

Climate Change, Intergenerational Justice and Development

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Abstract: The subject of this paper is distributive justice in relation to financing greenhouse gas abatement. After separating the various questions of distributive justice in climate change (first section) and isolating the financing issue (second section), the paper explores whether any effective moral norms resolving this question already exist. It is argued that such norms still have to be constructed. As a basis for the further discussion, a criterion for moral duties is proposed, progressive norm welfarism, which takes up the constructivist idea (third section). These ethical, intuitive and political considerations finally converge into a proposal for 'no harm to developing countries' (fourth section).

Questions of distributive justice in climate change

Climate change raises several questions of intergenerational, international and intranational justice, in particular: 1. *Reduction target*: How much should greenhouse gas (GHG) emissions be reduced? 2. *Measure mix*: How much should we rely on emission reduction and how much on adaptation, mitigation and compensation measures? 3. *Financing*: Who shall pay how much for these measures?

The importance and urgency of this question has been made evident recently by various developments. In 2006 the rapidly increasing Chinese CO₂ emissions surpassed those of the USA, which for decades were the largest emitter. Since 2005 industrial countries have been emitting less CO₂ than the rest of the world. Whereas GHG emissions in the 1990s increased by 0.9 percent per year, in the first (not yet full) decade of the new millennium (2000-2007) they increased by 3.5 percent per year. While the carbon intensity of economic activities (i.e. the amount of CO₂ released per Euro GDP) had decreased for decades, it increased from 2003 to 2005 – despite the efforts to curb emissions in several Kyoto Protocol signatory countries. The main cause of this trend reversal is the massive increase in energy consumption in China and India, served mainly by – outdated – coal combustion.¹ These also are problems of distributive jus-

justice because China and India do not recognize any strong obligation to curb their emissions. They do not accept that they should pay for restrictions on their emissions with strong constraints of their econo-

Unless we stop dumping 70 million tons of global warming pollution into the atmosphere every 24 hours, which we are doing right now (...), the continued acceleration of this pollution will destroy the future of human civilization.

/Al Gore/

mic development – in particular considering that the much richer First World countries, which are polluting more per capita, did not undergo analogous restrictions when developing at comparable economic levels and are responsible for most of the high increase of atmospheric GHG concentration occurring since the industrial revolution.

Isolating the financing question

Tradable emission certificates are not only an important economic instrument for making GHG attenuation more efficient but also an analytic device to separate – at least partially – the question of reduction targets (question 1) from the question of how to finance this reduction (question 3).² The question of reduction targets corresponds to determining the total number of emission certificates, whereas the financing question corresponds to determining certificate distribution. The latter holds because if trade in certificates functions properly, having more certificates is equivalent to possessing a certain amount of capital. The answers to the two questions are only incompletely separable though because fair answers depend on people's comprehensive well-being under the respective regulations, and, of course, this well-being depends on all the main factors touched on by the two questions: the many direct effects of a more or less warm world (from stifling heat waves to climate casualties e.g. by undernourishment), economic abatement costs and economic development. Whereas the question of reduction targets at first seems to be more an issue of intergenerational justice and the question of financing reduction a matter of international

justice, even this holds only partially; since intergenerational and international justice are intertwined for at least two reasons: lenient global reduction targets (intergenerational justice) imply more damage to

poorer countries (international justice) because these countries are generally more vulnerable (due to their geographical

position their agriculture will suffer more, in addition they have less money for adaptation measures). And strong abatement obligations / fewer certificates for poor countries today (international justice) *ceteris paribus* imply less development and therefore more relative poverty in the future (intergenerational justice). Nonetheless, for reducing complexity and for delimiting the unmanageably high number of possible options, one can roughly fix one of the variables by assuming more or less plausible values for this resulting from other discussions and try to give a justified answer to the other question on this basis.

