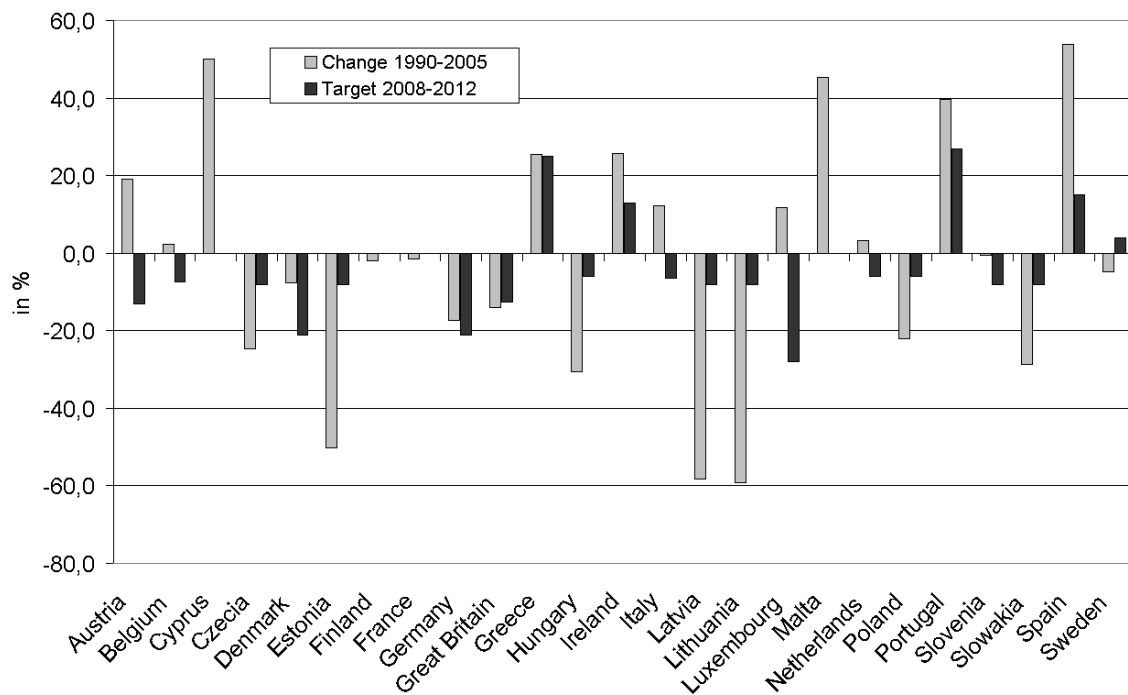
¹ The nations of APEC (Asia-Pacific Economic Cooperation) are: Australia, Brunei, Canada, Chile, China, Indonesia, Japan, Malaysia, Mexico, New Zealand, Papua New Guinea, Peru, the Philippines, Russia, Singapore, South Korea, Taiwan, Thailand, the USA and Vietnam.

² Australia announced a “New Clean Energy target” that defines a concrete amount of 30,000 Gigawatt ours of low emissions technologies like renewable energy and carbon capture and sequestration (CCS), see Turnbull and Macfarlane (2007).

“EU ETS”) under which firms operating in the energy and industry sectors of all EU countries are free to buy and sell CO₂ emissions allowances. Initial experiences with this new instrument indicate that incomplete information and imperfect competition – and consequent strategic behaviour – have led to an over-allocation of emissions allowances in almost all European countries (see Figure 2). The emissions trading market almost collapsed as a result, with the price of allowances dropping to almost zero in 2007.

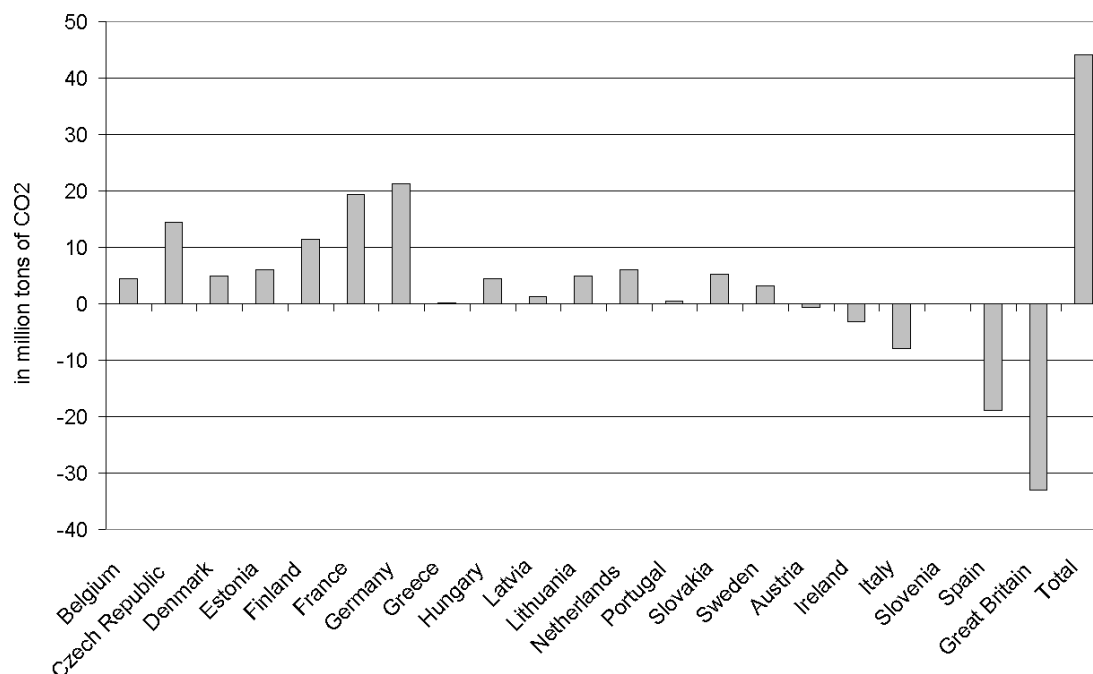
Figure 1

Changes in Greenhouse Gas Emissions and Kyoto Target for EU Countries³



³ Source: Unfccc (2006).

