

The future of the international climate change regime: The contribution of “regional approaches” towards an international climate change agreement

FULL REPORT¹

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Content

1. INTRODUCTION.....	4
1.1. THE INTERNATIONAL CONSENSUS AND DISAGREEMENT.....	4
1.2 THE STRUCTURE OF RESEARCH.....	5
1.3 LINKAGES TO OTHER PROJECTS.....	6
2. INTERNATIONAL REGIME BUILDING.....	10
2.1 INTERNATIONAL RELATIONS THEORY.....	10
2.1.1 <i>International regime theory</i>	10
2.1.2 <i>Global governance theory</i>	12
2.2 RECENT LITERATURE ON INTERNATIONAL REGIME BUILDING.....	13
2.2.1 <i>Absolute targets</i>	15
2.2.2 <i>Intensity targets</i>	15
2.2.3 <i>Linkage to redistribute costs and benefits</i>	16
2.2.4 <i>Coordinated sector-specific domestic policies</i>	16
2.2.5 <i>Taxation</i>	17
2.2.6 <i>Technology development</i>	17
2.2.7 <i>The Triptych approach</i>	17
2.2.8 <i>The Orchestra of Treaties</i>	18
3. CAN DIFFERENTIATED INTEGRATION ADVANCE THE CLIMATE NEGOTIATIONS?	27
3.1 INTRODUCTION AND RESEARCH QUESTIONS.....	27
3.2 DIFFERENTIATED INTEGRATION IN THE EU.....	28
3.2.1 <i>Theoretical considerations</i>	29
3.2.2 <i>EU experience</i>	31
3.3 LESSONS FROM OTHER INTERNATIONAL ORGANISATIONS.....	33
3.3.1 <i>Elements of differentiated integration in the international trade regime (WTO)</i>	33
3.3.2 <i>Elements of differentiated integration in the international monetary regime (IMF)</i>	34
3.4 CONCLUSIONS AND OUTLOOK.....	34
<i>Outlook</i>	35
4 REGIONALISATION OF THE INTERNATIONAL CLIMATE CHANGE REGIME.....	39
4.1 THE OVERVIEW OF EUROPEAN REGIONALISATION.....	39
4.1.1 <i>A conceptual framework for regionalisation</i>	39
4.1.2 <i>Evidences for regionalisation</i>	40
4.1.3 <i>Preliminary findings</i>	45
4.2 THE CASE OF RUSSIA.....	47
4.2.1 <i>EU-Russia relations</i>	47
4.2.2 <i>Bilateral institutions</i>	49
4.2.3 <i>Russia and its neighbourhood</i>	50
4.2.4 <i>GHG emissions in Russia</i>	50

4.2.5 A Green Investment Scheme (GIS).....	51
4.3 THE CASE OF UKRAINE	52
4.3.1 EU-Ukraine relations.....	52
4.3.2 Bilateral institutions.....	54
4.3.3 Energy security.....	55
4.3.4. GHG emissions in Ukraine.....	55
4.3.5 A Green Investment Scheme (GIS).....	56
4.4 EUROPEAN REGIONALISATION.....	57
4.4.1 Preliminary findings revisited.....	57
4.4.2 Summary and conclusions.....	58
5. THE TRADE & ENVIRONMENT LINKAGE: MULTILATERAL VS. REGIONAL AGREEMENTS	67
5.1 INTRODUCTION.....	67
5.2 ECONOMICS OF TRADE AND THE ENVIRONMENT	67
5.3 ENVIRONMENT & THE WTO.....	70
5.3.1 From Uruguay to Seattle.....	70
5.3.2 Breakdown at Seattle.....	71
5.3.3 The Doha Agenda & MEA Treatment	72
5.3.4 The DDA Post Cancun	74
5.4 THE REGIONAL IMPETUS: PROGRESS OR RETREAT ?	75
5.5 RTA S & ENVIRONMENTAL PROVISIONS.....	77
5.5.1 Prospects and limitations for regional trade-environment links.....	80
5.5.2 RTAs: Helping or hindering the WTO?	80
5.5.3 Incompatibilities and tensions.....	81
5.6 CONCLUSIONS.....	82
6. REGULATORY UNCERTAINTIES AND TRANSACTION RISKS IN GREENHOUSE GAS MARKETS: BUSINESS MANAGEMENT AND INSTITUTIONAL DESIGN ISSUES	88
6.1 OBJECTIVES AND ISSUES OF THE STUDY.....	88
6.2 LITERATURE ON RISKS AND UNCERTAINTY.....	91
6.2.1 Uncertainties and risks in greenhouse gas markets.....	91
6.2.2 Uncertainty and risk in economics, government policy analysis and financial management.....	93
6.2.3 Studies of political risks, country risks and sovereign risks in international business.....	93
6.3 GREENHOUSE GAS MARKETS.....	93
6.3.1 Terminology.....	93
6.3.2 Typology of GHG market ‘commodities’	94
6.3.3 Regulatory complexities.....	96
6.3.4 Interactions between the climate change regime and the trade regime	100
6.3.5 Typologies of uncertainties, risks and returns.....	101
6.3.6 Foreign exchange rates.....	105
6.4 VOLUMES AND PRICES IN THE GREENHOUSE GAS MARKETS.....	108
6.4.1 Volumes.....	109
6.4.2 Prices.....	109
6.5 MANAGEMENT TECHNIQUES	110
6.6 FURTHER RESEARCH.....	111
6.6.1 Quantification.....	111
6.6.2 Exchange rates.....	111
6.6.3 Analytic models of firms’ decision-making.....	111
6.7 SUMMARY AND CONCLUSIONS.....	112

