



What? Bend the curve in global emissions within a decade of Copenhagen

How? Establish a global power sector carbon budget

1. Introduction

A key criteria for a global climate change deal in Copenhagen in 2009 is that it should be sufficient, meaning that it must address the need for global emissions to peak and decline quickly. Time is a critical factor in the science of climate change. Delaying action increases risk.

And yet reaching a global deal has proved to be a complex and time consuming issue. Global emissions are currently increasing at approximately 2.5% per annum – last year adding an additional 27 billion tonnes of carbon dioxide to the atmosphere 20% of which will still be present in the atmosphere around 1,000 years later.

The sooner the growth curve in emissions peaks and declines the better, both in scientific terms and in terms of communicating that progress is possible and the problem resolvable.

The question is how to achieve this rapid peak and decline?

2. Obstacles to progress

It could be achieved by creating a steadily declining global emissions budget to be shared amongst the highest emitting countries. The allocation of this budget could incorporate common but differentiated responsibilities that take into account the historic responsibilities of different countries. These are the principles on which Kyoto is based. However, under Kyoto many rapidly industrialising nations are not yet required to take on legal caps and, even with differentiated treatment, the appetite for economy-wide caps, amongst countries which do not currently have them, (and some who do), is generally very low.

One obstacle for developing countries taking on a budget or cap is that there is a lack of reliable information about their 'business as usual' emission projections so they simply do not know how much effort might be involved in remaining within a given budget. In addition, the task of creating an economy wide registry for emissions is a daunting task for many countries. Another barrier is the perception that the developed world has not yet demonstrated it takes its responsibilities seriously – the US's refusal to ratify Kyoto and continuing high emissions in Europe are cited as strong evidence of this.

3. Dividing the cake another way

A number of countries (most notably the US and Japan) have proposed that a sectoral approach to the issue of tackling emissions could be adopted – that is to say that the global carbon budget could be divided by sectors of the global economy as well as by nation state.

Taking a sectoral approach has the advantage of more directly engaging the economic actors who control investment decisions in energy infrastructure, which often has a long life span. The economic actors in a sector are also a homogenous group compared to country economies and many are multi-national organisations capable of deploying international strategies.

Three major sectors make up the majority of global carbon dioxide emissions – the generators and suppliers of electricity, the suppliers of transport fuels and the suppliers of fossil fuels for heat processes. Additional industrial sources of CO₂ include iron ore processing and cement manufacture.

4. Power sector first

The biggest sector by volume of carbon dioxide emissions is the global power sector accounting for 30% of global emissions – emitted from ~50,000 installations controlled by ~4,000 companies¹.

The sector is sufficiently large that effective regulation in this sector alone could help to bring about a bend in the global curve in emissions.

Starting the process of bringing emissions into a global regulatory framework by focusing on the power sector has the following advantages:

- It is the sector with the most developed and best understood mitigation technologies.
- Europe has already demonstrated its willingness to take on very challenging caps in this sector (the EU ETS already places a significant cap on power stations – the UK, Germany and Spain all handed out approximately 35% fewer permits in 2008-12 than emissions in 2007).
- The US has already introduced caps on the power sector in some states (via the RGGI state level trading scheme) and federal legislation is expected to follow.
- Fossil fuelled power stations are a highly concentrated source of emissions and often subject to some form of pollution regulation already making the establishment of registries relatively easy.
- It is not a sector exposed to international competition or risk of 'leakage' making differentiation within the sector easier to agree.
- It is sufficiently large to have a material impact on the global emissions curve.
- Once decarbonised this sector can help to deliver mitigation in the transport and heating sectors.
- Once built, infrastructure is long lived – early regulation avoids lock in to a high carbon future and prevents stranded assets being created.
- There are energy security and air quality co-benefits associated in a rapid decarbonisation of this sector that can offset the extra cost of 'leap-frogging' traditional technologies.
- If the world moves together economies of scale will be increased making it cheaper for everyone.

