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How to Prepare for the Unknown? On the Significance of Future Generations and Future Studies in Environmental Policy

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ABSTRACT

The core question of this article is: how can we take account of the future and future generations if our knowledge of the future is so sparse? The importance of the future is discussed within the framework of our (linear) concept of time. After that it is argued that future generations do not constitute a new, let alone unique, element in the debate on the future. Two different routes to acquire knowledge about the future and prepare for the future are described. Both reflect facts and values of the present and the past instead of giving an accurate picture of the future. Finally the view is defended that future-focused activity should be based to a greater extent on durable principles. Some of these durable principles are presented and discussed.

KEYWORDS

Time, future, future generations, durable principles, environmental policy

INTRODUCTION

Philosophy is perfectly right in saying that life must be understood backward but forgets that it must be lived forward.

Søren Kierkegaard¹

We have to take the future into account – and that includes the environment. Perhaps even the environment in particular because if the future can bring

unpleasantness anywhere then it is in the environmental field. The examples are more than familiar: shortage of clean drinking water, scarcity of fertile land, holes in the ozone layer, the disappearance of plant and animal species, a less rich natural world. And we are aware that a future of that kind is already a partial reality, and in fact it is not the future that will cause us the unpleasantness but rather our own short-sighted and irresponsible behaviour. The worst thing of all is that not only are we doing harm to people, animals and plants alive today, but we are also doing harm to future generations. The former might be regarded as foolish; the second fits into the category of the immoral.

Up to this point it all sounds very logical, very familiar. It is a story that appears in many publications and there seems little about it that can be contested.² And yet there is something not quite right, as becomes evident whenever we realise that certain doom-laden prophecies have failed to come true or when unpleasant – or even pleasant – turns of event come about which no-one has forecast. There is also some measure of friction whenever we are asked to say precisely what is a good way of taking the future into account. Yes, true enough, hindsight enables us to say something sensible about what we should have done or left undone. It is always possible to find someone who was a voice crying in the wilderness in the past and who, now that his or her prophecies have come true, causes major annoyance by constantly reminding all and sundry. But this hindsight-based wisdom – and, it should be said, the wise ones themselves – usually turn out to be of little value in considerations about the future. The whole concept of the future seems to be a problem. Does it make sense to introduce discontinuous categories (today, future) into a continuum such as time? How many generations forward should we be looking? What do we actually know about them? How can we find out and how reliable would that sort of knowledge be as a guideline for our actions in the present?

Thus the core question in this article is: can we take account of the future and future generations if our knowledge of the future is so sparse? And then, depending on the answers, there are further questions that follow logically from the first: if not, why not? what then? if so, how? Because of the special position accorded to future generations I will deal with that position first. Although in the course of my analysis I will be referring to recent environmental literature, it is my intention to take a wider historical stance and I will make efforts to place the questions and answers in a broader context.

TIME AND FUTURE

Anyone reflecting on the future comes up against the question of time. As far as we know, from the dawn of human history Man has tried to get a grasp of the notion, both by consideration of time's nature and by attempts to measure time.³ Some of the oldest written sources are calendars.⁴ Time seems to be bound up

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with the cosmos, but it is unclear how we should represent for ourselves the coming into existence of time, of the time-space system. Current explanations go a long way but always end up posing more questions than they answer.⁵ It hardly seems to make any difference whether the explanation is sought in astrophysics and cosmogony or in religious creation myths.

Knowledge of time is according to most scientists something reserved to the human race. It is, of course, extremely difficult to prove that animals have no knowledge of time in the sense that they have no awareness of time; it is almost certain that the higher orders have the awareness but obviously the role that the phenomenon of time plays in humans is of a totally different order and extent. Man reflects on time, which leads to an interesting variation at both individual and group level. In that variation time should not be seen primarily as physical but rather as perceived, the manner in which time is experienced and handled. It is assumed that this type of human reflection started with the awareness of mortality and was later given a social and societal form.

Anthropologists have uncovered remarkable differences between cultures with respect to time awareness.⁶ The various notions can be roughly divided into two groups. In the first, time is regarded as a *circular* phenomenon, a constantly repeated cycle of particular events. Beginning and end are interchangeable, there is little or no notion of progressive development and to a certain extent there is no history in the sense of a unique sequence of distinct events. This view of time means that the awareness of time is rather shallow.⁷

The second group of notions can be characterised as *linear*. This is the awareness of history as having a beginning, a present, a future and perhaps even a goal. Time is seen as a line and the present as a point on that line. Behind that point lies the past and in front of it the future. The metaphor frequently discussed by physicists, that of time as an arrow with a clear direction, corresponds well with the linear perception of time and for that reason is regarded by many as confirmation that the notion is correct.⁸ The linear notion is regarded as characteristic of Western culture and has its background in ancient Israel.⁹ The system of measuring and dividing up time appropriate to the linear notion has been gradually imposed on the rest of the world.

Linearity of history assumes long-term change, that the future will be different from the present or the past. Future processes and events may closely resemble those of today or of past times but history does not repeat itself. Within the linear notion of time, therefore, separate account can or must be taken not only of the past and the present but also of the future. Reliable knowledge regarding the future becomes advantageous. Those who acquire it can take account of it in their present activities and prepare themselves thoroughly for the events to come. Generally this brings benefits and explains not only the desire for such knowledge but also the value placed in those who seem to possess it. This can be clearly traced in our Western cultural history.¹⁰ Eschatological expectations and utopias flourish in this sort of climate and it also constituted fertile

ground for Enlightenment thinking and the theory of evolution. A further accompanying idea which grew up earlier – in the Renaissance – is that of the cumulative development of knowledge.¹¹

However it is worth noting that the possession of a linear notion of time does not imply a qualitative, moral type of progress in the course of time. This type of moral judgement has crept into forms of Enlightenment thought and of the theory of evolution, resulting in belief in progress and social Darwinism respectively.¹²

A further point relates to the importance accorded to the past in activities focused on the future. We can think of various positions here. Determinists, for example, believe that the past leaves little room for the future and that much is already set in stone, whether genetically or in the laws of nature, whether in social or societal structures. Optimists, on the contrary, see the future as completely open and for them the past is barely an obstacle to the realisation of desirable developments. The most extreme variant of the latter position turns the causality of cause and effect on its head and sees the present and the future as determining the past.¹³

After all there is no reason to regard the linear and circular notions as incompatible. By way of synthesis it is perfectly possible to regard history as a spiral or, in mathematical terms, as a torus forming a spiral.¹⁴ Here the ‘linearists’ would emphasise the progressive movement of the spiral and the fact that things are essentially different while the ‘circularists’ would point to the similarities in events and the cyclic character.