Figure 2

Surplus (+) and Deficit (-) of Regional Emissions Permits under NAPI ⁴

Over-allocations of this kind are unlikely to be repeated in the future, however, because the member states' national allocation plans (NAPs) for emissions allowances now require the approval of the European Commission. The future market price of emissions allowances for 2008 currently stands at 20 euros per tonne of CO₂. Some EU countries have decided to auction a small share of their emissions permits (EU member states may auction no more than 10% of their allocated emissions); for example, Germany plans to auction 9% (i.e. 40 million tonnes of CO₂ emissions) of its annual emissions allowances, which still leaves 91% of allowances being freely allocated. Given the existence of market imperfections and strategic behaviour, an open auction would probably drive up the price of allowances in order that the remaining, freely allocated share of emissions allowances would be valued as highly as possible. Thus, with a view to avoiding distortions of this nature, a book-building or fixed-price system is recommended as the most appropriate auction format.

All in all, it can be said that the instrument of emissions trading is basically an effective and cost-efficient tool for diminishing greenhouse gas emissions. However, its success will depend on the maximum possible number of countries, sectors and greenhouse gases being

⁴ Source: Kemfert et al (2007).

included in the scheme and on the freedom of member states to auction 100% of their emissions allowances. Full auctioning of emissions allowances would increase transparency; partial auctioning would neither resolve the problems of optimal free allocation nor reflect the real situation on the market. Recent moves in the USA towards joining the EU ETS at the county level could be a step in the right direction. The revenue from auctions could be used to promote low-emissions technologies and possibly to compensate those sectors that are subject to evident competitive disadvantages on international markets. In the long term, an effort must be made to make emissions trading a global instrument for climate protection.

Although the emissions reduction target of the Kyoto Protocol will not be enough to eradicate climate change, it is essential that the responsible nations agree on a joint proposal to shrink emissions: an effective climate policy needs to be global. Both the USA and Australia should have committed to some kind of climate policy. One advantage of the Kyoto Protocol is the flexibility of the instruments involved: emissions trading allows for cost-effective emissions cuts, while CDM and JI bring innovative low-carbon technologies to middle- and low-income countries. The flexibility of the instruments causes a double dividend of climate improvement and economic benefits. The main disadvantage of the Kyoto Protocol is that it does not allow for flexible emissions reduction targets. Flexible targets such as dynamic indexed targets cannot guarantee concrete emissions reductions but they do allow for the necessary economic flexibility. The APEC declaration illustrates that economic concerns are substantial, as the nations agreed on indexed targets that take into account dynamic growth. An intelligent climate policy should combine economic growth and emissions cuts, and a decoupling of economic growth and greenhouse gas emissions would be indispensable. Promoting innovative CO₂-free technologies not only brings more energy security, as it reduces vulnerability to energy supply disruptions and fossil-fuel price shocks, but can also strengthen economic growth and competitiveness.

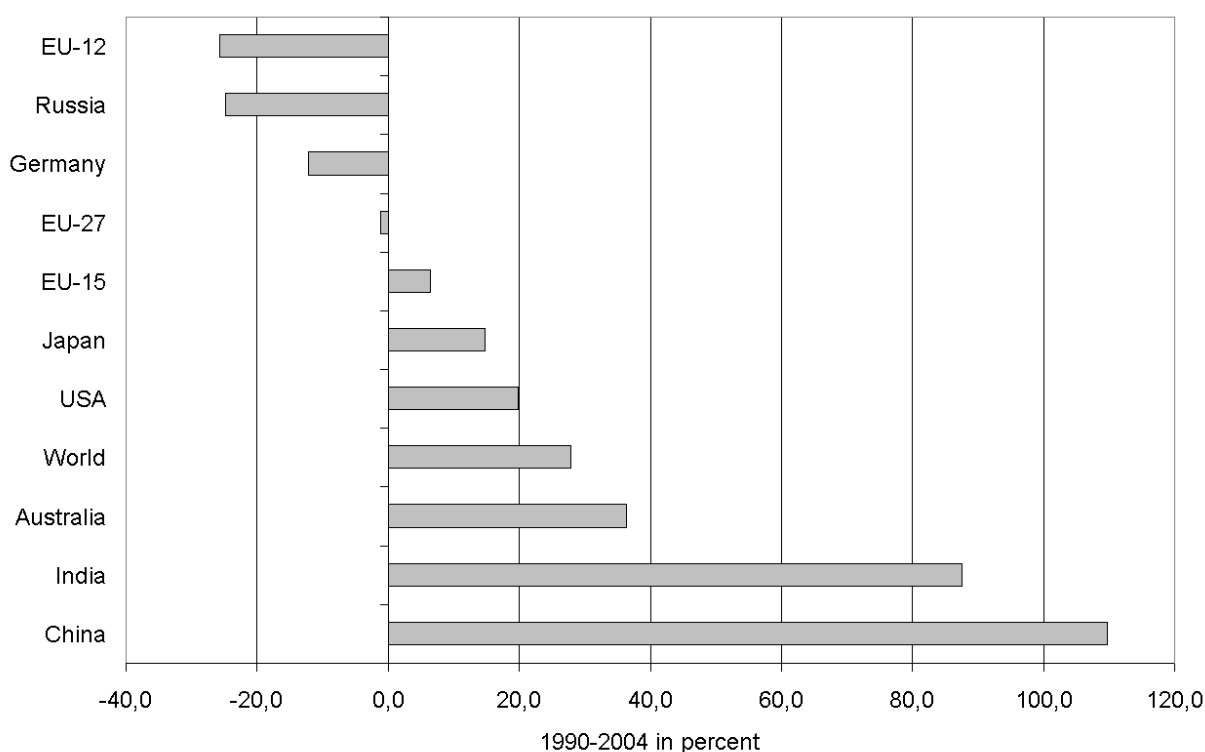
The Kyoto Protocol is one important first step towards an international climate agreement in which the responsible nations take the lead in reducing emissions. There was a long negotiation process from the first joint signing of the Protocol in December 1997 in Kyoto and the ratification of the last required nation, Russia, in November 2004. The current negotiations cannot be that long; an agreement is needed very soon. The main concern of high-emissions countries such as the USA was that concrete emissions reduction measures could harm economic development. The USA feared economic decline and disadvantages in the competitive-

