



Earth on fire

climate change from a philosophical and ethical perspective

Gjerris, Mickey; Gamborg, Christian; Olesen, Jørgen Eivind; Wolf, Jakob

Publication date:
2009

Document version
Publisher's PDF, also known as Version of record

Citation for published version (APA):
Gjerris, M., Gamborg, C., Olesen, J. E., & Wolf, J. (Eds.) (2009). *Earth on fire: climate change from a philosophical and ethical perspective*. Narayana Press.

The climate debate's debating climate

Polarisation of the public debate on climate change

GITTE MEYER & ANKER BRINK LUND

1. Intro

“Imagine if a scientist won the Nobel Prize in 25 years’ time, proving that CO₂ does not affect the climate at all. Would that in any way imply that our efforts to reduce fossil fuel consumption and our battle against pollution then had been a waste of time? Why can’t we just behave properly?” This was one of the final comments made by a member of the scientific panel at a public meeting in Copenhagen in spring 2008.

The meeting was about anthropogenic climate change. The comment was a response to a question about the uncertainty of climate models, and it was expanded with calls to drink tap water instead of bottled water and to drink soft drinks out of recyclable bottles rather than from plastic cups. It was followed by applause from the hundred-strong audience in the hall. And it raises a number of big and difficult questions: Is the climate debate a scientific or a political debate? Or is it a moral debate? Why have scientific data and models been so central in the *debate* if they are not central to the *substance* of the issue? And what is actually the substance of the issue?

In this chapter we will take a look at the public climate debate – and not least the discussion about the debate – as an example of a societal discussion or discourse where science plays an important and very complex role. We will scrutinize a small selection of texts from the vast debate, texts that in different ways are suitable for illustrating problems in the debate. The purpose is to provide food for thought on how professionals – scientific researchers or administrators with a background in the natural sciences – can act appropriately in such debates and participate in them in a sensible way. There are no definite answers as to what it means to act appropriately or sensibly. And there are no recipes for how to do it. It requires ongoing

judgement depending on the situation. What we must do is think. This may be facilitated by the use of real-life examples, by drawing on insights from the history of ideas and by the formulation of thought-provoking questions. We will endeavour to do this in the following pages.

2. A fragile model

Amongst the members of the Danish public who attended the above meeting in Copenhagen, there seemed to be general support for the view that the climate debate is actually not about science. Put bluntly, this view can be worded as follows: Science or not – doing the right thing can't do any harm. And we know what the right thing is; we are well aware of our moral obligations vis-à-vis the environment, and we know that bad things will happen if we are not careful. We know that our patterns of production and consumption – of energy and generally speaking – must change, and that this goes for society in general as well as for us as individuals. So, according to this view, the 'issue' is not a scientific question of whether human activities have caused the climate change seen so far and will cause similar climate change in future, and it is not a question of how and to which extent this can be documented scientifically. No, the 'issue' is a moral and political one. It is about behaving ourselves. It is about the way in which we use resources, and how we as a society should organise ourselves with regard to our patterns of production and consumption.

This view is not the only possible one. The public climate debate – and the debate about the debate – seems largely to have taken place and been judged on the assumption that the issue is scientific and should be discussed scientifically before becoming political. This has been the most widespread view, regardless of the stance that people have taken, and it is to some extent in line with the very popular model for the relationship between science and politics which dictates that first science establishes the truth about reality, and then it can be discussed and decided politically what should be done within the framework of these scientific facts. According to this model, science should confine itself to describing what 'is', while politics should confine itself to prescribing what 'should' be done. It may be that the political 'should' cannot be deduced directly and unequivocally from the scientific 'is', but 'should' must follow 'is', politics must follow science, the prescribing of action must obey the scientific description of reality.

All along the way in the public climate debate, this model has been creaking and groaning. It has not been possible to maintain the radical separation of 'is' and 'should', of science and politics. Rather there have

been signs that it has become difficult to distinguish at all between science and politics. We will take as our starting point the view that it is valuable to maintain the ability to distinguish between science and politics and that society needs both.

Discussion, discourse, dialogue and reason

Box 1

Debate, discussion, dialogue, discourse are all words used to describe conversations and the exchange of opinions: The words have come from Latin or Greek, and whether one word or the other is used in a particular context will depend, among other things, on the specialist field to which the text pertains. Some specialists tend to use the word 'discourse' all the time, whereas 'dialogue' dominates in other contexts – and in this chapter on the public climate debate, we have decided to talk about 'discussion' and 'debate'. So is this of any significance? Both yes and no.

All the words can be used to refer to conversations, and they are frequently used interchangeably. On closer study their etymologies and meanings are different, but these words – like words in general – are not unambiguous, but can be interpreted in various ways. This is most obvious in the word 'dialogue' or 'dia-logue'. The last syllable comes from the Greek word for reason: *logos* – which can also mean both 'word' and 'figure'. So 'dialogue' can be used to refer to reason as both ambiguous (word and speech) and unambiguous (figure).

3. Old story with a new career

It is a new phenomenon – at the most a couple of decades old – that the climate is discussed as something requiring political action. But it is nothing new that scientists occupy themselves with the impact of human activities on climatic conditions. Nor is it anything new that scientific attempts at predicting long-term climate change have been taken to the public sphere. In the polarised discussion that has been going on in recent decades of climate change as man-made or not, representatives of both camps have presented historical information to support their arguments. The different ways of making use of history for argumentative purposes may, in turn, serve the purpose of understanding what has changed.

More than 100 years ago, in the 1890s, the Swedish physicist and chemist Svante Arrhenius, who was, by the way, awarded the Nobel Prize in chemistry in 1903, studied how CO₂ emissions could contribute to increases in

Many misunderstandings arise because words such as ‘public’ and ‘politics’ are used without any thought being given to the fact that others may understand the words differently. For example, ‘public’ will make some people think about the state and the power of the state, and politics may be seen as synonymous with state control. This perception connects ‘public’ and ‘politics’ with a lack of freedom and coercion. Public affairs come to refer to situations in which the state must intervene. In this context, it may be demanded that the state’s policies be based on science, i.e. on precise, accurate and, in so far as is possible, unambiguous scientific knowledge about objects and their working mechanisms. In connection with discussions about technology, such demands are often made – i.e. demands for ‘science-based policy’.

On the other hand, ‘public’ can also be associated with what is shared and common to all – society rather than just the state – and ‘politics’ can similarly be associated with conflicts between different perspectives, principles and interests. The second version is more in line with the classical views which associated the public and political life in the Greek city state with freedom. Here, public affairs come to refer to questions which should be debated in public.

