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# MASTER THESIS

A comparison of politicians' use of risk concepts in relation to climate change with current risk science

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## Abstract

This master thesis examines how Norwegian politicians uses risk-related concepts and principles in their communication on climate change from a risk science perspective. The study aims to analyse statements made by politicians and political parties to understand how risk concepts are conveyed to the public, identify any inconsistencies with risk terms and concepts compared to the literature, and discuss the findings in order to draw conclusions. The research reveals some noteworthy findings. Firstly, the precautionary principle is utilized by some politicians to oppose climate-reducing measures; however, their interpretation and application of the principle deviate from established risk science principles. Secondly, cost-benefit analysis, a strategy employed by Norwegian politicians, is found to be misaligned with current risk science due to limitations that undermine its effectiveness. Furthermore, discrepancies in how risk is expressed by politicians in comparison to risk science standards are observed, indicating a potential need for greater precision and transparency in risk communication. Additionally, the thesis highlights the issue of politicians' misuse of scientific sources to support their policies and the avoidance of acknowledging uncertainties and opposing viewpoints, contributing to polarization and hindering constructive discussions. Overall, the study highlights some discrepancies and delves into their underlying causes.

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*List of Abbreviations:*

AP	Arbeiderpartiet (Political party)
FrP	Fremskrittspartiet (Political party)
IPCC	Intergovernmental Panel on Climate Change
IRGC	The International Risk Governance Council
MDG	Miljøpartiet De Grønne (Political party)
NRK	Norsk Riks Kringkasting
SARF	Social Amplification of Risk Framework
SV	Sosialistisk Venstre (Political party)
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
WHO	World Health Organization

# 1 Introduction

## 1.1 Background

Climate change is a big topic of today's society. In the words of former secretary-general of UN Ban Ki-Moon: "Climate change is the single greatest threat to a sustainable future" (United Nations, 2014). With climate risk is risks related to changes in the climate.

Climate change and the management of climate change is a challenging endeavour. Since it is a global phenomenon the problem and potential solution is not bound to the borders of Norway, yet each country is a part of the whole system. This includes both the assessing sphere regarding climate change and the management sphere. There are international organisations that are trying to regulate the knowledge and the best approach of climate change cross-border. However, it is up to each country to align their policy and to what extent they decide to give weight to climate change. The policy of each country as a whole will be the deciding factor of how future climate change will play out.

Much of the research points to an increase in temperature on Earth that has undesirable potential effects such as an increase in floods, drought and raised sea levels that in turn can affect the food industry, such as the AP6 IPCC report (IPCC, 2022). Much research also points at the recent increase in temperature is a result of the increase in climate gas emissions such as carbon dioxide and methane which are manmade. The future risks associated with climate change as a result of human activity has potential consequences with uncertainties. With a global problem such as climate change politicians on national and international level can have a huge impact on how we respond to this problem as smaller organs will not have much of a global impact alone.

The management and decision-making are a crucial part of risk governance. Norwegian politicians often play the role of decision-makers where they are responsible for decisions and implementations and have the final saying in matters. Although their actions are affected by the experts and assessments, they also have more to consider, such as ethics, values, and a balance between protection and development. Seeing that the politicians are often playing a part of risk governance it may be interesting so see to what extent they are acting in line with principles from the science of this area, namely risk science. This can be reflected both in actions and in communication.

Risk science, like any other science, has been a field that has developed and evolved through time. This means that the field of risk has and will change with new and more information, episteme and understanding. When understanding increases practices may change. An increase in understanding can lead to change in practices and create new consensus. This new consensus is most often a step in a right and improved direction, but it also requires an effort to stay up to date. Having an outdated view and/or use of risk as a decision maker and communicator can cause confusion, misunderstandings and suboptimal results that perhaps could have been avoided. Additionally, risk science is not fixed, meaning there will always be a discussion what the current correct risk science is, and different practices may vary. Risk science has frameworks, models, definitions and best practices within assessment, management and communication.

Norwegian politicians as decision-makers play a key role in risk governance on a national and regional level and certainly affect the lives of individuals and the society as a whole. How they use and communicate risk concepts will therefore have a consequential effect. Politicians have the power to affect the physical climate change in two major ways. One, politicians can directly take action. They have the power to utilise the government budget, make new rules and legislation and how to implement climate measures that applies to both individuals and companies. Two, politicians are public figures with power and influence that can form how risks are perceived by the public, and thus what the public want from the politicians.

## 1.2 Purpose

The purpose of this master thesis is to obtain knowledge on how Norwegian politicians refer to risk-related concepts and principles when it comes to climate change, using a risk science perspective. The specific objectives are to

- Find and examine examples of statements from politicians and political parties that give an insight to how risk concepts are communicated to the public.
- Find out if there are any inconsistency with risk terms and risk concepts in statements from politicians compared to the literature.
- Discuss the findings and make conclusions based on the findings and discussion.

## 1.3 Content

The structure of this thesis is set up as follows:

- Chapter 2 will look at examples of statements from politicians where they use concepts from risk in their communication with the public. This is to establish a foundation of the current use among politicians regarding risk concepts about climate change and will be the basis of further discussion in chapter 3. This will be both verbally and written communication.
- Chapter 3 will use what we have learned in chapter 2 and compare this to the current risk science and discuss potential discrepancies.
- Chapter 4 will be concluding the discussions regarding the politicians' use of risk concepts in relation to climate change with current risk science.

