Sustainable Energy Briefing 23: South Africa's Mitigation Targets

This briefing will discuss South Africa's recently released National Climate Change Response White Paper, which lays out the country's mitigation targets and mechanisms going forward. The briefing will outline the extent to which the targets are not aligned with scientific research conducted globally that has examined how to limit global temperature rise to below 2°C. The White Paper targets are shown to be far too high to keep a global temperature increase to 2°C, let alone the 1.5°C target that many nations have called for. Not only will cumulative emissions to 2050 be too high for South Africa to contribute fairly to climate change mitigation, but the peak, plateau and decline trajectory laid out in the White Paper will make meeting lower targets - such as 1.5°C - even more challenging.

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I. Introduction

The recently promulgated National Climate Change Response White Paper (White Paper) while comparatively far improved over the Green Paper released last year, still contains several serious flaws within it. While the Department of Environmental Affairs has taken some of civil society's comments into consideration – notably through the exclusion from the document of nuclear power as a solution to climate change, and through the inclusion of defined emissions quantities as part of the Paper's commitment to hold global temperature rise to below 2°C above pre-industrial levels – there remains substantial potential for improving the country's primary climate change policy document. The principal issue with the White Paper is that the emissions levels for South Africa that it contains are far too high; the targets it lays out are neither in line with what the most recent science is saying about emissions reductions globally, nor does the allocation it presumes to take for South Africa of the remaining carbon space reflect a fair share for the country.

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II. Mitigation targets

The White Paper claims that South Africa is a, "...responsible global citizen… with moral as well as legal obligations under the UNFCCC," and the country is therefore, "...committed to contributing its fair share to global GHG mitigation efforts in order to keep the temperature increase well below 2°C."[1]

Globally, there have been widespread calls to hold temperature rise to only 1.5°C above pre-industrial levels. The Alliance of Small Island States and other least developed countries (for example the Africa Group) have all demanded a target below the politically agreed upon 2°C.[2] The potential impacts of unmitigated climate change - which could exceed 6°C - are likely to be catastrophic; even a 2°C rise, however, will have severe impacts. These include increased flooding, droughts, and storms; increased desertification; ecosystem collapse; increased food insecurity as crop yields change; and various other impacts. The risk of runaway climate change – the point at which natural feedbacks becomes more significant than anthropogenic emissions – is already evident and becomes a near certainty at 2°C. At 3°C, the melting of glaciers and ice sheets means severe water scarcity is likely and sea levels will certainly rise, with irreversible climate feedback systems set off. Present commitments made under the Copenhagen Accord (including South Africa's, which is reflected in the White Paper targets) and sanctioned at Cancun will likely result in at least a 3°C rise in temperature (with a 50% chance of exceeding even 3°C).

There are two issues here. Firstly, the 2°C target is not a stringent enough target, and South Africa (and other countries in the climate negotiations) must recognise this and start to look seriously at what would be required to hold temperature rise to 1.5°C.

Secondly, the benchmarks 'targets' laid out in the White Paper bear very little relation to what is required globally, even under a global carbon budget that hopes only to hold temperature rise to 2°C. A global carbon budget, "...is the amount of tolerable global emissions over a period of time."[3] That is, it is the amount of carbon space that can still be filled over a certain period of time, or the cumulative emissions to hold temperature rise to a particular level.[4]

The White Paper proposes that a carbon budget approach be used for sectoral allocations within South Africa, with budgets for the liquid fuels, electricity supply, mining, industry and transport sectors to be drawn up over the next few years. The White Paper does not, however, set out what is required by science globally and then show how South Africa's emissions reductions work in that context for the country as a whole. The benchmark trajectory is not based on allocating South Africa a portion of what remains of a global carbon budget. Rather, it sets out South Africa's "Benchmark"