Similarly, what is public and shared can be thought of as that which everybody agrees on and which is not open to discussion. Or, on the other hand, it may be thought of as relating to all which is uncertain and unpredictable and therefore calling for many different points of view and perspectives: discussion. These examples of interpretations are rarely found in their pure form in real life. They can to a certain extent be combined, but at the same time, they are very different, and they reflect a lack of agreement which has characterised the entire history of the Western civilisation. The difference is related to the difference mentioned in the box on ‘Discussion, discourse, dialogue and reason’, focusing on the question of whether reason should be associated with words and speech (ambiguous) or figures (unambiguous).

temperature. In the 1930s, the British engineer G.S. Callendar, who was also into meteorology, collected temperature measurements from various parts of the world and concluded that increases in temperature were caused by emissions from industry of what we now term greenhouse gases. Similar conclusions were drawn by a small number of other scientists around 1950. However, these scientists were clearly working on their own, as traditional and specialised scientists keen to increase the knowledge about the natural world through their empirical testing of hypotheses about natural mechanisms. Every now and then, conclusions from such research were presented to the public in the form of questions about natural phenomena which people could then ponder a bit. ‘Is the World Getting Warmer?’ was such

a headline in the British *Saturday Evening Post* in 1950. 'Are Men Changing the Earth's Weather?' asked the US *Christian Science Monitor* in 1957. In 1966 and 1977 global temperature increases and human activities were seen as interrelated in reports from the United States National Academy of Sciences (see also Chapter 3).

This information has been gathered by advocates of the view that humans are to a considerable extent to blame for the climate change which may lead to dramatic changes to the living conditions on the planet, and that mankind should therefore also act decisively to counter such change. Such information provides the greenhouse theory with a history and lends a certain venerableness to it; this is not some modern whim, but based on age-old insight.

History is also used the other way around, i.e. in support of criticism of the greenhouse theory and related predictions as being untrustworthy and unsuitable as a basis of political action. This is done with reference to the changing waves of climate science as they have been reported by the US media in the course of the twentieth century. The point is that warnings of global warming have alternated with warnings about a new ice age. In 1895 and in 1912, *The New York Times* carried articles warning that a new ice age might be on its way. In 1923, on the other hand, *Chicago Tribune* printed an article warning of global warming: 'Scientist Says Arctic Ice Will Wipe Out Canada'. In the following decades, a number of articles were published on the impending global warming, but in 1974 *The New York Times* published an article headlined 'Climate Changes Endanger World's Food Output', warning of a possible new ice age. The following year *Time Magazine* published an article with a similar message. Scientists were quoted as saying that unpredictable climate patterns in recent years could be a sign of global climate change. It could take the form of a new ice age.

So history has been used to emphasise that it has been known for a long time that emissions of CO₂ could affect the climate and lead to global warming, and on the other hand to stress that scientists have never been able to agree on how the climate was developing and have changed from one extreme position to the other. And what is new then? The possibility of climate change can no longer be presented, depending on the temperament and the horizon of the individual speaker, simply as either curious and entertaining or as fateful and threatening. Rather, climate change has become an issue which requires deliberation and decisions. The old climate research has embarked on a new career as a societal issue. When reporting historical information like the above, one must be careful to make it clear which side the information comes from. This is because the information

has been gathered and published as ammunition in a conflict between two camps that disagree on how energy should be produced and consumed, how society should be organised, how we ought to act politically.

The background to this strife – which has been particularly polarised and taken the form of a war between left and right in the USA – seems to be a fundamental agreement that the real question is a scientific one; once we know the truth, we will know what to do. Unfortunately, ‘the others’ are forging the truth. They are ‘politicising’ science. They are allowing science to be directed by politics whereas it ought to be the other way around.

It is a widespread regret – which is not only voiced within the framework of the climate discussion – that science is becoming politicised. Underlying this regret seems to be an assumption that politics is dirty by definition. This is certainly not a helpful starting point for scientists wishing to make reasonable contributions to political discussions of topics belonging to their field of knowledge. A more fruitful starting point could be to regard modern environmental research as a field which has always been ethically and politically motivated, and which thus has not only been informed by a pure curiosity concerning natural mechanisms, but also to a large extent by a concern about how production and consumption affect the natural world.

Environmental research has not been about pure description, but about description which was to move other people and prompt them to action. Moreover, it has been less about understanding specific individual mechanisms in order to be able to imitate or control them than it has been about understanding large complex systems and interrelations. Thereby uncertainty – a basic condition for human action which modern science to a large extent was developed to reduce – has become more visible as a basic condition that also applies *within* science.

One groundbreaking book in the history of modern environmental research was *Silent Spring*, written by the US biologist and geneticist Rachel Carson in 1962. When the book was reprinted in London in 1964, the text on the cover started as follows:

For as long as man has dwelt on this planet, spring has been the season of rebirth, and the singing of birds. Now, in some parts of America, and throughout the world, spring is strangely silent, for many of the birds are dead – incidental victims of our reckless attempt to control our environment by the use of chemicals that poison not only the insects against which they are directed but the birds in the air, the fish in the rivers, the earth which supplies our food, and, inevitably, (to what degree is still unknown), man himself. Rachel Carson became so concerned with this situation that she

spent over four years gathering data from all over the world on the effects of pesticides now in general use.

(Carson, 1964)

Both up until and after the Second World War, the natural sciences have played a decisive role in the development of industrial production processes, including the development of chemicals for eradicating insects and killing weeds on farmland. Through modern environmental research the natural sciences also came to play a key role with regard to shedding light on the dark sides of such production processes. None of these efforts can be described as amounting to pure, curiosity-driven research.

From the outset, environmental research and environmental politics have thus been inextricably related. It is not an infection of which science can be freed. It is a condition for environmental research and for the environmental scientists' contributions to the public debate that they address big, complex questions which are accompanied by many and considerable uncertainties, and that ethical and political aspects are always present.

Since the 1960s, the environmental discussion has refused to die down. It has been an international discussion with regional and national variations. Especially in the USA, more than in Europe, it seems to have remained a sticking point dividing society into two warring factions, rather than having become a unifying issue around which everybody could unite and see themselves as good people supporting a good cause. The climate discussion can be seen as a preliminary culmination of half a century of environmental debate. Unlike the 1970s' warnings of forest deaths, warnings which proved too radical, and unlike the warnings of increasing human infertility as a result of the widespread use of chemicals, the greenhouse theory and the accompanying models and predictions have found support both among scientists within the field and among other citizens, and references being made to 'the scientific consensus' on man-made climate change are now common.

