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Ethical Aspects of Climate Engineering

KIT Scientific Publishing

4. Central Issues, Principles, and Problems

Publisher: KIT Scientific Publishing
Place of publication: Karlsruhe
Year of publication: 2012
Published on OpenEdition Books: 12 January 2017
Series: KIT Scientific Publishing
Electronic EAN: 9782821874343



<http://books.openedition.org>

Electronic reference

BETZ, Gregor ; CACEAN, Sebastian. 4. *Central Issues, Principles, and Problems* In: *Ethical Aspects of Climate Engineering* [online]. Karlsruhe: KIT Scientific Publishing, 2012 (generated 08 septembre 2023). Available on the Internet: <<http://books.openedition.org/ksp/1790>>. ISBN: 9782821874343.

4 Central Issues, Principles, and Problems

After having introduced the macrostructure of the CE controversy and the detailed structure of its sub-debates in the previous chapters, we shall identify and discuss some common questions and problems in the chapter below. Since each of these issues pertains to several arguments set forth in the CE controversy, they are particularly relevant to assessing the debate in terms of coherent positions (cf. Chapter 5).

4.1 Weighting of Side-effects

Weighting of side-effects represents a common issue that occurs throughout the CE controversy. The proponents of the controversy do not explicitly address (e.g. tackle through further arguments) the question as to how a series of side-effects, which are partly certain, partly probable, and partly possible, are to be evaluated and weighted against each other. Depending on which weighting is made by the proponents, they will endorse or not endorse the corresponding arguments and objections.

Consequentialist arguments essentially involve a weighting of the side-effects of alternative actions while taking the intended consequences into account. In doing so, the positive and beneficial (certain, probable or merely possible) effects are compared with the negative and harmful (certain, probable or merely possible) ones.

In the CE controversy, one finds two types of argumentation that refer to an action's consequences. To begin with, some of the arguments single out presumably crucial positive or negative consequences on the basis of which they then argue for or against R&D and deployment. Argument A45 TERMINATION PROBLEM, for example, alludes to the lack of an exit option – a single potential harmful effect of CE deployment – to justify T9 CE DEPLOY-

MENT WRONG. Arguments from fairness, to give another example, denounce CE deployment because of the expected distributional effects. Arguments A67, A69, A70, A76, and A96 fall into that group, too. Such arguments, which claim that a single consequence of some action – let us call it I_A – is decisive for the action's assessment, characteristically consider the further consequences of that action (intended and unintended ones) negligible. All such arguments thus must be based on a premiss saying that:

- There are no moral reasons that outweigh I_A and speak against (or in favour of) the corresponding action.

In effect, that premiss implies a hidden, more or less complex weighting of consequences, which can be challenged and disputed by the proponents of the debate.

The second way of arguing for or against an action in terms of its consequences consists in specifying all relevant effects and weighting them against each other. Such explicit and comprehensive weighting of consequences is found in the central argument of the sub-debate on R&D side-effects (A8 OVERWHELMING NEGATIVE SIDE-EFFECTS). A8 does not simply confine itself to assessing just one single side-effect. Instead, it lists the entire range of harmful side-effects and declares them to outweigh, *in toto*, the whole range of positive effects. Sentence (8.8) represents the decisive premiss of A8. To oppose such a premiss, it suffices, in principle, to point out that some relevant consequences have not been considered at all. However, the more comprehensive and exhaustive the list of positive and negative consequences (for each of the decision options), the more difficult it becomes to criticise such an argument in this way. The evaluation of consequentialist arguments that are based on a (presumably) comprehensive list of consequences is, in fact, tricky. For a proponent who rejects a side-effect-predicting premiss of such an argument does not necessarily disapprove of the weighting carried out and of the inference that is drawn from the weighting. Quite the contrary: She may as well believe the remaining side-effects to provide a sufficient reason for refraining from (carrying out) the corresponding action.