## 1.4 Approach/method

### 1.4.1 Data collection

To achieve the objective of this thesis it is necessary to gather some statements made by politicians and political organs such as parties.

There are multiple ways to gather information that ultimately can affect the outcome this thesis. One alternative is to compare politicians' use of risk concepts in relation to climate change with current risk science with regards to the political spectrum. This could be done for each political party. Alternatively, this could be done by dividing politicians and their respective parties into three groups; left-, centre- and right-leaning.

Another alternative is to not divide into parties and political spectrum, but rather look at all the politicians as a collective whole. This thesis will use the latter method, namely, to look at the politicians as a collective whole. And in doing so, try to not favour any side or party and try to get diverse and representative data, although the statements found might not necessarily be even between all parties.

This thesis will not look at what is right or wrong with regards to political matter or discuss the best plan of action when it comes to preventing preventable climate change consequences. This is purely to see how politicians are acting and expressing risk concepts within this topic.



#### 1.4.2 Limitations

Since this thesis is mostly using what is documented statements from politicians on the internet as a basis for discussion, as listed in chapter 2, there are some limitations to how this sample may not be generalised to all statements made. There are a limited number of statements about such a specific topic and some statements may be easier to find than others. This can be due to some statements generating more traffic and “clicks” than others, such as radical statements that draw attention. More balanced statements are perhaps not as interesting to the public and can be harder to find. Another reason for uneven exposure of statements and views can be attributed to some statements are covered multiple times by multiple medias, whereas other statements do not get the same attention.

## 2 Politicians' statements

This chapter contains all of the findings of statements made by politicians that will be discussed in chapter 3. Different platforms that have been used to find statements such as press conferences, parliamentary meetings, public debates, news coverage, official websites pertaining to political parties and official statements made on social media by politicians. This is done in order to get a broad representation as the politicians have many platforms and ways to communicate with the public. Each element has its own chapter heading which is how the statements are referred to in later chapters, e.g., statement 2.3. They are not sorted with regards to significance, but rather chronologically the way they are used in the discussion. Some statement has some clarification to where it is found and/or contextual clarifications if needed. All statements listed below has been translated from Norwegian to English.

### 2.1

“The Earth's climate changes over time, and we know too little about what influences these changes. It is therefore important to base climate policy on a precautionary principle rather than channelling all efforts in a specific direction. This means that it makes sense to prioritize measures that have an additional effect beyond being a climate measure. There is too little research into natural climate processes” (Fremskrittspartiet, n.d.).

This is collected from FrP's homepage under the topic climate, discussing their views and visions regarding this topic.

### 2.2

“When there are so many unresolved issues related to climate and climate change, it is extremely important to have a precautionary policy” (Nygård, 2014).

A statement from an interview with local news outlet with Jan-Henrik Fredriksen, at the time he was a parliamentary representative and FrP's spokesperson for environmental policy. In this interview he uses the precautionary principle as an argument to be skeptical about climate change due to the associated scientific uncertainties and that action should not be taken until more research on the subject has been conducted.

### 2.3

“Søviknes believes the report shows what the FrP has been advocating for a long time, namely that more knowledge is needed before conclusions about greenhouse gas emissions. (...) [FrP] has taken a precautionary approach” (Krekling, 2017).

In an interview with NRK Terje Søviknes, the oil and energy minister and a FrP politician, argues that more scientific knowledge is needed before implementing costly measures and that a report that underlines that there are uncertainties associated with the effects of greenhouse gas emissions supports their policy. In the same interview he also refers to their politics as in line with the precautionary principle.

### 2.4

“The government will base its policy on stewardship and the precautionary principle. The climate threat and poverty are major global challenges. Therefore, a broad agreement has been reached in Parliament on climate policy. The government will base its work on climate agreement. The cooperation parties wanted to go further in several areas than what was possible to reach an agreement on in the climate agreement. The government will take responsibility for the livelihoods of future generations by contributing to internationally binding emissions agreements and by investing in research and development of new technology that can contribute to the realization of a low-emission society” (Solberg, 2013).

A statement from Erna Solberg, a Høyre politician, from the declaration of accession from the Solberg government.

### 2.5

“Fremskrittspartiet wants to base all implementation of climate measures on a thorough cost-benefit analysis” (Fremskrittspartiet, n.d.).

This is collected from FrP’s homepage under the topic climate, discussing their views and visions regarding this topic.

## 2.6

“Lillestrøm FrP has also put forward a proposal that a cost/benefit assessment should be used as a basis for climate measures, but this was voted down in the municipal council”

(Fremskrittspartiet, 2023).

This is from FrP’s own news website, an article directed at discussing local policy of climate measures in the municipality of Lillestrøm.

## 2.7

“In short, we must approach this significantly smarter, and with a global perspective. Real cost/benefit analyses need to be utilized to a greater extent, while symbolic and costly climate measures are halted, and tangible environmental and climate measures are implemented”

(Nilsen, 2023).

A direct statement from a FrP politician and energy policy spokesperson Marius Arion Nilsen where he himself have posted this as a debate post on the news outlet Fædrelandsvennen.

## 2.8

"We don't want to be an environmental laggard, but we won't do things where the costs are not proportional to the benefits," says the Mayor of Harstad. She believes there are many other things that the municipality can do for the environment at the same cost and provide greater benefits" (Five, 2023).