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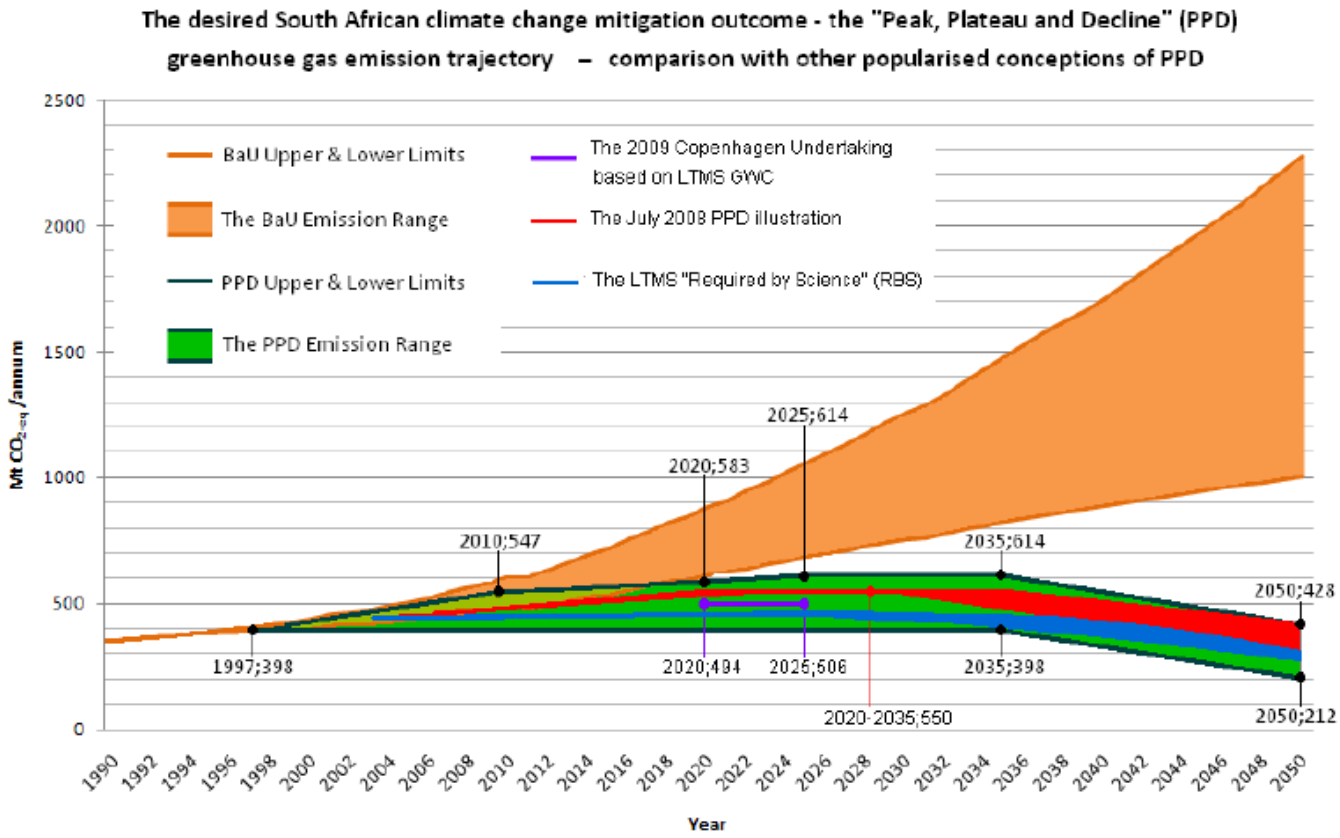
1 Republic of South Africa (2011) *Climate Change Response White Paper*. October 2011, pg 24-25.
2 Jogelj, R. & Meinshausen, M. (2010) "Copenhagen Accord pledges are paltry" in *Nature* vol 464, 22 April 2010.
3 Hohne, N. & Moltmann, S. (2009) "Sharing the effort under a global carbon budget". Report produced for WWF International by Ecofys. Pg 5.
4 Meinshausen, M., Meinshausen, N., Hare, W., Raper, S.C.B., Frieler, K., Knutti, R., Frame, D.J., & Allen, M.R. (2009). "Greenhouse gas emission target for limiting warming to 2°C" in *Nature* 458, 30 April 2009, doi:10.1038.

Trajectory range for emissions to 2050. These are based on an earlier Department of Environmental Affairs discussion paper that was not open for public comment or input. The benchmark range is in the form of a 'peak, plateau and decline' trajectory with an upper and lower range. The numbers on which the trajectory are based were developed through analysing the country's Long-term Mitigation Scenarios (LTMS) 'Growth Without Restraints' (i.e. Business as Usual) scenario in relation to current emissions, drawing a conclusion regarding the accuracy of the forecast BAU line, and then applying the range of this chosen permissible difference to the pledges made by the country.[5]

This then results in emissions with a lower peak of 398Mt CO_2eq in 2020, a plateau for ten years, and then decline from 2036 onwards to a lower limit of 212Mt CO_2eq. The upper range peaks in 2020 at 583Mt or in 2025 at 614Mt, then plateaus for ten years at the upper limit of 614Mt. From 2036, the decline starts, with a decline to 428Mt by 2050. The graph below illustrates the DEA's emissions range in relation to business as usual emissions, the LTMS target scenario, and South Africa's Copenhagen Pledge. The Copenhagen Pledge figures are incorporated within the benchmark trajectory, with a 2020 figure of 494Mt and a 2025 figure 506Mt CO_2eq.