FUTURE GENERATIONS

A very different and apparently new argument in discussions about the future is constituted by the generations yet to come. In the debate on the environment the concept of future generations is closely linked to that of durability (often termed ‘sustainability’ by environmentalists).¹⁵

If we are to obtain an answer to the question of whether the concept of future generations adds anything to the debate on the future and – a related question – how we can take those generations into account, the following points require clarification:

What do we understand by the concept of future generations? The question may at first sight seem trivial, but it soon turns out to be an awkward customer. Many writers do not even tackle it but simply leave it unanswered. For them future generations are more or less synonymous with the future: it is a way of speaking about the future and a metaphor for ‘concern about tomorrow’. In that case the concept adds nothing, nor does it pretend to do so. If we are to obtain a meaningful description we must start by distinguishing three positions.

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The *first* regards future generations as our own children and grandchildren. Here the concept refers to a younger generation already born. Conceptually speaking this is a clear category, but because of the seamless passage from generation to generation it is not possible to point to the category in a total population. In practice the coming generation is mixed in with part of the present generation. The future is already included in the present.

The *second* position regards the future generations as those (as yet) unborn. Conceptually speaking this seems to be the most logical position, but closer scrutiny shows it to be extremely problematic. I have put the phrase 'as yet' between brackets to emphasise that it is assumed that these generations will at some time be born. Which raises the first problem, since that is something that cannot be simply assumed. Taking account of (but actually also taking no account of) future generations means that we are taking account of people who will not be born at all and/or with people 'different' from the way we perceive them now.¹⁶ This not only makes the concept of future generations fairly difficult to maintain but it also does the same for the argument that we have to take them into account. The second problem with this position is the lack of determination as far as time-scale is concerned. How many future generations should we take into account? The problem becomes acute when, for instance, we are encouraged by many authors to be economical with non-renewable, finite resources so that we leave at least something for future generations. If the number of future generations to be taken into account remains undetermined, this view implies that we may consume nothing because that will always mean, no matter how economical we are, at least one generation for whom nothing is left.¹⁷

Finally, while the *third* position does assume the general concept of future generations, it operationalises it so that it becomes a concrete time-span. This is, in fact, what the first Dutch National Environmental Policy Plan (1989) does. By announcing a 'ban' on the passing on of a negative environmental inheritance to the next generation and by interpreting it in such a way that the solving of environmental problems is given a time limit of twenty-five years a continuously forward-moving horizon is created. However for each problem defined there is a future time limit that can be defined. In this way the third position differs from the first.

It must therefore be concluded that the most logical way of defining future generations is also the one that raises the most problems. These can be avoided by taking up other positions but then it could be denied the concept adds anything relevant and new to the discussions about future-focused behaviour. In that case we are never going to look any further forward than the time horizon of people currently alive.

Do we have to take future generations into account? Our culture has an axiomatic belief that we take our immediate descendants into account and that we are morally obliged to do so. It goes without saying. The need applies primarily to

those immediately involved – the parents and educators – but it also applies to society as a whole. Many regard it as based on the ethics of care, care for descendants, but in addition there is a more legal basis in terms of obligations towards and rights of the coming generation. It should also be said that this applies in every culture, even in those characterised by a circular notion of time. Serious problems arise only when the discussion centres on the ‘real’ future generations – the people who are not here yet but who might come. Obligations of justice and solidarity can, according to many, only exist between parties capable of being pointed out.¹⁸ It is always the present generations who articulate such interests. In court cases held in the name of future generations we hear people of this era expressing their ideals for the future. Speaking in the name of future generations is a form of ventriloquism where, in fact, it is we ourselves who are speaking. For similar reasons, but then starting from an opposing position, objections can be raised to the anthropocentric character of the notion of future generations.¹⁹ Care is expressed exclusively for human descendants, though of course that form of care can also include many interests involving the environment and the natural world.

Can we take them into account? This question will be answered here only insofar as it applies to future generations as yet unborn. In order to take them seriously into account we need to know enough about their needs, wishes, notions, standards and values. Should breaks in trends or major changes occur it will be well-nigh impossible to take the unborn into account in an appropriate manner. History tells us that such breaks in trends are more rule than exception. Unfortunately neither direction nor content can be predicted with any certainty. Which is why it is usually assumed that such matters are an extension of our own needs. When it speaks of ‘their own needs’ in reference to future generations the Brundtland report (WCED 1987) is, in fact, talking about (an extrapolation of) ‘our needs’. Very often there is no precise definition of these ‘needs’. And whenever they are expressed in concrete form this is usually in terms which have an almost universal and timeless character. Thus we read of the primary requirements for life such as clean drinking water, sufficient food and housing, plus other abstractions such as a world fit to live in, welfare, freedom. No matter how important these things may be, they give little unambiguous direction to our actions designed to benefit the distant future; and to the extent that they do so they add nothing to the direction that it is important to follow right now in the interests of the present generation. Further problems arise when such abstract notions are clarified with the use of metaphor. Holmes Rolston III suggests for instance that we should leave the world to our descendants ‘no worse than we found it, like campers who use a campsite’.²⁰ What is meant here by ‘no worse’? That we should inhabit the world in such a way that we leave no trace of ourselves behind? No pyramids? No artificial mounds or dykes? And, actually, no campsites? With respect, I should like to define this as a nonsensical point of view. The same