1. Introduction

The ultimate objective of the UN Framework Convention on Climate Change (UNFCCC), which was ratified by more than 170 parties and entered into force in 1994 is to stabilise greenhouse gas (GHG) concentrations in the atmosphere 'at a level that would prevent dangerous anthropogenic interference with the climate system'. With the aim of returning individually or jointly to their 1990 GHG emission levels by the year 2000 all parties committed themselves to adopting national policies and measures on the mitigation of climate change by limiting their emissions and protecting and enhancing its sinks and reservoirs. The UNFCCC however amounted to not much more than a process to work towards the stated objective.

It was the Kyoto Protocol that made a step towards international regime formation. The Kyoto Protocol attempts in a comprehensive way to address the problem of climate change by including six gases and "carbon sinks" such as forests and farm land which are capable of absorbing GHGs. To smooth out the economic cycles, it has introduced the possibility for countries to average their reductions over a period of five years (2008-2012). Central in the Kyoto Protocol were differentiated targets, which over time would gradually be extended to all countries. Starting with industrialised countries, historically responsible for the majority of emissions and therefore concentrations, in a following commitment period developing countries would enter the regime under terms still to be discussed. Detailed implementation issues and the progressive development of the regime were delegated to annual Conferences of the Parties (COPs).

A number of recent events have called that process into question. Among them are notably the US (and Australian) defection, the indecisiveness of Russia on ratification and the lack of a comprehensive strategy to engage developing countries. Together with the obligation of those countries that have ratified the Kyoto Protocol to start discussing the second commitment period, these events constitute a strong incentive to address in a comprehensive way the future of the international climate regime.

1.1. The international consensus and disagreement

It is important to note that the recent discussions on the future of an international climate change regime do not start from scratch, but that they can build on important achievements made already.

First, there is now a global consensus that climate change represents a significant potential threat to the world and that "the changes are mostly due to human activities". This view has been confirmed not only by the IPCC's third assessment report (e.g. Watson 2001) but also by official US government sources, as has been documented in the 2003 CEPS contribution (Egenhofer and Fujiwara 2003, Chapter 7).

Second, there is wide agreement both within politics and academia that the approach towards an international climate regime needs to be:

- gradual (i.e. modest initial commitments although there is question on what modest means),
- comprehensive (e.g. covering all sources including sinks and reservoirs),

- differentiated (e.g. “common but differentiated responsibilities”),
- reliant on flexible mechanisms such as the Kyoto mechanisms, and
- allow for inter-temporal flexibility.

The principle contentious and therefore open questions are about two items: i) how to ensure participation (and avoid free-riding) and ii) how to ensure compliance. This culminates in essence in the question of how commitments are formulated. Properly formulated commitments and compliance should be two sides of the same coin.

Incentives for participation have been discussed extensively in recent economic literature. International environmental agreements can - in the absence of a fully-functioning international governance structure - only be achieved on a voluntary basis. Because climate change protection is a global public good - no country can be prevented from enjoying climate protection irrespective of participation - such agreements provide very high incentives to free-ride (cf. Bac 1996, Carraro and Siniscalco 1998). As other international environmental agreements, climate change faces the challenges related to the need for global participation, the long-term nature, strong policy interactions and free-riding (cf Carraro and Galeotti 2003). If anything, climate change is even more complex given its high degree of *uncertainty*², and the *lack of technological solutions*.³

Several authors have analysed the participation incentives, which different policy measures provide for different countries (for an overview, see Finus and Rundshagen 2002). They include “carrots” and “sticks”. Sticks are for example disincentives for non-participation such as trade sanctions (cf. Chen 1997, Brewer 2003). Carrots are incentives such as different target allocation mechanism (for a full discussion, see the 2003 FEEM contribution as well as the 2003 CEPS contribution, Egenhofer and Fujiwara 2003, Chapter 6), transfers, emissions trading to lessen the costs for emissions reductions, issue linkage and better access to research and technological development (cf. Carraro and Galeotti 2003; for a synopsis Buchner and Carraro 2003).

The question of how to secure compliance, the second open issue, has mainly been discussed in international relations theory, which we will review in Chapter 2.

1.2 The structure of research

The CEPS research is based on the assumption that the basic structure of the overall Kyoto Protocol framework will remain in one way or the other but that it allows increasingly for differentiation to bring incentives to participate more in line with

² Climate change policy is characterised by uncertainty about the causes and effects of damages in general, their geographical distribution and their timeline (cf. Watson 2001). For example, Hansen (2001), one of the early advocates of the dangers of climate change has recently claimed that methane rather than CO₂ is the main cause of climate change. O'Neill and Oppenheimer (2002) present evidence that delays in achieving GHG reductions might lead to irreversible effects, e.g. a delay of reductions until 2020 might foreclose the options to stabilise concentrations at 450ppm.