So, to answer the financing question, we need a rough idea of the reduction target. However, in the literature rather divergent targets have been proposed. One problem that has led to this divergence is the great disparity of advantages and disadvantages accompanying the various options. Simple moral principles do not allow considering and pondering all of them. For that purpose, complex and elaborate models are needed to quantify all the advantages and disadvantages in one common currency. The currency economists use is money; they usually propose rather modest reduction targets. Most ethicists, however, find that money cannot capture the real moral value of things; many of them prefer the currency of well-being or utility instead, which is expected to give more weight to certain damages like death and thus to lead to far more demanding reduction targets. However, welfare calculations with well-being as the general currency are even more complex than monetizing, so adequate calculations are still a desideratum.

I have undertaken such a study, which includes also the application of several ethical standard criteria.³ On account of the convergence of these criteria, the study's results with regard to the morally best and morally required CO₂ reduction targets may provide a rather strong basis for assuming a reduction target in the present context.

In the study four options were considered, namely a₁: business as usual, a₂: global stabilization of GHG emissions at the 1990 level, a₃: strong (25 percent) GHG emission reduction with respect to 1990 until 2015, a₄: sustainable (60 percent) GHG emission reduction compared to 1990 until 2035. (A 50-70% reduction of emissions is needed to prevent most of the usually projected damages.⁴ In 1990 sustainable reduction meant a decrease to about 0.4 t C/capita x year.) Sustainable reduction (a₄) turned out to be morally best or morally required by the vast majority of the moral criteria taken into account.⁵ Considering, however, that annual global CO₂ emissions from 1990 (5.85 Gt C/yr) to 2007 (8.1 Gt C/yr) increased by roughly 39 percent (China alone: increase from 0.7 to 1.8 Gt C/yr),⁶ the morally best option now seems almost unreachable. Therefore, the following discussion will presuppose that the community of states will ideally only strive for strong reduction until 2030.

Are there effective moral norms for the financing problem? – A case for moral constructivism and progressive norm welfare

With respect to the interests of future people, GHG abatement may be a moral requirement. However, among present people (and the states representing them), GHG emissions – like many other environmental problems – constitute an n-person prisoner's dilemma: (i) for (almost) everybody, higher GHG concentrations are worse than (ii) the lower concentrations that could be reached by global cooperation in reduction efforts;⁷ but (iii) if only few people make strong efforts their situation is even worse than it would be if no efforts were made at all (because the efforts are costly, but the global reduction achieved is only marginal); (iv) finally, free-riding on the vast majority's reduction efforts is the best option from a selfish point of view (the free-rider benefits from the better climate without paying for it). The most obvious and, in this case, probably only solution to the resulting dilemma (i.e. that rationality requires the egoists not

to cooperate, i.e. not to abate their emissions, even though mutual cooperation would be better for each individual), is to sign a binding contract for reaching forced mutual cooperation.

However, the strategy of simply relying on a contract is problematic for several reasons, which require at least a moral complement to contractualist proposals. First, a better climate, the aim of cooperation, is a public good (or, more precisely, a common-sink resource). This implies that even those who do not participate in the contract profit from other people's participation in an agreement (the USA have profited in this way from the Kyoto Protocol, free riding on the signatory states' efforts). Therefore, the usual threat in negotiations, i.e. that without mutual agreement and, therefore, in particular without one's own agreement everybody is reduced to the status quo, does not work in this case. Unforced agreement has to be based on reasons beyond the expectations for a better climate, in particular on moral reasons like wanting to be fair or to contribute to a better future. Second, contracts can be made only between living people. However, the biggest advantages of a contract (and disadvantages of a failure) would inure to future persons; and in a fair contract their interests, of course, have to be considered. Because their interests do not coincide with those of present persons and require stronger environmental investments a morally just contract calls for a moral engagement beyond the satisfaction of the present contracting parties' personal interests. Third, even if climate protection were not a public good (so that only those who participate in the contract would profit from improvement measures) the potential damages as well as advantages and disadvantages are distributed so unequally that a merely rational contract (e.g. according to the Nash solution) would be far from just - as is often the case with rational contracts. So it might be a rational, though morally disgusting, result that the most aggrieved have to pay the strongest polluters for reducing their GHG emissions. So a morally just contract again requires a moral engagement beyond the parties' personal interests.