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applies to a similar formulation which states that we must 'leave the world behind us as we were given it'.²¹ Such statements are based on a cyclic notion of time and an extremely static image of the world. It is not only miles removed from reality but is also undesirable – and only possible if every cultural and natural development is crystallised. Authors more careful with their words modify the statement to: 'we must leave the Earth behind with the same possibilities it had when we entered it', 'the same amount of natural capital', – in Brundtland's formulation: 'the ability to meet needs'. The illustrations used to demonstrate the feasibility of this are taken – among other things – from the worlds of agriculture (prevent erosion, maintain soil fertility), of forestry (ensure natural replacement, obligatory replanting) and of energy (fossil fuels may be used provided investments are made in equivalent renewable replacements). The examples are well chosen. If humanity had possessed this vision, the ancient forest would not have vanished and the concomitant loss of biodiversity would have remained limited. However the question is whether these are examples of a more general future-oriented strategy or selections that cannot be generalised. It could be that they can only be applied to renewable resources or resources that can be allocated. But what can we say about such things as the digging of the Channel Tunnel or the construction of a dam? Do these changes have to go on the black list? Can we ever leave an Earth behind with the same possibilities? I believe that as a general principle it shows shortcomings.

After discussing the questions as put, we have to conclude that future generations do not constitute a new element in the debate. But they can most certainly be a metaphor pointing towards that future. Which brings us back to the core question posed in the introduction: how can we take the future into account? Any answer to the question requires us to have knowledge of the future. Can such knowledge be acquired?

KNOWLEDGE ABOUT THE FUTURE

From the earliest times we can distinguish two routes by which knowledge about the future is acquired. The *first* is linked to certain individuals. Either these individuals are in contact with others (gods) who announce future events to them in their capacity as prophets or the individuals in question are in possession of faculties that enable them not only to summon up certain phenomena but also to interpret them and use them to read the future. Clairvoyants and futurologists, but also their less serious colleagues such as readers of tea leaves and Tarot cards, have taken over certain elements from the work performed by the seers, the explainers of dreams and the oracles of the past.²²

The *second* route is not linked to particular persons but reposes on the use of knowledge and methods which are, in principle, within everyone's grasp. They

vary from pieces of folk wisdom that link a red sky in the morning to shepherds taking warning, up to and including worldwide monitoring networks and advanced models which equally make pronouncements regarding the atmospheric precipitation we can expect over the next few days. In this approach we recognise the development of rational science, based on an increased insight into the laws governing a particular phenomenon and thus able to make predictions about the future of identical or similar phenomena.

Seen from an historical perspective the second route has displaced the first both as regards extent and reputation. But it has certainly not replaced it. Particularly when the search is for a future perspective tailor-made for a particular individual the first route remains stubbornly present. This is understandable, since the second route is based on general laws and characteristics of systems, which in many cases are incapable of producing reliable statements about a particular individual case.

In our time we see the appearance of an interesting mixture of the first and second routes. It is also a form which has a long history. Today's seers make use of general techniques and public information, but they mix that with their own special gifts. The spectrum between the first and second route runs from the expert who is regarded as capable of throwing clear light into a dark future through professional trend-watchers and psephologists to those occupying the top posts in planning agencies.

How reliable are the two routes?

As modern people with our feet firmly planted in today's world we tend to qualify as unreliable the first way of acquiring knowledge about the future. And this is not a denial in principle of the existence of visionaries or exceptional gifts, nor is it because, seen in hindsight, no accurate predictions are made, but rather because it has gone out of fashion as a general method for people who think rationally. Statistically speaking this route would seem to be inferior and its working methods are opaque and difficult to follow. It should be noted here that unreliability has never stood in the way of popularity.

The second route seems to be considerably better. One major difference with the first route is, moreover, that the second route improves greatly with time. The greater our store of knowledge and the better we understand all sorts of mechanisms the more we are likely in the future to predict the phenomena under study. This applies particularly when, as well as a statistical link, we can establish a causal link between phenomena. No one raises an eyebrow when the exact times are given for solar and lunar eclipses scheduled several decades from now. In all such cases we are dealing with more or less circular events and our knowledge of the future is extrapolated from knowledge about the present and the past. Historical data, direct measurements and models in which links are

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demonstrated between the data, go hand in hand here. Extrapolation and reasoning in analogies provides a picture of the future. The enormous explosion in our capacity to perform calculations has proportionately contributed to the development of models of prediction. As far as models are concerned the assumption has been that the more exact the knowledge regarding the thing being studied the more reliable is the knowledge regarding the future.²³ When predictions fail to come true the blame was and still is placed on incomplete and/or inaccurate knowledge of the system studied. The way to arrive at a better picture of the future, therefore, was and remains: more data, more accurate knowledge and better models. For years enormous amounts of money have been paid out to finance this notion: monitoring networks, computers and models designed to predict the weather.²⁴

And yet this second method also turns out to have limits. First of all, it has become steadily clearer that in many areas, even practically speaking, it is impossible to collect together sufficient relevant and accurate data and insights. Moreover theory tells us that even extremely accurate knowledge of the initial data can be insufficient because tiny deviations working through an accumulation of multiplied errors can very rapidly lead to major inaccuracies.²⁵ In contrast to some of our models of reality, reality itself is not deterministic. Many (components of) models are necessarily simplifications of reality. Furthermore the chaos theory developed by mathematicians shows us that (even deterministic) complex systems can be inherently unpredictable.²⁶ The extent to which we have to accept that here we are dealing with inherent unpredictability on theoretical or practical grounds is a question of semantics.

The classic example of a complex system that is inherently impossible to predict (accurately) is the weather over a period of more than four or five days, but we can also quote the examples of the effects of CO₂ emissions on the climate or the future of an ecosystem following the disappearance of one or two species from that system. Finally there are unpredictable external events, trend breaks, which make the predictions unreliable. Almost all relevant systems are subject to external influences of this kind since rather than being locked up in laboratories they are slap in the middle of the fullness of life.²⁷ Trend breaks such as the fall of the Berlin Wall, the oil crises, panic on Wall Street, Mandela's release from prison all have one thing in common: that directly or indirectly they rendered the then current future predictions largely inoperative. The only sure thing we can say about such trend breaks is that they happen now and then.