³ This is especially true for the energy sector, the sector with the biggest potential impact on GHG emissions. Within this collaboration projects, IIASA has shown that in a perspective until 2050, broadly two different sustainable energy scenarios might emerge: renewables/hydrogen/fuel cell or a clean coal and carbon sequestration scenario (cf. Schratzenholzer et al 2002). Thus, one the key factors leading to a successful completion of the Montreal Protocol to combat ozone depletion, the available ready technology is not given in climate change.

national preferences, which can be derived from power, interests, ideas or a combination of all. In this sense, the CEPS study is addressing some concerns of the literature on international regime theory (Young 1989, Young 1993), which has identified a gap between bottom-up (i.e. local systems) and top-down (i.e. international or global regimes) studies (for further analysis, see Chapter 2).

The thesis is that the key to unlock the deadlock of the international climate regime is to allow for regional approaches, which we have depicted in the 2003 CEPS contribution (Egenhofer and Fujiwara 2003). Such approaches could have a double-effect. First, they allow for national/regional preferences (thereby provide better incentives to participate). Second, they widen the scope for trade-offs (therefore increase incentives to comply).

In addition to a review of international relations theory and an overview on the principle literature on international change regime building (Chapter 2), we have chosen four areas of analysis.

The first research area is concerned with the institutional aspects of the international climate change regime. CEPS will bring to the debate the rich experience on how differentiated integration is used in the EU as well as international organisations and will draw some tentative conclusions (Chapter 3).

The second is the analysis of how the EU incorporates its climate change preferences into its external relations in general and thereby creates incentives for its neighbours to undertake climate change policies. The general analysis is supplemented by two case studies, one on Russia and one on Ukraine (Chapter 4).

The third is the interface of the climate change/environment and trade. In particular, we analyse whether and to what degree trade policy in the forms of trade agreements can be used to pursue climate change objectives and thereby to increase both incentives to participate and to comply with commitments (Chapter 5).

The fourth is the business and climate change intersection. There we analyse how the need from business for regulatory certainty could be applied to increase incentives to participate and how this might affect compliance (Chapter 6).

Each chapter has its own conclusions, references and abbreviations list. In a separate document, the so-called Synthesis Report, we will provide for a summary and conclusions in a condensed form.

1.3 Linkages to other projects

CEPS will test the FEEM thesis (Carraro and Galeotti 2003) derived by game theory that a series of regional agreements ("bottom-up approach") is more likely to achieve a stable and profitable international agreement in the medium term than attempting a global agreement from the outset. The international effort – currently lead by the EU, Japan and other participating countries of the Kyoto Protocol – will only succeed if it convinces the US and other countries to join via emissions trading or other instruments. Precondition is that the international effort is able to demonstrate in a credible way that instruments can be designed in a way that they provide incentives to firms and consumers to allow for implementation. This has been at the centre of the CEPS and FEEM work of first phase of the Collaboration Projects, which was published in Carraro and Egenhofer (2003). The

project of the University College Dublin (UCD), which concentrates on "winning policies" that provide the right incentives to industry and governments alike is deepening the analysis further. The CEPS research on "trade" and "business" are important complements to UCD.

The FEEM theme is that innovation is central in moving the agenda forward, hence the focus on the potential role of R&D and other innovation policies in creating incentives to collaborate regionally and globally. An increasingly central role is associated with how technology, R&D and trade policy interrelate with climate change. While FEEM is doing high end modelling, CEPS addresses the institutional and policy pragmatics of making progress in an imperfect world. There is also complementarity with the studies by Mitsubishi Research Institute (MRI) by Nagayama and Sekine and by the Kyoto University under Prof. Ueta, since they focus on "regional strategies" as well and therefore can test the validity of a more regional approach to achieve a global agreement.

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ABBREVIATIONS AND ACRONYMS

COP	Conference of the Parties
GHG	Greenhouse gases
IPCC	Intergovernmental Panel on Climate Change
UNFCCC	United Nation Framework Conference on Climate Change

2. International regime building

The following chapter has two purposes. It reviews international relations theory, notably international regime and global governance theory, both which are particularly relevant to our work in remaining chapters. Then it provides an overview of the principal climate change literature on regime building to set the CEPS work into context.

2.1 International Relations Theory

2.1.1 International regime theory

The CEPS study on “The contribution of “regional approaches” towards an international climate change agreement” has its background in international regime theory that has been the dominant approach to international co-operation. This strand of theory recognises the importance of both self-interested behaviours and institutional factors in determining outcomes, and focuses on the role of ideas, principles and norms in a sociological account of international relations (Williams 1998). However, depending on the school of thought, different emphasis was attached to power (by e.g. neo-realists), interests (neo-liberals) or ideas and discourses (by constructionists). For an analysis see for example Young (2002b).

While these generally regime-centric approaches have predominantly looked at the effectiveness of institutional performance and less so at environmental outcomes (Kütting, 2000), environmental effectiveness considerations have not always been absent. More recently there has been more environmentally-focussed work, i.e. research that has considered the environmental problem necessitating the agreement.⁴ They are foremost associated with Young who pioneered the treatment of climate change in regime theory by developing a model of institutional bargaining (Young, 1989, 1993 and 2002a).

