Arguing about climate change : judging the handling of climate risk to future generations by comparison to the general standards of conduct in the case of risk to contemporaries

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Chapter 1: An inconvenient truth

1. Introduction

In 2006 the documentary film *An Inconvenient Truth* was released, based on a keynote presentation given around the world by former United States Vice President and later Nobel Peace Prize Laureate Al Gore. In this presentation Al Gore discussed the science and politics of climate change and the necessity of taking action. According to Gore "There are good people who are in politics … who hold this at arm's length. Because if they acknowledge it and recognize it, then the moral imperative to make big changes is inescapable." Particularly through the success of the film, including an Academy Award for best documentary feature, *An Inconvenient Truth* has become a well-known and widely used phrase. I take this phrase as a starting point to explain the setting of the present thesis, the widespread rationalisation of the ongoing burning of fossil fuels. What is the *truth* about climate change (section 1), why is it *inconvenient* (section 2), what is being done about climate change (section 3), and why do politicians hold the truth *at arm's length* so easily (section 4)?

2. The 'truth'

Two reports have recently been published summarising the state of the art with respect to the science of climate change: the Stern Review on the Economics of Climate Change, commissioned by the UK Government (Stern, 2006), and the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC, 2007a, 2007b). Since I have no intention of adding new insights to these authoritative documents with respect to the science of climate change, I take the liberty of borrowing extensively from the Stern Review's first chapter *The science of climate change*, updated here and there on the basis of the IPCC report.

Human activities are changing the composition of the atmosphere and its properties. Since pre-industrial times (around 1750), carbon dioxide concentrations have increased by just over one-third from about 280 parts per million (ppm) to 379 ppm in 2005, predominantly as a result of burning fossil fuels, deforestation and other changes in land use. This has been accompanied by rising concentrations of other greenhouse gases, particularly methane and nitrous oxide. Current levels of greenhouse gases are higher now than at any time in at least the past 650,000 years (Siegenthaler et al., 2005).

There is compelling evidence that the rising levels of greenhouse gases will have a warming effect on the Earth's climate by increasing the amount of infrared radiation (heat energy) trapped by the atmosphere: "the greenhouse effect". Current understanding of the greenhouse effect has its roots in the simple calculations laid out in the nineteenth century by such scientists as Fourier, Tyndall and Arrhenius. Fourier (1827) realised that the atmosphere was more permeable to incoming solar radiation than to outgoing infrared radiation and therefore trapped heat. Thirty-five years later, Tyndall (1863) identified the types of molecules (known as greenhouse gases), chiefly carbon dioxide and water vapour, which create the heat-trapping effect. Arrhenius (1896) took this one step further, by showing that doubling the concentration of carbon dioxide in the atmosphere would lead to significant changes in surface temperatures.

As anticipated by scientists, global mean surface temperatures have risen over the past century. Since around 1900, the Earth has warmed by 0.7°C. Over the past 30 years, global temperatures have risen rapidly and continuously at a rate of around 0.2°C per decade, bringing the global mean temperature to what is probably at or near the warmest level attained in the current interglacial period, which began around 12,000 years ago (Hansen et al., 2006). All of the ten warmest years on record have occurred since 1990. The IPCC concluded in 2001 in its Third Assessment Report that there is new and stronger evidence that most of the warming observed over at least the past 50 years is attributable to human activities (IPCC, 2001a). This key conclusion has been supported in the Joint Statement of Science Academies in 2005 and a report from the US Climate Change Science Programme (2006). In its most recent report (2007a), the IPCC has strengthened its previous claims: "The understanding of anthropogenic warming and cooling influences on climate has improved since the Third Assessment Report (TAR), leading to *very high confidence* [meaning at least a 9 out of 10 chance of being correct] that the globally averaged net effect of human activities since 1750 has been one of warming".