We are therefore forced to conclude that the second – scientific – route to the future is also characterised by uncertainty. While it is true to say that there are considerable differences in the extent of the uncertainty in the various fields, uncertainty is never absent. The greatest uncertainty arises from incidental and specific events, but events with a general character are less certain than we would have them be. Lack of knowledge, simplifications, inherent unpredictability and

trend breaks ensure that the uncertainty will never be removed.²⁸ Future-oriented activities – in fact, therefore, human activities – are activities carried out in uncertainty.

The question then arises: to what extent is this a bad thing and what does it signify for the nature of our activities?

HOW SHOULD WE ACT?

While uncertainty may be a fact of life, in day-to-day practical situations uncertainty will remain within acceptable limits and reliability is sufficient for the short term. The level at which the uncertainty appears is of major importance. It is, for instance, not possible to scale up uncertainty at the atomic level and state that it also applies to 'higher' levels. This is something which is sometimes forgotten, as when Heisenberg's uncertainty (or indeterminacy) principle raises its head in a description of social and societal processes.²⁹ There are also many fields where it is not necessary to know exactly what the future will bring in order to make choices right now. Not every student, for instance, needs an accurate picture of his or her future working environment in order to choose a particular course of study, whereas the choice of study is relevant to if not determinant of the students' future work.

But when larger scale social questions are involved uncertainty very quickly becomes a problem and we do our utmost to bring about certainty using reconnaissance (outlooks), scenarios and models of the future. They also play a major role particularly in economic policy-making and in the environmental field. Macro-economic and environmental outlooks are the most familiar examples of this. Companies like Shell have quite a tradition of making and using scenarios. Following the trend set by the private sector, governments are making more frequent use of scenario methods in the context of policy-making. Quite deliberately the scenario method is not presented as a method of prediction but as a reconnaissance of or an outlook on the future in which, almost always with the aid of models, a number of possible developments are systematically calculated and compared.

Unfortunately pretensions very quickly far surpass this cautious description, although it must be said, mainly by users. In a recent publication, for instance, the following were among a number of functions ascribed to scenarios: 'They integrate future developments in one or more consistent images of the future. In addition they identify relevant circumstances, events and developments which will assume importance in the future'.³⁰ I think that this is typical of the way scenarios are regarded in the practice of policy-making.

Neither the fact that the future is characterised by uncertainty nor even the equally well-known fact that statements about the future made in the past have with monotonous regularity proved to be far removed from the truth or even

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incorrect, discourages the supporters and users from unconditionally ascribing to future outlooks the functions listed above. By way of justification of the use and in reply to these facts the following two types of argument are advanced:

1. *It is the best we have.* This argument implicitly assumes that our actions have to be future-oriented, something that can only make sense when based on the best knowledge available regarding the future, in which case a model is better than a crystal ball. The reasoning is disputable. And I do not mean the comparison between a crystal ball and a model. We may congratulate ourselves on having advanced models at present which enable us to analyse the behaviour of complex systems in time. Models are far better instruments than crystal balls and palmistry. But the question is: better for what? Without doubt, better for the analysis of the (isolated) system, but does that also apply to a decision regarding that system as embedded in reality and in interaction with reality? Can it be said that a policy seeking its own validity in future scenarios is better? As far as I am aware there has never been a serious comparative study of the advantages of an anticipatory policy over an ad hoc policy (although it may be hard to accomplish such a study properly). We assume automatically that the former is sensible and responsible – to govern is, after all, to foresee – and that the latter is dangerous because short-sighted. Everyone substantiates this with the successful ‘measures taken in time’, but they forget the vast number of costly measures, also taken in time, which have turned out to be wrong, while actions totally inspired by short-term thinking and which, in spite of their ad hoc nature, have turned out to be extremely profitable in the long term, are left out of the picture.³¹ An interesting example is the sale of Dutch natural gas at the end of the 1960s to foreign countries, including Italy, for a ‘very modest’ price. This trading method was, on the one hand, inspired by energy scenarios that indicated that within the foreseeable future nuclear power would replace gas as a source of energy and, on the other, by a political ‘scenario’ stating that if we failed to deliver gas to the Italians the Russians would become Italy’s gas supplier, thereby posing the threat of a Communist take over in the client country. Both developments took a totally different course and this ‘anticipatory’ policy cost the Dutch a great deal of money. Could they have done better? Let us therefore examine the appropriateness of the principles which, at the time, underlay the decisions, namely: 1). If another source of energy comes on the scene the gas will be worth ‘nothing’ and therefore it must be marketed as quickly as possible; and 2). Economic weapons should also be used to combat Communism. I find these principles wholly inappropriate. Even at the time they were not appropriate as guidelines for action – and certainly not in tandem. However discussion of these points is possible and the discussion should be held. My thesis is that the quality of policy depends more on the quality of the principles and criteria applied in the use and evaluation of outcomes of calculations based on models and much less on the accuracy of the outcomes themselves. It is not a question of reliable or unreliable

knowledge of the future since such knowledge is never reliable enough: rather it is about reliable, sustainable principles.³² And to close, the following. If we arrive at the conclusion that the current principles are possibly of major importance, perhaps we can also use methods which better correspond. One of the methods that is on offer in this context is what is known as backcasting. Here the first step is to sketch out a desirable future on the basis of current insights (data, standards and values); then an analysis is made of any obstacles present and of what has to happen to bring that particular future closer by.³³ This method too has its disadvantages and, of course, it cannot escape the uncertainties already outlined, but it does have one major advantage: the future is mapped out on the basis of current norms, while forecasting attempts to prepare us for that future by predicting it, missing out completely on the discussion. Because of the inherently limited extent to which the future can be manipulated, backcasting runs a major risk of failure or is even risky if it tries to force developments into the wrong utopian mould, but this does not detract from the fact that a discussion about the desired future can put us on the right track today.