What could motivate such a moral engagement? The strongest kind of prompter would be moral obligations sustained by formal, i.e. legal norms. However, the problem is that such norms do not yet exist; the fair contract to be concluded should constitute exactly such a norm.

A much weaker though still, at least in the long run, strong prompter would be moral obligations sustained by *informal social*

Global warming causing climate change may be the ultimate issue that unites us all.

/ Louise Burfitt-Dons /

norms, i.e. rather generally observed modes of acting whose known non-observation will be punished by informal sanctions implemented by any other moral subjects, where the informal sanctions may range from utterances of disapproval to lynch law. The most obvious candidates for such informally valid moral norms are the no-harm and the polluter-pays principle.

With respect to the no-harm principle, however, it is not obvious what it requires in this case. In an immediate sense, every breath we take harms other people insofar as it (albeit marginally) increases the atmosphere's GHG concentration. Of course, it would be absurd to require not harming other people by not breathing. The problem is that any, even marginal, emission is harmful only on the basis of an already tremendously high level of emissions by other people. So a more sensible interpretation of the no-harm principle is to, first, determine which global level of GHG emissions would be harmless in the sense of being sustainable, then, second, to break this global budget down to the individual level, e.g. in an egalitarian fashion, and, third, to take transgressions of these individual budgets as the harms prohibited by the no-harm principle. The first step leads to a rule similar to the above mentioned sustainable reduction (option a₄), with the important difference of requiring sustainable reduction immediately. The fact that the vast majority does not observe this limit,⁸ according to the definition of 'informal norm', already implies that a respective informal moral norm is not socially in force. In addition, immediately reducing all persons' GHG emissions to a sustainable level would cause severe economic damages to other persons as well, which means that the no-harm principle would be violated in any case. And finally, the second step, i.e. to distribute emission rights equally, is not morally evident because this rule considers neither interpersonally different needs and costs nor abilities to pay.

The status of the polluter-pays principle is not much better because it is far from clear what this principle requires in the case of

GHG emissions. It could require payment for damages generated by emissions above the sustainable level – but to whom? To future generations via investing in a kind of fund from which they will be compensated? Again, this is far from being a common practice and thus not an informally holding social norm. And then, would not the best investment be increasing the national capital and since this is something we aim to do anyway, so that the most important change compared to the current practice would not regard us but only our heirs (who would have to use some part of the inherited capital for compensating those who will be damaged across the respective national borders)? A stronger interpretation of the polluter-pays principle demands that we also pay the so-called ‘historical debts’, i.e. damages caused by excessive emissions in the past. Again disregarding the difficult question of what ‘excessive’ would imply, it is dubious whether present people can have such historical debts resulting from their ancestors’ activities or from their own activities before the harmful effects of GHG emissions became more or less vague common knowledge, i.e. around 1990. And since immediate and radical emission cuts to a sustainable level at that date would have extensively damaged the whole economic system and thus other people, it is dubious whether all post-1990 emissions above that level have generated historical debts (Some further discussion of historical debts will be provided below).

The upshot of this discussion is that there do not seem to be even halfway clear moral norms already informally socially in force. On the other hand, there seems at least to emerge a vague informal social norm to practically recognize one’s responsibility as a GHG emitter towards the vulnerable and future people by reducing one’s emissions where this is not expensive as well as perhaps also another norm for politicians to make stronger emission reductions legally binding.⁹ (The internationally widespread moral disgust about the former US-president George Bush’s and his followers’ hardliner activities would be part of the sanctioning behavior belonging to this informal social norm.) Although the fact that these norms are becoming socially valid constitutes moral progress, they are only vague and weak¹⁰ informal norms, which – for resolving the problem – demand too little, do not provide much motivation and cannot be establish a guide for stronger legal norms.¹¹

An even weaker form of moral obligation that could perhaps enforce moral engagement in the climate question could result from the ontological kind of moral norms endorsed by moral realists (like Brink, McNaughton, Schaber), who think that there are moral norms independent of our subjective attitudes. However, in metaethics the idea of such a moral reality has been strongly criticized for ontological, epistemological and practical reasons.¹² Here is not the place to elaborate these arguments. I can only assume that such a moral reality and its norms probably do not exist. The positive lesson of those criticisms is that moral reality is a man-made construct and that stronger moral norms, which really help to resolve the problems of global warming, have to be socially introduced and enforced, preferably by legal norms.