Source: DEA (2011)

5 Department of Environmental Affairs (2011) "Defining South Africa's Peak, Plateau and Decline greenhouse gas emissions trajectory". Explanatory Note 24 August 2011.

It is important to note here that current emissions are at 547Mt CO_2eq according to the DEA, meaning that the lower end of the emissions benchmark trajectory has already been overshot. The 2020 upper limit of 583Mt is very close to being reached. With several highly carbon-intensive projects in the pipeline, including the completion of the Medupi and Kusile coal-fired power stations, and a possible new coal-to-liquids plant (Sasol's 80 000 barrel/day Mafutha plant) the 2025 peak of 614Mt is likely to be reached long before 2025. Medupi and Kusile alone will add between 55-60Mt CO_2 per year once on line; while coal-to-liquids technology is highly carbon-intensive, and could add at least 20Mt per year once built. The country is also looking at building other new capital-intensive plant, including a 400 000 barrel/day 'mega refinery' at Coega; new investments in manganese and ferrochrome mining; and other energy-intensive mining and manufacturing expansions.

III. Carbon budgets

Subsequent to the IPCC 4th Assessment Report, which called for a global limit on temperature rise of no more than 2°C, significant peer-reviewed work has been undertaken on how to achieve this in a global context using a carbon budget approach. Research conducted globally has found that a global carbon budget that would give the world a 75% chance of not exceeding a 2°C temperature rise would be 1000Gt CO_2 from fossil sources and land-use change from **2000 until 2050**. To have an 80% chance of limiting temperature rise to 2°C would mean a carbon budget of 890Gt CO_2 from 2000-2050. If the other Kyoto gases were included, this would mean a budget of 1500Gt CO_2eq for 2000-2050, for a 75% chance of holding to 2°C.

CO_2 vs CO_2eq: What is the difference?

Carbon dioxide is the most common of the different greenhouse gases that contribute to global warming. Other gases, however, also contribute to the greenhouse effect, and thus to climate change. These include methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride. Each of these gases has different time spans that they remain in the atmosphere and different effects, and the simplest way of dealing with them is to convert them into carbon dioxide equivalents (CO_2eq). So when measurements are in CO_2eq, it just means that all the greenhouse gases are accounted for in one format. Some carbon budgets are for CO_2 only; usually, this is because the authors have assumed that emissions from other gases will be dealt with separately from carbon dioxide. The numbers, although not strictly comparable, can still be used to examine South Africa's targets, since more than 80% of South Africa's emissions come from CO_2 alone. Similarly, the White Paper targets are in CO_2eq, and most of the allocations discussed below are also in this format.

To put this carbon budget in perspective, known proven recoverable reserves of oil, gas, and coal, if burnt, would produce 2800Gt of CO_2. If the world is to avoid exceeding a 2°C temperature rise, then

drastic reductions in fossil fuel use will have to take place as quickly as possible.[6] Other research by the German Advisory council - using slightly different assumptions of risk – has used a carbon budget of 750Gt CO_2 from 2010-2050, with a 67% chance of holding to 2°C.[7]

Not only is there a scientifically established global carbon budget for 2°C, but, furthermore, successful mitigation will require global emissions to peak somewhere between 2011 and 2015 and reduce year-on-year. The later global reductions are left, the steeper the cuts will have to be to reduce cumulative emissions sufficiently. It will be simply impossible to keep below a 2°C rise if global emissions peak later than 2020, and the sooner emissions peak the easier it will be. Delays in peaking increase the probability of higher temperature rises and subsequent catastrophic effects, as illustrated in this table from the IPCC 4th Assessment Report (which is specifically endorsed by the White Paper) and in which a global peak can come no later than 2015. Optimally, a global peak should have come even sooner (between 2000 and 2015), but the world has surpassed these dates now and thus 2015 is the latest date at which peak must take place.[8]

Table SPM.6. Characteristics of post-TAR stabilisation scenarios and resulting long-term equilibrium global average temperature and the sea level rise component from thermal expansion only. {Table 5.1}[a]