¹ Source: CARMA.org – this figure includes installations with zero emissions (ie renewable and nuclear) and does not apply a de minimus threshold. Fossil plants alone are around 25,000 and applying a de minimus would reduce this number further.

5. Determining the Budget

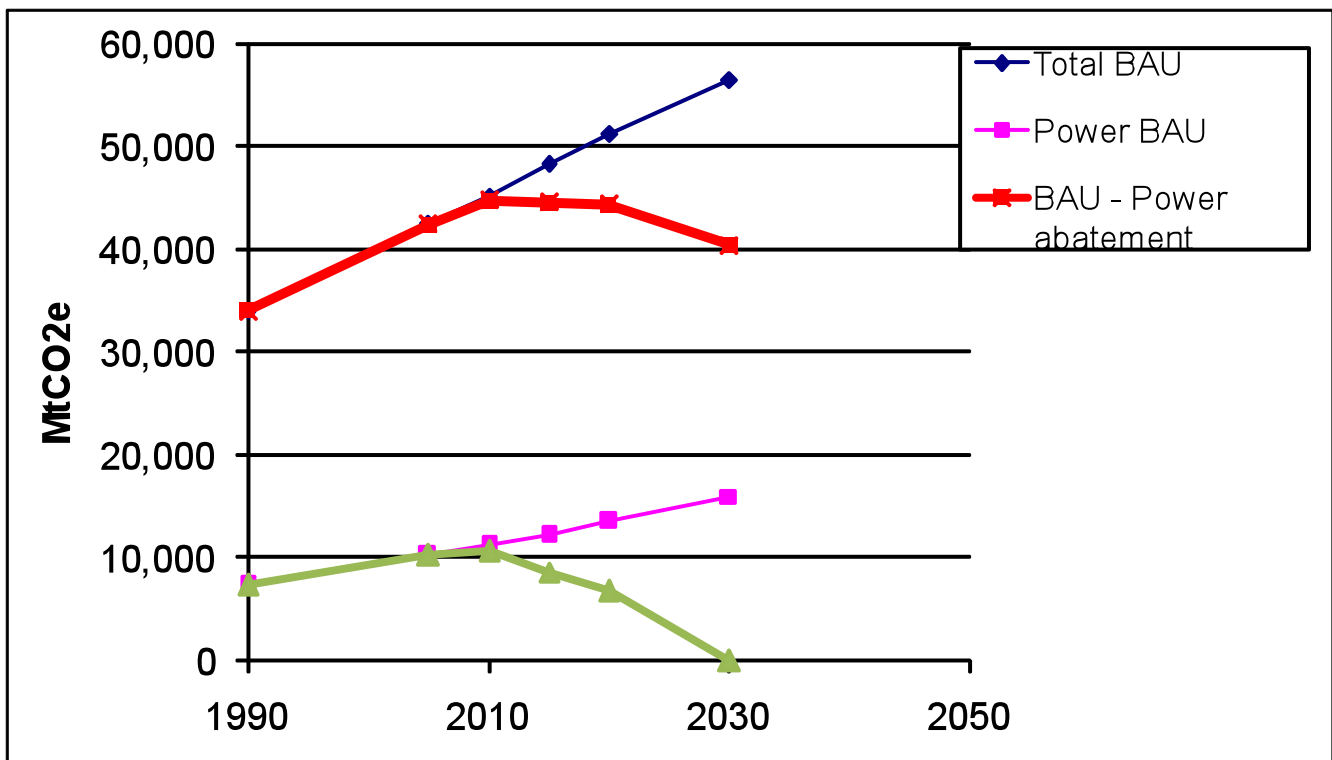
In order to determine a global budget for the power sector, sufficient to bend the curve in global emissions, we must make an assumption about assumed growth rates of in the remaining other sectors. If we assume 'Business as Usual' growth in these sectors then in order to bend the curve by 2020 the global power sector would need to reduce by a third relative to 2005 levels – effectively a 50% cut in business as usual projections for this sector.

This gives a global budget for the sector of 6.8Gt CO2 in 2020.