So, there are no norms in the deontological sense and hence no obligations in a strict sense apart from legal and socially valid norms. Not all legal and social norms, however, are at once *moral* norms and obligations – think e.g. of racist laws – but only those that can be morally justified, namely as being morally good according to a conception of the morally good. The most widely accepted family of such conceptions is *welfarist*, i.e. it conceives the moral desirability of an object *p* as a function of the individuals’ desirabilities / utilities of *p*. One such conception is *utilitarianism*, which equates moral desirability simply with the sum (or the mean) of all the individuals’ respective desirabilities of *p*; another conception is *prioritarianism*, which gives greater priority to improving the lot of people worse off, and the greater priority, the worse off these people are; still a further conception is *moderate welfare egalitarianism*, which over and above the sum of individual desirabilities gives higher rankings to more equal distributions; etc. In the following, I presuppose one of these welfarist conceptions of the morally good; but for the present purpose it is not very important to specify which one.¹³ If our moral obligations (in the strict sense) do not go beyond what the morally good legal and socially valid norms require, this is far less than what we can morally do. Most utilitarians find that this is insufficient and postulate a moral duty to always do what is morally best (in utilitarian terms). However, this has been criticized as an excessive demand and as moral exploitation; in addition, it again postulates an ontologically obscure obligation. A far more appealing middle

course between an illusory excessive demand and the unambitious fulfillment of low obligations is *progressive normativism*. Progressive normativism tries to raise the standards of moral duties at least historically, in the long run. It says, first, that morally responsible people should politically try to enforce the morally best legal and informal norms that are currently realizable, thereby historically improving the stock of social norms, and, second, that everybody is morally bound to such norms. Progressive normativism thus implements the constructivist lessons concerning the reality of moral norms. In the following welfarism will be taken to be the right conception of moral value, and progressive normativism will be presupposed as the right conception of moral norms; their combination may be called *‘progressive norm welfarism’*.¹⁴

A proposal for constructing the financing norm: no harm for developing countries

Progressive norm welfarism is a basic and general criterion for moral evaluation and moral duties (a “primary principle”, so to speak). Now we have to look for more concrete and specific precepts, directives or norms (or, somewhat paradoxically, ‘secondary principles’) to be applied in more specific situations, such as that of the financing problem, and which may be justified by the primary moral principles. The no-harm and the polluter-pays ‘principles’ are already such more specific precepts; and so are the solutions to be discussed in the following.

According to the discussion in the second section, the financing question can be reduced to the question of how to distribute (the reduced number of) GHG emission certificates. Many proposals regarding this

Your grandchildren will likely find it incredible - or even sinful - that you burned up a gallon of gasoline to fetch a pack of cigarettes!

/ Paul MacCready, Jr. /

distribution have been discussed. Some of them are rather implausible, so can be discarded quickly. This holds in particular for grandfathering and distribution according to GDP.

Grandfathering means to distribute emission certificates proportionally to present emissions so that every nation has to reduce its emissions by the same factor. This principle rewards present emission inefficiency (i.e. inefficient use of the limited sink capacities of

the earth), obstacles or may even prevent development in Third World countries, and it is grossly unfair in terms of all major theories of distributive justice like welfare egalitarianism, prioritarianism, sufficientarianism,¹⁵ welfare leximin¹⁶ or utilitarianism etc.