ness of US firms, and it never ratified the Kyoto Protocol. In addition, Russia has never made any secret of its scepticism of the Protocol. Russia is a nation with one of the largest shares of oil and gas reserves in the world and therefore has a great interest in selling fossil fuels to the world, improving its economic performance and becoming a world market leader. The ratification of the Kyoto Protocol in 2004 by Russia was motivated not by climate policy but basically by economic reasons: both emissions trading and JI projects can bring positive impacts to the Russian economy. More importantly, Russia has a strong interest in joining the World Trade Organisation (WTO). It is most likely that Russia's position on climate and energy policy will change in the future and it will become a real opponent of any kind of emissions reduction. China and India, on the other hand, want to see concrete steps towards emissions reduction by the responsible nations such as the USA and Europe before they are willing to commit to any kind of emissions reduction target.

3 Flexibility of Targets

The economic and emissions development of different countries in the world have varied widely since the Kyoto base year of 1990. Upper-middle economies such as Russia suffered drastic economic decline, whereas high-income nations such as the USA and Australia increased their emissions significantly (see Figure 3). Europe-27 benefited from the enlargement of the Eastern European countries as these countries are characterised, like Russia, by significant economic decline. The increase of emissions was lower in the EU-15 countries than in the USA and Australia. Fast-growing countries such as China illustrated a very high emissions increase. In terms of emissions per capita, the USA, Canada and Australia headed the list of all world nations (see Figure 4).

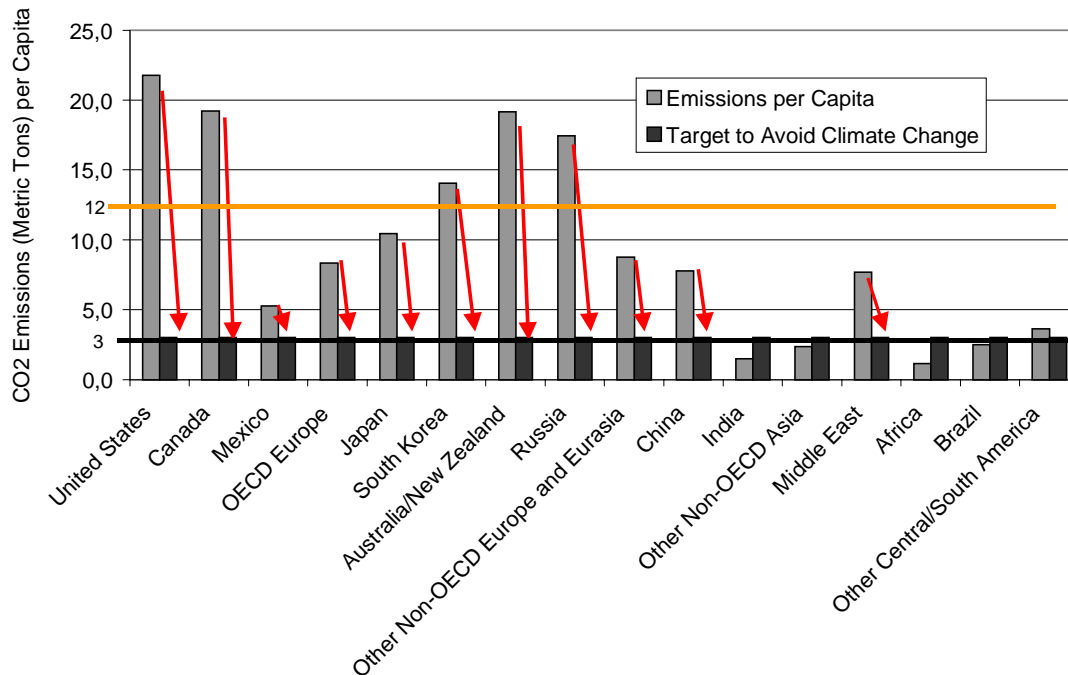
Figure 3

Changes in CO₂ Emissions from Combustion (%), 1990–2004⁵

In order to meet the 2°C target, the per capita target should not exceed 3 tonnes per capita (IPCC 2007). This emissions limit target would stop climate change but – most likely – would be politically not feasible. The most frequent criticism of concrete and fixed emissions reduction limits is that they do not take into account dynamic aspects, especially changes in growth or population. The economic costs of emissions limits are highly uncertain and probably often overestimated.

