



Trøndelag fylkeskommune
Trööndelagen fylhkentjielte

HOW WE DO IT IN TRØNDELAG

STRATEGY FOR TRANSFORMATIONS TO MITIGATE CLIMATE CHANGE

Approved by the county council on october 14. 2020.



Chasing short-term profits can stand in the way of good choices that serve the common good of individuals, society, and the planet.

And research shows us with more and more clarity that we have for too long exploited the earth's resources more than it can endure.

We need to meet all the new possibilities given to us with calmness.

We need downtime for meaningful conversations about important topics in a time characterised by rapid change, tough debates, and global unrest.

At the same time, we need to step up to the challenges voiced by our impatient youth.

We need to do all of this, so we do not lose ourselves and one another and all the good that we have created together.

The question is: What serves us people and our common future best?

This is a matter of concern for us all. We have different answers and may be deeply divided, but we must just continue to search for the answers together, around our kitchen tables, in the lunchroom, in classrooms, in politics, and in the international arena. For only together can we find the answers.

We must live with the fact that we are different.

We must come to terms with unpleasant facts.

We must be able to see beyond our own little space.

We must dare to realize that our worldview may not be the only right one.

And we must come to terms with being challenged – yes, even hurt.

That is what it means to live together – as part of both smaller and larger communities.

His Majesty King Harald's speech on New Year's Eve 2019

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Name and delimitation	<p>HOW WE DO IT IN TRØNDELAG – STRATEGY FOR TRANSFORMATIONS TO MITIGATE CLIMATE CHANGE.</p> <p>This strategy deals with greenhouse gas reduction and climate change adaptation in Trøndelag.</p>
Rooting in the plan system	<p>The decision to initiate this strategy is in the Regional planning strategy 2016-2019.</p> <div data-bbox="580 320 1295 622" style="text-align: center;"> <pre> graph TD A[TRØNDELAGSPLANEN Regional planstrategi i fylkestingsperioden] --> B[Regionale planer Handlingsprogram etter plan og bygningsloven] A --> C[Regionale strategier Handlingsplaner] B --> D[Utfordringsdokument / Økonomiplan inkl. årsbudsjett] C --> D </pre> </div> <p>An action plan Transformations to Mitigate Climate Change 2021-2023 will be drawn up, which will contain information about the county council's measures and projects.</p>
Relevant priority areas in the short-term part of the Trøndelag regional plan 2020-2023	<p>Trøndelag responds to the climate challenge</p> <p>Innovative solutions so everyone can work and live throughout Trøndelag Sustainable business and industry throughout Trøndelag</p> <p>Competence to meet a working life undergoing change</p> <p>Cooperation in new structures</p>
Adjacent plans	<p>Regional plan for land use (to be adopted in 2021)</p> <p>Regional plan for cultural heritage (to be adopted in 2021)</p> <p>Regional plan for water management (under development)</p> <p>Transport strategy for Trøndelag with associated sub-strategies:</p> <p>_mobility, traffic safety, road, sea and cargo</p> <p>Strategy for innovation and value creation in Trøndelag</p> <p>The Art of Balance – Culture strategy for Trøndelag</p> <p>Competence strategy for Trøndelag</p>
Key national guidance	<p>LOV-2017-06-16-60 Act relating to Norway's climate targets (Climate Change Act)</p> <p>LOV-2008-06-27-71 Act relating to Planning and the Processing of Building Applications (the Planning and Building Act)</p> <p>White Paper 41 (2016-2017) Norway's Climate Strategy for 2030 – a transformational approach within a European cooperation framework</p> <p>National expectations to regional and municipal planning 2019-2023</p> <p>White Paper 16 (2019-2020) New goals in cultural environment policy</p> <p>White Paper 45 (2016-2017) Waste as a resource – waste policy and circular economy</p> <p>White Paper 18 (2016-2017) Urban sustainability and rural strength</p> <p>White Paper 11 (2016-2017) Change and development – A Future-oriented agricultural production</p> <p>White Paper 33 (2016-2017) National Transport Plan 2018-2029</p> <p>White Paper 25 (2015–2016) Power to change – Energy policy towards 2030</p> <p>White Paper 33 (2012-2013) Climate change adaptation in Norway</p> <p>Governmental planning guidelines for climate change mitigation and energy planning</p> <p>The Government's expert committee on green competitiveness</p> <p>NOU 2018:17 Climate risk and the Norwegian economy</p>

WHAT IS THE OBJECTIVE OF THIS STRATEGY?

provide inspiration and guidance for Trøndelag's response to climate change. It will be a useful tool for the county council and the municipal councils. The interaction with the County Governor of Trøndelag, the Norwegian Association of Local and Regional Authorities, regional sector authorities and business and interest organisations has been important in the development of this strategy, and will remain an important success factor with the ongoing work in the future.

The strategy's targets are based on international (the Paris Agreement) and national (the Climate Change Act) obligations. The climate crisis is global. The transition from fossil fuels to renewable resources can only be achieved through international climate diplomacy. Norway participates in the EU Emissions Trading Scheme (ETS), which regulates much of the emissions-intensive industry, e.g. the power supply, processing and aviation industries.

However, much of the policy related to climate change is national rather than regional. This applies especially to transport, energy and industrial policy, but there is still considerable latitude for regional policy related to climate. People's attitudes and actions are also of great importance.

Trøndelag can take a leading role in efforts involving transformations to mitigate climate change. Our strong industrial and scientific communities can create new opportunities for value creation and local quality of life for our residents. Figure 1 shows the targets for a climate neutral Trøndelag in 2030. Targets within the focus areas are based on the targets in the county master plan – the Trøndelag plan – and other national documents. This figure also outlines the common goals for all focus areas.

The focus areas for transformations to mitigate climate change were defined based on knowledge from the research communities, road maps towards low emissions from various industries and climate workshops for young people in Trøndelag. The challenges and opportunities for each area are outlined, while the "How we do it in Trøndelag" boxes describe how we can work together to achieve transformations within these areas.

If we are to succeed in the transformation to a low-emission society, the infrastructure related to transport, food production, the value chains in the industries as well as consumption and travel habits must undergo a fundamental change. Trøndelag's youth are optimistic and have a positive outlook. They believe that a low-emission society achieved through technological solutions and behavioural changes will create more environmentally friendly communities, less focus on material consumption and stronger social unity.

CLIMATE NEUTRAL TRØNDELAG 2030

Trøndelag uses the UN's Sustainable Development Goals as a basis.

Trøndelag will
reduce greenhouse
gas emissions by 50
-55% by 2030¹

FOOD:

In 2030, Trøndelag has sustainable production of food and bio-materials. Emission reductions are in accordance with the targets in the agriculture sector's climate plan.

