TO **UNFCCC Secretariat**

Ad Hoc Working Group on the Durban Platform for Enhanced Action, **ADP**

secretariat@unfccc.int

FROM **Dr Harley Wright** – ('About the Author' page 19)

Climate Sense, Sydney Australia

harleyjwright@gmail.com

DATE 22 Feb / 18 Apr 2012

Submission to UNFCCC

Mandate: FCCC/CP/2011/L.10, paragraph 8:

> *"Requests* Parties and observer organizations to submit by 28 February 2012 their views on options and ways for further increasing the level of ambition and decides to hold an in-session workshop at the first negotiating session in 2012 to consider options and ways for increasing ambition and possible further actions. Establishment of an Ad Hoc Working Group on the Durban Platform for Enhanced Action"

FRAMEWORK TO SHARE CARBON SPACE TO 'INCREASE AMBITION' & 'ENSURE HIGHEST POSSIBLE MITIGATION'

"If for some reason you are not willing to lead; leave it to the rest of us; please get out of the way"
Kevin Conrad, Bali Dec 2007

From Current status → **Framework for timetable of strong action**

- Future vision unclear
- Methodical, serial decision making.
- No clear timetable for abatement
- Lacks formulaic basis to share emissions

- Full consensus on all decisions – slow, incremental progress

- Seeks an agreement "applicable to all Parties"

- Simple, fair, transparent, good future vision
- Flexible, adopts simple, least contentious options first
- Timetable sets decisions, → emissions trajectory
- A move to equal per capita emissions gives formula to share emissions
- Voluntary participation for 2016 start to strong reductions. Late starters encouraged to join (ethical pressure, trade equalisation)
- Accepts some Parties may not participate at start (2015/16)
- Startup period uses reliable emission values (fossil fuel and cement = CDIAC CO_2); coverage around 2/3 of total CO_{2e}.
- Include more GHGs (hard to estimate) CH_4, N_2O and LULUCF, later when practical for most countries.

Executive summary

Recent reports from the OECD and EIA give stark warnings of the need for urgent and strong action to reduce greenhouse gas emissions.

The science is clear that there is a limited quantity of GHGs which can be emitted in the future. If we started in 2016, world emissions must reduce by almost 6 percent, year on year, to stay within the emission 'quota' to 2050. Any further delay makes the task harder still.

This framework can assist COP's Durban Platform for Enhanced Action [1] complete its work no later than 2015. The timetable (page 20) shows steps leading to worldwide emissions reductions and trading in 2016.

It provides a fresh approach to speed up climate negotiations. It addresses two primary issues;

- Allocation of future emissions rights amongst Parties
- Funding contributions to support development in developing countries.

Measures outlined here can:

- Provide a legal agreement between most Parties to determine their carbon constraints and enable widespread trading in emissions entitlements.
- Provide a framework to reduce global emissions to an agreed safe level over time
- Provide substantial funds for sustainable development in low-carbon countries
- Require participating countries to agree to future emissions entitlements (= emissions profile), which can be traded (as permits).

The proposal is founded on **the principles of Contraction and Convergence[2].** It has four essential steps:

1 Agree on a global maximum emissions cap to 2050 [eg, 1000 gigatonne CO_2]. This is **contraction**.

2 Agree on the principle of equal per capita emissions at some stage (the date is not determined in this step, simply the principle). This is **convergence**

3 Agree on the *date* when all emissions entitlements become equal per person. This is the crux of the issue. The **date**(s) **of convergence** determines the size of the high value trade in entitlements between high-carbon and low-carbon countries, viz, developed and developing countries

4 Determine **emissions profiles**, issue permits, manage reconciliation and facilitate global trade. High-carbon countries buy permits from low-carbon with annual trade of around $100 billion or more depending on the carbon price.

These four steps enable a fair determination of each country's emissions entitlements. Step 3 in particular, is highly contestable and most difficult. **Agreement on these four steps can resolve the crisis and hiatus. Other issues are secondary to these core steps which need to be resolved first.**

Acknowledgment and disclaimer

I am pleased to acknowledge much valuable assistance from friends and colleagues – they know who they are. My calculations and graphs are presented for illustrative purposes in a semi-quantitative sense. They are not forecasts and may not be accurate.

[1] Durban Platform for Enhanced Action includes: Item 6, Decision; "the process shall raise the level of ambition"; Item 7, Decision; "close the ambition gap with a view to ensuring the highest possible mitigation efforts by all Parties"; Item 8, Request; "consider options and ways for increasing ambition and possible further actions."

[2] Contraction and Convergence at; candcfoundation.com/pages/whatis.html also www.gci.org.uk/Documents/ZEW_CONTRACTION_&_CONVERGENCE.pdf.

Contents

A. Introduction & background

Kyoto a landmark – more needed

The Kyoto Protocol was a momentous landmark in global agreement. At Kyoto, almost 40 developed countries in Annex B agreed to constrain their emissions. They knew this would be adverse to their current economy, yet realised this small cost was necessary for the common good of the world's climate and to avert ever increasing costs of climate effects. It was the first step of contraction. Many more steps are needed.

Regrettably, we have made little progress since to make more cuts.

Sharing limited 'carbon space' – solving the problem

Carbon emissions – a finite resource

The maximum aggregate emissions from 2010 to 2050 is estimated to be 1000 Gt CO_2 (Meinshausen 2010[3] and BASIC Experts 2011[4]) to keep the temperature increase to below 2°C with a 25% probability of exceeding 2°C.

How does the world go from its current annual emission of 9.1 Gt CO_2 in 2010[5] to 2050 while maintaining a maximum aggregate of 1000 Gt? How do we share this 'carbon space' amongst the Parties?

Reducing emissions with a constant exponential rate means that the difficulty is constant in relative terms. Using this form of reduction, a 5.8% per year rate of exponential decrease is required to limit aggregate emissions to 1000 Gt CO_2, from 2000 to 2050. By the time these proposed cuts could start in 2016, around 460 Gt of CO_2 will already be emitted. The CO_2 emissions reduction, from 2016 at 5.8%/year is shown by the lower curve labelled, 'CO_2 CDIAC' in Figure 2 (page 14). The world's annual emissions drop to 4.8 Gt CO_2 (7.2 Gt CO_{2e}) in 2050.