⁵ Source: International Energy Agency (2007).

Figure 4

CO₂ Emissions per Capita in 2004 and Targets ⁶

One alternative target would be an *indexed target* such as a target for CO₂ emissions per GDP or per capita (see Table 3-1).

As Figure 5 shows, emissions and GDP per capita vary widely between the world nations. Germany's Chancellor Merkel suggested that a global post-Kyoto agreement should be based on per capita emissions.⁷ The advantage of per capita emissions targets is that developing and fast-growing nations such as China and India would have the option of increasing their emissions to a certain target.

⁶ Sources: Energy Information Administration, EIA (2007) and own calculations.

⁷ See http://www.bundesregierung.de/nn_6538/Content/EN/Artikel/2007/08/2007-08-31-f_C3_BCnfter-tag-bundestkanzlerin-in-japan__en.html.

Table 3-1

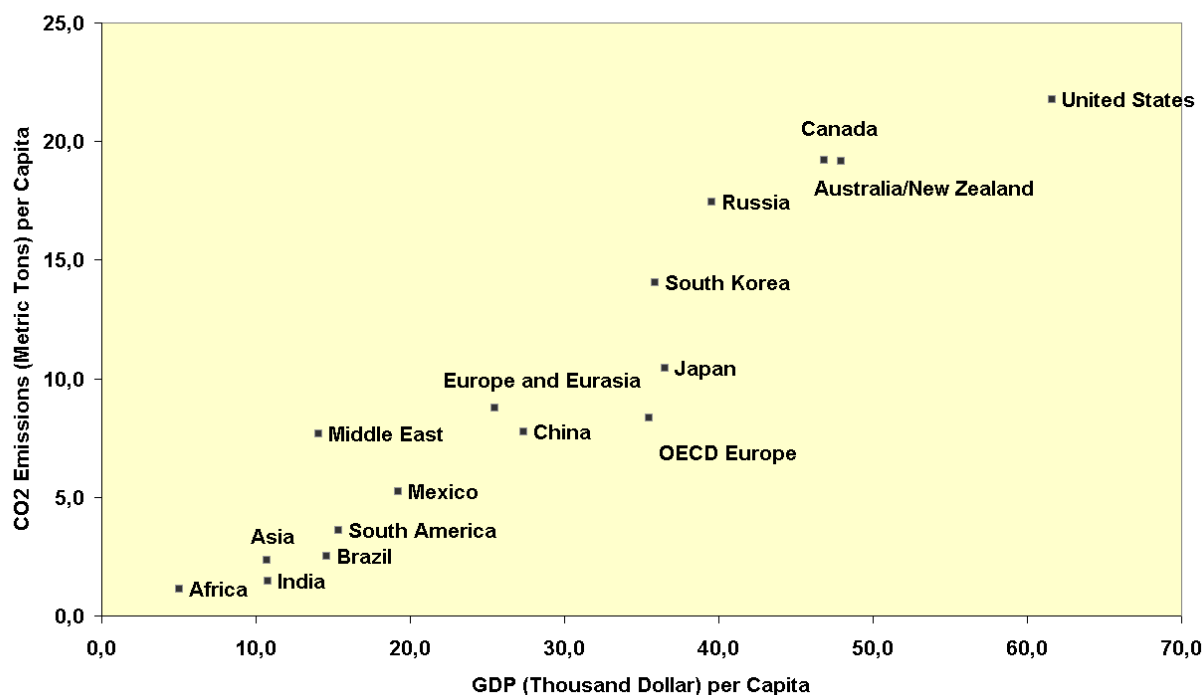
Positive (+), Negative (–) and Neutral (0) Impacts of Emissions Targets⁸

	Ecological effectiveness	Flexibility of compliance	Influence on economic growth	Control of costs
Absolute emissions reduction target	+	+	–	–
Indexed target	0	+	0	0
Conditioned target	0	+	0	+
Sector-specific target	0	0	0	–
Financial target	0 / –	+	0	+

The main concern of fast-growing nations is that any kind of emissions reduction limit will hinder economic growth. However, it depends on how the per capita target is defined. The advantage of such indexed targets is that dynamic economic or population developments can be included. The disadvantage of such a fixed target is that high-income and high-emissions countries such as the USA are very unlikely ever to accept any kind of drastic emissions reduction. Therefore it is advisable to find and define flexible and dynamic targets that take into account national conditions and visions. Another disadvantage is the determination of the correct and sufficient future target by the so called business as usual (BAU) development. The BAU emissions, technology or population development is highly uncertain. Indexed targets need to be adjusted in certain time frames.

⁸ Source: Bardt and Selke (2007).

Figure 5

CO₂ Emissions and GDP per Capita per Region in 2030⁹

Another option is that an emissions reduction target is linked with specific conditions, such as welfare or cost conditions (a conditioned target). For example, if a country exceeds a specific welfare measure (e.g. if it moves into a different income category) or if emissions reduction costs exceed a certain well-defined range, the target could be adjusted. One example that is often mentioned is the so-called “safety valve”. A country would reduce emissions as long as the emissions reduction costs do not exceed a certain limit. Within an emissions trading system, a safety valve would fix the price and would bring more certainty about economic costs (Paltsev et al. 2007). If an emissions permit price is fixed, though, the market-based mechanism of the emissions trading system, that supply and demand determine the scarcity price, is invalid. A safety valve would undermine the functioning of an emissions trading system and work more like an emissions tax. It would be more effective to combine an emissions trading system with flexible targets.