TRANSPORT:

In 2030, the transport sector in Trøndelag is climate neutral. The emission reduction is in accordance with the government's target of a 50% reduction by 2030.

BUILDINGS:

In 2030, the impact on climate from energy consumption, building sites and use of materials is halved in all major construction projects.

MEETING PLACES:

In 2030, Trøndelag will be characterised by a good quality of life and diversity.

MATERIALS AND PLASTICS :

In 2030, business/industry in Trøndelag will be based on environmentally friendly business development and technology. Public sector actors demand renewable materials with a focus on recycling and documented climate footprint.

Reduce the
climate footprint

Climate smart
Trøndelag by 2030

CLIMATE CHANGE ADAPTATION :

In 2030, business/industry and authorities in Trøndelag are well prepared for and have adapted to the climate changes.

CARBON SEQUESTRATION:

In 2030, Trøndelag has sustainable production of biomaterials. The uptake of carbon is higher than emissions from harvesting and land-use changes. Carbon storage in soil is in accordance with the targets in the agriculture sector's climate plan.

Adopts fossil-free and resource-efficient solutions in all sectors	The public sector as a client will contribute to developing and adapting new environmentally and climate friendly technologies, products and solutions	The authorities and business/industry use the platform of knowledge about climate risk as a basis for decision making	Increased circularity and resource productivity in Trøndelag
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Trøndelag uses its climate budget as a management tool for emission reductions.

Figure 1: Targets for transformations to mitigate climate change in Trøndelag

¹compared with 2009



Toolbox for transformations to mitigate climate change

You can click on one of the boxes in this toolbox to go directly to the relevant chapter in this document. You can return to this page at any time by clicking on the toolbox icon in the top right-hand corner.

WHAT IS:

[THE CARBON CYCLE](#)[CLIMATE FOOTPRINT](#)[TRANSFORMATION](#)[CLIMATE RISK](#)[CLIMATE CHANGE
ADAPTATION](#)[THE MUNICIPALITY'S INSTRUMENTS](#)[PRINCIPLES FOR TRANSFORMATIONS TO MITIGATE
CLIMATE CHANGE](#)[CIRCULAR ECONOMY](#)[THE EMISSIONS IN TRØNDELAG](#)[USEFUL LINKS](#)

TEMAOMRÅDER:

[BUILDINGS](#)[CARBON SEQUESTRATION](#)[FOOD](#)[MEETING PLACES](#)[MATERIALS & PLASTICS](#)[TRANSPORT](#)



What are transformations?

Transformations to mitigate climate change involve reducing greenhouse gas emissions, climate change adaptation and increased carbon sequestration in forests, soil and the sea. These technological and societal transformations will contribute to the sustainable development of local communities based on local qualities and advantages.

Limiting global warming will necessitate replacing fossil fuels with renewable energy sources. In many areas, we know about the technology but it's a matter of using fossil-free solutions on a larger scale throughout Trøndelag.

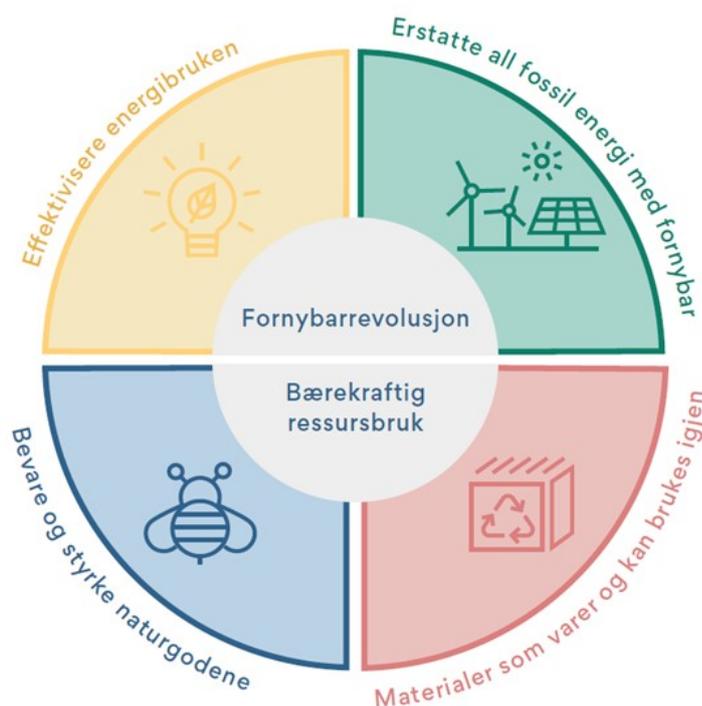
Loss of biodiversity and soil is a global challenge on the same level as climate change. Agriculture and aquaculture have a key role in developing new ways of preserving and strengthening the biodiversity in Trøndelag. This can strengthen the resilience of the agricultural sector, while enhancing the quality of life through the local environment having good recreation and outdoor areas. The construction industry, agriculture and aquaculture, trade and industry and the waste management industry are all extremely important when it comes to materials that must be used in a cycle to prevent them from becoming waste/pollution, a so-called circular economy.

The UN Intergovernmental Panel on Climate Change (IPCC) defines transformation as a "profound and often deliberate shift initiated by communities toward sustainability, facilitated by changes in individual and collective values and behaviours, and a fairer balance of political, cultural, and institutional power in society". The targets for this transition process are summarised in Figure 2.

In Trøndelag, we have chosen to look at the opportunities associated with such transformation. The need for new solutions in the

transport, energy, food production and infrastructure sectors represent development opportunities for the public administration and business/industry. The synergies we have in Trøndelag between regional education institutions, R&D institutions and business/industry mean we are well positioned to seize these development opportunities.

It's possible to image a good quality of life with reduced material consumption in a low-emission society. Trøndelag can be a living lab for the development of solutions that reduce our climate footprint and impact on the ecosystems. Developing societies that will be resilient in encounters with unpredictable events is a key task for the public sector.



FIGUR 2: Bærekraftig ressursbruk og utfasing av fossil energi (Kilde: Klimastiftelsen)



What are the reasons for anthropogenic climate change?

The use of fossil fuels (coal, oil and gas) leads to greenhouse gas emissions. In Norway, the industrial, transport and construction sectors are the largest consumers of fossil fuels. There is a clear connection between increased concentration of greenhouse gases in the atmosphere and increased global temperature. Climate status 2020 from the Norwegian Meteorological Institute showed that the global temperature has risen more than 1 °C, but that this increase is unevenly distributed. The increase is greater in the northern hemisphere. Although the increase in Oslo is 2 °C, the average temperature in Svalbard has risen by more than 5 °C (compared to 1961). Approximately half of the greenhouse gas emissions are stored in the atmosphere and contribute to global warming, while a quarter of the emissions are stored by plants on land and a quarter are stored in the sea (see the carbon cycle, fig.5).