A statement by Kari-Anne Opsal, AP politician and Mayor of Harstad , during an interview with the online newspaper Altinget. She is not directly using the term cost-benefit analysis, and one could argue that it is not necessarily from an extreme economist perspective, but it implies a monetary angle.

## 2.9

“Climate change creates new types of risk. In the world, we see that extreme weather and permanent climate change lead to poverty, refugee flows, great destruction to local communities, people's livelihoods and flora and fauna. That is the reason why the Conservative Party has revolutionized Norwegian climate policy” (Høyre, n.d.).

From Høyre’s own website, an article on Høyre’s climate policy. In this section they are explaining why climate change is of concern but does not express the risk with any notations or definitions, just stating climate change brings new risks and precedes to list some accompanied consequences.

## 2.10

“Man-made climate change is the biggest problem facing the world. Higher temperatures, extreme weather and weakened ecosystems put our very basis of life on the line and threaten future welfare and growth. To prevent this, we have to cut our emissions” (Høyre, n.d.).

This text is found on Høyre’s homepage on climate.

## 2.11

“Also here at home, an increased risk of floods and landslides will be a danger to people's lives and health” (Marhaug, 2022).

A statement taken from a blogpost on the official website of the political party Rødt.

## 2.12

“War, with subsequent refugees, is the “silent” risk of the climate crisis” (Mood, 2021).

This statement is from Robert Mood, a politician of MDG, in an article he himself posted on an online newspaper website.

## 2.13

“We will therefore discontinue the exploration reimbursement scheme, limit the exempt income and reduce additional interest deductions and depreciation rules so that it is the companies and not the state that takes the risk” (Venstre, n.d.a).

Taken from Venstre's official website in an article about their policy of how to solve the climate crisis.

#### 2.14

“If warming exceeds 1.5 degrees, according to the UN's IPCC report, we will face a much greater risk of irreversible climate change. This will require major emission cuts of up to halving the world's emissions by 2030” (Sosialistisk Venstre, 2019).

In a document from SV on their policy on climate change. There is no attached link to the IPCC report in the document that would enable the reader to check for themselves, but with the information given it is possible find on the internet given some computer literacy.

#### 2.15

"But first, what is climate risk? Risk is fundamentally about uncertainty. And climate change not only entails harmful consequences, but also great, great uncertainty. No, not uncertainty about whether climate change is man-made or not. But uncertainty about how big the consequences will be, about what measures will be introduced to limit climate change, and about when we will implement the measures. It is therefore both about the consequences of future climate policy and future climate change" (Økland, 2018).

A comment from a non-politician on an online newspaper.

#### 2.16

“Fantastic to hear the MDG admit great uncertainty about the impact of emissions” (Krekling, 2017).

In an interview between NRK and Terje Sjøviknes, the oil and energy minister and a FrP politician.

#### 2.17

“While the scientists are sounding the alarm, asking all the world's countries to stop oil and gas production (...) We are absolutely clear that we must align our policy according to what the research says, and will therefore work to stop looking for oil and gas and build out new fields“ (Miljøpartiet De Grønne, n.d.).

From MDG's website regarding the topic of climate. MDG is claiming that scientists say that all oil and gas production and that their policy is science based. No sources, references or footnotes are found on the page regarding this claim.

#### 2.18

“Pursuing an active, radical and responsible climate policy based on research is the most solidary thing one can do in this century“ (Miljøpartiet De Grønne, n.d.).

A statement from the same source as the previous statement. MDG insinuates that their policy is based on science and research as opposed to some other parties.

#### 2.19

“The Green Party stands for a science-based transport policy, a policy that is good for climate, city air and public health” (Bergen MDG, 2016).

A statement in a post from MDG's official Facebook page in Bergen where they claim their policy to be science-based.

#### 2.20

“Yes, this was a science-based measure, says the city council with a laugh at the morning meeting” (Prestegård, 2016).

A statement from at the time environment councillor Lan Marie Nguyen Berg when talking on the radio station P4 about electric bicycle support as a measure to reduce greenhouse gas emissions.

#### 2.21

“Unge Høyre will lead a knowledge- and research-based climate and environmental policy that takes care of natural diversity and natural resources and that achieves the goals of the Paris Agreement” (Unge Høyre, 2021).

A written statement of the policies of Unge Høyre, a political youth organization under the party Høyre.

## 2.22

“The researchers are crystal clear: The climate- and nature crisis is here now! I have a science-based approach to all policy areas. A vote for me is a vote for science-based politics”

(Arnfinnson, B. 2021).

A statement from Brynjar Arnfinnsson, a MDG politician. This was included in his official ‘why vote for me’ section when running for the parliamentary elections.

## 2.23

“Among the parties, we are the ones who take the long-term future most seriously. I would argue that it is only the MDGs that consistently take the long-term future seriously, that develops science-based policy accordingly” (Miljøpartiet De Grønne, 2018).

This was said during the National Assembly by Per Espen Stoknes.

## 2.24

“The climate summit in Paris gave the world a clear message: We must cut our emissions now to fight against dangerous climate change” (Sosialistisk Venstre, 2023a).

From Sosialistisk Venstre’s own website on the topic climate.