Distribution according to GDP, which has been proposed by Wirth / Lashoff and Cline as one component of a more comprehensive distribution scheme,¹⁷ is different from grandfathering because GHG emissions are not proportional to GDP, so it rewards emission efficiency to a certain extent. Distribution according to GDP, however, privileges the rich and thus is again unfair, and obstacles the development of poor countries. Some distribution proposals which merit more discussion are the following:

Certificate egalitarianism, popularized by the Global Commons Institute under the name of 'contraction and convergence', aims at an equal distribution of emission certificates to all persons (convergence) over the medium term, where the sum of the certificates is defined by a global reduction target (contraction). Certificate egalitarianism is a specific precept (dealing only with certificate distribution), which may be justified as an application of the (primary) moral principle 'resource egalitarianism'. Welfare egalitarianism, which is another (primary) moral principle, on the other hand, will not lead to certificate egalitarianism because an equal number of certificates for different people will often lead to different levels of well-being or welfare. Certificate egalitarianism has found many supporters among theoreticians.¹⁸

Historical responsibility is a precept to be applied in combination with other maxims, e.g. certificate egalitarianism, and requires polluters who in the past have exceeded the justified limit of emissions to pay for the damages generated (historical debts, cf. sect. 3). Usually the respective responsibility is attributed to states, and the historical debt is calculated on an egalitarian basis, i.e. excess emissions are equal to actual emissions minus individual emission budget times population size. Historical excess emissions have been calculated (and their redemptions proposed), e.g. starting from the year 1950¹⁹ or even 1800.²⁰ The principle of historical responsibilities has found supporters in particular among friends of poor countries.²¹

No harm for developing countries (NHDC) is a distribution directive according to which, on the basis of a tripartition of countries, beyond their own emission reduction the

rich (OECD and rich OPEC) countries pay the GHG abatement of poor, developing (and perhaps poor emerging) countries, whereas the middle group of countries only pays their own emission reductions. According to certificate egalitarianism, the emission certificates for rich countries would be far below their present emissions; however even some of the poor countries exceed their egalitarian emission limits so that these countries, with certificate egalitarianism, would have to invest a considerable part of their development capacities into GHG abatement; and that, in a certain sense, constitutes a harm to them. The idea of NHDC is to take these abatement costs of poor countries by assigning them more than the egalitarian share of emission certificates and a lesser share to the rich countries. Shukla e.g. has defended this principle.²² A model for implementing this idea technically is joint implementation in the way that rich countries provide highly efficient energy technology to poor partner countries. In order to get the biggest polluters into the boat of GHG abating countries now, the definition of 'poor' has to be stipulated so that China (and hence India) counts as poor for some more time still.

From a welfarist point of view – e.g. for utilitarianism, prioritarianism, welfare leximin or moderate welfare egalitarianism – NHDC is clearly morally better than certificate egalitarianism. Though certificate egalitarianism benefits the very poor countries, which may gain from selling certificates not used by them, countries who are somewhat better off have already trespassed the egalitarian limit or would do so soon under unrestricted conditions. Therefore, they have to renounce further development or to invest in more GHG-efficient energy. The idea of NHDC is to make rich countries pay for this investment instead of poor countries (as in certificate egalitarianism), because the resulting welfare loss in rich countries will be lower. The first reason for this is the decreasing marginal utility of income, whereby subtracting one dollar from a poor person's income decreases his utility more than subtracting one dollar from a richer person's income. Because of this reason, already utilitarianism prefers NHDC to an egalitarian distribution of emission certificates. Prioritarianism, moderate welfare egalitarianism and welfare leximin make this preference still stronger because they give more weight to utility changes among people worse off than to the same utility change for

people better off (prioritarianism, leximin) or because a welfare transfer from the better off to the worse off is valued positively (welfare egalitarianism). A third reason strengthening this preference still further is the difference in the purchasing power of money, which implies that the same dollar spent on energy efficient high technology bought in the international market results in greater losses in purchasing power for local products in poorer countries than in rich countries.