The UN Intergovernmental Panel on Climate Change (IPCC), set up in 1988, has undoubtedly played a major role in this development. The IPCC, which published its fourth report in two parts in 2007, has developed into a gigantic body with several thousand affiliated experts who are operating in a borderland between science and politics. This fourth report seems to a large extent to represent and/or to have brought about the turning point which has changed the climate debate from being a war between two opposing factions and into a unifying cause for everybody who would like to be a good force and to be perceived as such. Why? In July 2007, Mojib Latif,

a German professor of climate research, wondered about this development: “The results now being discussed are already almost twenty years old. The last UN report from 2001 said more or less the same thing,” he declared (NDR fernsehen, 2007). A Danish study is concluding that journalists are asking fewer critical questions about the topic than they did before the report. It also points out that this may have to do with the fact that the conclusions in the report are presented as more certain than is usually the case in scientific reports (Asbjørn & Bakalus, 2007).

The widespread consensus that could be observed in summer 2008 concerned the issue as a scientific question, the answer to which should be followed by political consequences. Now it is generally regarded as a fact – and is therefore discussed less than before as an open question – that human activities are making a considerable contribution to climate change. All sorts of products can be marketed as climate-friendly or criticised for not being so. All sorts of questions can be raised and proposals made with reference to their impact on the climate. Newspapers set up climate blogs. Universities appoint climate panels. Scientists join forces to submit applications for funding of climate-related research – and to write textbooks concerning the climate.

However, there is no reason to believe that this means that the discussion is over and that there is no need to learn from the process so far with a view to being able to improve in future. Actually, from another perspective it seems doubtful whether greater consensus has been achieved. From this perspective the issue is taken to be a political issue – with scientific elements – about how we should organise our societies with regard to production and consumption. Admittedly, the cue ‘climate’ – like a cue such as ‘sustainability’ – can now attract people with widely differing views on continued economic growth and market mechanisms, and money can be made by emphasising climate care. However, the lack of consensus about growth and market mechanisms remains an undercurrent in the environmental debate. And drawing the line between politics and science remains the big challenge.

4. Why everybody wants science to be on their side

It has been a characteristic of the discussion so far that everybody has wanted to appear scientific: They have science on their side, while their opponents are unscientific. This has given rise to quite a lot of linguistic dodging. Let us again take a look at examples from both camps.

Among the most active advocates of the view that human activities are

having a substantial impact on the climate, it is not unusual to refer to studies which are concluding otherwise as ‘so-called scientific’. Likewise, scientists from the other camp are often not referred to as scientists but as extreme and peripheral persons, such as “a fringe group of dissenting figures”. Or they are described as “a tiny minority of the scientific community”. Or they are called “the Scientific Fringe” or “enemies of crucial research” or “contrarian scientists” – as opposed to “mainstream scientists”. Or they are simply referred to as “these dissenters”.

The above examples have been taken from the USA and the UK where the debates have been most polarised and where polarisation trends are most clearly visible. These trends have been less pronounced and less obvious in other countries, for example in Denmark, although present beneath the surface.

The choice of words is interesting. It is worth noticing that they are characterised by a different tenor to the one which dominates today’s discussions about democracy in English-speaking countries. In discussions on democracy it is normal to emphasise ‘local’ as something positive, as opposed to ‘central’, which is seen as something negative. In the climate discussion, on the other hand, ‘the fringe’ has negative connotations, as compared with ‘mainstream’, which has positive connotations.

The expression ‘dissenter’ refers to religious strife and is used quite frequently. The term was originally used about Protestants and others who did not belong to the Roman-Catholic Church, and today ‘dissent’ means having or expressing views which are contrary to normal or official views or to official religious doctrine. A ‘Dissenter’ – with a capital D – is a Protestant who does not accept the doctrine on which the Church of England is built, or a person who refuses to conform to the established church. The term ‘dissident’ does not refer to religion in the same way, but first and foremost to politics – it is, however, difficult to use the term about one’s opponents as it has chiefly been used about critics of totalitarian regimes, especially in the former Eastern European bloc, and therefore has positive connotations.

The religious undertones have been picked up and used as a starting point for critique. Thereby science moves to the other side: It is argued that the commitment to countering man-made climate change is not scientific, but religious. Again, the ‘so-called’ science rears its head, for example with a reference to ‘some of the doomsday scenarios currently being brought to market’ and which others ‘seem to regard as scientific’. There is talk of “scientists sceptical of climate alarmism”, and warnings about serious consequences of the large-scale emissions of greenhouse gases are no longer associated with science, but with the “media and entertainment industries”, the “Hollywood

elites”, the “hysterical left” and to “the eco-doomsayers” as well as “grant seeking climate modelers”. The roles of “pop culture” and “computer models” are emphasized as a contrast to “leading scientists”. Modellers desperate for funding are contrasted with “the many skeptical scientists” and “the serious scientists out there today debunking the latest scaremongering on climate change”, based on “scientifically unfounded fears”.

There is a clear trend that both camps in the polarised debate want to have science on their side and see ‘the others’ as being caught up in politics and/or religion and/or the media distorting the issue. The groups with which one agrees ‘find’, while the others ‘fabricate’. ‘The others’ are in the pockets of special financial or political interests, while one’s own side is pure and above interests. Everything that can be seen as open to criticism is, so to speak, shifted away from science and blamed on religion or politics or the media. Again, what we see is an underlying agreement. It would appear that there is widespread consensus that the ‘issue’ should primarily be seen as a scientific one. There is agreement also on what can be regarded as reprehensible, i.e. views and attitudes and social interests. First and foremost there is also agreement on what must be seen as most trustworthy: science as the true description of reality, elevated above views, attitudes and social interests. The warring factions seem to agree that what is good and true must be found in or come from science, while what is bad and untrue originates outside science.

The agreement has links to the model on the division of labour between science and politics which takes all questions about how things really ‘are’ to be scientific, while questions about what ‘should’ be done are related to politics only. In this model, science stands for the truth about reality. In practice, politics easily comes to be seen as the opposite, i.e. as untruth.