This is a daunting challenge for the developed countries alone (the North) were it not for the obvious needs of developing countries (the South) to

1. higher energy use, which normally means higher carbon emissions, and
2. other per capita increases, eg meat and fertilisers which also have high carbon intensity.

The BASIC countries seek: "equitable access to the carbon space" and "equitable access to sustainable development". (BASIC Experts 2011[6])

A restraint on emissions is unfamiliar and unwelcome. It affects lifestyle choices and economic activity.

---

3 Meinshausen et al*, "Greenhouse-gas emission targets for limiting global warming to 2°C" Nature* **458**, 1158-1162, 2009)

[4] *Equitable access to sustainable development – a paper by experts from BASIC countries*, embargoed 3 Dec 2011

[5] *Record High 2010 Global CO2 Emissions .."* See http://cdiac.ornl.gov/trends/emis/prelim_2009_2010_estimates.html

[6] *Equitable access to sustainable development – a paper by experts from BASIC countries*, embargoed 3 Dec 2011

Methods to share and limit emissions

What methods or theories can help us find an appropriate path?

COP needs to set a target on the size of the abatement needed, eg, a limit of 1000 Gt CO_2 from 2010 to 2050 or a perhaps a range may be suitable to allow for later adjustments. But how is this shared amongst Parties?

There are various proposals of how abatement could be effected. Like this submission itself, proposals are commonly of a single approach. In contrast, Prof Ross Garnaut wrote a Review for the Australian Government in 2008[7]. Chapter 9, "*Towards global agreement*", provides an excellent review of various options and methods which the world could use to reduce emissions. Methods reviewed include carbon taxes and tradeable emissions entitlements:

From this inciteful analysis of alternatives Garnaut concludes:

> **"The only realistic chance of achieving the depth, speed and breadth of action now required from all major emitters is allocation of internationally tradable emissions rights across countries. For practical reasons, allocations across countries will need to move gradually towards a population basis."**

He notes also

> "Under contraction and convergence, each country would start out with emissions entitlements equal to its current emissions levels, and then over time converge to equal per capita entitlements, while the overall global budget contracts to accommodate the emissions reduction objective. This means that emissions entitlements per capita would decrease for countries above the global average, and increase (albeit typically at a slower rate than unconstrained emissions growth) in countries below the global average per capita level. Emissions entitlements would be tradable between countries, allowing actual emissions to differ from the contraction and convergence trajectory."

And further

> "The contraction and convergence approach addresses the central international equity issue simply and transparently. Slower convergence (a later date at which per capita emissions entitlements are equalised) favours emitters that are above the global per capita average at the starting point. Faster convergence gives more emissions rights to low per capita emitters. The convergence date is the main equity lever in such a scheme."

I know of no better appraisal of plausible methods of abatement which have the breadth and depth of Garnaut's Chapter 9, His careful and objective analysis confirmed my own intuitive view of our best option. Hence this submission is based on equal per capita emissions. What plan or methodology is COP following? Garnaut's Chapter 9 is embedded for consideration.

[7] *Garnaut Climate Change Review*, Australian Government, 2008


Garnaut 2008 Chapter9.pdf [double click to open]

The need for full consensus on decisions at COP constrains rapid progress. Progress seems to be in small, incremental steps ('incrementalism'). There is still no clear framework to agree on the emissions which each Party may make in the future. There seems no timetable to achieve such a framework.

My submission proposes [heroically!] such a framework and timetable. The framework aims for fairness and wide acceptance. The framework aims to start strong abatement as soon as possible. We are running out of time to manage the problem without serious distress. The timetable (page 20) aims to start strong abatement from 2016.

With speed and strong abatement the priority, this framework suggests streamlining options. My framework accepts that not all Parties may be prepared to participate from 2016 (when it first commences). So be it in the short term. Second, it proposes that the formally constrained and traded emissions would be those most easily and unambiguously measured.

Contraction and Convergence – ethical imperative

The key purpose of the contraction and convergence principles and measures is to determine a fair share of future carbon emissions for each country, noting that:

- Current world emissions need to be cut significantly- **the key principle of contraction**
- Developed countries have high per capita emissions arising from practices convenient in building and maintaining their standard of living
- Developing countries have low per capita emissions. They now aspire to become developed in accord with the Millennium Development Goals[8]. This development will require higher emissions in the short term before changes enable low emissions with a satisfactory quality of life.

The key principle of convergence is that each person has a right to emit the same amount of a controlled substance (GHGs) to the atmosphere – the global commons. This equity principle is embodied in:

- The Universal Declaration of Human Rights[9]
- United States Declaration of Independence[10]

A climate agreement is based on the allocation of national emissions targets, determined by population. This enables emissions entitlements/permits to be traded globally. Developing countries get substantial incomes from selling emissions permits in early years to developed countries. The market establishes carbon prices at future times and trading allows developed countries to meet their reduced emissions targets at least cost.

Ideally, all UNFCCC countries need to commit to this framework soon. Given the probable difficulty, this proposal suggests that a legal agreement be made when sufficient participating countries have emissions meeting a suitable threshold, eg 70% of world emissions. Prof Garnaut noted, *"Deep trade among a set of countries which includes major sellers and buyers of entitlements is enough to secure these benefits; not all*

[8] UN Millennium Development Goals

[9] Article 1. "All human beings are born free and equal in dignity and rights."

[10] "We hold these truths to be self-evident, that all men are created equal,"

countries need to participate in trade."[11] Garnaut also proposed a graduated approach to national entitlements.

Ethical imperative

The contraction principle is implicitly embodied in the Framework Convention and associated agreements. The principle of convergence is widely accepted. It is formally endorsed by many countries.

But **convergence** is not yet formally implemented by the Convention. Yet this principle is at the heart of the last 50 years of environmental law and policy. The Brundtland report[12] endorsed the internalising of externalities – the policy principle to implement the 'polluter pays' principle, which Brundtland also promoted. These principles are widely adopted in laws around the world. They also align with ecological principles where harvesting should be limited to the 'sustainable yield' - while emission loads should be limited to the 'assimilable capacity' of the environment. Limiting the emissions of greenhouse gases is a global exemplar. The common means to limit extractions from, or discharges to, the environment is by rationing, and the use of quotas or ration permits.