Category	CO_2 concentration at stabilization (2005 = 379 ppm)[b]	CO_2-equivalent Concentration at stabilization including GHGs and aerosols (2005 = 375 ppm)[b]	Peaking year for CO_2 emissions[a, d]	Change in global CO_2 emissions in 2050 (% of 2000 emissions)[a, c]	Global average temperature increase above pre-industrial at equilibrium, using "best estimate" climate sensitivity[d, e]	Global average sea level rise above pre-industrial at equilibrium from thermal expansion only[e]	Number of assessed scenarios
	ppm	ppm	Year	Percent	°C	metres	
I	350 – 400	445 – 490	2000 – 2015	-85 to -50	2.0 – 2.4	0.4 – 1.4	6
II	400 – 440	490 – 535	2000 – 2020	-60 to -30	2.4 – 2.8	0.5 – 1.7	18
III	440 – 485	535 – 590	2010 – 2030	-30 to +5	2.8 – 3.2	0.6 – 1.9	21
IV	485 – 570	590 – 710	2020 – 2060	+10 to +60	3.2 – 4.0	0.6 – 2.4	118
V	570 – 660	710 – 855	2050 – 2080	+25 to +85	4.0 – 4.9	0.8 – 2.9	9
VI	660 – 790	855 – 1130	2060 – 2090	+90 to +140	4.9 – 6.1	1.0 – 3.7	5

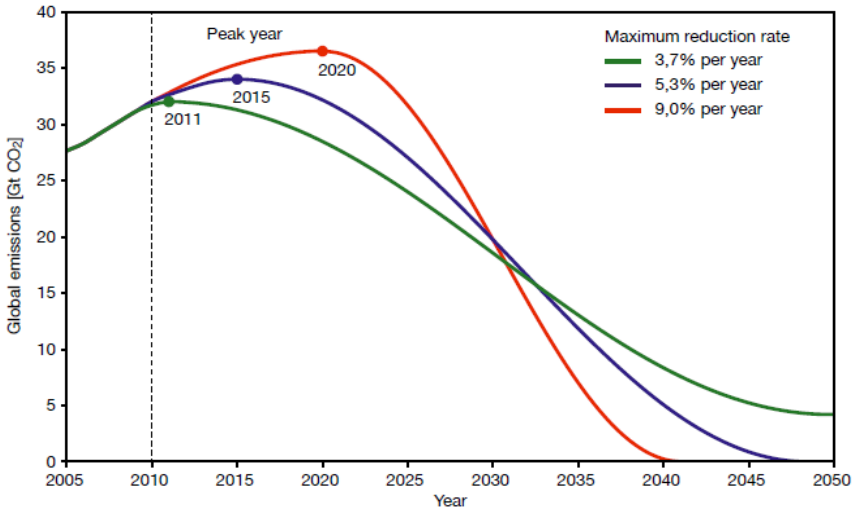
Source: IPCC (2007)

If global emissions are left to peak later than 2015, then reductions will have to be significantly steeper. This is illustrated in the graph on page 6, which highlights how leaving the global peak to even 2020 means reducing global emissions to zero by 2040. A peak in 2015 means reaching global carbon neutrality between 2045 and 2050, as well as lower annual reduction rates. To reduce sufficiently with a peak in 2020 means annual reduction rates of 9% - far higher than the reductions achieved thus far under the Kyoto Protocol.

It is imperative to peak as soon as possible so as to make reducing emissions practicable in the future.

6 Meinshausen et al 2009.
7 German Advisory Council on Climate Change (WBGU) 2009. "Solving the climate dilemma: the budget approach".
8 Intergovernmental Panel on Climate Change (2007). *Fourth Assessment report: synthesis report.* Pg 67.

Furthermore, given the likely impacts of 2°C, the South African government should align itself to the 1.5°C target. This will mean that global emission will have to take on a much steeper decline than those illustrated above. To hold temperature rise to 1.5°C in the context of a later peaking date would make meeting global emissions reduction targets impossible. The White Paper ignores this scientific reality and instead opts for a high emissions trajectory, one which peaks only in the mid-2020s and which does not decline until the mid-2030s.



Source: WBGU (2009)

IV. Allocating carbon space

As will be demonstrated below, the emissions reductions in the White Paper are completely inadequate to reach even the 2°C target and are not a reflection of fair share under common but differentiated responsibilities. Not only does South Africa have amongst the highest per capita emissions in the world, it also has high historical emissions. The White Paper fails to recognise the contribution South Africa makes to global emissions, and ignores that the country's emissions profile is unlike most other developing countries. But although emissions per capita are high, there is still very unequal access to carbon space within the country, with industry and the wealthy using considerably more carbon space than the poor.