5. Conditions for politics

In the course of the history of the West, political and public life has been regarded as representing the quintessence of human freedom, but it has also been seen as a mere free-for-all. Democracy has been seen as an organisation of public decision-making allowing everybody to contribute to decision-making processes about public affairs. On the other hand, democracy has also been seen as an organisation of societies, facilitating first and foremost that all citizens may represent and speak on behalf of themselves. Public debate has been seen as a fruitful struggle between many different views and interests. But disagreement has also been seen as threatening, perhaps even as a possible precursor of civil war. The model which says ‘science

first, then politics' is not related to any particular *understanding* of politics. Rather, one could see the model – which is as old as modern science – as an attempt to avoid or bypass the fundamental conditions for politics and for human action in general: the existence of uncertainty, different social interests and disagreement.

As natural scientific enquiry and approaches have spread to ever more, ever larger and ever more complex issues, these political conditions have become increasingly prominent also in discussions on science-related issues. The climate discussion can be seen as an example of the difficulties of *dealing with* uncertainty, social interests and disagreement by means of frameworks of thought which have been designed with a view to *circumventing* these conditions in so far as possible.

Uncertainty and doubt as ammunition

'Warming sceptics' is one of many terms of abuse having been coined in the climate debate. Somewhat peculiarly, it has been used against critics of scientific climate theories and models. Why is this peculiar? Because scepticism is normally seen as a virtue in scientific contexts, not as a vice. How can it be that the connotations of scepticism suddenly change from positive to negative?

Scepticism is an important concept in modern natural science; 'organised scepticism' has even been described as a part of the ethos of science – the set of norms of behaviour binding scientists together (Merton, 1968). Being sceptical means being inclined to doubting or to having reservations, for example about established assumptions. It can also mean being doubtful about the usefulness of trying to interfere actively with aspects of life. And being doubtful about the possibilities of achieving true knowledge. In English – impacting on today's international discussions because of its status as a lingua franca – there is a religious meaning to the term. A sceptic can be a person who does not believe in religious doctrine, an unbeliever. 'Sceptic' is not a neutral term, but may be used to signify honour or dishonour depending on the circumstances. Because of the uncertainty unavoidably surrounding climate models, the climate discussion is rich in examples of both uses of the term.

There is a clear connection between scepticism and doubt on the one hand, and uncertainty on the other. The sceptic is raising doubts about claims which are presented as certain. The sceptic will immediately ask whether something is, in fact, certain. This can give rise to renewed investigations and testing. A principle involving such processes of continuously raising doubts and conducting more tests is central to scientific observa-

tion and description and constitutes, for example, the basis for the editing of scientific journals. The aim is to achieve the greatest possible degree of certainty – or the least possible degree of uncertainty – but there are no hard and fast rules as to when such a process driven by scepticism must and should stop. In principle, it can carry on indefinitely. That in itself is uncertain. One may decide, but cannot prove, when it is reasonable to stop doubting.

Scepticism – doubts about what is certain – is used in natural science in an attempt to achieve the greatest possible degree of certainty. There is ambiguity here, a double relationship with scepticism. There is a confession to doubt which is voiced by scientists during the scientific process. But it is not uncommon for the signs to change, from plus to minus, when doubts are voiced by other citizens, including politicians, and when they concern the results – such as climate models – of scientific processes.

Where scientific discussions and issues are confined to being considered in isolation in the scientific community, this ambiguity is not necessarily very evident. In such cases, scepticism and doubt can be encapsulated in the scientific world, i.e. can be reserved for internal use. Subsequently society at large can then be presented with the findings: the largest possible degree of certainty or the least possible degree of uncertainty – the appearance of certainty, for non-scientists to rely on. However, in connection with the climate discussion, this has not been the case. It has not been possible to confine the uncertainty to internal scientific exchanges. The scepticism has also entered the public domain. Thus, the uncertainty of the climate models has been a regular topic in the public debate.

Those who are sceptical about the impact of human activities on climate change have, in this respect, had an easy time. For quite a long way they have been able to refer without ambiguity to the need for and the value of scepticism, using the uncertainty of the climate models as their ammunition. Uncertainty has, so to speak, been on their side.

Nor has the uncertainty been difficult to deal with for the probably large group of people in between the camps, who do not contest that human activities contribute to climate change, but who do not see climate change as the most important of issues and who tend not to be convinced of the factual value of accurate predictions of future events. From this point of view, the uncertainty surrounding the models is only a problem in so far as it is not acknowledged.

However, the most active of the proponents have had a difficult time. The uncertainty has not been on their side, and they have not been able to contain it.

On the one hand, scepticism has been presented as ‘our’ virtue: Accusations have been made against ‘the others’ to the effect that they demanded absolute certainty and therefore would not or could not accept the fact that science is always subject to uncertainty. The recognition that science is characterised by uncertainty – and by an ability among scientists to express themselves in a guarded and nuanced manner – has been described as a scientific virtue. This virtue has been seen as being in opposition to the demands made by ‘the others’. It has been argued that ‘the others’, and especially the politicians, do not understand that science involves uncertainty, and therefore demand absolute certainty about future climate change and about mankind’s contribution to such change before they are prepared to act.

Scepticism has thus been presented as a mistake on the part of ‘the others’: Those ‘others’ have been accused of being sceptics – of being incurable doubters who would not acknowledge that now something had been sufficiently substantiated and demonstrated: “Doubt is being produced and thereby an argument for politicians to abstain from action. This supports the oil companies in getting their way” (Fog, 2007). Debates have been framed to make room, at the same time, for criticising politicians and others for not being able to appreciate the uncertainty inherent in science and for contemptuous references to ‘the sceptics’. Scepticism has been described as a practice which historically has been good and sound in and for science, but which has been abused in the public climate discussion. Journalists in particular have been ticked off in a big way. They have been told that they should be extremely sceptical about the scepticism of scientists outside the mainstream precisely because the conclusions behind which the majority of scientists within a particular field end up rallying are the results of long-standing, stringent, professional, critical and sceptical processes.

Doubt and scepticism in the public with regard to climate change, its causes and likely future development has been described as a problem created by the media. The ambiguity of science with regard to certainty has been pointed out: Science has been developed, it is said, among other things, to minimise uncertainty. At the same time there is uncertainty in science. However, the argument continues:

“The manufacture of doubt and uncertainty regarding the science of climate change was a deliberate, well-financed tactic by oil and coal companies and conservative politicians in an attempt to undermine public confidence in science and thereby defer action against global warming.”