## 2.25

“To achieve this, the world must cut its greenhouse gas emissions in half by 2030” (Sosialistisk Venstre, 2023b).

From Sosialistisk Venstre’s own website on the topic climate plan.

## 2.26

“Constant demands for more profit and consumption are about to destroy the earth. Our children will grow up in a more dangerous world because of global warming”,

“The world has already found more oil and gas than the climate can bear for us to use” (Rødt, n.d.a).

From Rødt’s own website on the topic fair environmental policy.



### 2.27

“This means extremely dangerous climate change for nature and people, with extreme weather and heat waves in all countries” (Rødt, n.d.b).

From Rødt’s own website on the topic fair environmental policy.

### 2.28

“Now it is a to be or not to be for the climate. The UN's climate report flashes code RED for all of humanity” (Rødt, 2021).

An article from the official website of the political party Rødt.

### 2.29

“Man-made greenhouse gas emissions are warming the earth. The result is clear both at home and outside” (Venstre, n.d.b).

An article from the website of Venstre on environment, climate and nature.

### 2.30

“Climate change is the biggest crisis facing humanity. Fortunately, we know what needs to be done” (Miljøpartiet De Grønne, n.d.).

### 2.31

“But if we manage to stay below 1.5-2 degrees of warming, we will - according to scientific scenarios - have a greater probability of keeping natural disasters and other negative consequences down” (Miljøpartiet De Grønne, 2022).

“The big difference now is that it is happening at a much greater pace and that it has been scientifically proven that it is due to human influence” (Miljøpartiet De Grønne, 2022).

### 2.32

"The greenhouse gas emissions from oil production are large. We will implement a transition to a green and renewable economy, while at the same time ensuring that current oil production cuts emissions. Therefore, we must electrify the Norwegian continental shelf and invest in offshore

wind and the production of emission-free hydrogen. Today's framework conditions for oil and gas operations skew the distribution of risk from the companies to the state. We will therefore discontinue the exploration reimbursement scheme, limit the exempt income and reduce additional interest deductions and depreciation rules so that it is the companies and not the state that takes the risk" (Venstre, n.d.a).

## 3 Discussion

### 3.1 Use of the precautionary principle

The precautionary principle can be appealed to when the consequences of an activity are potentially serious and subject to scientific uncertainties, resulting in cautionary measures to be taken. As we can see from statements 2.1-2.3 FrP argues that we lack sufficient knowledge about natural climate processes, beyond man-made changes, suggesting a blurred line between human-caused and naturally occurring phenomena. In their argumentation, FrP invokes the precautionary principle to assert that measures should not be implemented solely for the sake of addressing climate change, but only if they yield additional positive effects.

Balancing development that creates value and taking risks, with protection that reduces risk, is the essence of risk management. This balance is not determined objectively, but rather influenced by human values, ethical considerations, and political decisions. From *Risk Science An Introduction*: “there is always a balance to be made between measures to create values, on the one hand, and measures to protect, on the other. Science does not give us the formula for finding the right balance” (Aven & Thekdi, 2022, p. 175). It is also worth noting that a difference in risk appetite is not considered bad (Bernstein, 1996, p. 105). Therefore, it is crucial to engage in open discussions about the politics and decisions involved in risk management. Furthermore, challenging and discussing scientific findings can be beneficial to identify biases, improve accuracy, and increase transparency in the risk management process. It is worth emphasising that when FrP challenges the need for climate-reducing measures, it is not fundamentally against risk science itself. FrP can be described as a party with a high risk-appetite where they suggest leaning further towards development and opportunities rather than safety and precaution.

The problem where FrP’s communication diverges from risk science is in the argumentation of why they wish to abstain from investment in climate reducing measures. FrP argues that there is no decisive scientific consensus, somewhat rightfully, acknowledging the interpretive ambiguity surrounding climate change. We do not have a perfect understanding of neither man-made nor natural climate changes. Consequently, more research is needed in order to be certain of the both the impact and the cause of climate change. The proclaimed effects and possible consequences of

man-made climate change, however, are very severe. When appealing to the precautionary principle, it is precisely because of scientific uncertainties that one would aim to avoid these potential consequences. This principle could be used to justify the implementation of regulations aimed at reducing emissions and mitigating some of the impacts of climate change, even without a guarantee of their effectiveness. This diverges significantly from what FrP are suggesting giving weight to the precautionary principle would entail. Thus, we see that FrP's use of the precautionary principle is not in line with how it is used in risk science.

The cause of the incorrect labelling of the precautionary principle may be due to two proposed reasons. The first one may be because it sounds like a good argument. This is a statement they have used multiple times at various platforms and is supposed to sway people into supporting their political party. When the receiver reads or hears that this strategy is following the precautionary principle, the term can evoke a sense of assurance and safety, satisfying to the need of feeling secure. It also suggests that going against this proposed policy is taking the bigger risk. Even though the precautionary principle is not the correct term from a risk science perspective, it may have been used to strengthen the argumentation for their policy.

Another reason of this incorrect use of the precautionary principle may be due to how their climate policy is heavily centred around being protective of the economy and free market. They want to mitigate certain side effects that follows some of the climate measures. E.g., a reduction or complete stop of oil exploration in Norway will most certainly impact the Norwegian economy and employment in the oil industry, both directly and indirectly in a negative way. From this perspective it can be argued that their policy is protecting some values and since the precautionary principle is primarily focused on protection, this can be the cause of confusion. However, this still does not comply with the definition of the precautionary principle as the consequences related to climate measures, such as phasing out oil, are not subject to scientific uncertainties, but rather an ethical dilemma.