The allocation of limited permits to emit to the atmosphere on an equal per capita basis is undeniably equitable. Yet many of us are used to discharging GHGs above the assimilable capacity of the atmosphere. The Kyoto response at the time was practical. Emissions from high-carbon countries were limited in proportion to their *historic* emissions. Moves to allocate emissions permits on *a per capita basis* will continue. The world (through COP) can move as quickly as is reasonable in this direction now. Prompt and efficient abatement could result. Or the COP can avoid the fair and inevitable process and continue to negotiate with slow, unsatisfactory and fitful gains. Delays to abatement now, will likely lead to dangerous climate change.

Permit trade provides large funds to developing countries

Agreement on the above enables emissions profiles to be set for each country with agreed parameters, applicable to all. Emissions permits, based on emissions profiles can be issued and traded which allows each country to reconcile its actual emissions with purchased or sold permits. Large payments flow from high-carbon countries to low-carbon countries. Total annual payments up to $250 billion could be paid by developed countries to developing countries[13]. This is in the same order of magnitude as the payments mooted for the Green Climate Fund, which is to assist developing countries adopt low-carbon and sustainable technologies.

The contraction and convergence model uses agreed and transparent emissions criteria as the basis for traded permits. The consequent large wealth transfer to developing countries helps provide for sustainable development. The size of the trade derives directly from the agreed and explicit principles. Other processes, including the Green Climate Fund, lack such explicit and agreed factors. The basis for the level of funds contributions by countries, and allocations to countries, seems qualitative and prone to gaming and continuing dispute, and this risks delivering the promised funds. Contraction and convergence avoids these issues and could reduce the funding needs of the Green Climate Fund.

Legal framework necessary

Contraction & Convergence (C&C) is arguably the only practical model leading to the sustained emissions reductions necessary and in time to avoid dangerous climate change. These proposed measures require a

[11] *The Garnaut Review 2011*, Cambridge Uni Press, p 45.

[12] Brundtland report, *Our Common Future*, 1987

[13] Developed countries might need to buy in aggregate 5 Gt CO_{2e} and pay up to $50/t of CO_{2e}, ie, $250 billion.

legal framework for all Participants. Voluntary actions (eg, the Hartwell Paper, 2009[14]) have scant hope of providing the necessary levels of quality assurance for high value trade in entitlements or the high rates of abatement needed in future.

Section B in this paper (*Four essential steps for COP adoption of Contraction & Convergence,* pages 9 to 14) sets out the key steps and policy decisions needed to adopt C&C. It deals with a few critical issues and allows several years if necessary to resolve the **major issue of the timing of convergence**.

This framework aims for speed in start up and the confidence of the Parties in the processes. Accordingly, the essential and simplest aspects are adopted first. Many more complex and difficult issues can be solve later from a sound working core. This promotes a wide understanding and confidence in the process, which developing countries have sought with the Kyoto Protocol.

[14] Hartwell Paper at; http://www2.lse.ac.uk/researchAndExpertise/units/mackinder/theHartwellPaper/Home.aspx

B. Four essential steps for COP adoption of contraction and convergence

The following policy steps are proposed as, "options and ways for further increasing the level of ambition", sought in the Durban Platform for Enhanced Action, COP 17.

Participation in Contraction and Convergence

Participation under the UN Framework Convention needs to include virtually all countries. However, to ensure it starts as soon as possible, full participation may not be complete in the early years. The process should start with as many countries as possible participating (initial Participants). The Participants would set the rules for the formal process of allocating and trading international emissions entitlements. This formal process is called the UN 2C process or zone[15] for convenience. It would be the main means of reducing emissions. Other complimentary processes can apply to those emissions not covered by the UNFCCC process. Those Non-Participants - not committing at the outset - should be encouraged into joining as soon as possible. Some means are mentioned later.

The Contraction and Convergence principles[16] should be a key part of determining all countries' fair shares of future GHG emissions. I suggest the following four essential steps are sufficient to establish a sound and practical base for strong abatement of emissions using contraction and convergence.

1. Science sets the contraction needed

The IPCC reports will inform the COP on the contraction needed in world emissions to avoid dangerous climate change. At its broadest, a specified contraction could be a maximum aggregate emission by a date – eg, 1000 Gt CO_2 by 2050. The timetable in section F (page 20) has this being agreed to in 2012 at COP18. Additionally, contraction in world emissions may be set by a more specific profile of emissions over time, eg, set amounts for every 10 year period – in the timetable, at COP19, 2013.

To allow changes to future targets due to changes in goals, (eg, due to improved understanding of the climate science) bands of emission quantities may be set instead of a single value. This then provides flexibility for changing targets which in turn change the value of emissions entitlements/permits, which have already been issued for later years. Australia explained a useful model of 'gateways' leading to specific 'caps'[17], which is considered further (page 12).

2. The Principle of Convergence

Hopefully, all signatories to the UNFCCC will agree to the principle that per capita emissions should, at some yet to be specified time, become equal. It is sufficient that a majority of countries agree and is timetabled for COP18, 2012.

3. Dates of Convergence

[15] 'UN 2C' is a suggested abbreviation for the UN Process using Contraction and Convergence, for several reasons. First; '2C' has an immediate correlation with the aim to limit temperature increase to 2°C [though 1.5°C needed]. Second; 'UN 2C' would be used for the formal, rule-governed processes under UNFCCC/COP and differentiate it from the generic use of Contraction and Convergence which would still be used.

[16] Contraction and Convergence homepage at; http://www.gci.org.uk/index.html

[17] "*Carbon Pollution Reduction Scheme*" Australian Government White Paper vol 1, sections 10.1, 10.2, Dec 2008

Agreement on the date when all emissions entitlements become equal per person is the crux of the issue. It determines the size of the high value trade in entitlements between high-carbon and low-carbon countries, viz developed and developing countries.

3.1. I suggest dates from 2008 (the commencement of contraction under the Kyoto Protocol) through to 2050 in the timetable (page 20) as the broadest range to agree on at COP18, 2012. Future negotiations should work to agree on a single date in this range.

3.2. A narrower date range only might be agreed at COP19, 2013, given the crucial effect on large trade values. The timetable suggests 2015 to 2030.

3.3. The timetable tentatively suggests a final convergence date of 2025. COP will debate this vigorously – it is a key determinant of the size of future trade in entitlements/permits.