4.2 Ethics of Risk: Possibilistic Predictions and the Precautionary Principle

The CE controversy takes place against the background of massive uncertainties. Not only are the side-effects of R&D and deployment poorly understood, but, what's more, we can't even reliably predict the effectiveness of CE methods. That's why more or less all arguments in the debate concern – in one or another way – the ethics of risk. A central question that arises in this context is how rational decisions can be made at all in spite of massive ignorance. The arguments where that decision-theoretic problem arises are reconstructed, in this study, such that they use variants of the precautionary principle.

So far, the reconstruction of the CE controversy has revealed that uncertainties and imponderabilities of CE deployment are paramount in the debate. As a matter of fact, limits of scientific understanding do not only play a decisive role in the argument cluster on ethics of risk. Ultimately, all arguments that refer to consequences of CE R&D and deployment must take uncertainties into account. The detailed reconstruction of the debate reveals clearly, among other things, that the question as to whether current uncertainties can be reduced is of special significance (cf. A52 IRREDUCIBLE UNCERTAINTIES).

In a decision situation, the characterisation of one's uncertain foreknowledge determines crucially the way in which one may argue in favour of or against a certain choice. If, for example, reliable probability forecasts are available, the expected utility of alternative choices may be calculated and compared. Yet, no one would seriously claim that faithful probability forecasts of the effects of CE R&D and deployment can be made at present. It is due to that fact that this study's reconstruction has been largely based on the assumption that, today, CE measures must be assessed with a view to their *possible* effects. Stakeholders face decisions under uncertainty, or "deep uncertainty" (Knight 1921, Kandlikar et al. 2005). How to make and justify a choice in such a decision situation is, indeed, controversial (Rawls 1975, Harsanyi 1975). Many moral philosophers, following Rawls, have argued in favour of a worst-

case principle, provided certain additional conditions are met (Gardiner 2006, Sunstein 2004, Shue 2010). This rule reads:

If relevant probability forecasts are unavailable and if the worst possible consequences of a decision are actually catastrophic, one should choose the option for action with the comparatively best worst possible consequences. (version of the precautionary principle)

This decision rule, moreover, represents a variant of the *Principle of the Priority of Bad over Good Prognoses* formulated by Hans Jonas (Jonas 2003, p. 70 et seq.). According to Jonas, “it is in particular in matters of a certain magnitude, i.e. matters of apocalyptic potential, that greater weight must be given to the prognosis of doom than to that of bliss” (p. 76, own translation).

The above worst-case principle is explicitly assumed in the reconstructed arguments A23 LESSER-EVIL and A54 IT MIGHT GET WORSE. In addition, many other arguments that could not be reconstructed in detail yet (for example A60, A69, A70, A106) presumably rely on it, as well. It is noteworthy that the worst-case rule figures both in arguments that tend to be in favour of CE as well as in arguments that speak against it. This means that a commitment to risk-averse precautionary thinking alone does not settle the CE controversy.

4.3 The Priority of Mitigation Policies

The priority of mitigation policies (T14) is taken for granted by various arguments, in particular by the moral-hazard objections and the alternative justifications of CE research. Conversely, though, some arguments contradict more or less explicitly the thesis that mitigation policies take, in general, priority. This holds especially for the efficiency and feasibility argumentation, which considers CE methods a favourable substitute for mitigation policies. Most of the arguments of the CE controversy, however, are compatible with the priority of mitigation policies.

As already indicated in Section 3.5.4, various arguments of the CE controversy assume that the avoidance of a dangerous climate

change through drastic CO₂ reduction is generally to be preferred to the deployment of CE technologies, which merely aims at *ex post* compensation of impacts. That thesis, which is supported by arguments A102-A106, enters, in particular, into the below considerations:

- The moral-hazard argument (A9), which is one of the most frequently cited objections to R&D into CE, implicitly assumes that mitigation policies are to be preferred to CE deployment. For otherwise, triggering a reduction of mitigation efforts would not provide a reason against the preparation of (i.e. the research into) CE measures.
- By the same token, argument A67 IMPEDIMENT TO MITIGATION, according to which CE deployment hampers emission reduction, presumes that priority is given to mitigation.
- The priority of mitigation strategies, however, figures also in one of the alternative justifications of R&D into CE, namely in A83 FOSTERING MITIGATION. This argument favours CE R&D for the very reason that it may strengthen mitigation efforts.