Most climate models show that a doubling of pre-industrial levels of greenhouse gases will commit the Earth to a rise in global mean temperatures: "It is *likely* to be in the range 2 to 4.5°C with a best estimate of about 3°C, and is *very unlikely* to be less than 1.5°C. Values substantially higher than 4.5°C cannot be excluded, but agreement of models with observations is not as good for those values." (IPCC, 2007a). This level of greenhouse gases will probably be reached between 2030 and 2060. A warming of 5°C on a global scale would be far beyond the experience of human civilisation and comparable to the difference in temperature between the last ice age and the present day.

Certain impacts of climate change itself may further amplify warming by triggering the release of additional greenhouse gases, creating a real risk of even greater temperature changes:

- Higher temperatures cause plants and soils to soak up less carbon from the atmosphere and cause permafrost to thaw, potentially releasing large quantities of methane.
- Analysis of warming events in the distant past indicates that such feedbacks could amplify warming by an additional 1 to 2°C by the end of the century (Friedlingstein et al., 2006).

Warming is very likely to intensify the water cycle, reinforcing existing patterns of water scarcity and abundance and increasing the risk of droughts and floods. At high latitudes rainfall is likely to increase, while regions with Mediterranean-like climates in both hemispheres will experience significant reductions in rainfall. Preliminary estimates suggest that by the end of this century the fraction of land area in extreme drought at any one time will increase from 1% to 30%. In other regions, warmer air and warmer oceans are likely to drive more intense storms, particularly hurricanes and typhoons. As the world warms, the risk of abrupt and large-scale changes in the climate system will rise:

- Changes in the distribution of heat around the world are likely to disrupt ocean and atmospheric circulations, leading to large and possibly abrupt shifts in regional weather patterns.
- If the Greenland or West Antarctic Ice Sheets began to melt irreversibly, the rate of sea level rise could more than double, committing the world to an eventual sea level rise of 5 to 12 m over several centuries.

The report *Climate Change 2001: Impacts, Adaptation and Vulnerability*, by IPCC Working Group II (IPCC, 2001b), assesses the sensitivity, adaptive capacity and vulnerability of natural and human systems to climate change and the potential consequences of that change. Among the findings to emerge are that "natural systems are vulnerable to climate change, and some will be irreversibly damaged" and that "many human systems are sensitive to climate change and some are vulnerable". Potentially serious impacts of climate change include sea level rise; changes in agriculture, forests and fisheries; changes in the energy, water, construction, transport and tourism sectors; increased risk of disaster, viz. changes in the frequency and severity of storms, floods, droughts, hurricanes and precipitation levels; declines in biodiversity; increased human morbidity and premature mortality; and human migration (see also IPCC, 2007b).

3. The 'inconvenience'

Why are the growing indications that human activities are changing the climate *inconvenient*? There are two reasons. First, the risk of climate change may be substantial, so too the costs of reducing that risk, for there is no cheap 'technological fix' available. The use of fossil fuels is closely

intertwined with our modern lifestyles. We use fossil fuels for heating our homes, for transportation, for lighting, for the production of consumer goods, et cetera. We could make our appliances more energy-efficient or use alternative energy sources, but there are price tags on all these options. Environmental pressure groups may tell us that a less consumerist life is a 'better' and 'wealthier' one, but it can hardly be denied that in the short term reducing the risk of climate change will be at the expense of long-cherished lifestyles. Since any serious climate policy will mean growing scarcity in the public availability of fossil fuels, it will effectively lead to a rise in the price of energy. We only have to look at the oil crises of the 1980s and the international efforts, including wars, to secure low energy prices to understand that a rise in these prices will not be warmly welcomed. In the 2001 IPCC assessment, the cost of stabilising the atmospheric concentration of CO_2 at 450, 550 and 650 ppm is estimated to lie in the range 2.5–18 trillion USD, 1–8 trillion USD and roughly 0.5–2 trillion USD, respectively, (Azar and Schneider, 2002 on the basis of section 8.4.3. of Working Group III of the IPCC, 2001c). Top-down models typically suggest that the cost of a 50% reduction of global CO_2 emissions from baseline by 2050 would cost some 1–4% of global GDP, and a 75–90% reduction by 2100 would cost some 3–6% (Grubb et al., 1993; IPCC, 2001c). Although many studies show that these costs are perfectly bearable (Schelling, 1997; Lomborg, 2001, p. 323; Azar and Schneider, 2002), they cannot be glossed over.