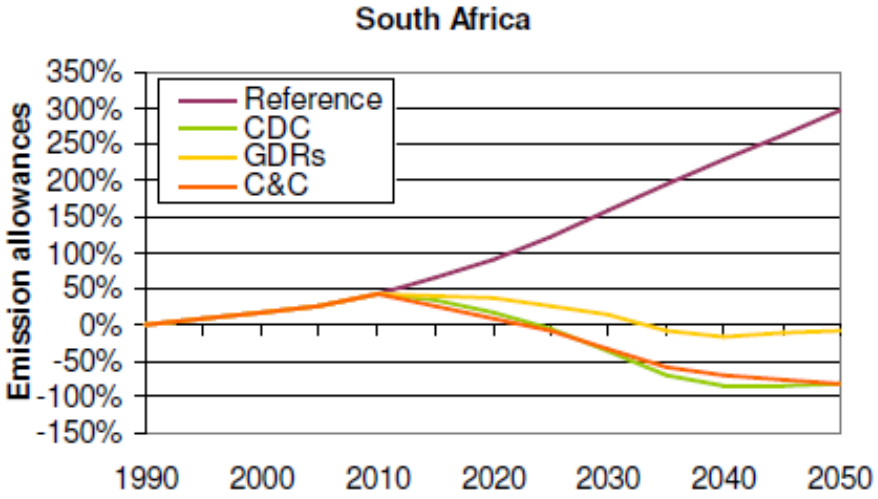
Allocation of the remaining emissions space is highly important, and highlights how South Africa's targets exceed the country's global fair share of carbon space. A recent Ecofys and WWF report examined what the emissions pathways and budget should be for key countries including South Africa (abbreviated ZAF in the report). It gave three options, based essentially on different ways of ensuring that developed countries take more responsibility for mitigation than developing countries. Under this model, a carbon budget of 870Gt CO_2eq from 2009 to 2100 was used (the difference between this budget and the budgets outlined above is based on different assumptions of deforestation rates, the role of other greenhouse gases, and the time period over which the budget must be spread). The budget was then divided in three different ways, as follows:

1. Greenhouse Development Rights (GDRs): All countries need to reduce emissions below their business as usual path based on their responsibility (cumulative emissions) and capacity (GDP). Only emissions and GDP of the population above a development threshold account towards responsibility and capability. Under this approach, a budget for South Africa would be between 12 and 16Gt CO_2eq from 2010-2050.

2. Contraction and Convergence (C&C): The targets for individual countries are set in such a way that per capita emission allowances converge from the countries' current levels to a level equal for all countries within a given period, here until 2050. This approach budgets 9-10Gt CO_2eq for SA for 2010-2050, with convergence in 2050.

3. Common but Differentiated Convergence (CDC): As above, targets are set so per capita emissions for all countries converge to an equal level over the period 2010 to 2050. For developed (Kyoto Protocol Annex I) countries' per capita emission allowances convergence starts immediately. For individual non-Annex I countries' per capita emissions convergence starts from the date when their per capita emissions reach a certain percentage threshold of the (gradually declining) global average. This approach budgets 9Gt CO_2eq for SA for 2010-2050.[9]

Emissions pathways were then calculated for individual countries based on these three conceptions of fair share. The following graph illustrates these emissions pathways for South Africa for a 2°C target. **This research shows clearly that even for a 2°C target and based on fair share principles, South Africa must peak its emissions before 2015 and then decline thereafter.**



Source: Hohne & Moltmann (2009: 25)

[9] Hohne & Moltmann (2009).