Hence, there are both justifications of and objections to CE R&D which rely, more or less explicitly, on the claim that mitigation measures take priority.

Still further arguments are closely related to the justifications of the priority of mitigation. Instead of assuming thesis T14 as a premiss, they – or very similar considerations – actually support T14:

- Arguments A71-A75, which express a fundamental critique of technology and civilization, seem to be based on far-reaching normative assumptions from which the priority of mitigation measures could be deduced as well.
- The direct justifications of the R&D prohibition – A96 RISK TRANSFER ARGUMENT and A98 TRUE MOTIVES – are based on variants of the polluter-pays principle which can also be drawn upon to support thesis T14 (cf. A104).

Next, there are some arguments in the controversy which explicitly contradict thesis T14 MITIGATION FIRST: namely the efficiency and

feasibility argumentation (A39-A41). These arguments consider CE measures a (potential) substitute for mitigation, which possesses diverse advantages (efficiency, feasibility, easiness). Correspondingly, they reject the thesis that mitigation is generally to be preferred.

In summary, some arguments rely on T14, others seem to imply it, and a third group of arguments contradict T14. Nevertheless, the great majority of arguments of the controversy are independent of T14. They can be coherently adopted no matter if one accepts T14 or not. In particular, the main justifications of T2 READINESS FOR DEPLOYMENT DESIRABLE, i.e. the lesser-evil argumentation and the 350 ppm argumentation, don't conflict with T14 – whereas they are not based on it, either. These two justifications remain intact, even if one believes mitigation policies to be generally more appropriate and better than CE deployment.

4.4 The Entanglement of Moral and Extra-moral Arguments

Within the CE controversy, moral and extra-moral considerations seem to be deeply interwoven. This is mainly due to the fact that the moral arguments also make use of descriptive premisses such as forecasts of an action's consequences.

It is evident from the reconstruction of the CE controversy that there is a profound entanglement of moral and extra-moral considerations in more than just one respect.

Firstly, the diverse arguments always make both normative and descriptive assumptions. Accordingly, they can be refuted for two kinds of reasons: factual or normative ones. The arguments from fairness (A60-A64), for instance, claim, on the one hand, that CE deployment would have very different regional effects. That claim constitutes a descriptive premiss which concerns mere matters of fact. On the other hand, the assumed regional differences are claimed to be unjust, which, in turn, represents a normative premiss of the argument. Both, descriptive and normative premisses, are found as well in the deontological arguments, which do not assess

actions on the basis of their respective consequences. The religious arguments (A79, A80), for example, claim that (a) CE deployment falls under a certain type of action (descriptive) and that (b) any action of that type is morally wrong (normative). Finally, to give one last example, the lesser-evil argument (A23), too, relies on both (mainly) descriptive (23.1) and normative premisses (23.2, 23.4, and 23.5). In general, the descriptive premisses give rise to expert debates about specific matters of fact and data. Hence, this is where the moral controversy smoothly connects with scientific controversies in different disciplines.