Second, the truth about climate change is not inconvenient in the same sense as the knowledge that smoking causes cancer. Although knowing the truth about smoking is annoying, one would rather hear it than not. After all, overseeing one's life, it pays to quit smoking. With climate change this is not the case, though. What makes climate change a truly inconvenient truth is that it challenges us *morally*, like the knowledge about the conditions under which factory-farmed animals are held. If we did not know the truth about factory farming, we would lead happier lives (in the hedonistic sense at least). The same is true of climate change, for we hardly gain personally by reducing the risk of it occurring. On the one hand, the lifetime of carbon dioxide in the atmosphere is between about 5 and 200 years (IPCC, 2001a).[1] Recent work suggests much longer effective lifetimes in the case of large emissions of carbon dioxide (see e.g. Archer, 2005; Caldeira and Wickett, 2005). On the other hand, there is a time lag between the emission of greenhouse gases and rising temperatures, because of the thermal inertia of the oceans, which need time to warm (or cool) in response to the forcing. This response time depends upon the rate at which the ocean circulation transmits changes in surface temperature into the deep ocean. Hansen (2005)

[1] In fact, no single lifetime can be defined for CO_2 because of the different rates of uptake by different removal processes rate of removal of CO_2 equivalent from the atmosphere. See e.g. Maier-Reimer and Hasselmann, 1987.

estimates the climate response time at about 50-100 years (see also Wigley, 2005; Meehl et al., 2005). In other words, if we experience climate change today, it will not be due to our present emissions, but to the actions of our ancestors. Whether we decide today to emit more or less greenhouse gases will hardly result in a climatic change noticed by ourselves during our own lifetime, but by people who are as yet unborn. Even if we were to notice benefits of climate policy in our own lifetime, these benefits will be small compared to the required costs. So the inconvenient truth is that we are causally responsible for substantial risk of climate change being experienced by future generations, that we will incur substantial costs to reduce that risk, but that we ourselves will scarcely benefit.

4. 'Holding the truth at arm's length'

As Al Gore observes, the truth about climate change is not only inconvenient; politicians also 'hold it at arm's length', generally backed up by the electorate. What practical action has thus far been taken to curb emissions of greenhouse gases? There are three major 'achievements': the establishment of the Intergovernmental Panel on Climate Change, the UN Framework Convention on Climate Change, and the Kyoto Protocol, each of which I shall now briefly discuss.

Recognizing the problem of potential global climate change, in 1988 the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) established the Intergovernmental Panel on Climate Change (IPCC).[2] The role of the IPCC is to assess on a comprehensive, objective, open and transparent basis the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts, and options for adaptation and mitigation. The IPCC does not carry out research, nor does it monitor climate-related data or other relevant parameters. It bases its assessment mainly on peer-reviewed and published scientific/technical literature. One of the main activities of the IPCC is to provide, at regular intervals, an assessment of the status of the knowledge on climate change. The First IPCC Assessment Report was completed in 1990 (IPCC, 1990).

The 1990 IPCC report played an important role in establishing the Intergovernmental Negotiating Committee for a UN Framework Convention on Climate Change by the UN General Assembly. The UN Framework Convention on Climate Change (UNFCCC) was adopted in 1992 and entered into force in 1994. The Convention on Climate Change sets an overall framework for intergovernmental efforts to tackle the challenge

[2] Source: http://www.ipcc.ch/about/about.htm

posed by climate change.[3] It recognizes that the climate system is a shared resource whose stability can be affected by industrial and other emissions of carbon dioxide and other greenhouse gases. The Convention, which came into force on 21 March 1994, enjoys near universal membership, having been ratified by 189 countries. Under the Convention, governments:

- gather and share information on greenhouse gas emissions, national policies and best practices;
- launch national strategies for addressing greenhouse gas emissions and adapting to expected impacts, including the provision of financial and technological support to developing countries;
- cooperate in preparing for adaptation to the impacts of climate change.