The issue of regime interplay has attracted increasing attentions (Stokke 2001; Ghering and Oberthür 2000; Young 2002c). Regime interplay refers to situations in which the content, operation or consequences of one institution are significantly affected by another (Stokke 2001). Horizontal interplay involves regimes on the same level, for instance, between global regimes or between sub-global regimes. The interface of the WTO and the Kyoto Protocol is an example of horizontal interplay (Brewer 2003). Vertical interplay involves regimes on different levels, for instance, between international agreements and regional agreements, or between international agreements and national legislation (Young 2000a and Young 2000b in Stokke 2001). The interactions between MEAs and the WTO is an example of both dimensions (Chapter 5).

The literature has identified a gap between bottom-up (i.e. small-scale local systems) and top-down studies (i.e. international or global regimes) of environmental problems (Young 2002b). Young (2002b) argued that research of international regimes is rather diffusive and lack of the sharp focus given to studies of small scale systems by their preference for use of case study methods. The same point, the importance of case studies, has been also

⁴ Kütting (2000) identifies the minority group specialised in environmental effectiveness in the Norwegian regime theorists (the Fridtjof Nansen Institute) and scholars of international environmental law.

raised by Miles et al. (2001). As a result, the study group by Miles gathered over a decade of experiences in testing regime theory through case studies on international environmental regimes.

The tension between bottom-up and top-down approaches is equally found in the *policy controversy* over global environmental governance (cf. Gemmill et al., 2002, Brack and Hyvarinen, 2002, Dodds et al., 2002, Esty and Ivanova, 2002a and Hyvarinen and Brack, 2000).

Global environmental governance has been characterised by a high degree of fragmentation with divided responsibilities for the environment across more than a half dozen UN agencies. In addition to the fragmentation there are independent secretariats to more than 500 Multilateral Environment Agreements (MEAs). MEA proliferation has placed an immense burden on most developing countries with lack of resources for participation in negotiations. Besides this the centre of gravity for the international environmental regime is much weaker than it is in other regimes (e.g. trade, health and labour). The existing environmental institutions have suffered from vague, diffuse and overlapping mandates, deficient authority, lack of expertise, small budgets and limited political support. Moreover, fragmentation of environmental governance caused serious flaws in data management systems. Compliance monitoring and reporting are unsystematic, scattered and informal. The existing financial mechanisms are also dispersed across international organisations. The institutional mechanisms for technology transfer have been ineffective. Furthermore, the absence of serious enforcement provisions in MEAs, scarcity of data and limited resources raises concerns for an implementation gap. The identification of these problems prompted a call for clustering of MEAs by organisational bodies, functions, issues and regions⁵ together with establishment of a single agency such as a World Environment Organisation or a Global Environmental Mechanism (GEM) (Esty and Ivanova 2002b). The agency would provide for adequate information, develops a policy space for negotiation and bargaining, and expand capacities.

The opponents of centralisation support the streamlining of the current system including MEAs.⁶ They argue that the high level of flexibility and capacity for specialisation is the strength. Among possible streamlining options clustering is considered to be a step-by-step process with an evolution from cooperation to coordination and to fit into a bottom-up approach. Clustering requires careful assessment over individual MEAs on a case-by-case basis, also specification of costs and risks involved in clustering need to be weighed against expected benefits on a case-by-case basis. On the other hand, MEAs have been considered to be the most innovative feature of the international environment regime

⁵ Clustering means to 'seek a variety of institutional and organizational arrangements short of merger that will increase the efficiency and effectiveness of existing arrangements without requiring elaborate changes in legal or administrative agreements'. The notion of clustering assumes the possibilities for closer integration of related or overlapping international environmental regimes (von Moltke 2002).

⁶ For instance, Najam (2002) recognizes the merit of clustering of MEAs but believes this does not require a super organization such as a WEO. Both Najam (2002) and Kimball (2002) argue that interlinked and cross-sectoral nature of environment issues require a more decentralised but well coordinated and integrated approach. In contrast, Whalley and Zissimos (2002) argue that the primary function of a WEO would be to facilitate bargains on the global environment possibly through developing linkage between environmental and non-environmental policies..

possibly due to their high level of autonomy. Also, recent management research reports that innovation proceeds more rapidly with some optimal and intermediate degree of fragmentation partly because of competition between fragmented entities (Dodds et al. 2002).

CEPS research addresses some of these concerns by filling the gap between small scale local/regional systems (bottom-up approaches) and international or global regimes (top-down approaches). This includes case studies on "sub-global" or, as they are usually referred to, regional agreements (Chapters 3, 4), trade agreements with an environmental focus (Chapter 5) as well as strategic firm behaviour related to climate change (Chapter 6).

2.1.2 Global governance theory

While the CEPS study has been inspired by International Regime Theory, its main purpose is not to trace in detail the process of negotiation and implementation of international regimes. The objective is rather to analyse the interaction between a group of countries' progress in fulfilling their commitments to the assigned targets on the one hand, and the development of emissions trading markets, or 'climate change areas', on the other hand. The following two points would highlight the unique features of our approach compared to International Regime Theory. They prompt us to complement the weakness of International Regime Theory with the globalisation theory in general and the theory of global governance in particular.