2. *Scenarios and models are self-negating prophecies.* Their function is not to forecast the future but to influence it. Within this argumentation models are more or less immune from criticism. They are never completely wrong and never entirely without function. The fact that the models fail to materialise says nothing about their accuracy, since the predictions assume unchanged policy, assume the *ceteris paribus* condition. The model does not (cannot) foresee the changes in circumstances, let alone the unexpected trend breaks. It also says nothing about the utility of the model, since that happens to reside in its capacity to provoke (policy) responses, so that reality becomes different from what was assumed and the predicted developments fail to take place. It is not a question of the reality content of the different scenarios but about the contrast that has come about between different images of the future.³⁴ The scenarios entitled *Status Quo* and *Business as Usual* are precisely designed to deviate from business as usual.³⁵ These arguments hold water to a certain extent. Many designers of models indicate fairly precisely the assumptions they have made and the conditions within which the outcomes have some sort of validity. Subsequent massive criticism when the model fails, or misuse of the outcomes, stems from a failure or a refusal to keep such restrictions in mind. It is undeniable that some doomsday scenarios, intentionally or unintentionally, have fulfilled the function of ‘booster’ and ‘have got things moving’ and if only for that reason have made it less likely that doomsday will happen.³⁶ Whether the same applies to the creative scenarios is a question of a totally different order.

The arguments supporting the ‘influencing’ function of scenarios do not, however, justify opting for the use of these tools (scenarios and models). It is reasonable to ask whether other, simpler methods would achieve the same or a better result. They in no way constitute proof that policy quality was thereby

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improved. Once again it depends on the direction in which things have been steered and on the principles used as basis for the assumptions and conditions. A pessimistic scenario may push people to action but the action can be a senseless course inspired by panic. The same also applies, incidentally, to 'creative' or 'utopian' pictures.³⁷ Which brings us back to the considerations described under point 1.

PRINCIPLES AND THE PAST

Both types of argument and my evaluation of them therefore raise the question as to whether it is possible to uncover principles that will withstand the test of time. I think that retrospection could serve as a route to set us on the track of such principles. If Kierkegaard was right, perhaps we would do better to use the past in a different and better way for the future. However here we are not posing the question: 'what should we have done given our current knowledge about the course of history?', but we are asking: 'is it possible to think up a principle that would have led to decisions which, despite the developments, could have been called sensible?' In fact we are looking for the philosophers' stone. We are unlikely to find it but the search might possibly provide us with something better than what we seem to be condemning ourselves to at present.

I would like to make four proposals and will then apply them to environmental subjects and questions relative to the provision of energy.

1. Do not undertake anything for the future which cannot be *well defended now*. This principle can be applied in many areas. A familiar example where its application could have prevented a great deal of anguish is the uncontrolled dumping of chemical waste that has occurred over the last few decades. Such a practice was extremely difficult to defend even at the time, even though detailed knowledge of the dangers posed by such substances was not available and even though there was no adequate legislation to prevent the practice. There was more than sufficient knowledge available concerning the chemicals in question for it to be clear that dumping was not a sensible option; and, moreover, the fact that something is not forbidden does not mean that it is sensible. Application of this principle could possibly also lead to questions about the massive amounts of money being poured into research into controlled nuclear fusion designed to put an end some day to the energy problem. There can, of course, be other and legitimate grounds for pursuing research into controlled nuclear fusion but the oft-quoted 'future argument' does not seem to me to be adequate in itself. The same applies to the argument whereby expected technological progress is used as a justification for activities carried out today. We may legitimately ask why fossil fuels must be left in the ground if we know that future generations will have cheap solar energy at their disposal. In the recent past there has been some sign

of ongoing technological developments and it is reasonable to assume that the tendency will continue. It is therefore justifiable to expect that future generations will have available more and better technological possibilities. But such an expectation alone is insufficient as an argument in discussions about decisions affecting the future. In the latter example the use of fossil fuels requires its own independent justification; its use must also be defensible here and now.

2. Set *invariable magnitudes* as units used for calculating the future. Many decisions relative to the future are taken on the basis of money. But money is not an invariable magnitude. We can safely assume that the Joule, the metre, the kilogram and even the Kelvin will retain their value in the coming centuries, but what the Euro will be worth in 2005 is something shrouded in mystery. This reasoning applies not only to magnitudes but also to the realm of laws. The laws of thermodynamics – and even the ecological laws – are harder and more long-lasting than the ‘laws’ governing the economy.³⁸ It is this sort of observation and consideration that leads to a hierarchy of rules governing decision-making, the order being determined by the hardness of the magnitudes and law systems. It does not, therefore, lead to the abandoning of money as a magnitude on which decisions can be based – since this would be not only unrealistic but also undesirable – but it defines and limits the role of that particular magnitude: it has a lower rank in the chain of factors influencing decisions. With the help of the first and second law of thermodynamics we are able to understand that in addition to energy conservation we can also speak of the quality of energy – exergy. Any choice involving energy systems should first and foremost be based on energy and exergy analytical principles, then on biological and/or geographical principles and, in the third place, on softer criteria such as money.³⁹ The application of thermodynamic principles, for instance, leads to the conclusion that it makes very little sense to burn high-quality natural gas in central heating boilers in order to heat water from 10° to around 60° to 80°, water which is then used for an extremely low-value application (raising the air temperature by a few degrees). Heat pumps or fuel cells are quite obviously better. The application of these rules also tells us that it makes little sense to let the efforts to save energy depend entirely on the price of fossil fuels and that the need to switch over to renewable sources of energy should not be linked exclusively to the oil price.