The Norwegian economy is largely based on revenue from oil and gas exports. The petroleum industry has contributed to Norway's increased prosperity, knowledge-intensive industry and high national wealth. Figure 3 shows that the emissions from extracted Norwegian oil and gas exported to countries are significantly greater than the territorial emissions. The figure also shows that despite policy targets to reduce emissions, Norway's emissions have been relatively constant since 1990.

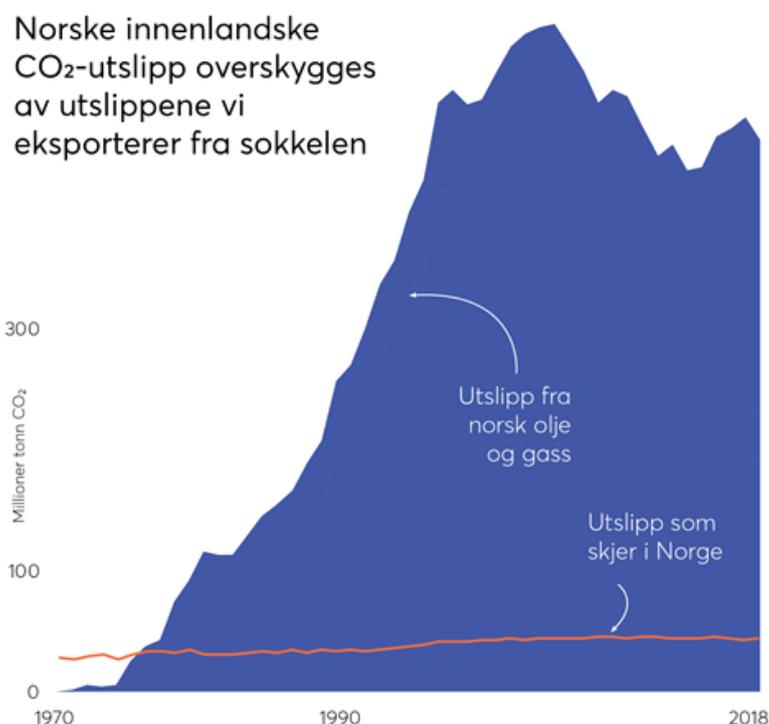


Figure 3: Emissions from Norway's extracted oil and gas compared with emissions included in Norway's emission statistics. Source: Cicero1.

¹Robbie Andrew, Norway's emission exports. First published: 1 November 2016. Updated 29 October 2019.



Norway's planned oil and gas production constitutes a breach of the obligations stated in the Paris Agreement. This is not unique to Norway, but symptomatic of all the countries participating in the international climate negotiations. The United Nations Environment Programme (UNEP) and a host of other international research institutions have described this as the global production gap. Figure 4 shows the gap between plans for fossil fuel production and the production that would be consistent with the obligations in the Paris Agreement. The lack of policy coherence between energy authorities and environmental authorities is typical of the major conflicts of interest in most countries.

If the targets to limit global warming are to be achieved, the rate of change in international and national energy policy, tax systems, taxes and subsidies to replace fossil fuels with renewable energy sources must be increased significantly.

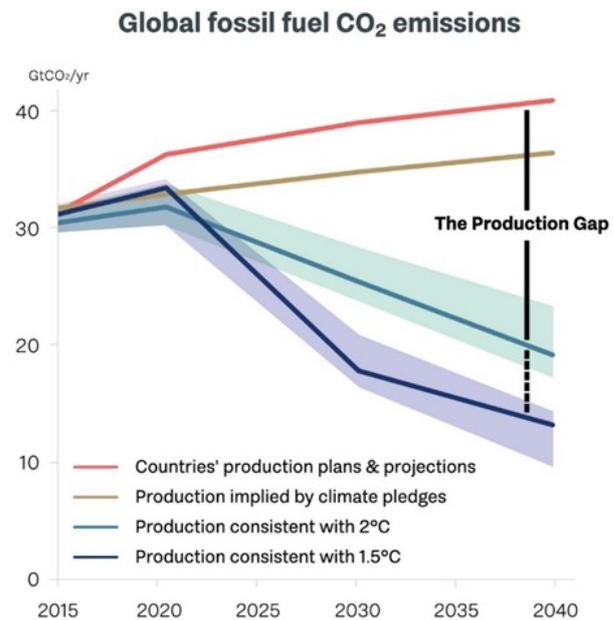


Figure 4: The gap between countries' plans & projections for production of fossil fuels and the obligations in international climate agreements. Source: <http://productiongap.org/>

What is the European Green Deal?

The European Green Deal is the EU's growth strategy that aims to make the EU climate neutral by 2050. The priority areas include industrial transition through the development of environmentally friendly technologies and products, circular economies and preserving of biodiversity, as well as establishing a fund for just transition and investing in R&D. This is a comprehensive approach covering all policy areas. The UN Sustainable Development Goals and the Paris Agreement form the core of all future policymaking in the EU.

The need for new solutions for transport, energy, food production and infrastructure represent development opportunities for public administration and business/industry. The strategies and instruments included in the green growth strategy offer a diversity of opportunities for Trøndelag. Our strong R&D communities, bioeconomic resources and focus on innovation mean there is a great potential for Trøndelag to cooperate and assert itself in a European arena.

One area the Trøndelag region can benefit from is the broad emphasis on partnerships with regions, municipalities and business/industry.



What is the carbon cycle?