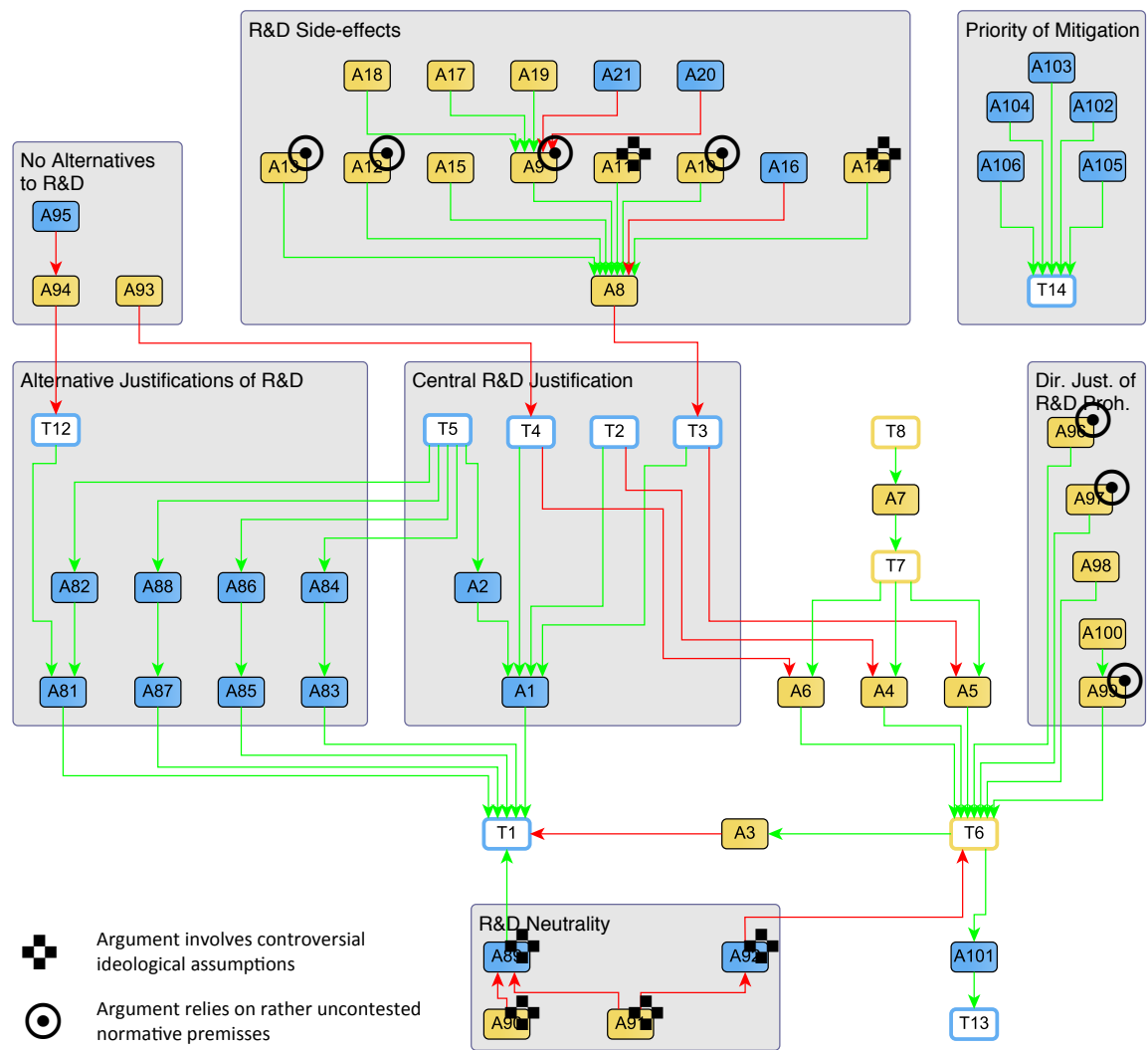
Secondly, the central normative theses are supported by moral arguments as well as legal arguments and arguments based on special interests, or so it seems. There are presumably reasons other than the moral ones that support R&D into CE and that's why moral and extra-moral considerations are entangled in the debate. However, one needs to be careful here. This study's reconstruction solely considers a moral "ought", i.e. refers to moral obligations and prohibitions only. The thesis that there is a moral obligation to research into CE, however, must in no way be confounded with the claim that e.g. legal arguments or economic reasons make research into CE compulsory (cf. also Section 1.2). Strictly speaking, such arguments warrant not one and the same, but refer to different and independent theses. For the sake of clarity, we should add the attribute "moral" – at least mentally – whenever an argument or thesis speaks of "ought", "must" or "may" – of obligations or prohibitions. Moreover, such a conceptual differentiation finally reveals that for some arguments of the CE controversy, there may well be alternative interpretations which do not necessarily imply *moral* obligations or prohibitions. The efficiency argument (A39), for instance, can be re-interpreted as a justification of an economic advice: Economic reason demands that ... And such a claim would be nothing but a hypothetical imperative: If maximisation of economic benefit is the only target we pursue, then we ought to ... Once more: It is essential to bear in mind that such a statement is entirely different from the moral thesis T2. The dual-use argument (A69), too, can be re-interpreted in a non-moral way. Accordingly, it justifies a geopolitical recommendation: If the achievement of peace and international stability is the only target we pursue, then ... Un-

like interpretations that do not invoke any moral concepts, the moral reconstructions are based on important additional premisses through which the intended moral claim can be derived (cf. 4.1). In this sense, the moral reasons that have been reconstructed in this study represent the more sophisticated arguments.