The preference between the two principles in welfare ethics is evident. Whether this preference shall be translated into a respective contract and legal norm, according to progressive normativism, depends on the question of whether this is the best norm that could be realized; and since the preference question has already been answered, it now depends on the issue of whether NHDC is politically realizable. Now, of course, the vast majority of politicians in rich countries will promptly oppose the implementation of this principle simply because it costs more. However, at second glance, financing highly efficient energy technologies in poorer countries may well turn out to be the only way of reaching the desired global emission reductions because it may be the only way to make these countries participate in a globally concerted abatement effort. Without this kind of financing and technological support, developing countries (in particular China and India), insisting on their 'right' to fast development, will probably continue to base their development on cheap and dirty energy technologies and thus first nullify expensive reduction measures taken in rich countries and then bring the global trend on a waste path - a nightmare scenario. Hence, NHDC probably is even the only effective policy towards curbing radical climate change. And this insight hopefully will also change the behavior of realist politicians.

This argument also helps to resolve an open problem, namely completing NHDC by fixing the upper limit of countries whose GHG abatement shall be financed by rich countries. In principle, the initial arguments in favor of NHDC as against certificate egalitarianism (i.e. lower utility loss if rich countries pay for the reduction than if poor countries do) lead to taking that mean national income that is identical to the global mean (always corrected for purchasing power) as the upper limit of passive abatement subvention. This is against the spirit of

progressive norm welfarism, which *inter alia* should resolve the problem of excessive moral demand. Progressive norm welfarism blocks this excess by its criterion for implementing new norms, which aims at enforcing the morally best norms that are currently realisable. The combination of optimality and realisability leads to the proper upper limit. The kernel of the initial argument is that the consumption of one Euro in relatively poor countries leads to more utility than the respective consumption in rich countries. Now this argument would lead to promoting development aid for the poorest countries but not to invest the money in improving the welfare in far richer countries such as China. However, there are two additional mechanisms that radically change the utilities. First, many of the impending damages caused by climate change, unlike the damages resulting from global absolute poverty, are threshold phenomena (aridization, melting of icebergs, etc), so that the utility of preventing these thresholds from being exceeded is extraordinarily high. Second, undertaking actions that lead to effective climate agreements, which radically and effectively curb global emissions by including all major emitters, would constitute a leap in utility with respect to the current situation. This leap goes far beyond the utility gained by shifting consumption from rich countries e.g. to China. Such a utility leap does not exist in the field of development aid - unfortunately. Getting China into the boat of such a climate agreement is crucial here and of strategic importance, because China is the strongest emitter, with emissions still rapidly increasing, and because China is one of the richest countries conceivable for receiving subventions - in fact, many westerners think China is far too rich to be eligible for subventions. However, the utility leap results only from accomplishing the effective agreement; subventions beyond what is necessary in order to convince strategically important contract parties lead only to the initially considered shift in consumption with a utility increase, in the case of China, lower than the increase achieved by investing in good development aid for the poorest countries. The NHDC norm that can be proposed on the basis of these reflections is that, the upper eligibility limit for subventions should be somewhat higher than the present mean income in China, e.g. equal to the Chinese mean income expected in ten years (corrected for purchasing power). These considerations concerning the moral value of subsidizing GHG abatement in rela-

Because we don't think about future generations, they will never forget us.
/ Henrik Tikkanen /