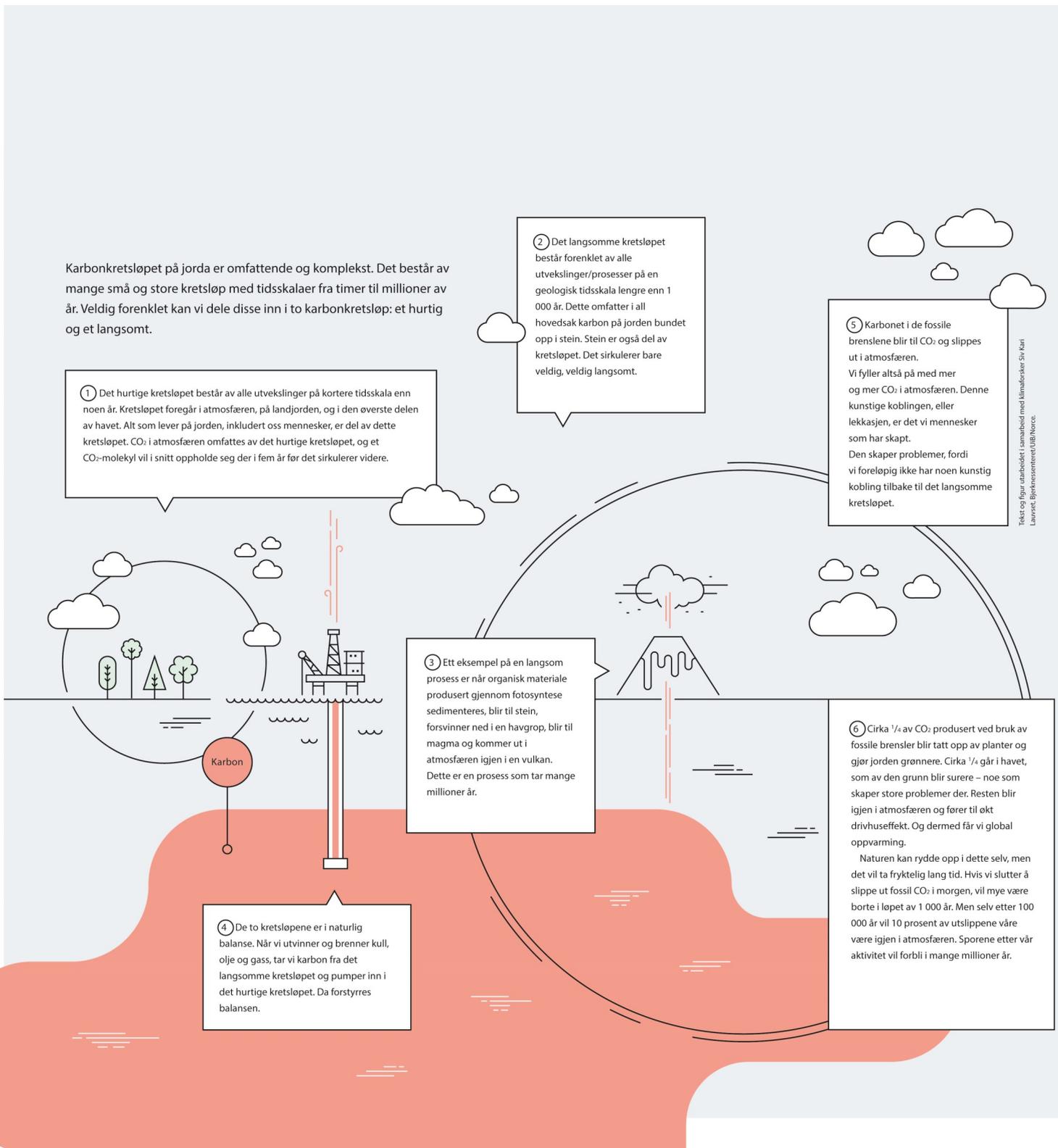


FIGURE 5: The short and the long-term carbon cycle (Source: Norwegian Climate Foundation)



What is climate risk ?

Climate risk is a term that describes the consequences of global warming in relation to four risk categories: physical risk, transition risk, liability risk and litigation risk. All four categories are relevant for both public and private sector entities in Trøndelag.

The Norwegian economy is exposed to **physical climate risk** linked to climate change. Physical risk refers to costs associated with physical consequences of climate change such as more flooding, landslides, droughts and rising sea level, etc. Trøndelag's primary industries are exposed to physical climate risk. It is also key to urban development. One can assume that the costs associated with unforeseen maintenance of the road network because of a wilder and wetter will increase in the years to come.

The risk of lost values owing to rapid technological breakthroughs or changed framework conditions is described as **transition risk**. To what extent can the municipality and business/industry participate in and contribute to the transition from fossil fuels to renewable energy? Many industrial processes are based on fossil coal as an input, which causes major CO₂ emissions. Reducing these greenhouse gas emissions requires new production processes, use of biocarbon, fundamentally new technology or carbon capture and storage. Less demand for fossil fuels resulting from changes in policy or technology can be a significant transition risk for the Norwegian economy.

Liability risk deals with claims for damages or a lack of decisions that may be related to climate policy or climate change. Norwegian municipalities that are responsible for climate change adaptation, a well-functioning wastewater and road network, land use plans and the management of surface water face liability risk if they do not include updated knowledge of climate change as a basis for decision-making and plans.

Litigation risk describes the use of the judicial system to stop activity that causes emissions or to be compensated for costs and losses due to climate change. There has been an increase in climate-related litigation cases, but it is difficult to quantify the size of the litigation risk for Norway (NOU 2018: 17 Climate risk and the Norwegian economy).