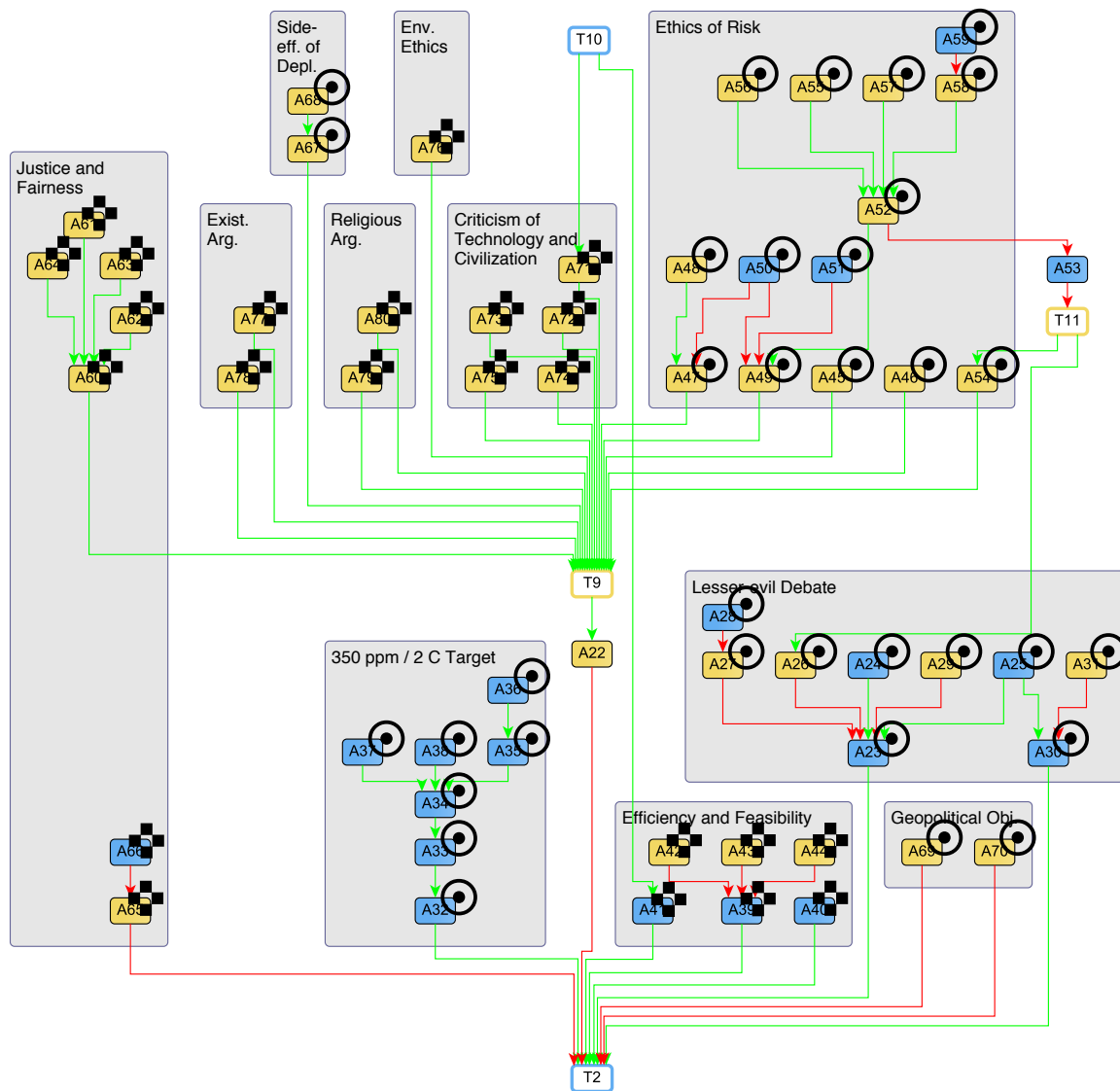
Thirdly, and finally, there is an intricate relationship between legal and governance issues on the one hand and the moral argumentation that has been reconstructed on the other hand. Thus, it depends – among other things – on institutional set-ups whether the factual premisses assumed in the moral arguments turn out to be true or false. Whether, for example, R&D into CE *de facto* results in a reduction of mitigation efforts depends, not least, on the legal conditions under which R&D is being carried out. That's why the reconstructed moral controversy may well provide a touchstone of legal and governance structures: A suitable legal and institutional framework for CE R&D should ideally ensure that the premisses of relevant objections to CE research become false. And legal or political-science analyses may investigate for which institutional provisions this is the case.