4. Emissions profiles; Permits issue and trade; Reconciliation

Participants in UN 2C set the world's **emissions contraction** as a maximum aggregate emission up to some future date – over the period of the contraction. They can then set a global emissions profile, eg assume a constant rate of reduction.

The emissions profile of each country sets its future allowed emissions which it agrees to meet through a reconciliation of its actual emissions with purchased or sold permits. Setting the emissions profiles is the critical part of the UN 2C process as these determine the amount of emissions entitlements/permits available for trade. Each profile will be determined by the common and agreed targets for either;

- **Simple Convergence**
  All countries converge to an equal per capita emission by a specified date, eg, somewhere between say 2015 to 2030. Note that fast convergence will be of greater benefit to developing countries than slow convergence. Conversely, fast convergence is more adverse to developed countries who, facing steep cuts in emissions, will be buying more permits from developing countries. As there seems little basis for settling the self-interest aspects involved, this is likely to be a strongly contested issue, which could invoke many aspects; or

- **Modified Convergence**
  Participants in the UN 2C process may modify the simple model outlined. Most likely, emissions profiles for developing countries may allow faster expansion of emissions in early years (providing 'head space') before falling faster, later (than a steady rate of change).
  Many variations are possible for the emissions profiles and they may be considered as the process develops. Note though, that increasing the complexity can make it harder in the future if further modifications are considered.

In general, Participants are issued entitlements/permits to emit equal to their original profiles. The permits are issued under the UN 2C process and are freely tradable.

Trading of permits enables reconciliation of actual emissions with a permitted profile:

Each **developing country** is allocated permits that allow for per capita emissions, generally at levels above its needs in early years.

Permits issued to **developed countries** will often be less than their needs, in which case they will buy permits (of the relevant currency period) from developing countries for reconciliation. The reconciliation process would build upon current MRV protocols. It will check that the sum of actual

emissions plus permits relinquished or sold matches each country's (or group of countries') emissions profile. A country's actual emission should equal its allocated emission permits from the UN 2C process plus or minus the permits bought or sold respectively. Small discrepancies might be carried forward for adjustment in the next reconciliation period.

Shortfalls in permits below a country's actual emissions in a period could be compulsorily reconciled by subsequent pruchase of permits – probably from a later vintage (designated period). A difficult situation might arise if many high-carbon countries had actual emissions plus purchased permits, each exceeding their respective entitlements in a period. The necessary purchase of of more permits to reconcile their aggregate exceedence of their entitlements might send the carbon permit market to unrealistic high prices, which could challenge the trust in the system. Measures to manage the stability of the market, the supply of permits and overall trust and confidence in the process could be developed. This will be a new fully international market of substantial value of a novel commodity – a colourless gas. Yet its mass and effects are as tangible as its human production from fossil fuels, carbonate rocks and other sources. Astute structure and management is a requirement for its lasting success.

Achieving full participation in the UN 2C process[18]

Initial Participants can use the same principles and calculations to set emissions entitlements for all countries, including the Non-Participants. It would be reasonable that high-carbon, late-joining Parties to the UN 2C process would have to account for their emissions, from the start of the process, before they joined. This, together with a demonstration of a significant and effective trading and accounting process by a majority of countries could induce Non-Participants to join. Non-Participants might also be labelled as 'free-loaders'.

Materiality – Emissions threshold to participate

The measurement, reporting and verification costs become proportionally larger for small emitters and economies. The COP may wish to set thresholds below which Parties are not obliged to participate in the UN2C permit and compliance process. Complementary Measures could apply to these exempt countries.

Border Adjustment Measures *[Comment[19]]* could be applied on emissions-intensive products imported from Non Participants into Participating countries *[Comment[20]]*. Appropriate modifications could be made to the General Agreement on Tariffs and Trade[21] (GATT, with the WTO). Participants would publish criteria and means to calculate appropriate import (BAM) fees under rules made by the UN 2C zone Participants.

Non-Participants pay BAMs on exports to UN 2C zone

[18] Countries that do not commit to the UN 2C process would be deemed Non-Participants.

[19] BAM is a common term commonly used in this debate. Hence it's included here as many can relate to this. Note that France has pushed for this for the EU – but was rejected. Ross Garnaut's Review (2008) favours some form of BAM given appropriate amendments to GATT.

[20] This is a means to pressure countries to participate in the UN 2C zone. Focus on high-carbon imports can keep transaction costs low.

[21] The following provision in GATT 1947 Article XXV, point 5, says;

- "In exceptional circumstances CONTRACTING PARTIES may waive an obligation ,,, and may;
- (i) prescribe such criteria as may be necessary …
- (ii) define certain categories of exceptional circumstances …"

Waivers under this provision of GATT might be developed to allow for border adjustment measures by the UN 2C zone – without compromising sound, free-trade principles. The reasons for, and uses of, this exception to GATT would be clearly explained to prevent escalating trade wars. These GATT provisions seem suitable to enable this.

Non-Participants are not obliged to reconcile their emissions. However the deviation of a Non-Participant's actual emissions from its published emissions profile can be included and used in the calculation of BAM fees levied on its products exported into the Participating zone.