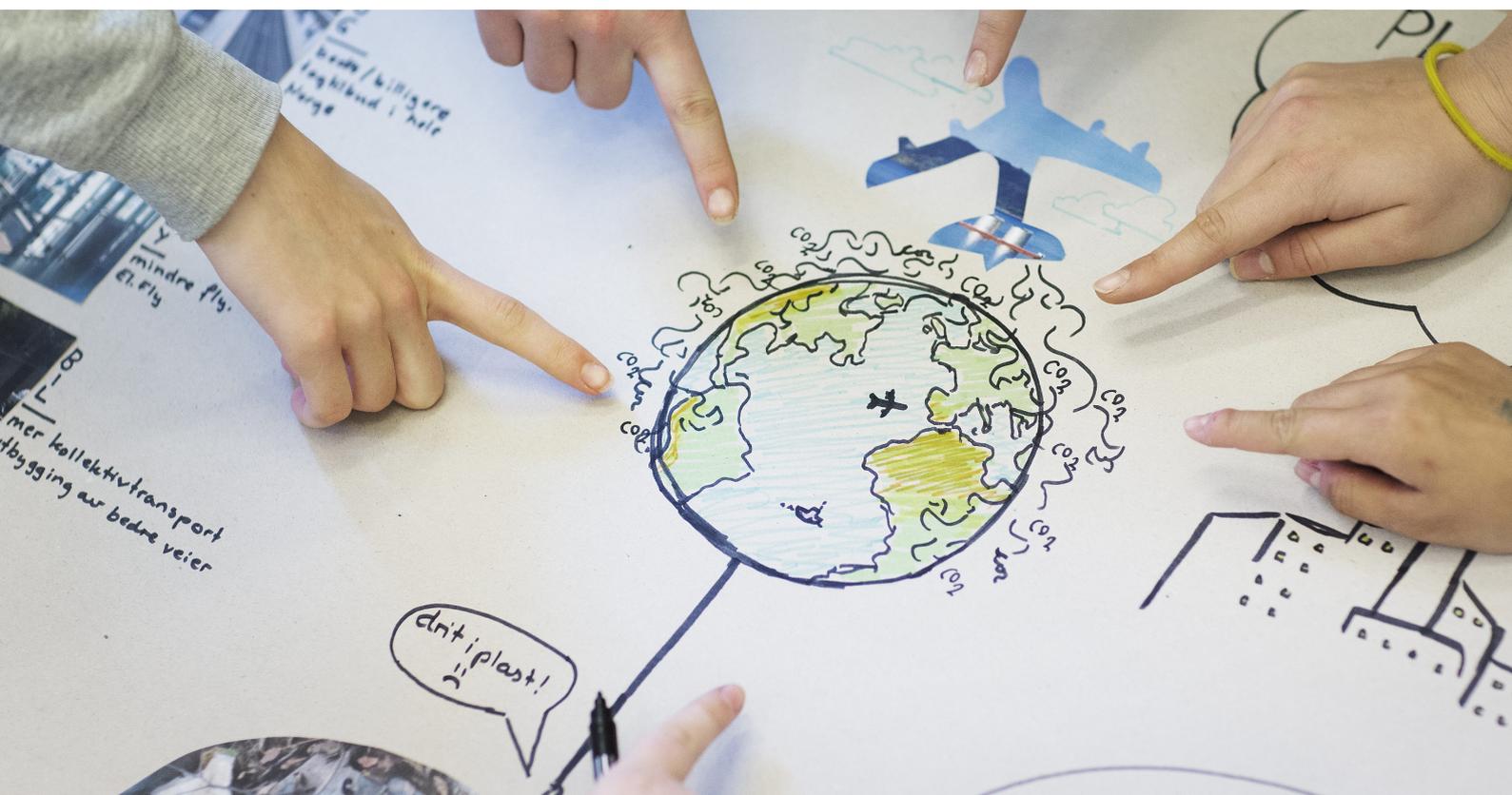


Climate footprint in Trøndelag

Trøndelag's climate footprint is much larger than just the direct emissions. Emissions from the production of goods and materials create an environmental impact where they are produced, which is often outside Norway. Climate footprints are not based on point emissions, but rather on the consumption and the emissions generated during the life cycle of the product/service. The consumption of clothing or electronics generates greenhouse gas emissions from production to distribution, which are often outside municipal boundaries. The climate footprint of the average Norwegian household, business or individual is many times larger than the direct greenhouse gas emissions reflected in the Norwegian Environment Agency's figures.

If we distribute the direct emissions in Trøndelag, then the average resident of Trøndelag has an annual emission of 6 tonnes of CO₂ equivalents. However, if we include imported goods and services, i.e. consumer goods that have caused greenhouse gas emissions elsewhere, this figure doubles to 12 tonnes of CO₂ equivalents. The factor that has the greatest effect on one's climate footprint is income because higher income creates higher consumption. For households in sparsely populated areas, energy accounts for a higher proportion of consumption. This may be attributed to more property per person and higher fuel use per car because of the longer distances and poorer public transport service. However, households in urban areas have a higher general consumption of goods and services in other categories, including more air travel.

The need for a systematic effort by the authorities and business/industry to reduce the climate footprint in value chains requires expert knowledge and a general overview in an extremely complex field. Reducing Trøndelag's climate footprint requires the development of good alternatives related to consumption habits for food, travel, goods and services. The public sector has an important role to play when it comes to making it possible to reuse, recycle, co-use, borrow, repair and share across various sectors and between the residents.





Climate change adaptation in Trøndelag

The climate change profile summarises the probability that the weather conditions in Trøndelag will change due to global warming, cf. Fig. 7. Efforts involving climate change adaptation must take into consideration emergency preparedness related to acute events, such as floods and forest fires, and slower changes, such as ocean acidification, rising sea levels and changes in growing season and the number of winter days. All the changes have consequences for the municipalities and business/industry. Extreme weather events now occur more frequently than before and are extremely expensive. Adapting and being one step ahead is much cheaper than repairing the damage.



Figur 7 : Hva klimaendringer betyr for Trøndelag (Kilde: klimaservicesenter.no)

The goal of the Governor of Trøndelag's network project for climate change adaptation is "A climate-resilient Trøndelag by 2030". To achieve this goal, the municipalities shall by 2022 have

1. mapped their vulnerable areas, or areas that are exposed to climate change
2. adopted a plan for climate change adaptation (either as a separate plan or as part of the Energy and Climate Plan)
3. implemented measures to mitigate the effects of climate change
4. organised the work involving climate change adaptation across all the departments

There is great potential for further developing nature-based solutions for climate change adaptation. Reopening streams and restoring waterways can be cheaper than technical solutions. Moreover, such solutions strengthen and preserve the biodiversity. Nature-based solutions can also pave the way for recreational opportunities and business development in these areas.

Climate change in other countries will have an impact on Norway because we will experience a dramatic increase in the need to provide emergency assistance and crisis aid and support for adaptation measures in developing countries. An increasing number of migrants could place greater pressure on immigration.



Instruments for transformation

The municipalities in Trøndelag can play an important role in this transformation. In their role as a community developer, the municipalities can initiate processes for transformation of local business/industry and measures among the residents. Mobilising for dialogue with local operators to implement local development measures is part of this role (figure 8).

An important factor for a positive development is rooting and ownership of transformations to mitigate climate change in both the political and administrative leadership of the municipalities. Research shows that climate mitigation work in the municipalities is still handled by climate enthusiasts. In some municipalities, there is still a need for more systematic work on this societal transformation in areas such as water and wastewater, property, roads, planning, education, health and care and procurement.



Figure 8: Roles and instruments the municipal sector can use to achieve transformations to mitigate climate change.



The Planning and Building Act is one of the most important long-term instruments in Norwegian climate policy. It instructs the municipalities to take climate change considerations, such as reduction of greenhouse gas emissions and climate change adaptation, into account in their planning. In their role as a planning authority, the municipalities shall facilitate land-use that reduces emissions by reducing transport needs. Through this act, the municipality can prevent the degradation of forests, peatland areas and cultivated land. These areas can store CO₂ providing they are managed in a sustainable way. Risk and vulnerability analyses related to the effects of global warming, such as rising sea levels and an increased risk of landslides, avalanches and flooding, must also be included in the municipalities' planning.

Market-based instruments are fees, various forms of subsidies and competitive public procurement. The municipalities can include environmental requirements in tender processes related to environmental management, reduction of greenhouse gas emissions and the use of fossil-free technologies and circular solutions. The public sector can take a leading role through innovative procurement by demanding products and services that are not currently on the market (e.g. express boats of the future or a digital platform for reuse and recycling building materials). In this way, the municipalities can be a driving force for climate-friendly technology development.

Public procurement is an instrument to achieve innovation that can promote transformations by piloting new solutions. However, public policy instruments must then facilitate upscaling.

Municipalities can introduce parking fees to limit vehicle use or waste collection fees to develop life cycle-based waste management. Market mechanisms municipalities can adopt include grants for electric bicycles, collaborative projects with the local businesses sector to achieve green business development and grants aimed at environmental measures in the agricultural sector.