The use of the precautionary principle is not limited to FrP, as we can see in statement 2.4. Erna Solberg uses the precautionary principle to emphasise the potential threat from climate changes and states that they aim to do more than already agreed upon in the established climate agreement. This usage is more in line with how risk science defines the precautionary principle as action is based on scientific uncertainty and potential high consequences.

### 3.2 Limitations of cost-benefit analyses

A cost-benefit analysis, in line with the economic perspective, can be beneficial in certain cases. Its main objective is to compare the expected costs and benefits of a proposed project, decision or policy in order to make decisions that maximise value. From statement 2.5-2.7 FrP is basing all execution of climate measures using cost-benefit analyses. In statement 2.8 Kari-Anne Opsal, Mayor of Harstad and a politician from AP, is not directly stating that their policy is based on cost/benefit analyses. But she is saying they will not make decisions where the cost outweighs the benefits which is describing a cost-benefit approach. However, from the literature in risk science, the cost-benefit analysis method has some limitations that applies when used to dictate decision-making regarding climate change and climate measures (Aven & Thekdi, 2020, p. 45).

Cost-benefit analyses are limited by their reliance on monetization. It is possible to put a monetary value on some aspects of climate policy, such as the cost of reducing greenhouse gas emissions or the potential loss of scaling down the oil industry in Norway. However, there are more advanced factors that has to play a part other than the Norwegian welfare. It is a different matter when quantifying the value of lives, social equity, intergenerational justice and ecosystem integrity, further resulting in increasingly higher pressure on food production and access (IPCC, 2020, p. 9). These are ethical issues that are hard to assign monetary values and makes it challenging to conduct a meaningful cost-benefit analysis. There are of course alternative strategies to purely act based on cost-benefit analyses, as FrP is pursuing, such as multi-attribute analyses, or even the precautionary principle. Seeing that so many of the factors when it comes to implementation of climate measures are hard to assign a monetary value, basing all implementations on a cost-benefit analysis is not a suitable approach from a risk science perspective.

Another challenge associated with monetization is the subjective nature of expected value assessment. Assessors may assign varying degrees of importance to different factors, resulting in biased calculations that favour a particular direction. This discrepancy becomes evident when comparing the assessments of different individuals who may prioritize certain factors differently. Two assessors may arrive at different conclusions, which emphasises the subjectivities of expected values.

Cost-benefit analyses are most useful when trained on a large dataset of similar cases to the situation being evaluated. This is to ensure that the analysis accurately captures the relevant costs and benefits and provides a reliable basis for decision-making, i.e., minimizing assumptions and to narrow down the expected values. However, the climate change scenario is a unique situation as there are no history of data to draw experience from to form any meaningful expected value. We have never before faced a similar process with such a sudden increase in temperature. “For climate risk, the use of statistical expected values to represent risk is inadequate. It cannot be justified as the situation addressed is unique” (Aven 2019). When we do not have any experience of climate changes, i.e., the cost, how then are we to accurately use a cost-benefit analysis to determine what measures to implement? It is not appropriate.

Another angle that makes cost-benefit analyses hard to justify in this climate measure case from current risk science is the dependency on expected values. This it is not giving weight to the uncertainties. When using expected values, it will only be a mean of a larger assessment, and information that could be crucial to the decision-maker can be lost. It does not reflect the extreme or surprising consequences that can occur. We do not know for certain how the climate will change, either with or without measures aimed to minimise climate change, and the ramifications of the changes. Therefore, it is possible to devise several potential outcomes depending on many factors. It is a significantly complex system that we not fully understand. The mean of what anyone believe are the potential outcomes is not a valid representation, not even necessarily a probable outcome. Just as playing a simple onetime game of chance where you have an 80% probability of winning 100.000 NOK, and a 20 % probability of losing 350.000 NOK. The expected value of playing this game of chance one time is 1.000 NOK. Let’s say the only information you were given before playing was the expected value. The decision-maker can be misled as critical information is lost and would possibly made a different decision if the whole picture was presented. Seeing that the state of the climate and the biosphere is one continuous event that is everchanging, it is not appropriate to be augmenting for from an economist perspective using the portfolio theory. The climate change has no portfolio, it cannot be replicated. We see then, that with these limitations why risk science would argue it necessary to see beyond the expected values to better describe a more comprehensive risk picture in a case like this.

In addition to the limitations of using cost-benefit analyses mentioned, there are other factors to consider when it comes to implementing climate measures. It is not just about weighing the costs and benefits, but also the political, social, and cultural factors that are unique to each country or region. The way people view climate change and their willingness to take action vary greatly, and this can greatly influence the success of implementing any climate measures. For example, countries with a heavy dependence on fossil fuels may be more hesitant to transition to renewable energy sources due to concerns about job loss and economic impact. The political climate and the power dynamics between different groups can also influence the decision-making process. In addition, the social and cultural norms of a society can impact the acceptance and effectiveness of climate measures. Therefore, it is important to take a holistic approach and consider all these factors not just measuring monetary costs and gains in order to effectively implement climate measures.