	1990	2005	2010	2015	2020	2030
Total BAU	34,077	42,515	45,328	48,334	51,184	56,402
Power BAU	7,368	10,275	11,243	12,299	13,591	16,007
Power Emissions	7,368	10,275	10,681	8,609	6,795	0
Fraction of power BAU abated	0%	0%	5%	30%	50%	100%
Change wrt 2005		0%	4%	-16%	-34%	-100%
BAU - Power abatement	34077	42515	44766	44644	44389	40395

The chart below illustrates the bend in the curve that this would deliver.

Global and power sector emissions curves 1990- 2030



6. Addressing equity issues

Countries under the UNFCCC are acknowledged to have common but differentiated responsibilities to act to avoid dangerous climate change. Criteria for triggering differentiated treatment are not clear, however.

Differentiation at a sectoral level can be achieved in a number of different ways. Through an allocation methodology which takes into account individual countries circumstances, through differentiated compliance and penalty regimes or through supplementary support mechanisms including access to international funding.

6.1 Allocation options

The simplest method of allocation would be by auction. This would ideally require that power sector companies bid in to a centrally held international auction². In this circumstance it is not possible to differentiate countries using the allocation methodology since all companies would be bidding with each other and this process would determine the price paid. It would, however, be possible to use the recycling of the auction revenues to address the question of differentiation.

Alternatively, it would be possible to develop a methodology for breaking down the global budget in stages and first allocating to blocks of countries, then individual countries, taking into account a range of factors. This could be based on a per capita basis or another metric.

A purely illustrative example of how the global budget could be allocated on a continental basis is provided below.

Continent	Gigatonnes of CO ₂	compared to 2007 emissions
Africa	0.35	15% increase
Asia	5.25	10% reduction
Europe	0.38	80% reduction
N America	0.62	80% reduction
Oceania	0.07	70% reduction
S America	0.14	No change
Total 2020 budget	6.81	*34% reduction

*based on a 2005 baseline – see Annex 1 for note on data

² This is a central idea in Oliver Tickell's Kyoto2 proposal. <http://www.kyoto2.org/>

6.2 Compliance

Compliance regimes offer another way of creating differentiation between countries with different circumstances. For example, in return for taking on a relatively challenging budget developing countries could negotiate a 'no-lose' or graduated penalty regime. For countries wishing to use emissions trading to stay within budgets this would mean countries had an incentive to keep emissions under budget in order to sell spare permits but if they were unsuccessful they would not be faced with a financial penalty – merely moral opprobrium from the global community.

7. Staying within the budget

The agreement to create a budget for the global power sector need not be prescriptive about the policies and measures used by countries to stay within budget. These could be determined by nation states according to their own national circumstances. Some examples of policies and measures that could be adopted include: use of cap and trade, emissions standards regulation (i.e. kgCO₂ emissions limits per kwh generated), carbon fuel taxation policy, decarbonisation and renewable obligations and energy efficiency regulations.

The degree to which 'offsets' from other sectors can be used would also need to be negotiated. It would be sensible to allow at least some use of credits to meet targets in the event of price spikes, with pre-agreed price triggers granting access.

8. Infrastructure and resources

All countries included in the budget would, however, need to establish an emissions registry to record emissions arising from the power sector. All Annex 1 countries are already required to maintain a registry but non Annex 1 countries are currently not required to do so. The establishment and maintenance of a registry requires resources and technical know-how which existing registry holders would need to provide to developing countries where assistance was requested.

9. Enforcement

An enforcement agency with powers sufficient to ensure the overall budget was being met would need to be established. Both the International Atomic Energy Agency and the Organisation for the Prohibition of Chemical Weapons provide interesting precedents for the creation of international agencies with inspection and enforcement powers. Rather than create a new body it might be sensible to modify the aims and objective of the IAEA to fulfil a global carbon management function.

10. Implications for Kyoto

The global power sector budget would not replace the need for economy wide caps on developed countries. It would simply require that national caps were sub-divided. This is the case already in the EU where ~50% of emissions have been entered into a private sector cap and trade mechanism while the economy wide caps also exist under Kyoto.