Facilitating networks is a role the municipalities can take to create meeting places where the municipality's residents and business/industry can meet and contribute to designing local climate mitigation measures and possibly new cooperation arenas. It's natural to involve the likes of the Research Council of Norway, Innovation Norway, SIVA and ENOVA in such networks, as well as inform about instruments the municipalities can use. ENOVA has grant schemes related to pilots for new technology and measures to improve energy efficiency.

The **Regional Research Fund** in Trøndelag has calls for grants for smaller R&D projects that small and medium-sized businesses and municipalities/municipal enterprises can apply for. Emphasis is attached to the projects with a defined research content that commission research from an approved R&D institution. Research projects focusing on transformations to mitigate climate change and emergency preparedness are relevant for financial support from this fund.



What is a climate budget ?

A climate budget in a municipality or county municipality is a management tool to cut greenhouse gas emissions. It shows how emission targets can be achieved, the measures that have been initiated and who is responsible for each measure.

The climate budget is based on the latest official figures on greenhouse gas emissions (from Statistics Norway and the Norwegian Environment Agency).

It's demanding for municipalities to address major sources of emissions, e.g. through traffic from road/sea/air or from industry. Consequently, the climate budget provides a good basis for discussions about the municipality's efforts and use of instruments, including in land-use planning, through business development, use of purchasing power or facilitation of infrastructure.

A climate budget shall follow the ordinary planning process along with the municipal budget. The climate budget contains measures to contribute to emissions not exceeding the target for the coming year.

The climate budget is based on the best available platform of knowledge. It's important to be able to measure the effects of systematic climate mitigation efforts to maintain motivation and commitment and to prioritise the use of public funds. However, the results of systematic climate mitigation efforts will come several years later.

The climate budget may be supplemented by climate accounts for one's own enterprise. Climate accounts show emissions from the purchase of goods and services, investments and operation of infrastructure included in the municipality's activities. Municipalities can make the submission of climate accounts a requirement for procurements. Climate accounts can also be used to evaluate the climate impact of various alternatives.





What is the connection between a circular economy and societal transformation ?

The linear economy, which follows the traditional “take-make-dispose” plan, has dominated the global economy over the past century. Moreover, it is anticipated that global consumption of non-renewable resources, fossil fuels, metals and minerals will double in the next few years.

A circular economy involves the entire value chain; from designing products that last and can be repaired, to offering repair, upgrading, reuse and services instead of products. Through measures like sharing, reuse and co-use, the resources form part of a cycle rather than being disposed of and leading to pollution. A circular economy contributes to reducing the consumption of energy and resources and maintaining value creation. We need solutions for high value material recycling so resources can be retained for as long as possible before going to energy recovery. A circular approach generates major reductions in emissions because products are reused.

The EU Circular Economy Action Plan was launched in May 2020. It contains measures to reduce resource consumption and pollution from the value chains related to electronics and ICT, batteries and vehicles, packaging, plastics, textiles, construction and buildings, food, water and nutrients.

What is the connection between digitalisation and societal

Digitalisation will change the way we produce and consume goods and services and, in so doing, will have an impact on societal transformation. Digitalisation enables smart homes and smart places. For instance, it will be possible to control traffic flows to reduce queues and energy demand. Good digital infrastructure will reduce the demand for transport and energy consumption related to travel.



1 NO
POVERTY2 ZERO
HUNGER3 GOOD HEALTH
AND WELL-BEING4 QUALITY
EDUCATION5 GENDER
EQUALITY6 CLEAN WATER
AND SANITATION

PRINCIPLES FOR TRANSFORMATIONS TO MITIGATE CLIMATE CHANGE IN TRØNDELAG

These principles describe the desired direction and behaviour for decisionmakers in Trøndelag. We can all contribute to moving in the same direction to achieve the goal of a climate-neutral, socially just and sustainable Trøndelag.

- Trøndelag uses the UN Sustainable Development Goals as a basis for efforts by authorities, business/industry and academia
- A climate resilient Trøndelag includes a fact-based climate risk assessment as the basis for decision-making by authorities and business/industry
- All parts of Trøndelag are committed at the individual, organisation and community level to the work to achieve a low emission society
- Trøndelag County Council, other public actors and business/industry perform innovative and sustainable procurements

7 AFFORDABLE AND
CLEAN ENERGY8 DECENT WORK AND
ECONOMIC GROWTH9 INDUSTRY, INNOVATION
AND INFRASTRUCTURE10 REDUCED
INEQUALITIES11 SUSTAINABLE CITIES
AND COMMUNITIES12 RESPONSIBLE
CONSUMPTION
AND PRODUCTION13 CLIMATE
ACTION14 LIFE
BELOW WATER15 LIFE
ON LAND16 PEACE, JUSTICE
AND STRONG
INSTITUTIONS17 PARTNERSHIPS
FOR THE GOALS



Focus areas for transformations to mitigate climate change

The focus areas for transformations to mitigate climate change were defined based on knowledge from the research communities, road maps towards low emissions from various industries and climate workshops for young people in Trøndelag.

The challenges and opportunities for each area are outlined, while the “How we do it in Trøndelag” boxes describe how we can work together to achieve transformations within these areas.

BUILDINGS

CARBON SEQUESTRATION

FOOD

MEETING PLACES

MATERIALS & PLASTICS

TRANSPORT



FOOD

In 2030, Trøndelag has sustainable production of food and biomaterials.

Challenges

Activities from food systems account for 21-37% of global anthropogenic greenhouse gas emissions (IPCC, 2019). The emissions originate from cultivation and production processes, processing and transport at all stages.

The climate footprint of food production is mainly related to emissions from livestock (enteric fermentation), crop production and land use changes, as well as the production of fertilizer, machinery and packaging.

A changing climate means changing conditions for food production. More unstable weather and precipitation patterns, warmer and more acidic seas and an increased risk of extreme weather all place an increased burden on infrastructure and equipment. Increased risk of landslides and avalanches place new demands on emergency preparedness. The loss of biological diversity and spread of diseases/pests to new areas can have an impact on food production in Trøndelag. These changes may lead to more unpredictable global raw material prices in the years ahead, which may have an impact on the aquaculture and agriculture industries in Trøndelag. It's extremely likely that the price of imported goods will rise, and that global food production will fall. As Norway is not self-sufficient when it comes to food, successful transformation to mitigate climate change must involve increasing food security and reducing vulnerability connected to food imports.

The transition risk for the agriculture and the aquaculture industries is related to complex value chains. Imports of input factors (e.g. feed) and exports of goods are based on low transport costs and an open global economy. Profitability will be affected if transport costs rise owing to extreme weather or higher prices for emission permits.