3. Develop *alternatives to time-discounting*: discounting a variable in the future. Discounting is related to but definitely different from writing-off. The latter implies a periodic diminution of the value of a (capital) good over the (economic) life-span of the good. Discounting is the determining of the current value of future costs and benefits. We usually accord less importance to things that are further away. It is thus paradoxical that despite our focus on the future we often do away with (the variable in) the future. The discount rate can be regarded here as the rate at which ‘the future’ loses its value. In general we assume a positive discount rate. If we value the future benefits higher then we can speak of a

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negative discount rate. Applying a positive discount rate leads to an economic valuation of energy reserves where the reserves have a progressively smaller value until they finally do not count at all.⁴⁰ The same applies to the damage to the interests of future generations, which automatically counts for less.⁴¹ In the current, strongly economy-dominated debate discounting is a much used and much studied method of dealing with the future. Its applications lie mainly in the field of private investment decisions and in decision-making relative to public investments in the field of infrastructure. Discounting has a less important role in decisions affecting education and military systems. In general discounting seems to be a sensible strategy because, as it were, it calculates in the extent of our uncertainty about the future. The further off something is, the less sure and the less relevant it is as far as being taken serious account of. The question is whether this is always reasonable and sensible.⁴² Accepting the disadvantages of an activity is strongly allied to the accompanying advantages. Discounting is based on our weighing the pros and cons. The weighing is distorted and therefore unreasonable when we shift the disadvantages to the future and collect the benefits in the present. When damage is caused or risks are posed to future generations it cannot always be said that for them the damage or risks will be compensated by benefits. In such cases it is justifiable to apply a much lower or even a negative discount rate so that risks and damage expressing themselves in the future weigh heavier than today's risks and damage. The problem increases when it becomes possible to speak of irreversible effects. If we wish to combat time-discounting in this sort of case there are points at which we can intervene. Recent experimental studies support the idea of a strategy in which present considerations on the future risks become more evident and the risk of irreversible effects is further highlighted.⁴³ Apart from the argument based on reasonableness there is a further argument as to whether it is always a sensible thing to discount in terms of money, whether or not in a manner adapted to and corrected for the environment, given the fact that money is not an invariable magnitude. The problems encountered in discounting brought Page to the point where he developed a *two-tier value theory*.⁴⁴ He makes a distinction between two layers that should not be mingled. The upper layer, known as the layer of *specific preference actions*, is also the layer of the *market* in which the economic discounting occurs. This layer, he thinks, should be limited by the lower layer, that of *broad equity*, which contains general social arrangements and principles such as constitutional legislation, equality between generations etc. And it is in the lower layer that Page places *sustainability*. 'We do not use discounting to define and evaluate sustainability. We use concepts to place constraints on markets. Once we have done this, we discount at normal rates.'⁴⁵ This quote makes it clear that Page's theory does not really solve the problem but merely displaces it, since the next question follows logically: what are the *constraints* arising from the *concepts of sustainability*? What principles constitute the basis of the plea for limitations in the *markets* (and, as a consequence, in the

discounting)? This, in fact, brings us back to the beginning of our search for the philosophers' stone. The principles detailed under point 2 in particular could serve as constraints.

4. An oft-mentioned principle is the *precautionary principle*, often spoken of in the same breath as *flexibility*. It is predicated both in its positive (keep the options open, willingness to take action in advance) and in its negative variant (do not undertake any irreversible actions, onus of proof on those who propose change).⁴⁶ As far as the irreversible actions are concerned, it is noticeable that while it is true to say that a number of examples can be given that make sense, maintaining this principle as a general principle also leads to problems. Classic, almost paradigmatic examples that meet with scarcely any opposition – and which are to be avoided – relate to the extinction, through human activity and exceeding 'normal' evolutionary change by far, of animal species and the world wide destruction of unique ecosystems. Difficulties arise when 'theoretical' species are involved, i.e. species we have not yet described but ones which we assume to be living in certain ecosystems. There are very good ecological arguments to assume that there are still innumerable plant and animal species as yet undiscovered, especially in the tropical rain forests. The disappearance of (parts of) the ecosystems means the disappearance of such unknown species dependent on this ecosystems. They become extinct while it is still uncertain if they exist and, if so, what they are. Seen from an ethical point of view we are on dangerous ground here. But the precautionary principle can be used as a basis for arguing that actions likely to cause this type of effect should, if possible, not be undertaken. The extinction of species and the world wide disappearance of ecosystems means irreversibility in the absolute meaning of the term. However, we frequently undertake activities which are relatively irreversible, activities which, while not theoretically irreversible, are so in practical terms: digging out peat bogs, the eutrophication of small oligotrophic lakes, building cathedrals and cities, draining seas, laying a high-speed rail track or digging a tunnel under the Channel. Here it would seem that it is not so much the irreversibility that is the problem as our (current) positive or negative assessment of how important the activity happens to be. It must be acknowledged that our valuing varies over time. Today's world would protest vociferously at the construction of pyramids and cathedrals by absolute rulers with the consequent exploitation of thousands of workers, but the results of such activity in the past are now a subject of deep wonderment and regarded as a treasure-house of culture. Many such activities were, in their time and judged by the then current standards, seen as inevitable and not infrequently as useful and positive.⁴⁷ The latter also distinguishes them from other activities such as the example previously quoted: the dumping of toxic waste.

Regarding the positive variant, it would be better to keep open the option to take a course of action previously rejected. In general terms: it makes sense to