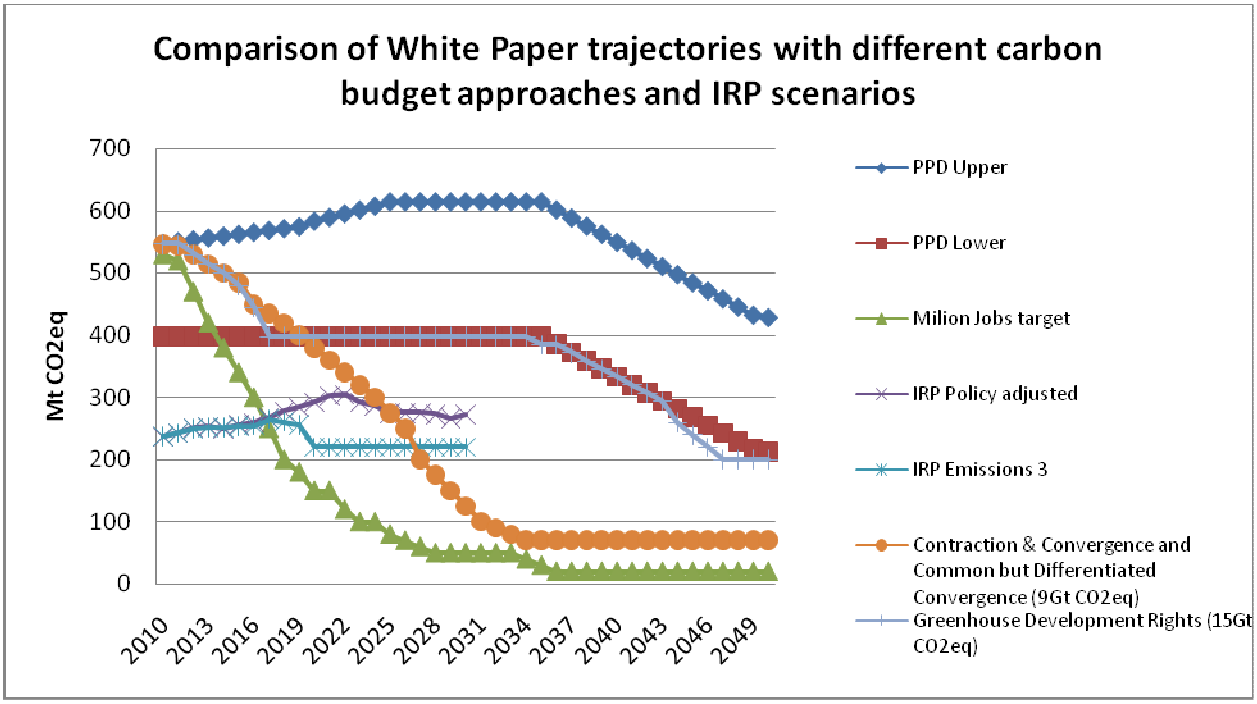
As can be seen above, there are different ways to allocate the global budget, with differing approaches depending on how historical responsibility is conceived. For South Africa this means looking at a smaller budget of 5.2Gt CO_2, with several approaches allocating around 9Gt CO_2eq, and up to 15Gt CO_2eq under a Greenhouse Development Rights approach. It must be pointed out here, however, that the formula for GDRs takes into consideration inequality in a country, which is why South Africa is allocated more space under this approach than under the others (since the country already has high per capita emissions, although these emissions are not fairly distributed).

V. How does this relate to the White Paper?

Under the White Paper trajectories, the emissions levels are substantially higher than any of those discussed above. The PPD lower would be closely in line with the GDRs budget of about 15Gt CO_2eq from 2010-2050; but as discussed above, the PPD lower trajectory has already been overshot, and South Africa is reaching the PPD upper range of emissions at a rapid rate. The upper PPD trajectory would result in cumulative emissions of 23Gt CO_2eq from 2010-2050. This is substantially higher than any fair share allocation discussed in the literature.

The graph on page 9 contains the DEA figures for the upper range of the peak, plateau and decline trajectory, as well as the lower range. It also contains the Integrated Resource Plan (South Africa's electricity build plan) emissions numbers from the Department of Energy which illustrate how the chosen policy (policy-adjusted) compares against the discarded Emissions 3 scenario (these lines only go to 2030 as the IRP is only a 20 year plan). They do illustrate, however, how recent electricity build plans will have emissions (which are currently about 50% of South Africa's emissions) into the future that far exceed what SA should be aiming for if it were to take a per capita, contraction and convergence, or even a GDRs approach. Only the discarded Emissions 3 scenario is roughly in line with the PPD lower trajectory or a GDRs approach; the chosen policy-adjusted approach will result in South Africa overshooting its fair share allocation of a 2^{o}C budget.

The 'Million Jobs' targets are based on research from a civil society and labour campaign on renewable energy. The trajectory is based on the WBGU's per capita split of a 750Gt budget of CO_2 only (i.e. this budget excludes other greenhouse gases), and is included as an example of other possible carbon budget for South Africa. The Contraction and Convergence and Greenhouse Development Rights trajectories are merely illustrative of how particular budgets might be filled. However, they serve to show how far off the White Paper targets are in terms of South Africa's fair share contribution to climate change mitigation. There could be a slightly different trajectory with the same overall carbon budget, but that would be, as discussed above, considerably steeper in the future if the peak were pushed back. Since a peer-reviewed 1.5^{o}C carbon budget has not yet been produced, it is not possible to illustrate what that trajectory might look like; but it would have to be significantly lower given that the budgets on which these lines are based only give the world about a 66% chance of limiting temperature rise to 2^{o}C.