Factors to determine Border Adjustment Measures

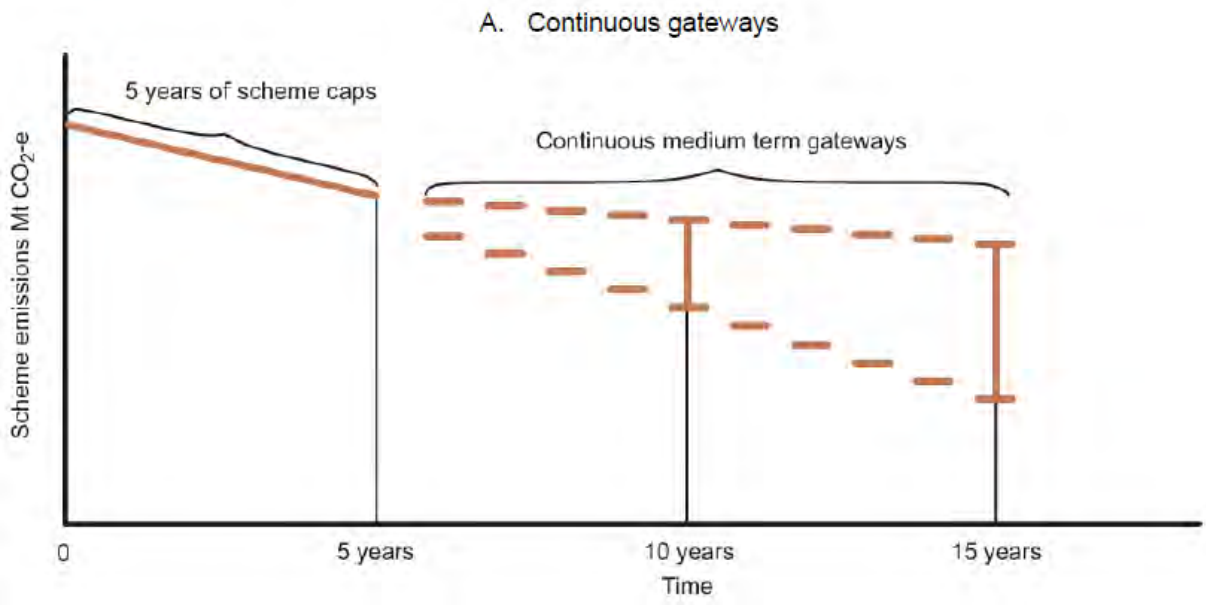
The level of Border Adjustment Measures to be applied to high (emissions) intensity imports from Non-Participating countries would have regard to:

a) The imputed intensity (tonne CO_{2e}/ unit or /weight or /value) of the import based on the emissions intensities of the economic inputs to make the high intensity imports (in its own country)
b) The traded price of CO_{2e} prevailing at the time, and
c) The degree to which the exporting, Non-Participating country is meeting or exceeding an emissions profile determined by the UN 2C process.

Coping with changes in emissions targets

Agreed targets – either emissions or dates – may need to change as circumstances change. Emissions permits in current and future years will have values which would be affected by changes in targets. Substantial revaluations might occur unless care is taken to avoid risks to the value and reliability of the scheme. An Australian model for emissions permits set longterm targets in a range ('gateways') to be targeted. But short-term targets – up to 5 years away - were set as a single value. Figure 1 from Australia's model is shown[22].

Figure 1: Forms of gateway



This model has the benefit of providing carbon prices (for emissions) for the next 15 years. This is a great benefit to informed decision making in all aspects of the economy – consumers, high carbon product producers, and government.

[22] *Carbon Pollution Reduction Scheme*, Vol 1, page 10-10, Australian Government, Dec 2008

I suggest similar target ranges could be made for, eg;

- The aggregate world emissions stock to 2050 (as first set in Step 1.2)
- The exponential decay rate (constant) to set the world's total emissions trajectory
- The convergence date for equal per capita emissions (Steps 3.2 & 3.3).

Basic coverage of emissions – facilitates easy start for all Parties

High participation is required for the UN 2C process to start. To encourage participation, it is suggested the process be simplified to the most simple needs. The coverage of GHG emissions is an aspect which can be simplified.

The Convention defines six greenhouse gases and aims to reduce the combined effect of these. The contraction and convergence framework requires estimates of GHG emissions, the allocation of emissions entitlements to countries, and trade in entitlements.

The majority of GHGs can be easily and accurately estimated. But others are diffiuclt and estimates vary depending on the methodology. The Marrakesh Accords are a great achievement in dealing better with many of these, including LULUCF.

Developed countries provide estimates of virtually all their GHG emissions when reporting under the Kyoto Portocol. Many of the minor emissions such as methane from landfills and sewage treatment are relativeley difficult to measure. The cost of estimating these emissions is relatively high compared to their relatively small contribution to total emissions, eg a few percent in developed countries.

Developing countries have argued against reporting their emissions, which is unnecessary when they have no specific targets. But to benefit from the sale of unused permits, through the UN 2C process, Parties need to account for their emissions.

The CO_2 emissions from burning fossil fuels and making cement are easily and reliably measured and reported. The CDIAC records these, which account for around two thirds of total GHG emissions. This subset of total GHG emissions provides reliable and easily measured values that should be suitable to estimate each country's allocation, thence allow trade in permits. This compromise requires that complimentary measures are needed to deal with emissions not covered by this [UN 2C] process.

Figure 2 shows model emissions trajectories for three different measures of CO_{2e} which range from 'full' coverage Kyoto emissions through reducing coverage to 'CDIAC CO_2' - the basic emissions of fossil fuels plus cement manufacture. A continuous 5.8%/year rate of reduction is required for the Meinshausen limit (1,000 t CO_2) to be met, starting with base 2015 emissions of 36.7 Gt CO_2.

The upward pointing arrow in Figure 2 shows how the core emissions of the UN 2C scheme would be expanded later with wide adoption of more detailed processes for measuring and verifying other GHG emissions. Emissions not included in the formally constrained and traded UN 2C process would be subject to complementary measures which all countries would be asked to implement.

Accounting for emissions

The UN 2C process, estimates and accounts for all actual and reliably estimated carbon emissions and limits these. It is simple and sufficient to manage the contraction of covered emissions.

Mechanisms such as CDM and JI have evolved as a means to extend abatement activities to areas outside the ambit of direct Kyoto obligations. Such measures invoke 'additionality', viz an imputation of emissions reductions relative to what would have occurred without the additional action. Such measures do not allow a reliable estimate of net additions of GHGs to the atmosphere and are inherently less reliable than direct measures of emissions. There is no benefit in measures based on additionality for emission sources already covered in the process. Such mechanisms need to be ended fairly, whenever full emissions accounting is established.

The REDD scheme is an example of a complementary measure to manage LULUCF emissions.