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maintain cultural and social pluralism in order to spread the risks, increase resistance and to seize opportunities offered by change. In more concrete terms: don't burn your bridges behind you, don't squander resources and don't let human actions cause any species to become extinct. Closer inspection shows that there are a great many questions. First of all, many options kept open are not specifically targeted on the future. They are often fallback options, alternatives that have been previously rejected in the course of decision-forming but which it is sensible to keep 'on the back burner'. The question is whether this really is a good way of preparing ourselves for the future. And in any case, it is impossible to keep all the options open; and it is uncertain what grounds should be used to reject certain options while others are/have to be kept open. The switch to natural gas meant the closure of the coal mines. As a consequence other options were also closed off. The introduction and fitting of the gas-fired central heating boiler just below the roof in new houses built in the Netherlands meant the disappearance of the chimney – which started in the living room. Because of this, local heating as an option has as good as disappeared and vulnerability to long-lasting power failures increased. And the desire to reduce this and other types of vulnerability was then used as one of the arguments for maintaining for decades a hefty (25-30%) and expensive over-capacity in power generation. Was this sensible policy? How far should one have gone to maintain flexibility? Another problem is that 'keeping the options open' is far from always flexible. After the Second World War many so-called duplex houses were constructed in the Netherlands. This flexible type of building was intended to anticipate the future, since two duplex houses – so went the argument – could quite easily be joined together to make one large house. However it hardly happened like that at all because when the housing shortage grew less and the demand for larger houses increased, the fused duplex houses turned out not to correspond in any way to the consumers' wishes. The duplex houses were demolished or they were maintained as small and qualitatively unattractive duplex dwellings for people of limited financial means. The opposite also occurs. For instance, in previous centuries large granary stores were built in the Dutch harbour towns. They were specifically designed for storing grain and had thick walls and small windows. To the amazement of many these monofunctional buildings turned out to be extremely flexible, lending themselves readily to being reconstructed as very desirable apartments. These and similar observations have prompted Dirk Sijmons, an architect, to state that a qualitatively good building, designed for the function intended at the time, is perhaps the most flexible and future-oriented type of construction. I believe this statement has the ring of truth and leads us to the last principle. A striving after *quality* should play an important part in our actions targeted on the future (for an elaboration of this thought see Boersema 1995). The decisive criterion, even in cases of absolute irreversibility, is: does it contribute to raising the present *quality of life*? Improving this quality should be done in a sustainable way. The (extent of) irreversibility serves here to

reinforce the judgement. The precautionary principle is a constant reminder in balancing the decisions we take now and in applying the standards and values and the derived principles. Which brings us partly back to the principles detailed under points 1, 2 and 3.

CONCLUSIONS

On the basis of the above analysis I would now like to summarise the following answers to the questions put in the introduction:

- Circular and linear notions of time can be meaningfully combined in the image of time as a forward-moving spiral. The forward moving notion of time constitutes fertile ground for ideas of evolution and progress in western culture.
- It is right that the future should play a major role in our culture and it is right that we should do our utmost to prepare ourselves for the future although it remains unknown.
- Future generations do not constitute a new factor in the debate about the future. They are useful as a metaphor to stress the importance of future oriented thinking.
- Future-focused activity, including in the field of the environment, should be based to a greater extent on durable (sustainable) principles than on the outcomes of outlooks and scenarios.
- Outlooks and scenarios remain useful tools.
- Among the interesting durable principles are the following:
 - Do not do anything in the interests of the future or future generations that cannot now be justified.
 - Use invariable magnitudes to perform future-related calculations.
 - In decision-making procedures give precedence to hard laws over softer.
 - Develop alternatives to time-discounting.
 - Maintain quality rather than flexibility as a criterion.
 - Consider and apply the precautionary principle, especially when there is a risk of irreversible effects.

In looking for and elaborating useful principles for the future we should most certainly take a look back at the past since the past can be a good guide, but the decision-making takes place in the present.

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NOTES

¹ The quotation can be found in his *Papirer* (collected and translated as *Journals and Papers*) see Hong and Hong 2000: 12.

² E.g., ‘man’s lack of concern for his future’ is even the greatest threat to our continued existence (Boniecki 1977). ‘This absence of real sense of the future explains our careless despoiling of the environment’ (Gault 1995: 149).

³ The literature is too abundant for it all to be included here. A few important and more general sources I consulted are: Toulmin and Goodfield 1965/1977; Sorabji 1983; Boorstin 1983; Prigogine and Stengers 1988; Clark, 1992/1994; Hawking and Penrose 1996.

⁴ See David Duncan’s captivating account: *The Calendar* (1998).

⁵ There is a good overview of these questions in Russell, Murphy and Isham 1993.

⁶ The anthropologist Evans-Pritchard did pioneering work in this field regarding the Nuer people (Evans-Pritchard 1940). For a clear review see Clark 1992.

⁷ Evans-Pritchard (1940: 108) describes the Nuer’s concept of time as shallow because: ‘the tree under which mankind came into being was still standing in Nuerland a few years ago’. Edmund Leach, who studied the Singalese of Sri Lanka, uses the same terminology: ‘This is a society which has ancient traditions but a shallow history’ (Leach 1961: 21).

⁸ The expression ‘arrow of time’ or ‘time’s arrow’ comes from Eddington 1928/1958. See also Morris 1984. The image of the *Arrow of Time* assumes that time has a preferred direction. The fact that this direction does indeed exist, follows from the Second Law of Thermodynamics and corresponds to the biological phenomenon of aging. In deterministic models physicists also use other descriptions of time (imaginary time, irreversible time) and in quantum theory non-linear and bent images of the time-space system are used (Isham 1993).

⁹ Thorleif Boman puts it like this: ‘Wie oben dargelegt, fassen wir Indogermanen die Zeit als eine Linie auf, wo wir selbst im Jetztpunkt stehen; dann haben wir die Zukunft vor uns liegend, und die Vergangenheit dehnt sich hinter uns aus’ (Boman 1968: 128–9). For critical discussion of the Israelite background see Albrektson 1967 and Hallo 1996.

¹⁰ See Bremmer 1991.

¹¹ The idea of accumulation of knowledge is credited to Bacon (1561–1626) and the idea of looking forward to new knowledge rather than back to recovery of old to Descartes (1596–1650). In this context the answer that Newton is said to have given (ca 1675) to the question as to why he could see so far is revealing: ‘If I have seen further it is by standing on the shoulders of giants’ (his forefathers).

¹² See: Brömer and Hoßfeld 2000.

¹³ Baudrillard, 1992: 155,156. For a highly critical review of these ideas see Socal and Bricmont 1997.

¹⁴ An interesting proposal to integrate the past in our way to face the future is made by Gault (1995). He opposes *chronological* (after *Chronos* the first Greek god of absolute time; ‘scientific’, ‘linear’) time and comes up with the concept of *kairological* time (after the second Greek god of time: *Kairos*; ‘more humane’, ‘the time of right times’).

¹⁵ In the environmental sciences: Hueting and Reijnders 1998. In law (with a thorough elaboration of the idea of intergenerational justice): Rawls 1971.