First, International Regime Theory tends to emphasise on processes and holds state-centric views, prompting criticism that the theory was lacking structural analyses and historical perspectives, which would help to understand the fragmentation of regime-building processes. Ruggie (1993) pointed to the focus on negotiation processes and the dynamics of regime construction as opposed to exploring the possibility of fundamental institutional discontinuity in the system of states. There was a late acknowledgement that governments have lost control over their territory, (i.e. governance has become dispersed and can no longer only be done by governments having the authority over a single territory). Ruggie (1993) stressed the importance of unbundling territoriality that is fixed, separated and mutually exclusive in exploring the conditions of post-modernity in international politics. This introduced a new research focus, highlighting "the question of whether the modern system of states may be yielding in some instances to post-modern forms of configuring political space" (Ruggie 1993)⁷, provoking a debate over the declining role of states in global governance (Falkner 2003; Scholte 2002; Krasner 2001).

The debate on the declining role of the state has highlighted the interface of governments and market developments. On the one hand it would be reasonable to suggest that the ongoing globalisation process is largely driven by markets. On the other hand proposed emissions trading markets are carefully designed by governments for strategic reasons in an attempt to fulfil their commitments to their GHG reduction target. However, once they are created the markets will likely stay in place regardless of progress in commitments

⁷ For a short overview of different notions of statehoods and the application to EU-Russia relations, see Emerson (2001).

and could even become a catalyst for a fundamental change in the system of states. We should expect that the emerging carbon markets will be a laboratory for empirical analysis of the impact of markets on global governance.

Second, the International Regime Theory acknowledges an increase in the role of non-state actors such as non-government organisations (NGOs), experts and business only relative to that of national governments so far as they participate in the formation of government positions for negotiations. However, in reality the distinction between state and non-state actors may become increasingly irrelevant even though there remain some crucial differences in terms of legitimacy, availability of resources, and capacity.⁸ Other potential stakeholders such as SMEs, local deputies and governments should be also taken into consideration since they exert certain influence in the ways by which climate policy is implemented and emission markets are developed. This has drawn the attention to an inclusive focus on stakeholders. An increasing popularity in use of a multi-stakeholder process may lead to the creation of political non-territorial space or what Ruggie has called 'global public domain' (Ruggie 2003), which is seen to be needed to accommodate the intensive dialogues among stakeholders as a consequence of growth in global civil society and awareness of corporate social responsibility.⁹

The issue of private environmental governance as well as the interaction between the development of emission markets as a response to the Kyoto targets and its potential for catalysing a fundamental change in international politics as summarised will receive further attention in in Chapter 4 on regionalisation and Chapter 6 on regulatory uncertainty and transaction risks of greenhouse gas markets.

2.2 Recent literature on international regime building

There is one strand of literature that rests on the assumption that the basic structure of the Kyoto Protocol framework will hold. For example, the commitment of countries supporting the Kyoto Protocol is seen as sufficiently robust to move forward even in the absence of a comprehensive international agreement. There is some empirical evidence by an analysis of the political economy in the EU, Russia, Canada and Japan, at least if the time frame is the end of the first commitment period (Egenhofer and Fujiwara, 2003).

Another strand of literature focuses on alternatives to the Kyoto Protocol. There are various approaches including absolute ceilings with price caps, a technology protocol, intensity targets, to list just the most popular ones. A short discussion is provided for below. For a full overview see Table 2.1 at the end of this chapter.

The two strands of literature converge to some extent when it comes to an analysis and prescription for the second commitment period. The difference in essence lays in the degree of modification of the existing Kyoto Protocol they would advocate. Some would

⁸ For instance, Krasner (2001) argues that despite growing NGO influence their power to affect a country's domestic affairs has been limited relative to governments, international organisations and multilateral corporations.

⁹ Ruggie (2003) refers to 'certification institutions' which adopt codes of conduct and negotiate rules and standards. A group of voluntary initiatives may include the Forest Stewardship Council, the Responsible Care and the ISO-14000 series for EMS. Also see Falkner(2003).

advocate modifying some of the provisions only, while others call for a “fresh start”. Nevertheless, there seems to be wide agreement both within politics and academia that the approach towards an international climate regime needs to be:

- gradual (i.e. modest initial commitments),
- comprehensive (e.g. covering all sources including sinks and reservoirs),
- differentiated (e.g. “common but differentiated responsibilities”),
- reliant on the flexible mechanisms such as the Kyoto mechanisms, and
- allow for inter-temporal flexibility.

The principal contentious and therefore open questions are about ensuring participation (and avoid free-riding) and compliance, culminating in essence in the question of how commitments are formulated. For an analysis see IEA (2002).

Consequently, a considerable body of literature on the post 2012 architecture concentrates on the “nature of targets” to achieve an acceptable burden-sharing between the different countries or groups of countries (cf. Sugiyama et al., 2003, Grubb et al., 2003, GES-EC-ICS Japan, 2003, Höhne et al., 2003, Baumert, 2002, Victor, 2001, Bodansky, 2002). The literature has identified a number of proposals for different target setting than the ones in the Kyoto Protocol to engage countries. They can be overlapping, compatible but also mutually exclusive. For a complete overview see table 2.1 at the end of this chapter and OECD (2003). We have broadly grouped them into nine categories. Note that the categories are somewhat arbitrary. Other categories would have been possible too.