### 3.3 Climate change risk expressed

In risk science, it is important to define how risk is understood prior to diving into the characterisation. This is done in order to establish an understanding of what is meant when talking about risk. A generic way to define risk related to an activity is (C,U), consequences C and uncertainty U. With a focus on an event A, it would be (A,C,U). Using this, the general risk characterisations would then consequently become (C',Q,K) and (A',C',Q,K), where A' is a set of specified events, C' some specified consequences, Q a measurement or description of uncertainties and K is the knowledge that Q and (A',C') are based on. Q is commonly represented by (P,SoK) where SoK are judgments of the strength of the knowledge supporting the probabilities P.

If we are to compare how politicians describe climate change risk and uncertainties compared to the how we find risk presented in scientific risk literature, we'll see that they do not hold the same standards of providing definitions. It is often that politicians and parties are throwing out numbers, percentages and statements without any explanation or clarity of where these come from or how these are obtained as we see in statements 2.9-2.16. They are often presenting statements as facts without informing the audience of where their information origins. It can leave the receiver guessing if this is well documented and something assessors have a strong knowledge about, or if there are large uncertainties associated with the information presented. In many cases the numbers are from reputable sources that many in the Norwegian public would hold in high regard and trust, such as the UN IPCC and WHO. Norway has a lot of trust in larger organs such as governmental institutions (OECD, 2022). This is also clearly reflected as Norway was one of the highest percentage of vaccinations despite the vaccination not being mandatory. When, however, the sources are not stated and not expressed, it is harder for the public to take the word of a politician than a large international organ that has detailed assessments. The consequences are that the public are left to its own to guess where these numbers may come from or question their validity. In the cases where the sources are reputable, the consequences for not being transparent with what background their policy is based on is a loss of trust and a less informed public.

Through the examples of statements mentioned, the politicians repeatedly engage in discussions about risk governance concerning climate change without explicitly using the term "risk."

Instead, they tend to list the most commonly referred consequences associated with climate change. On other occasions, they may not even mention specific consequences, relying instead on the public's pre-existing understanding of climate change, since climate change is a common topic, but the range of understanding can vary considerably. This approach introduces subjectivity in terms of numbers, consequences, and research, leading to potential discrepancies and conflicting perspectives from the public, rather than fostering a shared foundation of comprehension before discussing. This can potentially act as an echo chamber, where without clear definitions, the public is filling the gaps and interpreting the message resulting in a confirmation bias instead of being challenged.

Other statements are only utilising the term "risk", without further definitions. Again, leaving definitions and understanding up to the receiver most likely since this is a common topic. The receivers may interpret "risk" as climate change risks in the sense of extreme weather, raising ocean and increasing temperatures. Alternatively, other might interpret the word risk differently, e.g., transitional risks where businesses or countries must conform to new regulations, such as emission reductions, which could have unfavourable repercussions for an organisation or country, such as less income from the oil industry in Norway. These are two very different meanings of the word risk, and both of these distinct associations are legitimate and relevant. Without further explication from the sender or contextual information, the message can be unclear which is not good risk communication.

So, while there is a distinction between the usage of the word 'risk' in politics and risk science, does this difference have negative implications?

In some ways it would be favourable to use exact terminology such as (A',C',Q,K) and (P, SoK) when describing risks. To those that appreciate the methodical expression the communication would be more transparent, less ambiguous and it would be easier to understand exactly what is meant. Another potential benefit is that the laypeople could be led to a greater understanding of risk science and how risk can be expressed. Some dedicated individuals might look into and familiarise themselves with the technical expressions, creating an interest to risk science in order to be a part of the debate and understand the discussion about climate changes.

On the other hand, it might also cause more confusion for those that are not informed on how to interpret the same example. It can cause an impediment for those that do not understand the

language and what it implies. This could set a bar that would be of hinderance for some, possibly many, to become political engaged in climate change as they could feel inadequate to understand the jargon. Another result of not understanding could be to turn to another political party with lower standards when it comes to risk expressions so that they feel they can understand and more easily relate to.

Another potential problem with setting such expectations on politicians is that it would take time and resources to become assimilated to and master. That time and resources would have to be taken from other aspects of politician's professional lives, and this could be an unfavourable trade off if it would be at the expense of something more important.

With this in mind, it might not be reasonable or even fruitful, to expect the same level of technical correctness from politicians when communicating to the public compared to e.g. professional risk assessors. It is hard to draw a line of what is expected from politicians' risk expressions with regards to risk science, especially when considering that politicians do not only communicate in prewritten statements. They often engage in unscripted interviews, debates and questions from the press and other parties where they do not necessarily know beforehand about what exactly they will be questioned. It is not reasonable in those situations to expect risk expressions to the same degree as scientific literature. However, there are room for much improvement of risk expression on platforms such as the official website of a large political party to minimise confusion.

From statement 2.15, Økland is not a politician or a decision-maker with regards to climate change, but he is also not a risk expert, yet it is interesting to compare against the politicians. The article is presenting his thoughts after reading the same material that Norwegian politicians are provided with to inform the decision-makers in climate change, namely a report from the UN climate panel. Contrasting to the politicians, he is actually providing some definition to the risk terms that he is using such as "uncertainty". Without such definitions the public may have different interpretations of what it can mean as it is a broad term in the everyday language, as it can mean anything from low self-esteem to not sure about an outcome. By describing what "uncertainty" means in this situation the sender ensures that regardless of the receiver's subjective understanding of "uncertainty" it is now clear what it means in this context. And any subjective interpretation of what uncertainty could mean is irrelevant. As this person is similar to

the politician in that he is not a risk expert, it would be reasonable to expect the same level of risk communication from politicians. They are, after all, in a higher position where proper risk communication should be expected.