(Corbett & Durfee, 2004)

It has also been said that although journalists have to critically investigate the interests of various sources, critical journalism should not become ‘too critical as it can otherwise and unintentionally undermine the actual scientific message’ (Asbjørn & Bakalus, 2007).

Regardless of whether one looks at the climate discussion as primarily a scientific discussion or primarily a political discussion, it is problematic when scepticism is used both to signify own virtues and the vices of others. This is a challenge for the scientist or administrator who – with a background in the natural sciences – is to contribute to the climate debate or to other major public debates about the environment and health: scepticism and doubt cannot be isolated (any longer) within the scientific community and cannot be kept from or admitted to the public discussion at will. The sceptical traditions of science spring from real uncertainty which will not go away. There are plenty of reasons why public debates involving science-related questions are accompanied by scepticism. Therefore, openness about uncertainty is a prerequisite of trustworthiness, regardless of convictions about causes as good causes in need of immediate action.

Social interests always belong to the other camp

Independence of (special) interests is, like scepticism, part of the ethos of science, and the climate discussion has been strongly dominated by mutual accusations about not living up to this norm.

As regards this topic, the most active advocates of the view that climate change is to a considerable extent caused by human activities have had the easiest time. From the outset, the oil industry has had an obvious financial interest in ensuring that serious restrictions were not imposed on the use of its products, and it has supported the critics. The latter have, on the other hand, been referred to as the Carbon Club and the foot soldiers of the producers of fossil fuels. There has been talk of “a small cadre of dissenting scientists (of whom some are funded, in part, by industry)” and of “the industrial/sceptical contrarian view”, of “self-appointed climate experts, funded by the producers of fossil fuels” and of “sowers of uncertainty ... such as the oil and coal industry” and of ‘direct or indirect support’ from ‘the oil giant Exxonmobil’ and other representatives of the oil industry.

Reference has first and foremost been made to close relations with major financial interests. To a lesser extent, reference has been made to more or less clearly defined political groupings. There has, for example, been talk of ‘status quo interests’, of ‘the climate sceptic in the White House’ and directly of supporting the former US President George W. Bush.

The foundation for sending similar accusations in the opposite direction

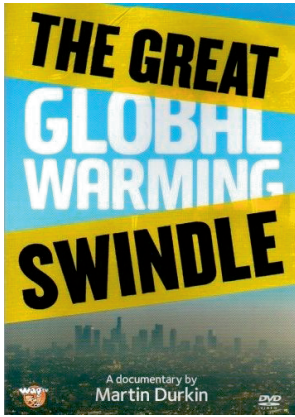
has been less obvious. Reducing emissions of greenhouse gases has only recently become a cause which could attract financial interests to any large extent. Instead, criticism has highlighted political connections, mentioning for instance “a global warming propaganda blog reportedly set up with the help of an environmental group”. Along this line, suggestions have been made about dubious connections to left-wing politicians and foundations and to partisan left-wing environmental groups, supposed to have a vested financial interest in hyping alarmism. It is no coincidence that these examples are taken from an American text (Inhofe, 2006). In a Danish context, for example, pointing out the opponents’ links with environmental organisations would probably not have served to make anybody appear suspicious.

Financial interests and political views cannot simply be put on the same footing. That would imply that politics could be reduced to no more than the safeguarding of financial interests. However, financial and political connections also have something in common. Both may signal a certain influence on people’s power of judgement.

The criticism about a lack of independence has generally been presented so as to imply that this was a particular problem which affected only ‘the others’. Thus, those wielding the criticism appeared to be free from that sort of thing. They simply represented the clear voice of good sense and good morals: ‘We’ glide across the surface of the waters, ‘the others’ have chosen to move along in the mud – an assumption which is probably not the best starting point for any self-critical reflection on the part of ‘we’. This is where the challenge currently lies.

Mistrust of special interests as something which can easily get in the way of the common good is part of the mental luggage in the West. This mistrust, accompanied by a wish to harness special interests, is also at the bottom of scientific norms and ideals about science as being completely independent and impersonal. In the past, the efforts have to a great extent been focused, firstly, on isolating science from special interests within the walls of protected research institutions and, secondly, on the development of methods to ensure that scientific results were uninfluenced by the persons who conducted the research. Such scientific methods are still being applied and developed further. However, at the same time, the Western world has embraced an official policy that scientists must maintain close ties with financial interests and government authorities, that as many patents as possible must be taken out, and that universities and other research institutions should conduct themselves more like private enterprises.

Also, it is pointed out increasingly often that it is unrealistic to imagine science as being detached from social interests – including scientists’ own



The Great Global Warming Swindle by Martin Durkin (2007) shows that in 2007 it was still feasible to question in public whether global warming is attributable to human activities – even though the scientific evidence presented in the film came in for strong criticism.

interests in promoting themselves as part of the competition for research funding. This, in turn, may result in the overselling of science-based messages – about imminent disasters or cures. In short: it is obvious today that the scientific community as a whole is not above the sphere of social interests. The idea that floating in space is a possible working position for science is likely to hamper reflection and deliberation about how to maintain integrity while dealing with and containing connections with various social interests.

Social interests have come to play an increasingly prominent role in science. At the same time, expert opinions are increasingly being sought as opinions from independent bodies which are completely detached from social interests. This is a dilemma of some urgency, regardless of whether an ‘issue’ is seen as being first and foremost of a scientific or of a political nature. This is a challenge for the scientist or administrator who – with a background in the natural sciences – is to contribute to the climate debate or to other major public debates about the environment and health: social interests (own interests and those of others) must be dealt with openly, critically and self-critically. There are no self-evident solutions or answers to this challenge, but the question can rarely be ignored. More often than not, science cannot be said to be free from affiliation with various social interests, but that does not imply that such affiliation should not be accounted for. Nor does it mean that it is unnecessary to document efforts to delimit the influences of those social interests on research questions and conclusions.

Disagreement as a threat to truth

In the climate debate, the most obvious clash between ideals about science and ideals about politics has taken the form of a demand that a political ideal about many-sidedness as a basis for the formation of opinion must give way to a scientific truth ideal. According to the political ideal, which is also a journalistic ideal, a public debate gains through contributions being made from as many perspectives and angles as possible. More voices encourage the well-founded formation of opinion. The scientific ideal is about uncovering the truth, of which there are not several, but only one. This scientific ideal can be interpreted and specified in many different ways, and some of these go quite well with a political ideal about balance or many-sidedness. However, the climate debate has been marked by a veritable clash between the scientific and the political ideal.