Emissions targets could also apply to specific sectors, such as energy or transport. Advantages of sector-specific targets are that sectors with high emissions reduction costs could be ex-

⁹ Sources: Energy Information Administration (2007) and International Energy Agency (2007).

cluded and that large economic disadvantages could be avoided. Financial targets to reduce emissions cannot guarantee that a concrete emissions reduction target will be met but they do allow for precise assessment of costs.

4 The Post-Kyoto Perspective: Viewpoints of Different Countries

Countries' perspectives on a post-Kyoto agreement diverge broadly. Whereas Europe intends to be the world leader on both emissions reduction aims and a sustainable energy policy, the USA and Australia seem to be sticking to more flexible mechanisms, as in the APEC declaration. However, some states in the USA and Australia seem to be interested in joining climate agreements separately.

Europe

The European Union plans to reduce its greenhouse gas emissions by something in the order of at least 20% by 2020 on 1990 levels. If other developed countries – the USA, for example – were to commit themselves to a climate protection agreement specifying similar emissions targets, and if developing countries were also to make an appropriate contribution, then Europe would be willing to reduce its emissions by 30% on 1990 levels over the same period. For the post Kyoto negotiations, it would be recommendable that Europe start with the emissions reduction goal of 30 % in order to signal other nations to set clear commitments. In this case, Germany would also be willing to strive for larger-scale reductions. Europe has committed itself under the Kyoto Protocol to reducing emissions of greenhouse gases by 8% from the base year (1990/1995) by the period 2008–12. Europe (EU-25) has already made a very significant contribution to emissions reductions and could meet or exceed this target by taking additional measures, the Kyoto mechanisms and credits for carbon sinks into consideration. Contributions made to reducing emissions vary substantially across the individual member states of the EU, however. The sharp economic decline seen in Eastern Europe over the last few years has led greenhouse gas emissions to decrease rapidly in most of the new member states, while they have increased in most of the old EU member states (EU-15) (see Table 4–1).

Germany has substantially reduced its greenhouse gas emissions since 1990. First and foremost, Germany was able to diminish emissions after 1990 by restructuring Eastern Germany's

power plant fleet, while other climate protection measures that have borne fruit were the increase in the use of renewable energy and of combined heat and power (CHP) plants and the introduction of energy taxes. Moreover, energy consumption has declined as a result of high energy prices and this has also reduced emissions. However, recent developments show that emissions have been driven up again in Germany by the strong economic growth registered in 2006. Other European countries, such as Spain, have failed to achieve significant emissions reductions and are a far cry from meeting the emissions targets laid down in the European burden-sharing agreement. Spain is likely to miss the target by 27.4%. Italy will only meet its target by taking additional measures, the Kyoto mechanisms and carbon sinks into account. Great Britain, by contrast, has already succeeded in significantly reducing its greenhouse gas emissions and will probably exceed its target (Kemfert et al. 2007).

Table 4-1

Different Emissions Reduction Targets (million tonnes of CO₂ equivalent) ¹⁰

	20 % fair	20%	40% fair	40%
Austria	23	19	46	38
Belgium	33	30	65	60
Czech Republic	22	30	45	59
Cyprus	2	2	5	4
Denmark	13	13	25	25
Estonia	0	4	1	8
Finland	15	14	29	28
France	118	113	236	225
<i>Germany</i>	<i>167</i>	<i>199</i>	<i>333</i>	<i>397</i>
Great Britain	120	132	239	263
Greece	34	27	68	55
Hungary	11	17	22	34
Ireland	18	14	35	28
Italy	136	117	272	234
Latvia	-1	2	-1	4
Lithuania	-1	4	-2	8
Luxembourg	3	3	7	6
Malta	1	1	2	1
Netherlands	48	44	96	88
Poland	62	77	124	155
Portugal	22	17	45	34
Slovakia	7	10	14	21
Slovenia	4	4	9	8
Spain	123	88	246	177
Sweden	14	14	28	28
Total	994	994	1987	1987

The distribution of the burden of EU emissions reductions of 20% by 2020 should take into account the reductions that have already been achieved in the individual countries and the reduction targets that have already been reached. A “fair” distribution of the remaining burden would take the emissions reductions achieved to date into consideration and would distribute the reduction obligations across the different countries in accordance with a burden equalisation scheme. If a fair distribution of the burden that takes past emissions reductions into account is negotiated, then Germany would be required to achieve reductions of 167 million tonnes of CO₂ equivalent (as opposed to 199 million tonnes) or 17% between 2005 and 2020; this would amount to total reductions of 33% on 1990 levels. Under the fair burden-sharing scheme, other European countries that have not yet contributed to reducing emissions would be obliged to make a much higher contribution based on the reductions they had achieved by 2005 (Table 4–1). In Spain, for example, emissions have risen substantially above the intended target, so Spain’s allocated contribution would be accordingly higher, while Great Britain’s emissions today, by contrast, are already below the Kyoto target.

USA

The USA has very strong concerns that any kind of emissions reduction will harm economic development. The USA is the country with the highest GDP and emissions per capita in the world (see Figure 5). Energy efficiency improvement options are not only very important but also cost effective. Improving energy efficiency means that energy consumption declines at low cost as high energy costs from fossil-fuel price increases will be diminished. As energy prices for fossil fuels such as oil and gas increase drastically, very high energy intensity is an even larger economic burden, though. Economic losses from fossil-fuel price increases of over 15% can cause a reduction in GDP of over 0.4 of a basis point. Not only does climate change trigger economic losses; in the short term, economic losses from fossil-fuel price increases are even higher.