### 3.4 Claiming science-based policies

Interestingly, from chapter we can see multiple parties and politicians claim that their policy with regards to climate change and their policy regarding climate measures is science based. This is seen in statements 2.17 - 2.22. This is problematic as it insinuates that the science requires or justifies the measure and policy that the party or specific politician is presenting. The sender is implying that this is the natural decision or conclusion to arrive at if you give weight to or appreciate science. It is an argument that can be very convincing and appealing and difficult to argue against. But this expression is misleading. Because, in fact, science can never justify any measure or lack of measure. Science can lead to knowledge. It is an important distinction between knowledge and facts, as knowledge is a representation of truth that can be more or less substantiated, contested, and in some cases, incorrect. Science is always under development, and knowledge can change dramatically over time with more data or more insight. Such as previously it seemed that new-born sleeping on their backs had a higher chance of infant death syndrome. This was the science at the time and the actual conclusions of assessments and official advice given by the government through its institutions. However, with more data and insight it seems that it is quite the opposite, leading to a change in recommendations. Science is an important aspect that can provide valuable insight into climate change and related measures, but never dictates the specific policy.

A more correct way to express this would be to call it science informed, as opposed to science based. Assuming, of course, that it is in fact science informed. This is more accurate as it implies that the science or research is taken into consideration and decisions are made with this in mind in addition to other factors. Other factors can be ethics, values, uncertainties and priorities. Therefore, stating that a suggested policy is science informed and then refer to the sources is more correct than just claiming that their policy is science based.

The consequences are probably not severe as this is rather a technicality. It is possible that many laypeople in the public would treat the wording 'science informed' and 'science based' the same way. Although, science informed is a humbler term and coming off less strong. This makes it easier for the party or politician to adjust their policy if there is anything in the process that would change but might not give the same confident impression that many seek in a disputed topic.

Another problem when claiming their policy is science based as the main argument is that it can create confusion between science and politics. Scientific literature within a large subject such as climate will often have contradicting findings. This can be due to a lack of knowledge, different approaches, outdated knowledge or biases. With the internet and all of its content at our fingertips it is easy to find what you are looking for. It can essentially become an echo chamber that only amplifies established opinions if one is not critical enough when looking into an area. As an example, there may be 100 scientific articles where some has been replicated, and one that is contradicting. When ignoring all the other work and only giving weight to and communicating the one it can lead to confusion and polarisation. That is not to say that the opposing study must be wrong, ignoring this is a simplification where critical information can be lost. But by only communicate this study is not representative of the scientific work done in a field, and the perception is skewed.

Furthermore, claiming that a policy is science-based can also put pressure on scientists to produce results that support the policy rather than following the scientific method and reporting their findings objectively. This can be a problem as it undermines the integrity of the scientific process and can lead to mistrust in science as a whole. Scientists have a responsibility to report their findings accurately and objectively, regardless of whether or not it supports a particular policy or agenda. It is important for politicians and parties to understand the limitations of science and to avoid misrepresenting scientific findings for their own gain. The relationship between science and politics should be one of mutual respect and cooperation, where science can inform policy decisions but does not dictate them. Ultimately, it is up to the decision-makers to weigh the scientific evidence along with other important factors and make informed decisions based on the best available information.

### 3.5 Purposeful misrepresentation

Another related problem as we see in statements 2.23 – 2.32, politicians use sources such as risk assessments, papers and other findings to strengthen their policy and the view of their political party. Often times not stating their sources and only giving statements in absolutes. In doing so the politicians are often simplifying their sources, and they are also using this as a means, presenting data or findings in a favourable way. This is done by highlighting parts they agree with, and downplaying or ignoring details that are inconvenient. E.g., not communicating the uncertainties, or not showing both sides. This can give the receivers and the audience a skewed view of what the sources are actually reporting on. This cherry picking can be shown across the borders.

Risk science is a field that studies the assessment, understanding and management of potential hazards and associated uncertainties, i.e., obtaining and interpret information about risks and opportunities and providing guidance in management. In the context of the IRGC framework, the politicians are actors in the risk management sphere as decision-makers. In the case of climate change, one can regard the general public as stakeholders as the public is affected by climate change and has a stake in its outcomes. A document from IRGC regarding involving stakeholders goes through the benefits and challenges, but ultimately concludes with “Stakeholder involvement is a crucial part of the risk governance process” (IRGC, 2020, p. 16). It is putting a lot of emphasis on the importance of good communication and how this can be achieved. Some of the key aspects of communication with stakeholders is transparency, openness and building trust. Hiding unfavourable details from their sources through simplification is not supporting a transparent and open relationship, and it is not building trust. It can give the impression that assessments and reports are used as means to justify their prejudice, i.e., confirmation bias. This, in turn, can convey that assessments are not being taken into consideration appropriately, which can hurt the trust and create frustration from the public to the politicians. This is strictly contrary to the goals of communication.