VI. Is this South Africa's fair share?

Another way to examine if the White Paper 'targets' represent South Africa's fair share would be to look at comparable countries, for example BRICS and Mexico, and see what would happen if they had South Africa's per capita emissions in 2050. Taking only per capita emissions in 2050 – and leaving the higher cumulative emissions from 2010 to 2050 – and assuming that South Africa's 'fair share' is similarly allocated to the people of China, India, Brazil, Russia and Mexico, it is possible to see that this 'fair share' is far too high to prevent temperature rise above 2^{o}C.

The table below illustrates what South Africa's 2050 per capita emissions would be for the PPD upper trajectory, and the PPD lower trajectory. What is clear is that the White Paper targets are neither consistent with the scientific realities of limiting temperature rise, nor the political realities of fair share.

Indeed, as can be seen below, per capita emissions for South Africa will increase over the period if the PPD upper trajectory is followed, although they will eventually decline slightly to end at 7.54 tons per capita in 2050. The PPD lower trajectory results in a much faster decrease in per capita emissions, although to stay in line with this trajectory will take significant emissions reductions immediately, since the planned peak of 398Mt has already been overshot. If emissions can be held at the lower end of the trajectory, then South Africa would have per capita emissions in 2050 of 3.74. While considerably lower than the upper range, these are still far too high compared to what science is saying is needed. The German Advisory Council on Climate Change, for example, advocates for a

global convergence at 2.7tons per capita. This would then need to be reduced further, to about 1 ton/capita, to stay in line with their carbon budget of 750Gt CO_2.

South Africa's Population, Total Emissions, Per capita Emissions, 2004-2050:

White Paper trajectory

	2004	2010	2020	2025	2036	2050
SA Population	47,227,000.00	50,133,000.00	52,573,000.00	53,751,000.00	55,600,000.00	56,757,000.00
Emissions (ton, upper limit)	446,000,000.00	542,000,000.00	583,000,000.00	614,000,000.00	614,000,000.00	428,000,000.00
Emissions (ton, lower limit)	446,000,000.00	542,000,000.00	398,000,000.00	398,000,000.00	398,000,000.00	212,000,000.00
Per Capita (ton CO_2eq), upper limit	9.44	10.81	11.09	11.42	11.04	7.54
Per Capita (ton CO_2eq), lower limit	9.44	10.81	7.57	7.4	7.1	3.74

So South Africa's per capita emissions in 2050 – which are substantially lower than the cumulative emissions that will add up to between 15 and 23Gt CO_2eq – are highly out of line with what the science is saying. In terms of whether these figures constitute a 'fair share', the tables below show how long a global carbon budget would last if South Africa's per capita 'fair share' were extended to the other BRIC countries and Mexico. The 1356Gt CO_2eq budget below is taken from Meinshausen et al (2009), and would give an 80% chance of limiting temperature rise to 2°C. It is for 2000-2050, however, and thus almost a third of the carbon space has already been used; this is not reflected in the calculations below.

If the rest of Brics + Mexico had South Africa's "Fair Share" in 2050:

	Population 2050	2050 Per Capita (lower limit)	Mt of CO2 eq in 2050	Gt of C02 eq in 2050	Years to reach 1356 Gt CO_2eq of total Carbon Budget on 2050 levels
China	1,295,603,763.00	3.74	4,839.37	4.84	154.98
India	1,692,008,631.00	3.74	6,320.03	6.32	118.67
Brazil	222,843,309.00	3.74	832.37	0.83	901.04
Russia	126,188,341.00	3.74	471.34	0.47	1,591.20
Mexico	143,925,837.00	3.74	537.59	0.54	1,395.10
Total	**3,480,569,881.00**	**3.74**	**13,000.70**	**13.00**	**104.3**

