

# Climate change and energy transition

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# Chapter 1

A central component to climate change is carbon dioxide, which is highly related to our energy use. Transitioning to a climate friendly global lifestyle, we must keep in mind the wish to keep our energy budget stable. Energy availability is tightly correlated with both economic growth and Human Development Index, neither of which are generally desired to reduce.

When discussing climate problems, there is an intrinsic need for an interdisciplinary approach. There are for instance questions raised by science concerning whether we have entered a new geological epoch, how we might get to a stable and sustainable system regarding climate, and how we might bring justice to those who greatly damage the climate. However, each of these questions have normative-, psychological-, and sociological- dimensions.

## 1.1 The Anthropocene

The concept of the Anthropocene, the age of man, wherein humans have the greatest control over the earth, is highly present in the climate change debate. While the question: “Have we entered the Anthropocene?” is a matter of natural science, the attitude towards it is a philosophical matter.

There are those who fully embrace the Anthropocene, and wish therefore to take responsibility for the maintenance of the earth.

This approach stands in great contrast one wherein the Anthropocene is despised, but seen nevertheless as inevitable. This approach typically does not lead to taking responsibility.

Belatedly, but more responsible, are those who wish to limit the Anthropocene, mitigating and reducing the negative impact humans have.

There are also other terms proposed against the term “Anthropocene”, for

instance Homogenocene or Eromocene. Respectively, the age of homogenisation and the age of loneliness (both referring to biodiversity loss).

## 1.2 Sustainability

Sustainable development is defined by the WCED as development that meets the needs of the present without comprising the ability of future generations to meet their own needs. This definition limits itself greatly to human ability, and does not properly define the needs current-, and future- generations have.

The assumption is that this “sustainability” is indeed possible, partly because the ethical and political implications of not meeting the needs to the present are too-repugnant to consider. This belief is not based in empirical evidence, but rather a matter of necessary hope.

# Chapter 2

## Values and Climate Models

There is a certain level of uncertainty regarding climate change. There are various details for which conflicting evidence exists. We do know however that we are not altogether wrong about anthropocentric climate change. Climate sceptics almost never pass even the lowest bar for counting as scientific, but then again, so do many historically-fringe opinions which we now count as fact.

While we know that climate change is largely-, if not primarily- caused by the emission of greenhouse gasses. The extent to which each affects the global rise in temperature, is not entirely known. Much like, local effects as opposed to global ones, various chemical reactions, threshold-theories, and various other facts.

One may claim that we are to simply adhere to those facts that are exposed to us through use of the scientific method. However, there are various scientific methods, whose exact parameters are not rigid. Among scientific models there are inductive-, deductive-, and abductive- ones, each with their own threshold for “truth”.

### 2.1 Models

A large part of the scientific study of climate change is climate modeling. The aim of a model is to simplify a given environment (called “the target system”) to predict the impact of various changes to said environment. Climate models in particular often combine various models, such as atmospheric-, tectonic-, and glacial- models, and various complex interactions between them.

We use our models to predict outcomes and inform action, though, due to the fact that models are – by definition – simplified, the modeled outcome rarely *entirely* conforms to reality.

An “ensemble model” is a model which combines the average output of various models which are calibrated for slightly different purposes. With an ensemble model, we can project how uncertain we are about a given outcome by analysing the divergence of each model to the ensemble model. Using an ensemble model however relies on certain assumptions, such as all models being equally good in measuring, and that each of them are scattered around the “true” value.

While there are good reasons not to use ensemble models (such a rejecting one of the assumptions made for using such models), they do show an important matter of philosophy of science, that being that no hypothesis is every entirely certain. Meaning that scientists, in accepting theories, make certain value judgements which lie outside the realm of hard-science.

There is for instance the matter of tolerating false negatives and false positives. In the case of the climate discussion, false negatives are often extremely catastrophic, whereas false positives are a matter of wasted funds. This might lead one to tolerate false positives but not false negatives (or rather a probability of a given negative being false), but this is a value judgement which ought to be made by a greater community than merely the scientific one.

Such a case is argued by Jeffrey, who states that scientists should only express their expert judgement, not their descriptive claims. Who then is left to make descriptive claims? This question is not answered to Jeffrey, though a compelling case can be made to not merely leave this up to the public, nor to a group working entirely separately from the scientists publishing the probabilistic facts.