According to article 2

> "The ultimate objective of this Convention and any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner."

According to article 3, principle 1:

> "The Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly, the developed country Parties should take the lead in combating climate change and the adverse effects thereof."

In 1997, the general agenda of the UNFCCC was translated into binding targets for the industrialised world for the coming years. In Kyoto, a protocol was formulated which asks the industrialised countries (Annex 1 Parties) to reduce their greenhouse gas emissions by at least 5 per cent below 1990 levels in the commitment period 2008 to 2012. Developing countries, such as China and India, have no binding targets under the Kyoto Protocol. The Protocol entered into force and became legally binding on February 16th, 2005, following ratification by Russia at the end of 2004. Right from the start, however, the US Senate rejected the Kyoto Protocol, unanimously adopting the so-called Byrd-Hagel resolution in 1997 (CR, S5622), a

[3] Source: http://unfccc.int/essential_background/convention/items/2627.php

position embraced by the White House in 2001 (Bush, 2001). Since then, the United States has not proposed an alternative international framework for the Kyoto Protocol.

Although the Kyoto Protocol sets binding targets, there are so-called flexible mechanisms, which weaken its force:

- Under *joint implementation*, an Annex I Party may implement a project that reduces emissions (e.g. an energy efficiency scheme) or increases removals by sinks (e.g. a reforestation project) in the territory of another Annex I Party, and count the resulting *emission reduction units* (ERUs) against its own target. However, countries like Russia and Ukraine have low emissions today compared with 1990 because of their economic collapse after the demise of the Soviet Union. Since they have agreed to stabilise at 1990 levels, which they are unlikely to reach by 2010, they can easily sell off these emissions – referred to as 'hot air' – which they would not emit until 2010. Thus, if an Annex 1 country buys emission reduction units from Russia, it reduces its need for domestic reduction efforts, although no real emission reduction is achieved.
- Under the *clean development mechanism* (CDM), Annex I Parties may implement projects in non-Annex I Parties, such as India, that reduce emissions and use the resulting *certified emission reductions* (CERs) to help meet their own targets. The CDM also aims to help non-Annex I Parties achieve sustainable development and contribute to the ultimate objective of the Convention. However, since the non-Annex I parties do not have binding targets, it is difficult to establish whether emission reductions are real (additional) or would also have been achieved without CDM. In the latter case, Annex I parties reduce their need for domestic reduction efforts, although no real emission cuts are achieved. The Marrakech Accords, agreed at the seventh Conference of Parties to the UNFCCC, defines additionality thus: "A CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity". In practice, however, the additionality is difficult to determine.

In 2004, the greenhouse gas emissions of the EU-15 (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom), were 0.9% below 1990 levels (EEA, 2006). This means that the EU-15 is little more than one-tenth of the way towards its 8% reduction target under the Kyoto Protocol. Greenhouse gas emissions in the EU-15 have risen since 1999 and emission levels in 2004 were the highest since 1996.

To summarise the world's efforts to curtail global greenhouse gas emissions: the US, responsible for one-quarter of global energy-related

carbon dioxide emissions, is taking no nationwide action to reduce greenhouse gas emissions, neither has it proposed alternatives for the Kyoto Protocol. China is at present the world's second largest emitter of greenhouse gases after the US, but is expected to become the world's top emitter by 2030 (IEA, 2006). Other growing developing countries, such as India and Brazil, are also fast becoming large emitters. China and these other growing developing countries as yet have no binding targets. So far, the European Union has only kept its emissions stable. Although the IPCC concluded in 2001 that "there is new and stronger evidence that most of the warming observed over at least the past 50 years is attributable to human activities", global concentrations of greenhouse gases have thus far provided no similar empirical evidence that the rising trend in those concentrations has in any way been intentionally curtailed by deliberate human action. Neither can the impacts of present climate policy on the global economy be discerned *ex post*, i.e. empirically. Therefore, scientific knowledge about the negative impacts of climate policy on the economy as yet stands in no proportion to our knowledge about the negative impacts of climate change.