Figure 2: Various sources of GHGs – constant 5.8%/y rate of reduction[23]

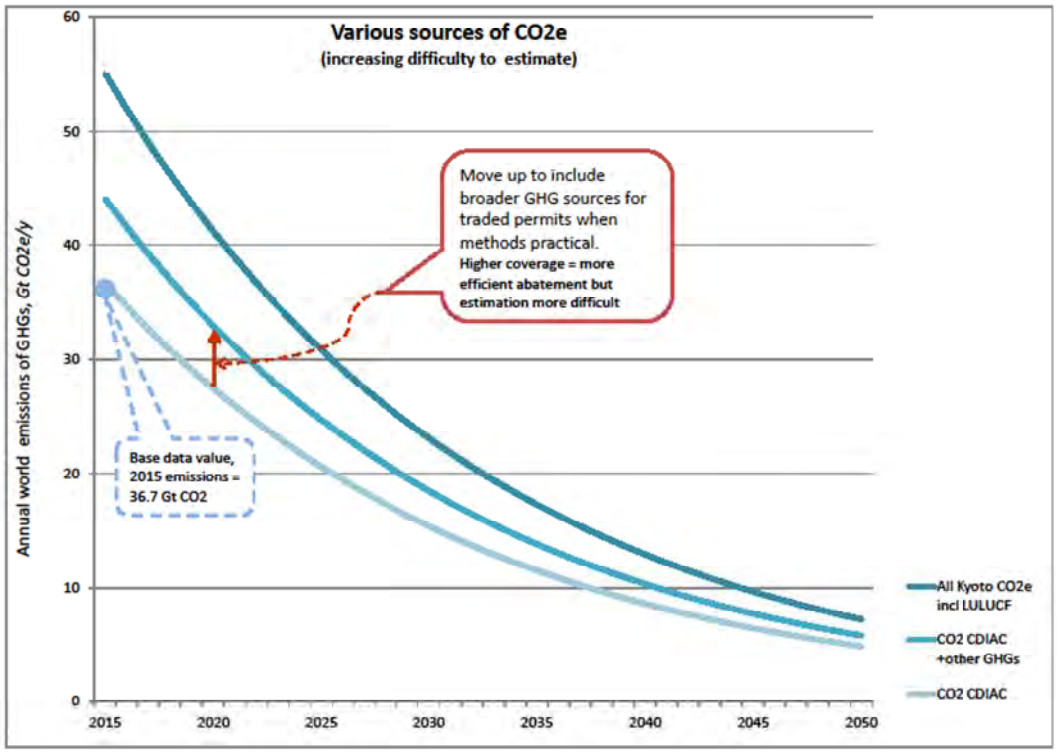


Figure 2 details: Three hypothetical emissions reduction trajectories. I determined the base data value, 2015 emissions = 36.7 Gt CO2 from fossil fuels and cement by extrapolation from CDIAC data[1]. And the 2015 emissions values are calculated as; 'All Kyoto CO2e incl LULUCF' = 'CO2 CDIAC' * 1.5, and 'CO2 CDIAC +other GHGs' = 'CO2 CDIAC' * 1.2. These relationships are simply indicative for illustrative purposes.
The exponential reduction rate for the CO2 CDIAC curves was set to give the aggregate emissions of 1,000 Gt CO2 from 2000 to 2050 (the Meinshausen limit). I used the CDIAC data to estimate CO2 emissions from 2000 to 2015 at 464 Gt CO2. Almost half the limit has expired before we commence strong abatement! The constant reduction rate needed is 5.8%/y.

[23] Calculations for these curves yet to be verified

Urgent action needed if we aim to limit temperature to 2℃

There are many reasons why action is urgently needed to reduce emissions. Here I illustrate how the window is closing on our ability to constrain the temperature rise to 2C.

In the graphical illustration of reductions in Figure 2, emissions reduce by 5.8%/y commencing in 2016, from a 2015 peak emission. But what happens if emissions levelled for four years from 2016 to end 2019 – before we started strong reductions? **Figure** 3 illustrates the situation. The critical feature is that now we need a constant reduction rate of 8.4%/y starting from 2020, rather than the 5.8%/y reduction if we started just 4 years earlier, in 2016. Since the formal agreement to avert dangerous climate change in Rio in 1992, we have sadly lost a lot of time. If my sums and estimates are reasonable, we face an unprecedented social and technical challenge. A quantum leap in effective effort is needed now.

Figure 3: Effect of 4 year delay in abatement[24]. Reductions go from 5.8%/y to 8.4%/y

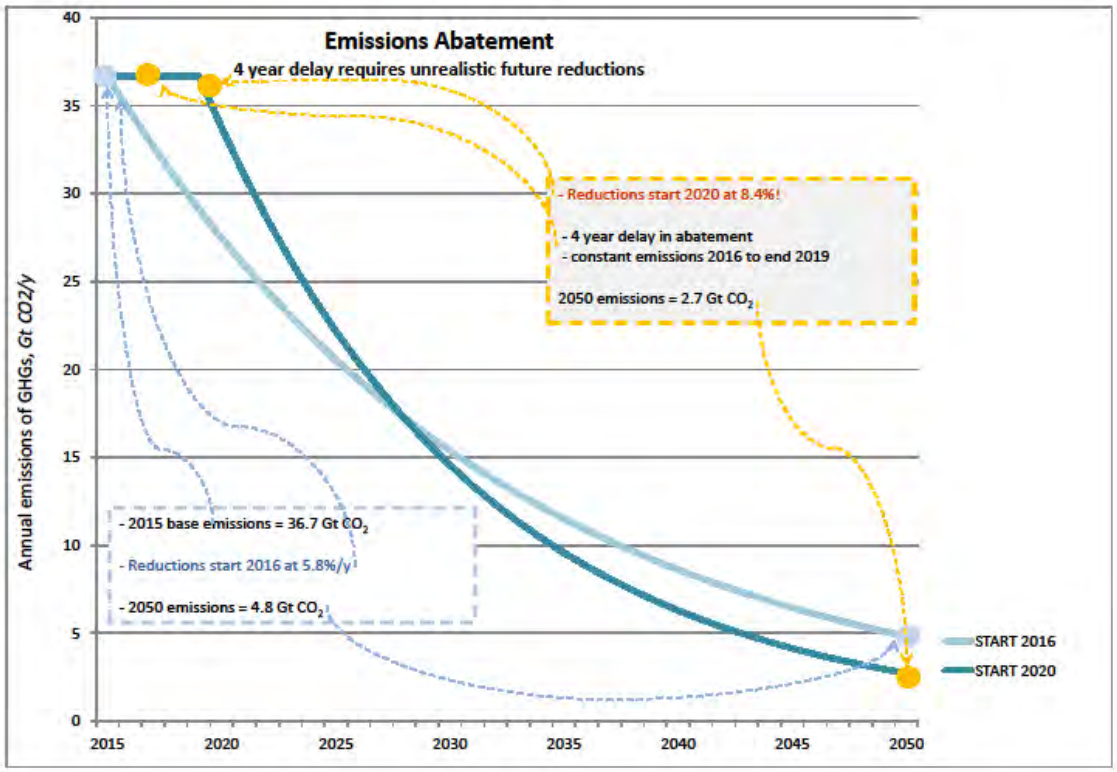


Figure 3 details: Two hypothetical emissions reduction trajectories. The curve decreasing from 2015 is the same CO2 CDIAC curve in Figure 2. The other curve shows constant emissions from 2015 to end 2019. Then an annual reduction of 8.4% (year on year) is needed to keep the aggregate emissions under 1,000 Gt CO2 from 2000 to 2050 (the Meinshausen limit).