Opportunities

Sustainable agriculture and food consumption are key to successful characterised to mitigate climate change. Climate-friendly and sustainable agriculture entails good circulation of nutrients, protecting cultural landscapes and biodiversity, using local resources, good human and animal welfare and a healthy economy. The agriculture and reindeer husbandry industry also involves food security, local communities, employment, cultural landscapes and tradition. In Trøndelag, we have a special responsibility to preserve the framework conditions for reindeer husbandry and the South Sami cultural heritage associated with this industry.

Good animal welfare creates healthy animals that utilize the resources well and provide good yields. This is climate-smart agriculture. It's possible to increase diversity and develop climate resilient plants and livestock. Increasing the production and consumption of Norwegian-produced crops for direct human consumption is important for food security and will have a positive impact on the climate. A change to greater use of local food from local producers combined with utilising seasonal produce will reduce greenhouse gas emissions from transport and storage. The fact that grocery chains and food producers have strong power of influence on consumer behaviour through their product range makes them important contributors to societal transformation.

About 25% of total food production for human consumption is lost or wasted (IPCC, 2019). Reducing food waste in every link the value chain has great potential because it reduces emissions from the food production and from the transport.

The EU "From Farm to Fork" strategy for a sustainable value chain for food offers opportunities for the Trøndelag region. This strategy will facilitate the creation of a circular economy and will strengthen the farmers' position in the value chain. Sustainable food production requires cooperation between all the actors in the food system in Trøndelag. The agriculture sector's climate plan outlines the actors' commitment to reducing emissions by 2030.

Climate change causes rising temperatures and changing weather conditions. However, this will probably increase the opportunities for growing fodder, wheat and other protein crops in Trøndelag. Knowledge-based climate change adaptation based on the Norwegian resource base is also important in agriculture.

A transition to new technologies will be key to reducing greenhouse gas emissions in agriculture. Examples include fossil-free energy solutions, electric machinery and tool carriers, using data from sensors, satellite imagery and GPS, reducing runoff through precision fertilisation and precise mechanical and chemical weed and pest control.

The fishing and aquaculture industry enjoys a strong position in Trøndelag and has an associated business development in a high-tech supplier industry. There is an opportunity to further develop the coastal and marine areas outside Trøndelag as energy-efficient contributions to global food production. However, sustainable development of the aquaculture industry is reliant on controlling waste streams and disease and resolving land-use conflicts. Residual raw materials from this industry can be utilised better and used to a greater extent in the development of high-value products. New sustainable resources can be integrated into the feed chain. Good arenas for collaboration have been established between administration, research and industry, which must be continued to ensure good management of marine resources and increased sustainable seafood production.

FOOD

How we do it in Trøndelag

- Safeguard environmental values and nature diversity in the food production
- Produce and process as much food as possible from local resources
- Cooperate to develop climate-friendly solutions in line with the agriculture sector's climate plan 2021-2030
- Exploit the opportunity to increase production of food and protein crops to increase self-sufficiency
- Further develop and adopt climate-resilient crops and animal breeds
- Reduce food waste in the entire value chain
- Take a leading position in phosphorous and nitrogen recovery/reuse in agriculture and aquaculture
- Electrify aquaculture and the fishing fleet



BUILDINGS

In 2030, the impact on climate from energy consumption, building sites and use of materials is halved.

Challenges

The construction industry accounts for 40% of global greenhouse gas emissions. Buildings have different climate footprints depending on the choice of material, construction process, transport to and from the building, heating and cooling in the operation and maintenance phase and during any rehabilitation or demolition work.

The building and construction sector is the largest consumer of material resources in Norway. This sector also generates a lot of waste, equally as much as the categories households and manufacturing industries generate. The waste is evenly distributed among construction, rehabilitation and demolition. There is a significant potential for increased material recycling, especially of wood.

The best soil for food production is situated in the most densely populated areas along the shores of the Trondheimsfjord and there is major development pressure. To preserve the ability to produce food, stop the loss of biodiversity and reduce emissions related to transport, urban and community development in the future must occur through densification to a much greater extent than is currently the case.

Buildings are exposed to physical climate risk through rising sea levels and increased risk of flooding and landslides. Wetter and wilder weather has an impact on the lifespan of buildings. Transition risk for the construction industry is related to a shortage of raw materials and higher prices for CO₂-intensive building materials.



Opportunities

Community and urban development can plan and facilitate for transformations to mitigate climate change, e.g. by co-location of important functions. This reduces the need for transport or adaptation to climate change. Reopening streams reduces the risk of flooding because they can hold large amounts of precipitation. This also creates recreational areas and green lungs, which safeguard biodiversity and benefit public health.

Rehabilitation of buildings cause less emissions than demolition and construction, when indirect emissions related to production and transport of construction materials are factored in. Good opportunities exist for municipalities, as major owners and operators of buildings, to use their purchasing power to adopt environmentally friendly solutions.

By increasing the use of wood in buildings, one can replace emission-intensive building materials like steel and concrete. In recent years, there has been extensive technology development in the field. It's now possible to construct wooden buildings in ways that comply with requirements concerning fire safety and sound and prevent the wood from rotting. However, the choice of material must be based on an overall assessment of resilience and the need for flexibility.

Buildings can harvest energy, i.e. buildings are integrated as an active part of the energy system and produce local energy from solar cells, solar collectors, heat pumps, wood burning, wood chip burning and other sources of bioenergy. Energy production and exchange in neighbourhoods can reduce the need for network development. Smart grid technology, energy storage, development of decentralised systems and new technologies in the households also create new markets for technology companies and the construction and supplier industries.

How we do it in Trøndelag

- Make demands about climate accounts and fossil-free technologies and emphasize this for buildings, roads and construction sites
- Make demands about using materials with the lowest climate footprint and/or that are suitable for reuse and repair
- Ensure a diverse housing structure and good living environment with densification in urban areas
- Use public buildings to harvest energy
- Test and develop business models for buildings as energy harvesters and producers
- Reduce energy consumption in buildings through systematic and targeted energy-saving measures
- Use knowledge from local building and craftsmanship traditions to build with local materials and in line with the climatic conditions and terrain
- Further develop digital platforms for high-value reuse and recycling of building materials and interiors



TRANSPORT

In 2030, Trøndelag has a sustainable transport structure and the transport provision is climate neutral.

Challenges

Transport causes greenhouse gas emissions from vehicles, as well as from the production and distribution of vehicles and fuel. The transport sector is responsible for 24% of emissions globally and 31% of emissions in Norway. Road traffic accounts for 55% of sector's emissions. The largest share of emissions in this sector is from transport, particularly road traffic. The climate footprint includes emissions related to the production of vehicles and the processing of materials when vehicles are discarded. Road construction generates emissions through changed land use, construction machinery and the use of materials.