5. Why is so little being done?

If many politicians and policy makers claim that climate change is not only the most serious environmental problem currently facing the world, but also one of the most important international problems per se (Gardiner, 2004, p. 555), then why are words not followed by action? In section 2, I offered two-thirds of the explanation. Tackling the problem of climate change is highly costly and we, the present generations, will ourselves hardly benefit. The last part of the explanation has a socio-psychological basis.

By definition, we cannot have any direct contact with future generations, the main beneficiaries of climate policy. There are no future generations to voice their interests today, although various philosophers and psychologists emphasise the importance of personal contact in people's perceptions of responsibility. In the work of the French philosopher Emmanuel Levinas, especially, personal contact with the other – eye to eye – plays an important role (see e.g. Levinas, 1961). According to Levinas, by our nature we try to make the world around us part of ourselves, 'consuming' and enjoying it. We can also fit other people into this agreeable worldview, as long as we are not in direct contact with them. In direct personal contact, however, in the face of the other we finally experience a real other person: something that does not allow itself to be appropriated or consumed, something that does not allow itself to be made into a mere pleasing experience. We are unprepared for the uniqueness of the other, and thus the other interrupts our egoism, penetrates our self-satisfied world and makes us feel vulnerable. Because this direct contact provides an *opportunity*

to respond, moreover, it also generally forces us to do so. We assume responsibility, and feel it. In short, we cannot ignore the moral pressure ensuing from the presence of the other.

That the 'face' of the other can exert a moral appeal on us is of course well known to any organisation seeking social commitment. Development organisations like Foster Parent Plan (Plan International) know as no other the importance of giving development aid a face. Binding donors to specific children enhances their commitment. Similar considerations apply to the importance of images of victims and interviews in disaster relief campaigns on national television. The same holds, too, for environmental organisations like the World Wide Fund for Nature, with its campaigns showing animals looking straight at the viewer. Through the eyes of the seal, it is not WWF that is appealing to us but the seal itself. Emotions aligned to ideas of fairness, solidarity and empathy are thus activated by the opportunity to put oneself in the position of the other, by identifying with them. The importance of a face is evident. Future generations and their situation, however, by definition we can never see. We cannot establish contact with them, either personally or through third parties.[4] We cannot have a conversation with them and we cannot read their feelings from their

[4] According to Passmore (1974: 88-89), there would exist a "chain of love and concern running throughout the remote future": because we love our children, we care about their children, who will also be loved by our children, and so forth. However, as de-Shalit (1995: 32-33) for example argues, it does not logically follow that we love those who are loved by the ones we love ourselves. And as far as we do, this love may diminish quickly the more remote and thus unknown our descendants are. People are not very attached psychologically to their great-great-great grandchildren (Barry, 1977: 279; Goodin, 1986: 171). We know, for example, that every inhabitant of this world is connected through ties of friendship, although we do not know the precise chain of friends. This does not mean we feel a bond of friendship with all world inhabitants.

In economics, some attempts have been made to *measure* empathy for future generations or *intergenerational altruism*, for example by determining option and bequest values in people's preference functions (see e.g. Krutilla, 1967; Greenley et al., 1981; Popp, 2001). Option value is defined as the willingness to pay for the opportunity to choose from among competing alternative uses of a natural environment in the future. Bequest value is defined as the willingness to pay for the satisfaction derived from endowing future generations with a natural environment (Greenley et al., 1981). Such research shows that people do to some extent care for the remote future. Furthermore, intergenerational transfers account for a significant part of aggregate saving, although there is much debate about the motives behind such transfers and to which extent such transfers are intended (see e.g. Kotlikoff, 1988; Fan, 2001).