[24] Calculations for these curves yet to be verified

C. Further issues require consideration

The following issues will need attention in the development of a detailed UN 2C process. Initial comment is provided but need not be decided upon in formulating a formal decision on the framework for the UN 2C process. There are other issues, not specifically mentioned, which the UN 2C process may need to address also.

Measurement, accuracy and compliance

The quality of emissions data varies widely amongst countries. Considerable monetary payments and receipts directly depend on the emissions data under the UN 2C process. In COP discussions some countries have opposed obligatory reporting of their emissions. Under the proposed UN 2C process, all participating countries (Participants) would have to provide reliable, audited estimates of emissions. Developed countries generally have reliable measurement of their emissions which can be audited against MRV standards developed under past COP processes. It is not reasonable to expect developing countries to have processes to provide accurate and reliable emissions data of the same high standards. Accordingly, different measurement methods might have a range of accuracies and reliabilities. This is the basis for suggesting the initial coverage being CDIAC CO_2, viz, from fossil fuels and cement, which are most reliably estimated.

The difference in a country's actual emissions estimate (eg, for 1 year) to its emissions entitlement is the estimate of that countries entitlement surplus or deficit. Some conservative adjustment could be made to surplus and deficit estimates before trading and requiting. The adjustment would depend on the accuracy and reliability of the estimates of actual emissions. The adjustment would be greater for estimates with less reliability. By such means, estimates for countries of varying reliability *[Comment[25]]* can be used as 'certified emissions' in a trading process involving billions of dollars. Normalising emissions estimates by conservatively adjusting them should enable most countries to participate in emissions trading, even when the accuracy or reliability of their emissions is not strong.

Population

Population is an important factor. World population is expected to grow around 30% by 2050 at which time it should be close to a plateau. This increased population aggravates the emission problem. Each country's current population would be used to calculate its future emission profile. But what happens as a country's population changes in future? This question is left to the UN 2C process. It is suggested now that the populations used at the start of the calculations be locked in (stay constant) for future calculations but further consideration is warranted.

Time of joining the UN 2C zone – initial Participants, Non-Participants, late Participants,

No details are suggested here for dealing with timing issues for joining the UN 2C zone. There would be the initial establishment by Participants. Later, other countries could join. Key issues include how to deal with past exceedences of emissions, relative to the emissions profiles established for all countries by the founding participants. Further consideration is needed here.

Historical emissions – pre 1992 Rio UNFCC Convention

The normal contraction and convergence measure is applied in a forward time sense, with an inherent starting time of the present. However the BASIC Experts say that those countries who have contributed to

[25] Currently, the trade in various units of CO_{2e} use different prices (per tonne CO2) for different sources. I am not familiar enough with this to know if this might work instead of the process suggested here. This proposal normalises data with different reliability in a conservative way that helps avoid fiddling the data. Also, it is designed to simplify the process for developing countries to become Participants and benefit from selling excess emission permits.

higher atmospheric levels of GHGs should now be responsible for their past emissions[26], [27]. Difficulties arise with this concept. There is the issue of making a law applying retrospectively to actions not known to be undesirable, let alone 'illegal' or otherwise penalised – see [28]. Note further, that assessing each country's emissions prior to say 1990 would be difficult and inaccurate, particularly with LULUCF emissions over some centuries. The arguments include a Party's past emissions [historic – eg, last 100 years] need not be resolved with a yes/no acceptance. Firstly, this contentious issue should be deferred from the immediate task of the early steps in the timetable. And when it is addressed later, it could be considered and resolved with an arbitrary, proportional value. Eg, acceptance of responsibility for 10%, 20% or some other proportion.

Ambit claims? It may be impolite to suggest, but perhaps some calls from the South and the North can be seen as ambit claims; ie, simply stating an extreme, perhaps unreasonable position, as a means to shift a compromise in a direction favourable to their own situation. So the South's call to include 'historic emissions' could be an ambit claim, as could the North's call for a convergence date of 2050, as is said to have occurred at Copenhagen, and a basis for a failure to agree.

A possible starting time for the UN 2C process could be 1992 when international agreement was reached on the UNFCCC at Rio in 1992. But later dates, eg, the start of contraction in the Kyoto commitment period, 2008, seem more suitable.

D. What happens . . . ?

(Possible questions to answer)

If COP does not adopt contraction and convergence?

Ans: There is widespread acceptance of the C&C principles from all sides of the debate, particularly the rich/poor (high carbon / low carbon) divide. There is no apparent alternative model to achieve the necessary consensus to equitably allocate emissions entitlements to countries, thence reduce emissions. If contraction and convergence is not adopted very soon, the continuing discussions down various deviating paths are unlikely to achieve sufficient reductions in time to avoid dangerous climate change. Contraction and convergence is the one possible path out of this most difficult problem. It addresses the key issues directly. It is sensible and fair and it has the potential to achieve the necessary reductions. Nothing else comes close. It should be adopted urgently. Perhaps the Easter Islanders and Mayans ignored the warnings of the OECD and IEA.

To the Green Climate Fund?