As discussed previously, simplification is hard to avoid, if even preferable. It is therefore also difficult to come up with an alternative solution to this misrepresentation of their sources as this is often a party’s or politicians’ best interest. A discussion with opposing views will often uncover any details that are purposefully left out or downplayed, but the time spent in this phase

could have been shortened down if all parties would be a little more transparent and acknowledge details both favourable and not to their policy. This would be shifting away from framing the sources in an advantageous way towards discussing what to do. It means that less resources are used on discussing what has already been found in the assessing sphere. I.e., shifting focus from the interpretive ambiguity to normative ambiguity about climate change. In doing so, more time can be spent on discussing what is ethical and morally right and mitigate some of the potential loss of trust. This is also found in the literature described by Ortwin Renn, where climate change is a case of interpretative and normative ambiguity. Risk assessors and risk managers have different tasks to undertake. “Assessors should engage in activity to find some common ground for characterizing and qualifying the evidence, and risk managers need to establish agreement about the appropriate values and their application” (Renn, 2008).

One possible explanation for the lack of transparency in addressing issues regarding climate change and is the fear of acknowledging uncertainties and opposing viewpoints within a proposed policy. This “admission” may provide ammunition for opponents to argue against that party’s policy. When a party aims to present a comprehensive approach and convey both sides of an issue, there is no guarantee that others will do the same. Consequently, there is a risk of being perceived as weak or mistaken, as opponents might choose to take a strong stance and argue only for one side, making the message skewed. This is clearly seen in statement 2.16. Here MDG is communicating uncertainties regarding the consequences of climate change and FrP is taking advantage and scoffing at MDG and using this transparency as an argument that MDG’s policy must be wrong. Thus, being transparent in this case can be seen as unfavourable politically.

Another reason might be that the public want concise and simple answers, and they want a party that is firm within their beliefs. This would be because if politicians are seen as confident and strong this can be confused with credibility, it is easier for the public to have faith in them because they clearly have faith in themselves. Compared to someone that is tentative, vague and uncertain, even if it is because it reflects the situation, this can be perceived as someone that is uncredible.

A combination of serving arguments to the political rivals and striving to appear strong and confident might be why we see this polarisation and lack of covering both sides in climate change. This can also extent to other political topics and are not limited to climate change and



climate policies. This would explain why politicians are very adamant, even to the point of simplifying and misrepresenting the whole picture. A potential solution to this would be that every politician and party would be more transparent and strive to cover the other side. But this is an unlikely resolve as parties have a responsibility to grow and for no one to take advantage in a political situation is unrealistic.

## 4 Conclusion

The precautionary principle serves as a valuable tool in risk management, particularly in situations where the consequences are potentially serious and scientific uncertainties exist. While the FrP party invokes the precautionary principle to support their argument against climate-reducing measures, their interpretation and application of the principle deviate from the established principles of risk science. The FrP's emphasis on development and opportunities over safety and precaution, coupled with their acknowledgement of interpretive ambiguity surrounding climate change, contradict the essence of the precautionary principle. There are also examples of use of the precautionary principle more in line with risk science.

Cost-benefit analysis is an “economist heavy” strategy that has been used by Norwegian politicians in regard to climate change. A cost-benefit analysis approach can be appealing due to its aim to optimize return on investment and avoid overlooking alternative measures that could yield greater impact at an equivalent cost. When we dissect what this strategy entails, we see that it is not very in line with current risk science as there are many limitations that hinder its effectiveness and undermine its alignment with established risk science principles. The weaknesses are monetising of ill-suited factors, the usage of expected values and that cost-benefit analysis is not fit for unique situations. Cost-benefit analyses has its use, but as a concept in relation to climate change with current risk science there are other more fitting alternatives.

Another discrepancy is in how risk is expressed in risk science in comparison to Norwegian politicians on climate change. Undeniably, the politicians do not have the same standard and it is interesting to see if this is negative or preferable in the context. As risk communicators, political parties would gain a lot by being more precise that result in greater transparency, build more trust, cause less confusion and more understanding. However, when engaging in debates and otherwise unscripted events, a lower standard is to be expected.

There are multiple examples of politicians and political parties that claim their policy to be “science-based”, which is not correct when looking at the statement from a risk science perspective. Science can provide knowledge and insights, but it is always evolving and subject to change with new data and understanding. When it comes to making decisions, there are multiple factors to consider beyond solely relying on scientific findings. Therefore, decisions should be made by decision-makers with a broader perspective and are never attributed directly to science.

A correct alternative would be to use “science-informed” instead that would be more in line with risk science. It might not come off as confident as intended, but it more suitable and allows a change in policy if more information is accumulated.

There are two discussed problems related to politicians' use of sources and communication of findings to support their policies. Firstly, politicians have a tendency to cherry pick data and forcing sources to support their policies, while leaving out details that can be inconvenient. This undermines transparency, openness, and trust, which are crucial for effective communication with stakeholders as the public. Another problem is a fear of admitting and lack of communicating uncertainties and opposing viewpoints. Due to the competitive nature of politics, there is an incentive to present a strong and confident image, even at the cost of misrepresenting the complexity of the issue. These problems contribute to polarization and hinder constructive discussions on climate change. A solution is hard to come by as this is a core aspect of politics in general, but greater transparency would be beneficial, resulting in more time that could be spent on discussing moral and ethics of climate change in stead of arguing about details.

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