The point, however, is not that present generations do not have any empathy towards future generations at all. The main point is that it is doubtful whether this empathy is strong enough to carry the demands of justice. There is a big difference between people's willingness to pay a limited amount so that their direct offspring can marvel at beautiful lakes, and the willingness to accept the fundamental changes in consumption patterns which may be required to protect the environment for unknown people living centuries from now.

face, making authors like Heilbroner (1974), Hardin (1977) and Care (1982) pessimistic about our capacity to be stirred by the interests of future generations.[5]

To make matters worse, some authors believe that even direct contact with vulnerable groups will be insufficient motive for those with established interests to change their ways, if those in the weaker position are unable to exert any 'nuisance power'. Although moral considerations, with no further prudential reasons, may motivate some individuals, De Swaan (1988) believes they have rarely moved an entire society to structural change. Centuries ago, the establishment introduced public health care because diseases could no longer be confined to the living areas of the poor. Slavery was abolished in the United States under pressure of those who had little interest in slavery: the Northern States and the slaves themselves. And in modern times the willingness of the Western world to care about people in developing countries or about animals is very much dependent on the capacity of the latter to 'annoy'. People in developing countries still have some nuisance power: they can bother the West by immigration and by causing geo-political instability. Animals can bother us by imposing the health risks accompanying modern food production. Future generations, on the other hand, have no 'nuisance power' whatsoever. In short, if societies choose to take the interests of future generations seriously, this would not merely mean a new step in the ever-expanding moral circle, but an unprecedented one.

On the other hand, in spite of the pessimism sketched earlier, it should also be observed that 'the night is still young'. From a historical point of view it is hardly remarkable if the present generations are *as yet* by and large indifferent to future generations. In ancient Greek society male citizens did not yet consider foreigners, slaves or women as moral equals, i.e. entities whose interests should be given (equal) consideration in the organisation of society. Nevertheless, after centuries of emancipation processes and moral 'progress' slavery was abolished and in most countries equal treatment of men and women became guaranteed by law. That the 'widening circles of identification' (De Swaan, 1995) have not yet extended to future generations is hardly surprising, considering that it is only relatively recently that present generations are becoming aware of the negative impacts of their activities on future generations. It should be noted, though, that in the case of future generations it seems there is no doubt among the general public whether future generations are to be considered as moral equals. The problem, however, is that there is insufficient identification with future generations to translate the abstract idea of treating future generations as moral equals into effective policy.

[5] See for a discussion of the motivational problem: Birnbacher (2006)

An interesting research topic would be how previous circles of identification have widened and how this might transfer to the climate debate. Although a thorough answer to this question falls outside the scope of this thesis, I suggest two promising directions to explore. The first is related to the debate about the primacy of technology versus social organisation. According to some authors, technological developments *initiate* the widening of moral circles. In America, one of the reasons that slavery was abolished in the northern states far earlier than in the southern states was because in the North mechanisation performed the tasks for which Southerners relied on slaves. Similar views exist on the influence of technological developments on the emancipation of women. Caring about the impacts of climate change on future generations may then only truly start once *autonomous* developments have led to a substantial decrease in the price of renewable energy. On the other hand, authors such as Feenberg (1999) argue that technology does not develop autonomously, but is to a large degree socially determined. *After* child labour was forbidden, technology developed which made child labour unnecessary. And in ancient Rome, new technology capable of replacing labour was not developed or used, as the abundance of slave labour made it unnecessary (Debeir *et al.*, 1991). The question then remains how society might establish the conditions for developing climate change mitigation technology.