Public awareness of climate change as an important challenge to future societies has increased drastically. Some states, such as California, have already announced reduction in emissions of

¹⁰ Source: Own calculations; we apply emissions reduction from 2005 emissions in order to take into account more intense emissions reductions.

25%.¹¹ It is likely that the USA will commit to some kind of emissions reduction target. However, it is unlikely that the USA will accept concrete and strong static emissions reduction targets. It is more likely to accept dynamic, indexed or conditioned targets (such as emissions per GDP or a safety valve). In order to determine indexed targets correctly, the development of the Business as Usual (BAU) emissions need to be specified. It is crucial that the USA joins a post-Kyoto agreement. Without the USA, the initiatives by Europe will not lead to a substantial reduction in the threat of global climate change, and neither will it be possible to convince any further countries, such as China, to act. The costs of emissions reductions can be reduced only if the USA and China, in addition to the Kyoto parties, join an agreement. One important precondition for cost effectiveness is that the post-Kyoto parties agree on concrete emissions reduction targets and have the option to trade emissions permits (Kemfert 2002).¹² The post-Kyoto negotiations will fail if the USA do not agree to any kind of target. It is therefore essential that all nations allow for flexible targets and national conditions. The APEC declaration is a first step towards more concrete climate targets. However, the announcement to reduce energy intensity might not be enough. The APEC declaration could be merged by combining APEC's flexible targets with concrete emissions reduction targets – either conditioned or indexed.

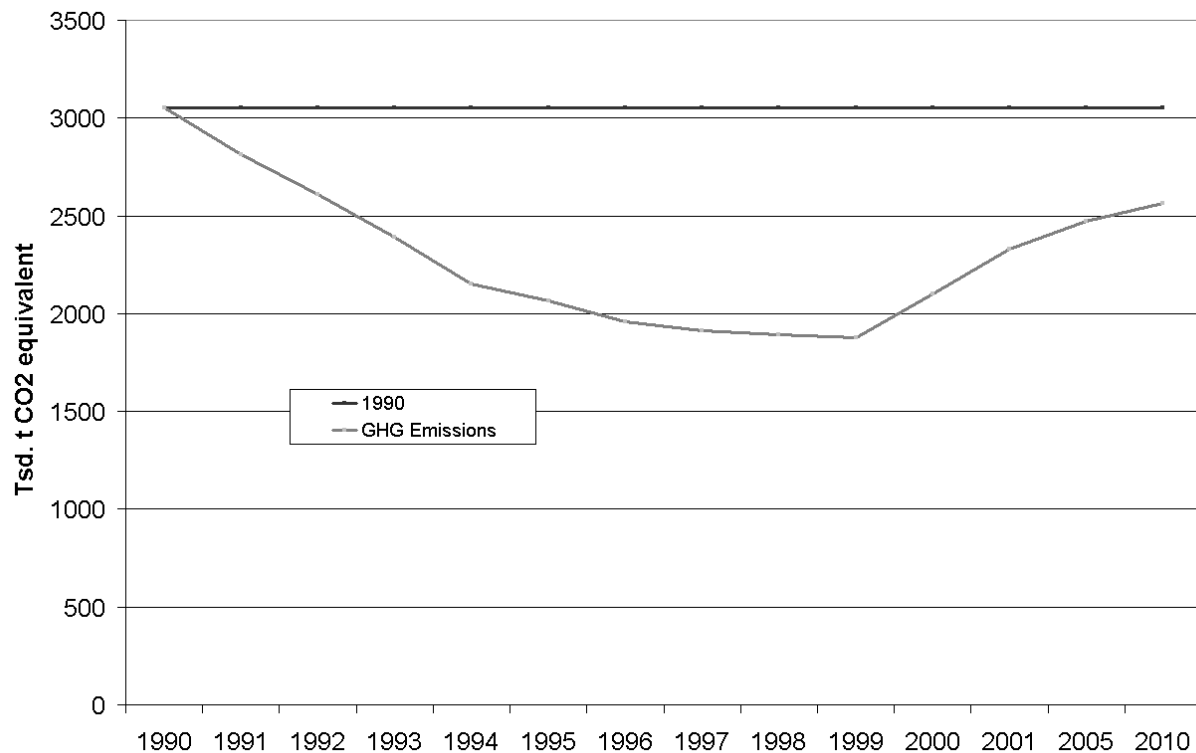
Russia

Because of the economic decline of the Russian economy after 1990, emissions diminished heavily. Russian greenhouse gas emissions in 2000 were still some 33% below the Kyoto commitment (see Figure 6). Emissions of CO₂ accounted for the largest share (80%) of total emissions in 1999. A large share of the decrease in CO₂ emissions since 1990 comes from the reduction in energy consumption, but some can also be attributed to an increase in the share of natural gas and a shift from nuclear power to hydro power (Russian Government (2007)).

¹¹ Governor Schwarzenegger has set ambitious emissions reduction targets for California; the emissions targets for cars, for example, are the highest in the world. California has also expressed its interest in joining the EU emissions trading system. See <http://gov.ca.gov/index.php?/press-release/1860/>.

¹² Emissions reduction costs can be cut by 50% if a cap-and-trade system is implemented.