tively poor countries go hand in hand with considerations concerning the current realisability of NHDC. At present most westerners are not particularly magnanimous towards Chinese people, as they are considered responsible for the loss of jobs in richer countries. Though this attitude is neither justified nor fair, the strategic argument just outlined is probably the only one that might convince these westerners to accept the suggested norm - along with their concrete experiences (e.g. of hurricanes) that the bad effects of climate change will also be hitting home. Would progressive norm welfarism adopt the principle of historical responsibility and make developed countries pay for their 'historical debts'? No. According to progressive normativism, social norms, in particular the norm of indemnifying damages caused and still more specifically the polluter-pays principle, have the instrumental function of motivating moral behavior. However, this function can only be fulfilled if in the moment of decision the agent knows which action is sanctioned by the respective norm. Until recently (about 1990) no application of the polluter-pays principle to GHG emissions could satisfy this condition because the harmful effects of such emissions were not sufficiently clear.²³ Today, of course, the polluter-pays principle should enter the GHG contracts in the form of a kind of fine for exceeding GHG limits, but not in the form of recognizing historical debts. These constructive justifications of NHDC without recognition of historical debts shall now be complemented by some intuitionistic arguments. Several pragmatic difficulties count against the principle of recognizing historical debts. Past emissions cannot be quantified exactly, political boundaries and, above all, population sizes have changed considerably. Past GHG emissions were not only useful for the immediate consumer but at least some part was also useful for the whole of later mankind insofar as these emissions were a by-product of technical development that also benefited people in countries with historically fewer emissions. Where it may be sensible that together with our wealth we have inherited also the costs generated by its creation, it is far less clear why we should also inherit mere costs of consumption that had nothing to do with the creation of that

wealth. While people on an individual level can reject a heritage it is unclear whether and in what way we can reject a collective heritage; and if this is unclear the application of the heritage idea to the collective level may be unfair. Finally, historical debts will eventually have been paid, so that indemnified countries needing special help will no longer receive these extra gratuities. Many arguments against every kind of primary egalitarianism (in particular resource or welfare egalitarianism) criticize that the ideal of equality has never been justified positively; its defenders take it as natural or evident; its critics just do not feel this. Egalitarianism is a comparative ethics. Isn't this kind of always making comparisons a repugnant character trait, namely a fruit of envy, which cannot bear that someone else is better off - instead of sharing the other person's pleasure? The most radical consequence of this character trait is levelling down, i.e. preferring that everybody be equally badly off to only some people being well off. Certificate egalitarianism is a special kind of resource egalitarianism. However, the *primary* objects of a just distribution should be primary, intrinsic goods and not mere means like emission certificates because a special distribution pattern of means may lead to a completely different distribution pattern of primary goods.²⁴ So an egalitarian distribution of emission certificates does not consider the welfare consequences of this distribution, neither does it consider special needs in energy consumption, like heating in high mountain regions or areas near the poles, nor the economic impact on and economic power of countries, in particular the curbing effect on developing countries. A general problem with certificate egalitarianism is that it is fixated on one special problem. Given the economic needs and aspirations of developing countries, however, it seems to be sure that a solution to the climate problem can only be reached by also addressing the issue of sustainable development. Certificate egalitarianism is sometimes defended as being favourable to developing countries, and to a certain degree it does, in fact, help the poorest countries. Yet, if that is considered a moral advantage, a more direct way to express this particular concern for the poor is prioritarianism; and generosity can be better practiced through the various forms of welfarism, which along with progressive normativism have led to the maxim NHDC. According to progressive normativism, what is still more important, however, than these principles and maxims

is the great-hearted motivation itself to reduce one's own GHG emissions and to actively install strict reduction norms in society.

Notes

1. Data from the National Energy Administration of China, however, imply that since 2005 China has diminished the carbon intensity of its economy (GCP 2008).
2. Kverndokk 1995, 130-131; 146
3. Lumer 2002.
4. Mabey et al. 1997, 380.
5. Sustainable reduction was morally optimal according to utilitarian and prioritarian evaluation criteria and morally required by a sustainability criterion, Kantianism and the no-harm criterion (Lumer 2002, 75, 78-80).
6. GCP 2008, Appendix.
7. There may be few winners of global warming, e.g. farmers in the northern USA, southern Canada or some parts of Russia. Of course, these people do not have any rational interest in stopping global warming. However, these small fractions never sum up to a nation's majority.
8. In 2000 the mean GHG emissions of only about 25 of the poorest, mostly African, countries were equal or below the sustainable level of then about 1.5 t CO₂ equivalent/capita (cf. WRI 2009).
9. Lumer 2002, 104.
10. A norm is vague if its content is not completely clear; it is weak if it does not require costly actions.
11. However, on the basis of this weak norm and for reasons of fairness as well as to encourage earlier efforts, it may be right to require from those countries which did not follow this norm that, in a global climate agreement, they be obliged to make good for this omission by stronger efforts or by receiving lower emission permits.
12. Mackie 1977, ch. 1.
13. In a more detailed and precise discussion, it would be necessary to specify the underlying welfare function. In such cases, I endorse a special kind of prioritarianism (Lumer 2006; 2000, ch. 7).
14. The name 'progressive norm welfarism' has been coined in analogy to names like 'ideal rule utilitarianism', where the 'ism' denotes the moral value function (welfarism), the other noun denotes the kind of objects that are central to the theory and that are primarily valued (socially valid norms), and the adjective gives some further specification (here: progressiveness, i.e. that the morally justified socially valid norms shall be his-