	Population 2050	2050 Per Capita (upper limit)	Mt of CO_2eq in 2050	Gt of $C0_2$eq in 2050	Years to reach 1356 Gt CO_2eq of total Carbon Budget on 2050 levels
China	1,295,603,763.00	7.54	9,768.85	9.77	76.77
India	1,692,008,631.00	7.54	12,757.75	12.76	58.79
Brazil	222,843,309.00	7.54	1,680.24	1.68	446.37
Russia	126,188,341.00	7.54	951.46	0.95	788.26
Mexico	143,925,837.00	7.54	1,085.20	1.09	691.12
Total	**3,480,569,881.00**	7.54	**26,243.50**	**26.24**	**51.7**

It is thus clear that the White Paper is assuming that South Africa's 'fair share' contribution to mitigation would not be the same as for other countries. That South Africa should have per capita emissions that, if extended to only a few other nations, would use up the remaining global carbon space very quickly. These per capita emissions are out of line with what the science is saying. For example, Meinshausen et al (2009) have shown that if global emissions in 2050 are 20Gt CO_2eq (i.e. half of 2000 emissions), then there would be only a 68% chance of limiting temperature rise to 2°C. With the PPD upper per capita emissions extended to other middle income countries (26.24Gt CO_2eq in 2050), this level would be exceeded even if no other countries emitted any greenhouse gases at all.

VII. Concluding Remarks

As was discussed above, there are different ways of approaching a global carbon budget, and the allocation of the remaining carbon space. There is clearly significantly less emissions space left than assumed by parties at the negotiations. Although limiting temperature rise to 2°C above preindustrial levels is a widely accepted target politically, a temperature rise of this magnitude will already have severe impacts for people and ecosystems. Irreversible, run-away climate change is highly likely if the 2°C target is exceeded. Current global pledges under the Copenhagen accord have more than a 50% chance of exceeding 3°C, and very little chance of limiting temperature rise to 2°C. Despite some calls for temperature rise to be held to 1.5°C, scientific and political realities are severely misaligned. The South African government must recognise this and adjust its mitigation targets accordingly, with a stronger emphasis on the 1.5°C target.

South Africa's Copenhagen pledges are contained within the 'Benchmark Trajectory' put forward by the White Paper. This trajectory bears very little relationship to recent scientific evidence of the rate and severity of temperature rise. While the paper claims to be committed to holding temperature rise to 2°C, an analysis of the peak, plateau and decline (PPD) trajectories shows that South Africa's cumulative emissions to 2050 will be far too high for the 2°C target. A carbon budget approach has shown that the country should have between 5 and 15Gt CO_2eq between 2010-2050, depending on conceptions of risk, historical responsibility and other assumptions. The lower end of the PPD trajectory is just in line with the upper end of this budget, if a Greenhouse Development Rights approach is taken. The PPD lower will result in 15Gt CO_2eq to 2050. However, this lower end of the

trajectory has already been overshot. Current emissions are at 547Mt CO_2eq, while the PPD lower peaks at 398Mt, plateaus at this level up to 2036, and then declines. In contrast, the PPD upper trajectory – which South Africa is close to reaching, and will reach once new carbon-intensive electricity generation capacity comes online – will result in cumulative emissions of 23Gt CO_2eq to 2050. This is substantially higher than what is recommended by a variety of carbon budget approaches.

Instead of continuing on a peak, plate and decline trajectory that bears no relationship to what is required by science, South Africa must accept that it has reached the limits of its carbon space already. Current emissions are at peak; if they are allowed to continue to grow, then rapid declines in emissions in the future will be necessary, and this will be highly difficult to achieve, if not impossible. Thus, emissions must peak by 2015 if feasible reductions are to be made in the future. The exact trajectory of emissions reductions will vary depending on when South Africa peaks and the speed with which it decreases its emissions; cumulatively, however, the country can emit no more than an absolute maximum of 15Gt CO_2eq up to 2050. This PPD lower trajectory should be viewed as South Africa's upper limit of emissions, not its most stringent target, needs to be examined in detail by the DEA, who must then draw up a planned trajectory for both a 2°C and a 1.5°C carbon budget. Such a budget will have to be considerably lower than this 15Gt CO_2eq target, however, since it is above what would be required to limit temperature rise to 1.5°C. As shown above, even at this lower level of emissions – which South Africa is currently nowhere close to obtaining – the carbon space for the entire world would rapidly be filled by South Africa, the other BRICS countries and Mexico if similar per capita allocations were given to those countries.

What the White Paper calls "South Africa's fair contribution to the global effort to limit anthropogenic climate change to well below a maximum of 2°C above pre-industrial levels" is actually divorced from both scientific research and political reality. South Africa's mitigation targets are neither stringent enough nor do they peak early enough for the country to make its fair contribution to climate change mitigation globally.

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