Figure 6

Development of Greenhouse Gas Emissions in Russia¹³

As it seems that within the Kyoto commitment time period of 2008–12, Russian emissions will be below the 1990 level, Russia could sell emissions permits and gain revenue of up to 10 million euros per year (Kemfert 2002; Haites et al. 2004). Annex I parties with an emissions reduction obligation in the first commitment period are eligible to transfer so-called emission reduction units (ERU) if the compliance criteria are fulfilled. However, it is unlikely that Russia will create a domestic emissions trading system within the first commitment period. Russia is also a very attractive party with which to create JI- projects. Currently, 23 JI projects have been contracted and submitted to the approval procedures. Russia has established national guidelines for JI procedures, although it remains unresolved which ministry will secure project approval. It might be unattractive that Russian firms are having to lobby different Ministries directly and are facing such uncertainties regarding the transfer of ERUs by the Russian government. The legislative basis for the JI projects will most likely be linked to the Federal Law on Capital Investments.

¹³ Source: *National Inventory Report of Russia*, page 9.

Climate policy has never been a top priority on the Russian political agenda. Many Russian scientists do not even see that there might be any man-made threat to the climate and those who do acknowledge one think that it could be beneficial for Russia. Thus it seems that the Russian ratification discussion before 2004 was probably primarily driven by the aim of getting accession to the WTO. Therefore, Russia more or less identifies domestic climate policy as energy policy. In fact, Russia is one of the most energy-intensive and CO₂-emitting economies in the world. According to its energy strategy for 2020, current energy consumption could be reduced by nearly 50% if energy resources were used more efficiently. Although a certain amount of progress has been made in recent years, there is still vast potential to enhance energy efficiency.

If Russia continues to grow as fast as it has in the past few years, it could turn from being a seller of emissions permits to being a buyer. It has also expressed concerns that any kind of climate policy in Russia could limit economic growth. As the main seller of fossil fuels in the world, Russia might not benefit from Western nations wanting to substitute for fossil fuels. Therefore, it is unlikely that Russia will hold a strong position in any future climate pact, although rising public awareness of the impact of climate change may alter the country's view. However, it is much more likely that the USA will agree soon to a future climate pact, and that Russia will take a more "wait-and-see" strategy. It is also possible that Russia will take over the USA's position of blocking any further effort towards an international climate policy.

China

China is a fast-growing nation that needs substantial energy supplies. It is using up large coal reserves and intends to import high oil and gas shares from Russia and Africa. China is also the country with the highest increase in emissions in the world (see Figure 3). Because of the fast economic and energy consumption growth, environmental problems such as water and air pollution arise, especially in urban areas. However, a large share of the population has no direct access to energy and clean drinking water. Therefore China's major interest lies first and foremost in economic growth so that living standards can reach the same level as in developed nations. However, the country faces very heavy pollution problems, so environmental standards and policies are urgently needed. China, alongside other Asian nations (e.g. India), takes the view that responsible nations such as the USA and Europe should take the lead on

climate policy. China has a strong interest in economic trade relations, especially with Europe. Therefore it is likely that, like Russia within the Kyoto Protocol process, China combines WTO interests with climate change policies. China will also suffer from climate change, as this will cause droughts in the North-East region and flooding in the Southern regions. The consequence will be scarcity of food and water. Environmental improvements will therefore be as important as climate change in the future. China intends to increase the shares of CO₂-free and domestic energy supply, and especially to increase the share of renewable energy. China and India are both attractive countries for CDM projects. China's future position on climate policy agreements will be driven primarily by economic interests. It is very likely that China will join a climate policy agreement if the USA joins, especially if such an agreement allows for flexible targets and instruments and is linked with economic directives, such as the WTO.

5 The "Bali Convention"

The forthcoming United Nations Climate Change Conference in December 2007 in Bali should take into account all the various national views, proposals and visions and define a joint convention where the main vertices should be defined for future negotiations. The "Bali Convention" should be the initial basis for the post-Kyoto agreement. It has to take into account flexibility of targets and instruments and should give economically attractive compromises. A global cap-and-trade system based on per capita emissions would have the greatest effect on economic and climate issues and be the most cost efficient. An emissions target of 3 tonnes per capita in each country of the world might limit emissions enough to reach the 2° C target (IPCC 2007). A global emissions trading system that includes high- and low-income countries could bring economic efficiency if all nations and relevant sectors were included properly and no market distortions took place. A global cap-and-trade system would determine a price for greenhouse gas emissions and allow for cost-effective trade of permits within industrialised nations and between developed and developing nations. Developing nations such as China and India could sell emissions permits and gain revenues, which ideally could only be spent on emissions reduction policies and measures. In addition to a global cap-and-trade system, flexible mechanisms such as CDM and JI should be retained.

In reality, though, a global cap-and-trade system has no chance of being implemented. National viewpoints differ tremendously. The USA is very unlikely ever to agree to any kind of

fixed emissions reduction target, but is much more likely to agree to flexible and indexed targets. Therefore it would make sense to start the post-Kyoto negotiations by allowing as much flexibility as possible. The ultimate goal must be to get some kind of agreement with some kind of target rather than have a complete collapse of climate policy negotiations. The most crucial climate policy parties are the USA, Australia and China. If the USA does not agree to any kind of target, future climate policy negotiations will fail. Without the USA, it will be more difficult to get Australia, China, India and even the "future Russia" on board. Because of this, current negotiations should be as open and flexible as possible. Europe has a strong goal to cut emissions drastically and convince other nations to follow. The USA, on the other hand, is very unlikely ever to agree to any kind of concrete and drastic emissions reduction. Flexibility of compliance can only be achieved by flexibility of targets. All parties need to find the lowest common denominator.