Creating a budget for the power sector would essentially remove any methodologies relating to the power sector from the Clean Development Mechanism which could continue for other sources of emissions.

11. Reaching a deal at Copenhagen

The agenda for Copenhagen is likely to be structured around two main negotiations - new targets for Annex 1 countries and 'monitorable, recordable and verifiable' commitments by developing countries. The issue of sectoral approaches is relevant to both and is very likely to be discussed in relation to future commitments under the Kyoto Protocol.

Sufficient public pressure must be applied so that elected representatives come away with an agreement to bend the curve in global emissions within the next decade and having committed to a global carbon budget, applied at the very minimum to the power sector, in order to achieve it.

12. Future COP/MOPs

Once a sectoral approach is established it can be rolled out to apply to other sectors – namely the supply of fossil transport fuels and heating fuels. In this way through the creation of three successive global sectoral budget a very high percentage of global carbon dioxide emissions could be contained in a structured global agreement.

13. How does this compare to other campaigns focused on Copenhagen?

Kyoto2

This is Oliver Tickell's proposal to introduce a cap and auction of pollution permits for sources of fossil fuel based emissions. The original proposal suggest that caps should be created as close to the source of the fuel as possible (ie where fuels are extracted) but he adopts a pragmatic view and supports the idea of capping at the point which is most practically negotiated and regulated.

Capping points of production distributes the global abatement effort relatively unevenly amongst oil, gas and coal producing nations, despite the fact that all countries use these fuels. This could prove politically difficult to negotiate. A cap on the use of fuels in power stations and refineries to supply energy to end users has the advantage of distributing the effort more evenly. The bend the curve campaign is likely to receive support from Oliver especially if it includes a call for auctioning to be the primary allocation method.

350 campaign

The campaign to establish a global stabilisation target of 350 ppm is entirely compatible with the bend the curve campaign since both have a common end goal which is to quickly reduce the risk of dangerous climate change. While the 350 campaign focuses on the long term target for a global agreement the bend the curve campaign consider what actions need to be taken in the short term to make that target achievable.

2 degrees

NGOs such as WWF and the UK Stop Climate Chaos coalition are likely to continue calling for the future global agreement to commit to limiting the global average temperature increase to 2 degrees. This already the stated policy of the EU and UK.

Again the bend the curve campaign is compatible with this campaign since it is addressing the 'how' rather than the 'what'.

Contraction and convergence

The campaign to establish a global carbon budget and distribute equitable shares of that budget, on a per capita basis, does not necessarily conflict with the bend the curve campaign, since the principles can be recognised in how the sectoral global carbon budget is distributed amongst countries/companies.

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Annex A

A note on the data used in this paper

For the calculations in sections 5 and 6.1 above, two different data sources were used.

Section 5: The BAU projections used to determine the global power sector budget in 2020 were provided by the IEA.

Section 6.1: The calculation of the budget allocation by continent was based on the global power sector data set maintained and published by carma.org. This is based on an original methodology developed by CARMA but underpinned with official data sources compiled from numerous sources. Emissions data for thousands of power plants in the U.S., Canada, the EU, and India come from official reports. Other data are derived from information provided by power sector analysts, the International Energy Agency, the U.S. Department of Energy, the Environmental Protection Agency, and a host of geographic databases.

How the two data sets compare:

Power sector emissions	Baseline year	Total current emissions	Projected emissions in 2020
CARMA	2007	11.4	17.6
IEA	2005	10.2	13.6

CARMA's projections of future emissions for 2020 are more pessimistic than the IEA therefore the estimates of reductions required relative to BAU provided in 6.1 are essentially 'worst case' scenarios. If the IEA projections are more accurate then countries will have to work less hard to stay within budget.

The **cost of staying within budget** could be estimated using marginal abatement cost curves. For these to be accurate they would need to take into account country specific information about the technical potential and costs of delivering different forms of low/zero carbon electricity.

A countries **ability to pay** could be estimated using a comparison of economic growth rates and /or other economic and social parameters.

Global population statistics could be used to calculate country allocations on a per capita basis.