Proponents of the current mainstream have argued that many-sidedness or balance may hamper the recognition of truth, and that journalists and others are indeed hampering such recognition by presenting the viewpoints of non-mainstream scientists. “Balance as bias” is the English-spoken version of this critique, while a Danish (or Continental European) version focuses on ‘many-sidedness’ rather than ‘balance’. Many-sidedness and balance can be said to represent different ideals and understandings of politics. Many-sidedness is about many different viewpoints and assessments. Balance, on the other hand, usually refers to just two parties, pro and con. There is a significant difference, but here we will concentrate on what the two statements have in common, i.e. the viewpoint that while ‘balance’ or ‘many-sidedness’ may be good and necessary in discussions about political and social issues, other rules apply when it comes to scientific questions.

This argument – which is based on the view of the climate debate as first and foremost a scientific discussion – is probably the most widespread argument of all in the discussion about the climate debate. It is cited again and again, either directly as the central argument in the discussion, or clearly appearing as an unspoken assumption.

In spring 2007, a BBC report concluded that the weight of evidence that climate change is predominantly caused by human activity no longer justifies equal space being given to the “opponents of the consensus”. Admittedly, the report also stated that it was not the BBC’s role to close down the debate and that the dissenters (or sceptics) would still be heard as long as their views were presented coherently and honestly. Nevertheless, the principle of ‘balance’ was toned down in favour of a principle of giving more space to mainstream science. Almost at the same time, the British Channel 4 – not

part of the BBC – broadcast the controversial documentary *The Great Global Warming Swindle*, which was also broadcast by the Danish public service DR2 channel in summer 2007, and which accuses climate researchers of seducing the global public and of having turned a scientific theory about natural mechanisms into a religion and ideology. This resulted in the same discussion flaring up, also in Denmark.

The Danish DR2 channel broadcast the documentary as part of a theme on the sweating planet (*'Kloden sveder'*) together with a number of other broadcasts about climate change. Afterwards on the DR blog, Jacob Mollerup, the Danish Broadcasting Corporation's Listeners and Viewers Editor, criticised the fact that the documentary had been presented as a 'science programme'. Mollerup described the programme as very categorical in style and as representing the opponents' views in a very caricatured form. He argued that 'broadcasting it could be justified if it was part of a debate', and that viewers would then probably be able to make up their own minds, but that it was problematic that DR2 should have 'provided it with a quality-stamp by broadcasting it as a science programme' (Mollerup, 2007). Other bloggers disagreed that there could be any justification at all for broadcasting the documentary. It was argued that: 'It is certainly not the media which should decide what is scientifically true or false. Science should. If the media want to do a theme about the scientific statements made by science in certain areas, then they must try to do so based on scientific criteria. The media have no competence to decide what is scientifically true or false'. And: 'Science is not democratic' (Rasmussen, 2007). The idea that people could make up their own minds was also attacked: 'After all, if Mr and Mrs Smith in their semi out in the suburbs could decide for themselves what is true and what is false, trustworthy and untrustworthy, then science would be superfluous!' (Fog, 2007). Mollerup specified his views further: 'The media should not play the role of superscientists. It is, of course, not for the media to decide what is good science. But the media must, for example, report on relevant debates about scientific results.'

Debates such as this generate questions of use to considerations on what constitutes proper argumentation in the climate discussion – and in discussions on other issues which have been subjected to scientific enquiry:

Should journalism and participants in the public debate simply passively report and receive the statements of scientists, or do we need scepticism and criticism from parties other than the specialists? Should others remain silent – or be silenced for that matter – when the scientists within a (more or less clearly defined) field have formed a clear consensus on a (more or less clearly defined) question? Are science and debate contrary in nature? If

so, how does this fit in with the widespread understanding of free and open discussion as one of the hallmarks of modern science? And what would be the consequences for political life in general if the argument that many-sidedness or balance hampers the recognition of truth was applied within all the other areas where scientific answers are on offer? Should all debate about the actual state of affairs be closed down once the scientists within a particular field had reached a consensus? How often can questions which are subjected to scientific study be clearly defined as non-political and non-social? And vice versa: How often can political and social questions be clearly defined as questions which cannot to some extent be studied scientifically?

This is a challenge for the scientist or administrator who – with a background in the natural sciences – is to contribute to the climate debate or to other major public debates about the environment and health: room must be made for the existence of disagreement proper on science-related political issues so that a free and open, public discussion and opinion formation is encouraged.

It is no easy task. It has even been quite diffusely defined in the above. We may, however, advance a step further in our understanding by taking a look at the notion of opinion formation and at frameworks of thought on the relationship between majorities and minorities.

6. The formation of opinion in politics and science

Both in the climate discussion and in the discussion about the discussion, reference is incessantly made to scientific consensus. This is not a very aptly chosen expression. Consensus signifies agreement. In the climate debate, it is used to refer to the views of a large majority. The view that journalists should toe the line of such consensus among scientists, no matter which side it supports, has long been widely held among, for example media researchers. Ten years ago only a minority of scientists argued that global warming was caused by human activities. It was therefore argued that the journalists should make sure that doubts were voiced and uncertainty highlighted (McComas & Shanahan, 1999). Since then, the minority has become the majority, and the expression of doubt in the public debate and in journalism has come to be described as a problem (Corbett & Durfee, 2004). References to the majority or mainstream have actually been imbued with such a positive ring in science communication that other words, such as “orthodoxy” must be introduced to express criticism of a majority view.

The relationship between the many and the few, and concerns about the possible tyranny of the majority are age-old themes. Linked to the latter

concern is the view that might and right should not be confused, and that a system which automatically gives the right to the many may end up turning right into might – and might into right. Such concerns have had a significant impact on the gradual shaping of today’s democratic societies. They have also informed a couple of centuries of debate about the controversial concept, the public opinion. Are they also relevant to the issue of opinion formation within the framework of the scientific community? Or is the formation of scientific opinion fundamentally different from the formation of public opinion?

It is a widespread assumption that such a fundamental difference exists. References are made to “rational consensus” and “the accumulation of collective opinion in support of an accepted interpretation of the available evidence”. Consensus does not mean that there is absolute agreement or certainty, it is emphasised, but it is based on “a large body of evidence” and “many thousands of scientific papers”, almost none of which – in fact far less than a fraction of one per cent of the total – has diverged from the consensus (Ward, 2008). There is talk of “sufficient consensus over data and models” (Boykoff & Rajan, 2007). And it is stated that “scientific theories and interpretations survive or perish depending upon whether they’re published in highly competitive journals that practice strict quality control, whether the results upon which they’re based can be replicated by other scientists, and ultimately whether they win over scientific peers. When consensus builds, it is based on repeated testing and retesting of an idea” (Mooney, 2004).