torically more and more ambitious).

15. Sufficiency is the principle that everybody should dispose of the necessary resources at least at the sufficiency level.
16. Leximin is a social preference order that prefers the one of two states where the respectively worst off is better off; if the worst off persons in both states are equally bad off, leximin prefers the state where the second worst off is better off; etc.
17. Wirth/Lashoff 1990 and Cline 1992.
18. E.g. Athanasiou/Baer 2002, 47 ff.; Ghosh 1993; Grübler/Fujii 1991; Meyer 2001, 56 ff; Ott 2003, 196-197.; Page 2006, 177-179; Paterson 1996; Shue 1993; Welsch 1993.
19. Smith 1993, 37-41.
20. den Elzen et al. 1993; Grübler/Fujii 1991; Grübler/Nakicenovic 1991.
21. Hyder 1992; Smith et al. 1993
22. Shukla 1990.
23. This justification for excluding liability does not hold for subjectively risky behavior, such as pharmaceutical research, because subjective risk can already establish liability. CO₂-emissions, however, were not even subjectively risky before that date. And, of course, that justification does not exclude historical debts generally but historical debts from, according to the present scientific knowledge, allegedly harmless actions.
24. This does not exclude that, for reasons of practicability, theories of justice determine also different secondary distribution patterns for certain means, which are expected to lead to the desired distribution of primary goods. However, even welfare egalitarianism, which determines just distributions in terms of the primary object of welfare, does not imply certificate egalitarianism; only resource egalitarianism does, which again speaks of secondary goods.

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Submitted: 11 June 2009
Accepted: 24 August 2009



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Epistemic Uncertainties in Climate Predictions. A Challenge for Practical Decision Making

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Abstract: *Most scientists agree that, at least for the time being, unquantified uncertainties are inevitably connected to predictions of climate models. Uncertainties, however, do not justify political inaction. This paper addresses the question of how epistemic uncertainties are of relevance for practical decision making. It is shown how common decision approaches based on the precautionary principle fail to adequately deal with uncertainties as they arise in climate modeling. I argue that with regards to climate change, unquantified uncertainties can neither be ignored in decision making nor be reduced to quantified ones by assigning subjective prob-*

abilities. This distinguishes the ethical problems associated with climate change from other problems regarding energy supply and demand like, for example, those associated with nuclear power.

Introduction

The uncertainty of climate predictions is discussed intensively within the scientific community – not only among climate sceptics. However, uncertainties are often kept under wraps when scientific findings are communicated to the public.² It is not the scientists who are to blame here. Rather the practical debate seems incapable of adequately reflect-

ing uncertainties in modeling predictions. If these uncertainties were communicated, sound scientific research runs the risk of being discredited as unscientific; the public seems to prefer black and white instead of the scientists' shades of grey. Often predictions are taken either as correct and unquestionably reliable or simply as wrong. However, most scientific models are neither true, in the sense that they exactly predict future events, nor simply wrong and useless.³ It is argued in this paper that in order to incorporate aspects of inter- and intragenerational justice, practical decision making has to carefully consider the shades of grey