The following aspects highlight the most important issues and conditions for successful future climate negotiations. A potential "Bali Convention" should be based on the following:

1. Climate change policy should be in line with social and economic targets.
2. There need to be clear but flexible goals: indexed targets might be combined with concrete emissions reduction targets.
3. APEC and (post)-Kyoto parties should be combined in one agreement.
4. The economic risks of climate change policy should be minimised.
5. There should be respect for different domestic circumstances and capacities.
6. Early actions need to be acknowledged and taken into account in future climate targets ("fair" burden sharing).
7. There should be flexibility of targets: concrete emissions reduction targets (EU, Japan, Russia) should be combined with indexed and conditioned targets (USA, Australia).
8. There need to be flexible instruments as well as national decisions on how to implement climate policy decisions.
9. Long-term perspectives are necessary to give planning reliability for firms. Climate and energy investments are long-term investments. Targets need to be expressed as clearly as possible and should be defined for a long-term time horizon.

10. Climate change policy should not harm the economy or the competitiveness of countries or firms; a potential bias of competitiveness needs to be avoided by either concrete measures (safety valve) or compensation.
11. In order to avoid disadvantages in competitiveness, climate policy should include as many countries as possible and allow for flexible targets and instruments.
12. Market-based instruments should be preferred and combined with regulatory measures only if other solutions cannot be implemented. Market-based instruments such as emissions permit trading are cost efficient only if many countries are included.
13. The importance of low- and zero-emissions technologies and of forests and land use changes must be recognised.
14. The inclusion of high- and low-income countries can bring positive economic impacts to all nations only if climate policy is based on a global emissions permit trading system (JI/CDM).
15. Distortions from market-based instruments must be avoided. Market-based instruments such as emissions trading can only work well if as many sectors and countries as possible are included. A partially negative burden only results from unilateral action with cost-ineffective measures.
16. Effective adaptation strategies need to be supported.
17. Climate and adaptation policy should be combined. Adaptation policy needs to have the same priority as climate policy.
18. There should be more research and development of low-carbon technologies and of adaptation options, and further climate impact research is needed; innovative technologies can bring an economic advantage to those regions that start early.
19. The economic costs of climate policy and adaptation should be minimised; there should be enough flexibility on the markets to react cost effectively.

First and foremost, it is important to start the coming UN climate negotiations by defining common interests and targets and by allowing for flexible approaches and goals. Table 5–1 highlights the potential options and opportunities for flexible targets. Fixed emissions targets in combination with an international emissions trading system seem to be most highly favoured. It is also possible, though, that fixed emissions reduction targets will be combined

with dynamically flexible targets such as a carbon intensity target, technology or renewable energy standard (Lewis and Diring (2007)). Some parties are both involved in the Kyoto Protocol and APEC parties or fast-developing nations (e.g. China). Russia might change its position soon from a Kyoto party to a pure APEC country (like the USA and Australia). The flexibility of targets might bring enough incentives for reluctant nations to join the next climate agreement. National instruments can vary widely between nations, especially because of the different social and economic conditions. International instruments, however, should not vary but should stick primarily to the emissions trading system and CDM and JI options already implemented.

Table 5-1

Proposals for Different Emissions Reduction Targets from different Parties¹⁴

	Kyoto parties	APEC parties	Fast-growing developing countries	Other developing nations
Fixed emissions reduction target	20–30% emissions reduction (2020)	Energy intensity target: –25% (2030)	No target	No target
Per capita target (cap-and-trade)	Emissions stabilisation at 10 tonnes per capita	Emissions reduction to 10 tonnes per capita	Emissions rise to 10 tonnes per capita	Emissions rise to 10 tonnes per capita
Flexible targets, variation 1	Fixed emissions reduction (20–30%, 2020)	Energy/Carbon intensity target	Per capita (10 tonnes per capita)	No target
Flexible targets, variation 2	Fixed emissions reduction (20–30%, 2020)	Energy/Carbon intensity target + Safety valve	Per capita (10 tonnes per capita)	Per capita target
Flexible targets, variation 3	Emissions stabilisation at 10 tonnes per capita	Technology Standard Renewable Energy Target	Emissions rise to 10 tonnes per capita	Emissions rise to 10 tonnes per capita
Flexible targets, variation 4	Emissions stabilisation at 10 tonnes per capita	Energy/Carbon intensity target	Emissions rise to 10 tonnes per capita	No target

¹⁴ Source: Own documentation

6 Outlook

The future climate policy negotiations urgently need concrete proposals and definition of the next steps. High-income countries with high emissions per capita, such as the USA and Australia, fear huge economic losses from the implementation of emissions reduction targets. China, however, is primarily concerned that climate policy will hinder uninhibited economic growth. Europe strongly favours concrete emissions reduction targets and envisages a climate goal that satisfies the 2° C target. Russia's role is ambiguous: on the one hand, it is very interested in growing fast and selling oil and gas at the highest achievable prices; on the other hand, a blockade of any climate policy would distort its economic relationships with the most important trade regions, such as Europe and the USA. As Russia evaluates the economic costs of climate change as being lower than the economic benefits, its future commitments to climate policy goals will be dominated by economic interest. Because of steeply increasing greenhouse gas emissions in Russia, its position might change to become a strong opponent of any kind of climate agreement. Russia might take over the USA's past position of blocking any further effort towards an international climate policy. The inclusion of the USA in future climate commitments is crucial; without the USA, future climate policy negotiations will fail.

Because of all this, it is important that the climate negotiators allow for as much flexibility as possible. Flexible dynamic, either indexed, conditioned or financial, targets should be combined with the concrete emissions reduction targets favoured by some nations. It is essential that climate change policy should be in line with social and economic targets. A so-called "Bali Convention" is urgently needed for future climate policy negotiations. As a starting point, the "Bali Convention" should include the proposals of the APEC nations and the Kyoto parties.

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