The underlying claim is that results of scientific methods and procedures should not be regarded as opinion, but as knowledge. What takes place is not the formation of opinion, but the production of knowledge. Does this hold? Is it that simple? Science does not necessarily fall apart if we allow the thought that the production of knowledge might take place concurrently with the formation of opinion, and that opinion and knowledge are not opposites, but different and overlapping phenomena. The above-mentioned references to “collective opinion”, “accepted interpretation”, “sufficient consensus” and “to win over scientific peers” indicate that it has not been possible to rid science completely of opinion formation. This does not have to be a problem, provided that the element of opinion is properly acknowledged and that the process of opinion formation is regarded with respect. On the other hand, it can be seen as problematic when references to the majority opinion are often supplemented with references to prestige and status – the “leading”, the “largest”, the “prominent”, “top scientists” etc. This could be a sign that the formation of opinion is connected exclusively

to status concerns and not surrounded with respect as an intellectual endeavour.

Opinions can be understood simply as more or less sophisticated expressions of special interests – as purely calculated. Opinions can also be understood in a straightforward way as rash and ill-considered results of gut feelings – as purely emotional. However, these are not the only possible ways of understanding opinions and the formation of opinion. Moreover, those understandings are likely to prepare the ground for contempt of public and political life as a seat of expressions and formation of opinion. Another option is to understand opinions – if founded on a solid process of opinion formation – as results of reflection based on observations, experience and the weighing-up of various principles and concerns. In this sense, opinions and the formation of opinion are indispensable in both science and politics as outcomes of the art of reasoning.

Two points from the critique of the complicated concept of public opinion are relevant here. One point is: Those who have the means can – not least by means of emotional appeals – manipulate public opinion to promote their own interests. This is a point of criticism which can easily become self-fulfilling. Rather than trying to counter such manipulation, it can develop into a view that the public formation of opinion must necessarily be manipulation. Public and political life then ends up representing no more than the safeguarding of vested interests and emotional appeal – as opposed to scientific facts, neutrality and thoroughness.

In a much-cited statement from 1989, the American biologist and climate researcher Stephen Schneider, a veteran on the IPCC, expressed his frustration at finding himself in a dilemma where he had to choose between “being effective” or “being honest” (Schneider, 1996). He associated honesty with science and with the open expression of doubt and uncertainty. Effectiveness he associated with public life and politics. Scientists, like everybody else, wanted to make the world a better place, he argued. To that end, they needed broadly based support. To achieve this, they needed a strong presence in the media. And so they had to supply alarming forecasts and dramatic statements, and say as little as possible about doubt.

This assumption about the necessary conduct in the public and political life – which is, precisely, an assumption and not a law of

nature – may have influenced many scientists participating in the public climate debate. Thereby, it may have contributed to dramatisation, polarisation and the toning-down of uncertainty.

Another point of critique which has been raised against the concept of ‘the public opinion’ concerns the fact that people are different and thus cannot have just one opinion. There will always be people with other opinions. Even though they do not agree with ‘the public opinion’ – which in reality is not shared by all, but is the opinion of the many – they may be right, but they may not dare or have access to voicing their opinion. This point of critique is relevant not only to the public debate, but also to the internal debate in the scientific community itself.

A German duo, consisting of the meteorologist Hans von Storch and the sociologist Nico Stehr, have made frequent contributions to the scientific and the public climate debate, and have raised the issue. They do not contest that human activities contribute to climate change, but they are concerned about the alarmism which, they believe, originates in the scientific community itself. Alarmism aims to generate action by instilling fear, but this may prove counter-productive, they argue. Fear only creates a shift in the short term. The fear must be renewed and increased all the time. This produces an endless spiral of exaggerations and, in the end, may develop into a crisis for science. The constant alarmist hype eats into a scarce resource – the credibility of science (Storch & Stehr, 2005).

Unfortunately, Storch and Stehr continue, the traditional scientific routines to secure quality and correct error do not seem to work. The public utterance of doubt by scientists is not welcomed by the scientific community, and may be referred to as the products of conservative think-tanks, as disinformation from the oil and coal industry and as detrimental to the good cause. Researchers tend to keep quiet about doubt in public, pretending to have accumulated solid knowledge, which simply needs the finishing touches around the edges. According to Storch and Stehr, scientists practise a kind of self-censorship which may easily erode their ability to recognise new and surprising insights competing or breaking with the acknowledged patterns of thought. Thereby, there is a risk of science becoming sterile, the argumentation continues, but differences of scientific opinion are not embarrassing family affairs to be concealed from the public eye. In science, as in all other areas of life, development is driven by differences of opinion.

In other words: Storch and Stehr clearly do not see science and disagreement as being incompatible, and do not consider the formation of public and scientific opinion as being essentially different in kind. From this per-

spective ‘the scientific consensus’ can be seen as ‘the public opinion’ in the scientific community. The advantage of that perspective is that it facilitates the practical utilisation, also in relation to science and to internal science communication, of centuries of thought about the complicated concept of ‘the public opinion’.

7. Improving the climate of discussion

In the introduction, we cited a scientist who appealingly asked: Why can’t we just behave properly? The short answer is: Because we – the citizens of Denmark, of Europe and all over the world – do not agree on what proper behaviour should be taken to mean. The marked trend which could be observed in summer 2008 of people uniting around the good cause of fighting against man-made climate change – so marked that environmental organisations were concerned that other important environmental issues were ignored – should not lead anyone to believe that disagreement has evaporated. The basic, political disagreement about the use of resources and the mores and means of production and consumption is still in place.

Like uncertainty and the presence of a variety of social interests, the existence of disagreement is a fundamental condition for political life. The acknowledgement of those conditions should not prevent, but rather encourage us to agree on guidelines on the proper conduct of discussions between different points of view. For example, people may hold different views on when and how it is reasonable to use science in a discussion – and at the same time agree that this is a topic for discussion in itself. The climate debate can be seen as an example of a discussion where this has rarely been debated. The dominant ideal has been based on the model providing science with the primary task of identifying the truth about reality while political life is presented with the secondary task of deliberating and deciding on action. The climate debate can also be taken to illustrate that this old model may somehow be flawed. In practice, it has not served to facilitate distinctions being made between science and politics. Rather, they have been allowed to become blurred.