- Absolute - Kyoto-type - targets, however with modifications such as a maximum price on allowances (Jacoby and Ellerman, 2002, Kopp et al. 1999, Hourcade and Gherzi, 2001, McKibbin and Wilcoxon, 2002).
- Energy or carbon intensity targets (e.g. energy efficiency). Ultimate target can be an equal per capita emissions target ("contraction and convergence") (Meyer 2003, Müller et al., 2001).
- Linkages, i.e. linking participation to R&D co-operation or financial transfers (Buchner et al. 2003, Buchner and Carraro 2003; Carraro and Galeotti 2003).
- Environmental conditionality (linking emissions trading to environmental “progress”, e.g. Green Investment Scheme, trade and bank approaches (Tangen et al 2001, Blyth 2003, Viguier 2003)
- Co-ordinated sector-specific domestic policies (e.g. IEA 2002, pp. 82).
- Global carbon tax (Cooper 2001)
- Technology development (usually referred to as "technology protocol") (Humphreys 2001, Barrett, 2001, 2002, 2003, Edmonds 2003).
- A combination of different instruments (i.e. intensity targets, sector-specific domestic measures and technology development), for example in the so-called Triptych approach (Phylipsen et al, 1998, Den Elzen 2002)
- Orchestra of treaties focussing on different co-existing commitments under different legal frameworks (Sugiyama et al. 2003).

None of these approaches is without flaws and currently seems to be acceptable to a majority if not all parties involved in the international negotiations (for an analysis see IEA 2002 and Van Ierland et al 2003).

2.2.1 Absolute targets

As we know, the Kyoto Protocol has chosen for absolute targets for a number of reasons including environmental certainty, simplicity and because it lends itself well to emissions trading. There are two major shortcomings. First, it remains a rigid instrument, especially if applied over a long time frame. Second, absolute caps do not accommodate well for unpredicted economic or population growth. The fact that throughout the 1990s US growth was considerable higher than European growth has meant an implicit change of the "burden sharing" as it was agreed in Kyoto. The US is not the only example. Ireland had a similar problem.

Given that the US discussion was always based on the fear of excessive costs, there have been calls for combining an absolute target with a price cap, meaning a guaranteed price for carbon that should not be exceeded. This proposal had and still has a lot of support on both sides of the Atlantic. Although it does to some extent undermine the environmental objective, in return, it constitutes an insurance against too high costs, which is the reason why it is also known as a "safety valve" (Jacoby and Ellerman, 2002, Kopp et al, 1999, Hourcade and Gherzi, 2001, McKibbin and Wilcoxon, 2002).

2.2.2 Intensity targets

Dynamic targets or intensity targets, to be based on variable indicators, address the issue of uncertain economic or population growth. Typically, an intensity target is based on the GHG/carbon intensity indicator such as GHG emissions per unit of output (GDP). Over time the target strengthens, a process which could be based on indexation or negotiation. The main advantage is that it does not punish fast growing countries. Finally, it is important to mention that relative targets in principle can be combined with emissions trading.

The other side of the coin is however the environmental uncertainty. But intensity targets raise other and deeper concerns, especially if applied economy-wide. First, there is a need for reliable statistics both for emissions and GDP measurement. What is more however; GDP is sensitive to exchange rate and even sensitive to the choice of GDP measure. Since intensity targets depend both on current and projected future fuel mix, uniform intensity targets raise the same burden-sharing issues like absolute targets. Fixed and *uniform* intensity targets will have major effects on competitiveness for industries just like absolute caps. It has therefore been suggested to set a uniform intensity target as benchmark and allow countries a deviation for reasons of economic development, climate conditions, fuel mix or economic performance. It becomes easily clear that all countries would ask for a deviation, making negotiations probably even more protracted. Second, although intensity targets leave room for above average economic growth, this advantage is reversed in time of economic stagnation or collapse. Intensity improvements will fully depend on new investment, which will not be undertaken in times of economic difficulty (Müller et al, 2001). For example, Russian and CIS emissions have fallen because of economic contraction while energy intensity has increased since the 1990s. To illustrate this point, Russia currently a major carbon creditor under the Kyoto targets, would become a major debtor under an intensity regime.

Thus, while we do not see good chances for economy-wide intensity targets - at least in a pure form - they could still be used as a sector-specific method such as for those

industries that compete internationally. This would somehow "harmonise" the burden for all companies of the same sector, at least in industrialised countries. But to agree on a "performance rate" may be difficult in practice. It is an interesting pointer that even in the EU with an internal market and strict competition rules, it is impossible to agree on common performance indicators for sectors. Nevertheless, the US has taken this approach and the current Administration is likely to promote it.

2.2.3 Linkage to redistribute costs and benefits

Redistribution of benefits can be used as an incentive for non-ratifying countries (e.g. US, Australia, Russia) to cooperate in an international climate agreement. Linkages can take two forms, either financial transfers or a sharing of other benefits. Financial transfers work best between industrialised and developing countries or economies in transition. It is however hard to imagine to "bribe" the US or any other rich country to join the Kyoto Protocol. But even regarding developing countries the instrument is complicated. First, industrialised countries prefer to provide in-kind rather than direct financial transfers. And if contributions are in-kind, they often benefit more the industry of the donor country than the recipient. Second, the current € 1 bn of transfers in the UNFCCC framework to developing countries is largely insufficient to trigger interest of developing countries to join. In order to make a difference, funds would probably be about ten times as much as a minimum. It is difficult to see where this kind of money would come from, since reforming current development aid would not be possible without consensus of developing countries.