¹⁶ Derek Parfit (1984: 351–80), among others, has pointed out this ‘non identity’ problem.

¹⁷ Here I mean the consequences of the argument and not the fact that the threatened exhaustion can be corrected or compensated by something like substitution.

¹⁸ ‘... morality is a matter of reciprocal obligations’ (M. Golding in Partridge 1981, pp. 61–72).

¹⁹ The well-known environmental jurist Stone is of the opinion that taking future generations into account in practice offers no solution to the problem of our moral position with regard to the environment. See Stone 1985, especially pp. 47–50.

²⁰ Rolston 1998: 278.

²¹ A much-supported ethical ‘foundation’ of this standpoint is that we do not own the Earth but have the use of it from our descendants.

²² It is a mistake to regard the seer of antiquity as someone exclusively engaged in foretelling the future. Both the male Greek seers and the Old Testament prophets also had other roles – for instance, that of problem-solver. Moreover they worked according to a certain method which, to some extent, could be acquired by others. According to Bremmer the seers seem more to resemble ‘the man hired by our politicians to calculate political alternatives and to “foretell” the future, but whose recommendations disappear into the wastepaper basket as soon as they are found to be distasteful. The high seer of the Netherlands is, seen from this point of view, the Director of the Central Planning Agency’ (Bremmer 1991: 5).

²³ By ‘models’ here I mean formal and simplified representations of reality. As far as this article is concerned, the most interesting models are those which describe in the course of time the behaviour of a complex system (the economy, the make-up of the population, the soil) and, with that as basis, arrive at predictions of major variables in that system (employment, number of children attending secondary school, the mobility of aluminum).

²⁴ Tennekes 1994.

²⁵ In his retirement lecture, the physicist Phil Smith talked of Determinism and its relationship with research (1989: 45). He calculated what can happen if we place seven small billiard balls in precise positions and then try to hit them with a cue ball which has a deviation in the order of the radius of one atom (2×10^{-15} m): after six successive ‘perfect’ collisions this leads to the seventh ball being missed. Smith poses the rhetorical question: ‘What is left of the determinist approach?’

²⁶ For this see (among others) Broer and Verhulst 1990.

²⁷ Tenner 1996.

²⁸ Hueting and Reijnders (1999: 9,10) arrive at a similar distinction. With reference to models, in addition to ‘ignorance’ (lack of knowledge, inherent uncertainty/trend breaks) they also distinguish two other types of uncertainty: ‘parameter uncertainty’ (insufficient accuracy in the data) and ‘model uncertainty’ (which comes about through the simplifications applied in the model with regard to reality). The authors indicate how each type of uncertainty could be reduced.

²⁹ For a critical review of these applications see Sokal and Bricmont 1997.

³⁰ J. van Deelen 1998: 11. For a similar opinion see *Openbaar Bestuur Magazine*, summer 1999: 35.

³¹ The French are more aware of this, as witness their proverb: ‘C’est que le provisoire qui dure’. Occasionally doubts are raised in the Netherlands regarding anticipatory long-term policy: ‘I reckon that it’s all about execution by events. Long-term plans are usually a

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waste of time and money' (IT chief J. Baan 1998). In the light of the current results achieved by Baan, not a very convincing argument – although...

³² Mark Kranenburg (1999: 7) also points to this in his column when he denounces the excessive significance attached to figure-based forecasts, for example in the discussion about whether motorists should be made to pay for driving: 'They are false certainties that only serve to muddy the waters of the basic question of the choice that underlies the proposal to make motorists pay.'

³³ For an application of this method in the environmental field see Mulder and W. Biesiot 1998.

³⁴ This assumed effect on policy also led to 'creative scenarios', 'imaginable developments', in which sober extrapolations are mingled with imaginative elements. The resulting scenarios – which contrast with one another – are fitted out with spectacular names ('Fort Europe', 'Big Mother') designed to provide support to the underlying picture of the future.

³⁵ To this end the German ministry of the environment has not only a *Status Quo Szenario* ('kein nachhaltigkeit') but also an *Effizienz-Szenario* and a *Struktur- und Bewusstseinswandel-Szenario* (Umweltbundesamt, 1997).

³⁶ This effect is ascribed particularly to the classic scenario study *Limits to Growth* and is also used as an argument in the discussions on the question of whether this report to the Club of Rome was right and was proven right or not.

³⁷ See de Geus 1996; Achterhuis 1998. De Geus sees the utopian-ecological vision as having a positive role in our post-modern era. Achterhuis is more critical, making a distinction between utopias that take shape along social or along technical lines. The former he rejects without further ado as dangerous and the latter are also not without risk. Fortunately the technical utopias now and then come into being via a different road than the one feared. We are not living in Huxley's *Brave New World* (p. 356).

³⁸ Georgescu-Roegen 1971; Amir 1994; Söllner 1997; Amir 1998. For a good overview of the achievements in the field of (natural) science see Markl 1998. For a fascinating account of the part played by mathematics see Wigner 1960.

³⁹ See Cornelisse 1997. For similar opinions see Norde 1997.

⁴⁰ Usually this reduction in value is compensated by the increase in value that comes about due to increasing scarcity or increase in efficiency.

⁴¹ Beckerman (1995: 174) sees in our discounting procedure no reason for unfairness to future generations because 'we are treating them in exactly the same way as we would have treated ourselves had we expected to be in their place in two hundred years' time'. I'm afraid he is a bit too optimistic.

⁴² Many environmental philosophers always answer this question in the negative: 'Do not discount the future environmentally' (Holmes Rolston III 1988: 277).

⁴³ See Hendrickx, van den Berg and Vlek 1993.

⁴⁴ T. Page, in Costanza 1991: 58–74.

⁴⁵ Quoted and discussed by de Groot 1992: 256–9.

⁴⁶ For the Precautionary Principle, see O'Riordan and Cameron 1994.

⁴⁷ Even though it is justifiable to assume that in the past there were different attitudes towards activities, depending on social position and the sharing of burdens and benefits.

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