Every time the basic political disagreement about production and consumption raises its head in a new shape, in the form of a new cause, science is called in. This may well happen too often. In the long term it may undermine the ability, firstly to acknowledge the limitations of science, secondly, to maintain the borders of science. If political aspects are not acknowledged as such, they cannot be dealt with. Thus, there is a need for the model to be revised so as to make room for acknowledging – and for attempting to

deal with – the fact that science also contains political elements: There are social interests and commitment, opinions and disagreement, uncertainty and more uncertainty.

It is not possible to radically separate questions about how things are and what should be done. Awareness of the continual interplay between these questions is a challenge for everybody who – with a background in the natural sciences – contributes to the climate debate and to other public debates about the environment and health. It is important for the sake of the debating climate which – incontestably – is man-made and which it is, at least to some extent, possible to do something about.

What it takes is acknowledgement of the facts:

- that reasonable argumentation and the reasonable formation of opinion are not the preserves exclusively of science, but are also possible and necessary in public and political life;
- that the difficulties with respect to acknowledging and dealing with uncertainty and with conflicts of interest are not confined to politics, but are also present in science;
- that science and politics are indeed different, but they are not opposites and do not constitute a dichotomy – rather, politics and science condition each other's existence;
- and that room for criticism is of vital importance for both science and politics in any democratic society.

References

- Anderson RW & Gainor D (2006): Fire and Ice. *Special Report*. Business & Media Institute.
- Asbjørn M & Bakalus S (2007): [In Danish] *Fra klimakoma til klimastress – da FN satte gang i klimadebatten anno 2007. En analyse af syv danske mediers dækning af FN's-klimarapport i forhold til rapportens videnskabelige indhold*. Specialeafhandling i Journalistik, Roskilde universitetscenter. [From climate coma to climate stress – when the UN started the climate debate of 2007. An analysis of the coverage of the UN climate report and its scientific content in seven Danish media] www.ruc.dk/jour/Forskning/Specialer/Silla_Mette.pdf [accessed July 2009]
- BBC Trust (2007): *From Seesaw to Wagon Wheel. Safeguarding Impartiality in the 21st Century*. www.bbc.co.uk/bbctrust/assets/files/pdf/review_report_research/impartiality_21century/report.pdf [accessed July 2009]
- Boykoff J & Boykoff M (2004): Journalistic Balance as Global Warming Bias. Creating controversy where science finds consensus. *FAIR – Fairness & Accuracy In Reporting*. www.fair.org/index.php?page=1978 [accessed July 2009]
- Boykoff MT & Rajan SR (2007): Signals and noise. Mass-media coverage of climate change in the US and the UK. *EMBO Report* Vol. 8, No.3, pp. 207-211
- Carson R (1964): *Silent Spring*. London: Readers Union Hamish Hamilton.

- Corbett JB & Durfee JL (2004): Testing Public (Un)Certainty of Science: Media Representations of Global Warming. *Science Communication* Vol. 26, No. 2, pp. 129-151
- Fog K (2007): [In Danish] Kommentar DR blogs. [Commentary to Mollerup] <http://blogs.dr.dk/blogs/jacobmollerup/archive/2007/08/06/l-gne-om-klimaet.aspx> [accessed July 2009]
- Haas J (2007): Die Wahrheit, die Medien, und die Angst. *Klima der Gerechtigkeit*. www.klima-der-gerechtigkeit.de/die-wahrheit-die-medien-und-die-angst [accessed July 2009]
- Inhofe J (2006): Hot & Cold Media Spin Cycle. A Challenge to Journalists Who Cover Global Warming. Senate Floor Speech Delivered Monday September 25, 2006. United States Senate. <http://epw.senate.gov/repwhitepapers/HOT%20AND%20COLD%20MEDIA%20SPIN%20CYCLE.pdf> [accessed July 2009]
- McComas K & Shanahan J (1999): Telling Stories About Global Climate Change: Measuring the Impact of Narratives on Issue Cycles, *Communication Research* Vol. 26, No. 1, pp. 30-57
- Merton RK (1968): Science and Democratic Social Structure, in *Social Theory and Social Structure*, The Free Press & Collier-Macmillan Limited, pp. 604-616
- Mollerup J (2007): [In Danish] Løgne om klimaet? DR blogs. [Lies about the climate?] <http://blogs.dr.dk/blogs/jacobmollerup/archive/2007/08/06/l-gne-om-klimaet.aspx> [accessed July 2009]
- Mooney C (2004): Blinded by Science. How 'Balanced' Coverage Lets the Scientific Fringe Hijack Reality. *Columbia Journalism Review* Vol 43, Issue 4
- NDR fernsehen (2007): Aufgeheizt und ausgereizt – Klima-Debatte in den Medien. http://www3.ndr.de/ndrtv_pages_std/0,3147,OID3762074,00.html [accessed July 2009]
- Pötter B (2007): Die Kluft zwischen Wissenschaft und Medien ist tief beim Thema Klimawandel. Sturm über dem Elfenbeinturm. *taz.de*. www.taz.de/index.php?id=debatte&art=4717&id=kommentar-artikel&src=ST&cHash=1137d77440 [accessed July 2009]
- Rasmussen S (2007) [In Danish]. Kommentar DR blogs. [Commentary to Mollerup] <http://blogs.dr.dk/blogs/jacobmollerup/archive/2007/08/06/l-gne-om-klimaet.aspx> [accessed July 2009]
- Schneider S (1996). Don't Bet All Environmental Changes Will Be Beneficial. *APS News Online*. http://home.att.net/ffirpuchalsky/sci_env/sch_quote.html#quote [accessed July 2009]
- Schwentker B (2008): Schlammschlacht ums Klima. *Zeit Online*. <http://www.zeit.de/online/2007/44/klima-schlammschlacht-rahmstorf> [accessed July 2009]
- Storch H von & Stehr N (2005): Klima inszenierter Angst. *Der Spiegel*. www.spiegel.de/spiegel/0,1518,338080,00.html [accessed July 2009]
- Ward B (2008): Reporters feel the heat over climate change. *The Independent*. www.independent.co.uk/news/media/reporters-feel-the-heat-over-climate-change-793586.html [accessed July 2009]
- Weingart P (2002): Kassandarufe und Klimawandel. *gegenworte.org* www.gegenworte.org/heft-10/weingart-probe.html [accessed July 2009]