A second direction to examine is the role of *fiction* in social change. According to the political philosopher Richard Rorty, expanding our moral circle is the product of "hearing sad and sentimental stories" from, or about, those people who are oppressed by our current rational discourse (Rorty, 1993). It involves 'sentimental education' about the effects of our exclusions. In this view, Harriet Beecher Stowe's novel *Uncle Tom's cabin or Life among the lowly* (1852) contributed more to the abolition of slavery than the whole gamut of philosophical treatises, by increasing sensitivity to the suffering of others (Rorty, 1989). Noticeably, *Uncle Tom's cabin* had its immense influence despite Stowe lacking any first-hand acquaintance with slavery in the South. She *imagined* how it would be, on the basis of stories. This is important in the context of future generations, where first-hand acquaintance is by definition impossible. Therefore, fiction about the risks of global climate change (such as the 1995 movie *Waterworld* and the 2004 movie *The Day After Tomorrow*) may play an important role in making the electorate accept more vigorous climate policy. The film *An Inconvenient Truth*, although a documentary, had also much more public impact than the various IPCC reports, perhaps by its link to the personal story of former vice-president Gore.

It should be noted that, in the literature, many other features of climate change have been suggested as explanations of why so little is being done to

address it. [6] I do not consider these features decisive, however. The first major barrier cited is that climate change is a problem of collective action on a global scale, while the global institutions to enforce such collective action do not (yet) exist. Climate change is not a real social dilemma or prisoners' dilemma, however. A social dilemma is a situation in which if all the participants seek to secure their own preferences, a situation is achieved which is worse than if all participants had cooperated. As explained earlier in section 3, however, in the case of climate change people do not personally gain by cooperation. The beneficiaries of cooperation do not participate in the 'game'. Furthermore, the preferences of the present generations towards the wellbeing of future generations are presently too weak – by the previously discussed lack of identification, for example – to make climate change a problem of collective action: the present generations prefer the situation of non-cooperation (including the present preferences regarding future generations) to a situation of cooperation in which the wellbeing of future generations is taken seriously. This is not to say that the global nature of climate change does not further complicate the issue. My only point is that at present it is not a decisive bottle neck for the tackling of climate change. A further supporting argument is that many other international environmental issues, but which affected the present generations more directly, have been more successfully tackled. Take, for example, the 1987 Montreal Protocol on Substances That Deplete the Ozone Layer, which effectively reduced the emissions of halogenated hydrocarbons.

A second barrier is deemed to be the inconclusive science about climatic change. Scientists disagree, express themselves with extreme caution, and once in a while reports are published trying to repudiate the whole issue of climate change. However, although the scientific uncertainty and controversy complicates political deliberation, this uncertainty once more does not on its own explain today's inaction. Policy is generally made under conditions of uncertainty and far-reaching decisions are often made on the basis of inconclusive information. We only have to look at the scientific basis for the invasion of Iraq by the United States, in which case inconclusive information from the US intelligence service, contradicting the conclusions of the chief UN weapons inspector, was deemed sufficient to go to war with Iraq. Or consider the recent lawsuits against the tobacco industry. Although the relationship between smoking and cancer is still the subject of research, US courts recently ruled that the *indications* of health risks reported in scientific journals in the 70s should already have been sufficient for the tobacco industry to change its ways (Engle v. Reynolds Tobacco Co, 2000). It seems reasonable to assume that an 'intergenerational court' would consider the first or second assessment report by the

[6] See for an interesting article on the psychology of denial concerning climate change: Marshall, 2001.

Intergovernmental Panel on Climate Change (IPCC, 1990; 1996) as providing at least as much of an indication of risk to future generations as the 70s reports of the health risks of smoking.

6. Conclusion

The IPCC has a very high degree of confidence that human activities have already changed the earth's climate. The IPCC also expects these changes to have serious adverse effects on human society. Reducing the risk of climate change will require bearable but nevertheless substantial costs. Owing to the inertia of the climate system, and the thermal inertia of the oceans in particular, the beneficiaries of climate policy will not be the present generations, however, but first and foremost people as yet unborn. The high costs of serious climate policy and the absence of a moral appeal by the beneficiaries themselves largely explain why the status quo of ongoing fossil fuel use is amply rationalised in public debate.

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