Nevertheless, there are promising concepts for linkages. Russia has suggested a Green Investment Scheme (GIS) with the EU, Japan, and Canada, which can be characterised as a tool to link Russian "hot air" sales to environmental investment (Tangen et al 2001, Blyth 2003). Similar schemes are currently discussed with developing countries. Trade and Banking (T&B), as system in which a country can only sell as much as it banks (Viguier, 2003) is another example of an internal issue linkage between ratification and voluntary commitments to emission reductions.

In addition, there have been discussions about linking technology and R&D to participation in a climate agreement. The best known variant of this is the Technology and Ratification (TR) linkage. TR sets out a condition that emission reductions will only be certified if their 'technical means of production' are manufactured in ratifying countries (Müller, 2002). The devil is however in the detail. Most concepts appear sufficiently complicated in order not to be adopted. It is difficult to imagine that this could work with the US given the US dominance in a share of world technology market and potential harm of implicit threat to those threatening (Buchner et al 2003, Buchner and Carraro, 2003).

2.2.4 Coordinated sector-specific domestic policies

There has been a renewed interest in co-ordination of domestic action. The idea as such is an old one and it is firmly anchored both in the UNFCCC and the Kyoto Protocol. And indeed, the literature reckons that there is a host of carbon-saving measures that are cost-effective or even have negative costs, i.e. have a net financial benefit over a given time (e.g. IEA 2002, pp. 82). The main problem is the administrative effort associated with it.

The concept, introduced originally by the Japanese government and known under "pledge and review" can be compared with negotiated agreements. It would automatically mean constant bargaining between negotiators, first on what countries are realistically supposed to do and then to review what they have actually done. It is uncertain whether the institutional capacity of the UNFCCC system would be able to cope with such a task.

2.2.5 Taxation

A global carbon tax probably is the simplest instrument, causing the least transaction cost (e.g. Cooper 2001). Environmental taxes, if properly designed have proven to work (EEA, 2000). Taxation gives a clear signal to firms for estimating mitigation costs and planning long-term investments. The main shortcoming is the visibility of distribution effects and transfers from private to public bodies. Finally, there is again the question whether a co-ordinated global tax would work. For instance, national counter-measures could negate the effects of the international carbon tax by reducing existing energy taxes or by increasing energy subsidies. It is also hard to imagine how countries could agree on a tax, if they can not even agree on reducing or abolishing economically and environmentally harmful fossil fuel subsidies, despite this being an obligation under the Kyoto Protocol and the Marrakech Accords. Thus, one would assume that taxation does not stand a high chance of being adopted.

2.2.6 Technology development

The Battelle Institute has formulated a Global Energy Technology Strategy in international cooperation with public and private sectors (Humphreys 2001, Edmonds, 2003). They stress the importance of concentration levels, the crucial role of technology in stabilising concentrations at low costs, the need of a portfolio of R&D investments across a spectrum of technology classes, and integration of energy technology development as part of a larger comprehensive strategy. The problem is that in the absence of targets, incentives are too low to apply in very advanced technologies, which by definition would have high costs (and no real economic benefit for a company). It is also clear that the strategy does not necessarily guarantee real emission reductions at least in the short to mid term. It would miss the potential of current technologies. Hence, the strategy needs to be complemented with utilisation of currently available technologies to a full capacity. A variant by Barrett (2001, 2003) proposes a new R&D protocol based on collective funding of basic research into the development of new technologies and on standard protocols for the adoption and diffusion of new technologies around the world. It shares common problems with the Global Energy Technology Strategy as identified earlier. The more interesting aspect of his proposal is setting of common standards and strategic effect of these standards. An energy efficiency standard is one of the examples and possibly represents a short to mid-term goal. Barrett also suggests that the long-term focussed proposal needs to be combined with further protocols for the short-term options such as 'targets and timetables' adopted by the Kyoto Protocol and more preferably domestic measures.

2.2.7 The Triptych approach

The Triptych approach (Phylipsenet al, 1998) combines a number of different strategies and instruments: intensity targets, sector-specific domestic measures, and technology

development. Originally designed for the burden-sharing agreement within the EU, it determines countries' overall emissions reduction targets for the medium term by aggregating individual targets for three groups of sectors: domestic sectors; internationally-oriented heavy industries; and electricity generation sectors. Countries would be bound only by the overall aggregate reduction targets. Excess emission growths in one sector are allowed as far as they are fully off-set by excess emission reductions for other sectors (Jansen et al, 2001). This means that overshooting in one sector must be compensated by real emission reductions in other sectors. The Triptych approach uses intensity targets for the internationally oriented heavy industry together with other parameters such as carbon intensity in power generation and a per capita approach for the domestic sector. It reflects technological improvements, technology transfer, and the transition to a low-carbon economy. Countries lack of sizeable heavy industries import goods from other countries and benefit from other countries' mitigation efforts. On the other hand, countries with a high share of these industries will be penalised for high emissions from this sector even if their products are mainly exported (Den Elzen, 2002).

The drawback is that the Triptych approach requires sector-specific information with a number of decision variables to be negotiated. Emission caps in the approach may also require a reliable monitoring system. The Triptych approach does not appear to consider implementation costs. While the approach can reduce compliance costs by taking into account targets sector-specific circumstances, it is essentially a quantity control scheme and estimated to be more costly than a price control mechanism. The advantage is that it could link emission allowances to domestic measures at the sector level through emissions trading. In the Triptych approach countries with binding targets expressed in decarbonisation and/or efficiency may participate in emissions trading (Den Elzen, 2002).