Winsberg argues against Jeffrey and states that scientists can make value judgements *if* they are transparent about their values. To what extent we *can* be transparent though is not entirely clear. The value-leadenness of a model lies in the details, not all of which are obvious to the scientists themselves, let alone the public,

# Chapter 3

## Climate Economics

### 3.1 Social Discount Rates

In the case of averting and reverting climate change, the question of cost dispersal is a big topic. The costs of reversion are high, and the potential agents capable-, and obliged-, to pay are spatially and temporally dispersed, as are the victims. Temporal dispersion is particularly problematic, as there is no straightforward way to assign *current value* to future generations. Economists have formalized this problem as  $\delta + \eta \cdot \gamma = \rho$  where

$\delta$  = Pure time discount rate

$\eta$  = Marginal increase of utility per unit of wealth

$\gamma$  = Elasticity of wealth growth

$\rho$  = Social discount rate

#### 3.1.1 Pure time discount rates

Using this way of calculating the social discount rate, we encounter problems, largely because this method was intended for economics. For instance, with a social discount rate of 5%, one death today would equal a billion deaths 400 years from now, and 5% is a rather modest discount rate (in the intended economic context). However, giving no social discount rate, the threat of eventual extinction – which, no matter how far off, seems currently inevitable – would overrule all current considerations.

In the discussion of social discount rates, there is a distinction to be made between pure time discounting, and growth rate discounting, with the labels speaking for themselves.

In the case of time discount rates, when applied to moral considerations, the question is asked in what way one's position in time is relevant to moral status. These arguments are particularly popular with utilitarians. In objection is said that having no time discount rate is unduly demanding for current generations, as it requires too many sacrifices on our account. To solve this, utilitarians introduced growth discounting.

### **3.1.2 Growth discount rate**

Since future generations will have more wealth, we ought not pay for them, for it unjust for the poor to pay the expenses of the rich. This makes it such that current generations do not need to make great sacrifices, whilst still maintaining that one's position in time is irrelevant to moral consideration.

While this principle on this own allows us to delay action, there are further considerations which make such delays problematic. It is for instance uncertain whether certain problem can still be solved in the future, whether future generations will be wealthier (in every sense of the world, monetarily, demographically, ecologically, etc.)

Rather than delaying action, one may instead argue for deferring costs. This would imply that we take action now, but push the cost of action to future generations. The amount of cost that may be deferred is dependent on the discount rate, and the damage caused by inaction, and non-deferral. Furthermore, not deferring costs is politically unrealistic.



# Chapter 4

## Sustainability

Sustainability is not necessarily a matter related to climate change, it is tightly interwoven with all matters of environmental justice. On its own, “sustainability” refers to some ability to perpetuate a certain practice without being self-destructive. Depending on the area of application, the particular matter in which sustainability is addressed differs. In commercial fields, there is often need for a comparison of different sustainable areas, such as sustainable manufacturing versus sustainable finance. In philosophy, such comparisons are less important. In both cases, sustainability combines facts about what is possible with wishes with what is desirable. A further consideration is the locality of sustainability, where certain practices are sustainable for individuals, they are not sustainable globally, and vice versa.

All of the above considerations lead to three primary question in the philosophy of sustainability. Those Being: What should be sustained, what sustainability dimension we should emphasise, and why is sustainability desirable.

### 4.1 What should we sustain?

The debate about what ought to be sustained is often discussed in terms of difference in capital (originating in economics). For instance, we might wish to sustain natural capital to the detriment of artificial capital. In this debate, desirability and possibility are very important.

In the debate, two types of sustainability – the weak-, and strong-conception – come forward. Weak sustainability refers to the practice of maintaining to-

tal capital. Replacing one type of capital for another is totally fine as long as the same functions are performed. The strong conception requires the individual capital stocks to be maintained. As such, even if all natal functions can be replaced artificially, a reduction in natural capital is not justifiable. Strong conceptions of sustainability might allow for exchanges within each capital stock, such as exchanging animal capital for plant capital because both fall under natural capital. Stronger versions would not allow this.

## **4.2 Which dimension of sustainability should be emphasised?**

Typically, sustainability is viewed in three pillars, those being: societal-, environmental-, and economic- sustainability. The question then is what the proper distribution is for focusing our efforts. Such a three pillar conception is less popular amongst philosophers of sustainability, though it is prevalent amongst economists.

Philosophers focus on supply-side versus waste-side sustainability. These are not necessarily related, and one will not necessarily lead to the other.

Furthermore, depending on which concerns are included in our notion of sustainability, certain matters become possible of impossible. For instance, when interspecies considerations are included, certain interpretation make, for instance the concept of: “sustainable fishing” conceptually impossible.

## **4.3 For which purpose?**

Sustainability ultimately comes down to human well-being. Well being must be sustained so that future generations have the ability to meet their needs, preferably just as well as we do, or better. Here too, there is a difference between economists and philosophers, as sustainable economic growth is seen by many philosophers as an oxymoron. Philosopher focus instead on human development, though this matter is also tightly linked with economic growth.

Typically, the sustainability debate becomes one of theories of justice, though with an additional ecological angle. The theories of justice considered typically include intergenerational, global, and interspecies concerns. Alongside the aforementioned ecological concerns, these theories are often called “planetary justice”.