4.5 Fundamental Assumptions and Weltanschauung

One may broadly distinguish two types of arguments in the CE controversy: Those which make controversial ideological assumptions, and those which do not rely on strong normative premisses but which involve, at most, contentious descriptive assumptions or basically shared principles whose concrete application is controversial. The first category comprises, in particular, the religious, existentialist, and environmental-ethics arguments, the efficiency and feasibility consideration, the arguments that rely on a critique of technology and civilization, the research neutrality reasoning, the arguments from fairness, and some arguments belonging to the sub-controversy about R&D side-effects.



Argument Map R



Argument Map S

As discussed in the previous section, the arguments of the CE controversy are made up of both descriptive and normative – or, to be more exact, moral – premisses. Two types of arguments can be roughly distinguished according to their specific moral assumptions (cf. argument maps R and S):

1. Arguments that rely on disputed normative assumptions (tied to a specific Weltanschauung) – be it in the form of a general moral rule or in the form of a value theory (axiology) that is used to assess consequences of an action. Such assumptions, for example, may pertain to the just organization of our society or the role of technologies and markets.

2. Arguments that don't rely on strong normative premisses but that possibly make contentious descriptive assumptions or that assume basically shared normative principles whose concrete application, though, might be disputed.

Of course, these two types of arguments cannot in any way be separated neatly. Moreover, the following classification is partly based on the authors' subjective judgment.

The first category of ideological considerations includes: Religious, existentialist, and environmental-ethics arguments (Section 3.3.9), efficiency and feasibility considerations (Section 3.3.3), the critique of technology and civilization (Section 3.3.8), research neutrality arguments (cf. Section 3.4), arguments from justice and fairness (Section 3.3.5), and the arguments "Commercial Control" (A11) and "Political Economy" (A14) from the sub-controversy about R&D side-effects. The authors of this study take it that these arguments and considerations are based on normative premisses on which consensus can hardly be obtained.

The second category of arguments, in contrast, comprises: The lesser-evil argumentation and the 350 ppm argumentation in favour of thesis T2 (cf. Sections 3.3.1 and 3.3.2); the arguments "Mitigation Obstruction" (A9), "Unstoppable Development" (A10), "Field Tests" (A12), and "Techno Escalation" (A13) from the sub-controversy about R&D side-effects; the "Termination Problem" (A45) and other considerations from ethics of risk (cf. Section 3.3.4); the military-geopolitical objections (Section 3.3.7); the assessment of deployment side-effects (section 3.3.6); and the direct justifications of the R&D prohibition, namely the arguments "Risk Transfer" (A96), "No Informed Consent" (A97), and "Dilemma Generation" (A99). While consensus is likely to be achieved on the normative premisses of these arguments, the descriptive assumptions tend to be controversial.

The above classification of arguments, however, by no means implies that arguments classified as (rather) ideological may be neglected or are of little significance: Firstly, the normative premisses of the type-one arguments could still be less controversial than the descriptive premisses of the type-two arguments. And, secondly, it is always conceivable that proponents in a debate, while starting

from different ideological assumptions, will nonetheless agree with regard to the central thesis – albeit for different reasons. The arguments that are based on strong ideological premisses, thus, are not necessarily less significant than other arguments when it comes to assessing the overall controversy.