2.2.8 The Orchestra of Treaties

Somewhat related is another scenario, which has been suggested by Sugiyama (2003) and concentrates on what happens when multiple efforts are pursued by flexible co-ordination of actors that are motivated by diverse incentives, not necessarily based on international commitments. The emerging regime ("orchestra of treaties") is seen to exist of four co-existing building blocks, in and outside of the current UNFCCC system: i) group of emissions markets (e.g. domestic caps and gradual linking of emissions markets), ii) Zero Emissions Technology Treaty focussing on long-term technological change, iii) climate-wise development policy addressing the concerns of developing countries including development, adaptation, technology transfer and mitigation, iv) the UNFCCC, which would serve as information exchange, funding mechanisms and political focal point. While this seems to reflect the current and likely immediate future situation, there are unsolved issues about how to ensure comparable efforts (i.e. avoid free-riding) but also questions on incentives for countries to undertake domestic action.

All these proposals attempt to strike a balance between environmental outcome, distributional equity, flexibility, dynamic efficiency, cost-efficiency and incentives to participation (see Table 2.1). The CEPS approach does not focus on these concepts except incentives but analyses the potential of bottom-up approaches that can emerge through regional co-operation (chapter 4), trade agreements (chapter 5) or based on stakeholder pressure (chapter 6 on business needs for certainty). Before doing this, we

will analyse in the next chapter the potential use of “differentiated integration” in the climate change regime.

TABLE 2.1¹⁰
Alternative International Policy Architectures for Global Climate Change

Alternative	Environmental Outcome	Dynamic Efficiency	Cost Effectiveness	Distributional Equity	Flexibility	Incentives for Participation and Compliance
Kyoto Protocol	Probably low, given short-term nature of commitments, and poor incentives for participation and compliance.	Requires reductions that are too large in short run, and silent on reductions required for long run.	Flexible mechanisms help cost effectiveness, but non-participation by key countries reduces cost effectiveness; CDM burdened by transactions costs.	Only industrial countries (ICs) face targets, but developing countries (DCs) help shape rules. DCs receive some adaptation assistance.	Emission ceilings are locked in, but only for five-year periods.	Incentives for participation and compliance are very weak.
Aldy, Orszag, & Stiglitz (2001)	Depends on safety valve price and extent of developing country participation.	Allows for policies that could be consistent with dynamic efficiency.	International emissions trading with a safety valve would likely result in common price for all participants.	Delays mandatory emissions commitments by DCs. Safety valve funds to DCs for abatement efforts.	Commitments and safety valve price adjusted over time in response to new information.	Use of sanctions, especially on trade, to promote compliance. Incentives for developing country participation.
Barrett (2001, 2003)	Depends on the agreed standards.	Technology lock-in may impair efficiency, but increased R&D may also lower costs.	Would not equalize marginal costs across all sectors.	R&D funded according to UN scale. ICs pay for technology adoption by DCs; adaptation funded by ICs.	R&D protocol provides information about technologies to lower costs, but standards may create lock-in.	R&D investment, economies of scale, network externalities, and trade restrictions create incentives for participation. No need to enforce compliance.
Benedick (2001)	Depends on levels for R&D, technology standards, etc.	Technology lock-in may be a problem, but public sector R&D may lower costs.	Would not be a global agreement, and would not equalize marginal costs across all sectors.	ICs to transfer new technologies to DCs. US to show leadership in reducing emissions unilaterally.	R&D would provide more information about new technologies.	Participation deliberately restricted, at least initially and in some areas. No explicit mention of compliance.
Bradford (2002)	Would depend on the magnitude of financial contributions to the central authority.	Could potentially support a dynamically efficient outcome.	Common offer bid for emissions allowances to all countries would insure cost-effectiveness.	Financing obligations would reflect ability to pay and expected benefits from mitigating climate change.	Central authority could adjust emissions allowances purchases with new information over time.	Does not explicitly address enforcement of financing obligations.
Cooper (1998, 2001)	Would depend on the level of the carbon tax.	Could potentially support a dynamically efficient outcome.	Common carbon tax would be cost-effective.	Tax would be uniform, but part of revenue could be redistributed to DCs.	Tax level can be changed, to adjust to new information.	Does not incorporate explicit mechanisms. Relies on a "commitment" to treaty objectives plus transparency.

¹⁰ 'Alternatives' in the table (p.9): J. E. Aldy, P. R., Orszag and J. E. Stiglitz, 'Climate change: an agenda for global collective action', prepared for the conference on The Timing of Climate Change Policies (PEW Center on Global Climate Change, Washington, D. C., 2001); Barrett, 'Towards a better climate treaty'; Barrett, *Environment and statecraft*; R. E. Benedick, 'Striking a New Deal on climate change', *Issues in Science and Technology*, Fall 2001, 71-76; D. F. Bradford, 'Improving on Kyoto: greenhouse gas control as the purchase of a global public good', Princeton University, *Working Paper*, draft (2002); R. Cooper (1998), 'Toward a real treaty on global warming', *Foreign Affairs*, 77, 2, 66-79 (1998); Cooper, 'The Kyoto Protocol'.