Ans: The Green Climate Fund would become less important because high-carbon countries will pay large sums to low-carbon countries to purchase emissions entitlements (permits). Annual payments for permits could likely exceed $100 billion. There are existing structures for guiding aid in developing countries and these could be an appropriate way to guide wise investment of the large

---

[26] Greenhouse gas emissions reduction: A theoretical framework and global solution" by Project Team of the Development Research Centre of the State Council, People's Republic of China, ca 2008

[27] *Equitable access to sustainable development – a paper by experts from BASIC countries*, embargoed 3 Dec 2011

[28] Universal Declaration of Human Rights, Article 11 says; • "(2) No one shall be held guilty of any penal offence on account of any act or omission which did not constitute a penal offence, under national or international law, at the time when it was committed."

income in developing countries from sale of permits. The funding needs for the Green Climate Fund would be much reduced. Note too, that the bases for developed countries to fund the GCF are qualitative and endlessly debatable.

To JI and CDM?

Ans: It is likely these will fade with time. There seems no basis for these mechanisms when the carbon accounting principle uses actual emissions, not imputed reductions using additionality. Transitional arrangements need be made.

If the USA does not become a Participant in UN 2C?

Ans: It will be the elephant in the room. It would be increasingly hard politically for the US to stay isolated from a separate world committed to abatement. The UN 2C process would be a virtuous commitment of rich and poor countries and large and small emitters - committed to international emissions constraint. It would seem hard for the US to stay outside this agreement.

When countries wish to commit to UN 2C after it has commenced

Ans: Let's leave this to COP to consider after it has agreed on the core aspects of the UN 2C process and agreement.

If a country wishes to leave the UN 2C?

Ans: As for point 5. above. Let's leave this to COP to consider after it has agreed on the core aspects of the UN 2C process and agreement.

E. Glossary

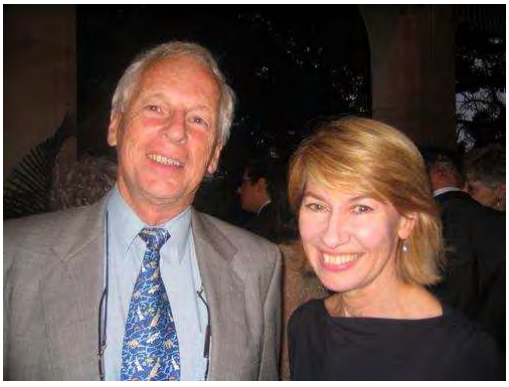
Abbreviation	Meaning	Comments
BAM	Border Adjustment Measures	These are 'waivers' under section XXV of GATT, which are yet to be detailed by Participants to UN 2C.
Carbon, C	The term 'carbon' is commonly used to designate CO_{2e}	If the cost (or other reference to carbon) is given as eg, $/t carbon it is to be interpreted as 1 tonne of carbon in its atomic abundance. Ie, 44 tonne CO_2 or CO_{2e} equals 12 tonne of carbon. A price of $10/t CO_{2e} is equivalent to a price of $36.67 /t carbon emitted (as 44/12 t, emitted in the form of CO_2 or other GHG)
CO_2	Carbon dioxide	
CO_{2e}	Carbon dioxide equivalent, as defined in the agreements under UNFCCC.	
Entitlement	issued to a country to emit a quantity of CO_2 or CO_{2e} in a specified period.	Entitlement is issued under a UNFCCC agreement and method. It is the basis for permits which can be traded.
GCF	Green Climate Fund	
GHG	Greenhouse Gases	
LULUCF	Land use, land use change, and forestry	

Abbreviation	Meaning	Comments
MRV	Monitoring, Reporting and Verification	
Non-Participant	A country not participating in the UN 2C policy; [*Term coined in this proposal*]	
Participant	A country participating in the UN 2C policy; [*Term coined in this proposal*]	
Permit	Derived from entitlements, to adjust for reliability of data. These are tradable units.	
REDD & REDD-plus	international UNFCCC process of reducing emissions from deforestation and forest degradation	
UN 2C	All aspects of the formal UNFCCC/COP adopted 'contraction and convergence' policy, process, rules and zone or group of participating countries in the process; [*Term coined in this proposal*]	

Prepared by Dr Harley Wright
Climate Sense, Sydney Australia
harleyjwright@gmail.com
22 Feb / 18 Apr 2012

About the Author;

I have been an environmental scientist and manager for 30 years, coming from a training in physical chemistry. I have had frequent, detailed engagement on climate change policy from national and corporate perspectives. I provided detailed expert commentary on the penultimate draft of the IPCC's *Synthesis Report* and *Summary for Policy Makers* to the Third Assessment Report. Now retired, I work on policy aspects of climate change and having no commercial or government affiliations, I act on my own account. I am an Australian citizen who is deeply concerned that the world is not acting firmly enough to deal with the increasing threats from global warming. I hope this helps.



Harley discusses climate change with Maxine McKew, ALP candidate for Bennelong, NSW Government House, 5 Mar 2007

F. COP – Timetable

Policy Steps to ensure "highest possible mitigation" – global emissions trading starts 2016

Step	Policy steps	2012	2013	2014	2015	2016
1. Contraction			Kyoto 2nd Period Ends 2015, Cap & Trade starts Jan 2016			
1	**Agree to Contraction** (qualitative only)	Agreed COP 18				
1.2	Maximum emissions for 2050, 2030	Agreed COP 18				
1.3	Maximum emissions by 2020 eg: Annex I = 1990 -25%; non Annex I = 1990 +20%		Agreed COP 19			
2. Convergence						
2	**Agree to Convergence** (qualitative – no time limit)	Agreed COP 18				
3. Convergence Date						
3.1	Agree shortest & longest convergence dates, eg, 2008 to 2050	Agreed COP 18				
3.2	Agree tighter dates, eg 2015 to 2030		Agreed COP 19			
3.3	Agree convergence date, eg 2025			Agreed COP 20		
4. Entitlement Profiles						
4	**Emissions Profiles, Permit issue & trade, Reconciliation**					
4.1	Framework – Principles & Policy Steps to be developed	Agreed COP 18				
4.2	Agree each Annex B country's target for Kyoto2 2013-2017	Agreed COP 18				
4.3	Working Party sets emissions entitlement (permit) profiles (say in 5 y steps)			Agreed COP 20		
4.4	Working Party develops • permit management, compliance • & late-joiners policy			Agreed COP 20		
4.5	Agree full compliance to start cap & trade 2016			Agreed COP 20		
4.6	The full working measure is finalised in 2015 & approved at COP21.				Finalise details. Agreed COP 21	Jan: **CAP &TRADE STARTS**
Other policies, issues						
	Green Climate Fund					
	Others - Many					