The climate risk related to transport is increased maintenance and operating costs for the road network if extreme weather events become more frequent and cause greater damage. Large volumes of water from increased precipitation and milder winters increases the load on the road and the culvert/drainage system. Community planning and development of other infrastructure, e.g. railways and power grids, also need to take climate change into account to reduce climate risk.

The transition risk for the transport sector is that it must deliver the largest emission reductions. This sector is strongly influenced by political decisions related to climate change. Examples of this include road tolls, zero-emission zones, congestion/rush hour pricing, tax exemptions for electric cars, bus lanes and road user charges. Regulations may also affect the intermodal competition in freight between road, rail and sea transport. The transition to a fossil-free transport sector represents major opportunities for value chains that support the changes. However, there is a threat to value chains that cause high emissions. The structure of taxes and fees and abrupt changes to these represents a significant risk for the industries involved, e.g. the price development of (used) vehicles, including both passenger cars and vehicles used for commercial purposes.





Opportunities

The zero-growth target for passenger cars requires further investment in measures related to public transport, pedestrians and cyclists. Benefits from reduced car use include improved air quality, traffic safety and general quality of life in urban areas and less noise pollution. Good broadband access throughout the county will make transport reductions possible because the digital infrastructure facilitates the development of mobility solutions related to car sharing, online meetings and seamless transit between public transport services, etc.

When it comes to registered vehicles in Trøndelag, there is a marked increase in the proportion of electric and hybrid cars. Electric and hydrogen-powered buses, boats and ferries are key to low-emission mobility. Moreover, innovation in smart information systems in transport and planning, new charging technology and batteries will change the way we move around.

The Trøndelag Commuter Rail (Trønderbanen) will be electrified on the sections Trondheim-Stjørdal and Hell-Sweden (national border).

Goals of the Transport Strategy include investments related to increasing frequency and capacity and improving transit hubs for pedestrians and cyclists. The latter is known as transit-oriented development (TOD).

The municipal sector can use its role as a road owner to set requirements related to fossil-free solutions when awarding contracts for operating and maintaining municipal road networks.

The tourism and experience industries in Trøndelag are in a good position to continue the work involving sustainable destinations, with attractions related to nature-based experiences, cultural/historical sites and local food culture that can be reached by public transport.

County municipalities currently have responsibility for procurement of services on Short Take-off and Landing (STOL) routes. The existing STOL network in Namsos, Rørvik and Røros can be turned into living labs. The "Green Flyway" project, which has EU Interreg funding, aims to establish and commercialise the route between Røros and Östersund (Sweden) as a test arena for electric and autonomous aircraft, among other things. This project is an example of how regional public bodies and technology environments can collaborate to create results of national and international interest.

TARGETS FOR ZERO-EMISSION VEHICLES (NTP 2018-2029)

- 100% of new passenger cars are electric by 2025
- 100% of new light vans are electric by 2025
- 100% of new heavy vehicles are electric by 2030
- 50% of new trucks are electric or hydrogen vehicles in 2030
- 100% of new urban buses are electric by 2025
- 75% of new long distance coaches are electric or hydrogen vehicles in 2030

How we do it in Trøndelag

- Reduce the need for transport through coordinated planning of housing, land-use and transport
- Support public policy instruments, like urban growth agreements and zero-growth targets, and cooperate to develop equivalent solutions for smaller towns
- Prioritise infrastructure that increases cycling, walking and public transport use rather than passenger cars
- Combine various modes of transport at transport hubs
- Facilitate car-free zones in urban areas
- Facilitate car sharing solutions
- Continue investments in broadband
- Work to achieve electrification of and multi-track railway lines where this has the greatest potential
- Develop new solutions for freight transport in collaboration with business/industrial and scientific communities
- Develop value chains for industries for zero emission vehicle infrastructure in line with the goals of the National Transport Plan (NTP):
 - ferry and shipping solutions that utilise new energy solutions and guidance systems
 - new energy supply solutions for the
 - transport sector, e.g. EV charging stations, battery technology or hydrogen solutions
 - environmental requirements for the taxi industry
 - self-learning intellectual systems for the transport sector
- Public actors use procurement processes to make demands about climate accounts and the use of fossil-free or advanced biofuel technology
- Use the air space between Røros and Östersund (Sweden) to test electric aircraft and drones to achieve the goal of electrification of domestic aircraft by 2040



CARBON SEQUESTRATION

In 2030, Trøndelag has sustainable production of biomaterials.

Challenges

There is huge potential to sequester CO₂ through production of biomass resources. However, this will require integrated management to ensure that bioenergy growth and planning of new forests do not have negative consequences for food security and biodiversity (IPCC, 2019). The scenarios developed by the UN Intergovernmental Panel on Climate Change show that it's possible to increase CO₂ uptake in forestry without compromising biodiversity or other sustainable development goals. This will require new multidisciplinary and inter-agency forms of collaboration.

The peatland areas are important for carbon sequestration and flood mitigation, and the land-use planning must take this into account. Road construction, urban development and the development of cabin villages have contributed to the degradation of important peatland and wetland areas, while large peatland areas have also been reallocated to agriculture.

More extreme weather can increase the risk of forest fires and loss of biomass, while warmer winters increase the risk of decay and pest attacks in forests. Shorter periods of frozen ground could have a major impact on the value of forests or forest properties. As the climate gets warmer, forests grow faster, and the treeline is extending higher up mountains. An increased demand for bio-raw materials for energy could provide an increased level of competition for the same wood resources between the construction industry, paper industry and manufacturing industry (biochar in industrial processes).

Opportunities

Trøndelag has favourable natural conditions for increasing carbon sequestration in soil, forests and the sea. However, achieving this will require developing the cooperation between the commercial actors and the R&D environments further.

Loss of biodiversity is a global environmental challenge on the same scale as climate change. National authorities are working to develop a land accounting tool that covers both climate and biodiversity. The scenarios developed by the UN Intergovernmental Panel on Climate Change show that it's possible to facilitate carbon sequestration in soil, forests and the sea without compromising biodiversity or other sustainable development goals. In the event of changes in the management and operation of the agricultural areas, an integrated approach must safeguard both environmental and social factors.

Improved soil health will increase the soil's ability to sequester carbon. Developing new tillage methods, plant species and catch crops can be good climate change mitigation measures. In Norway, a large proportion of uncultivated land is used for grazing. The ability of the grazing land to store carbon will be affected by various factors, including animal density. An integrated management practice, whereby the number of grazing animals is



adjusted based on feed availability, has produced positive results in relation to increased carbon content in soil.

Activity related to planting and young growth tending on Norwegian forest properties must be increased to fully exploit the forest industry's uptake potential. When it comes to management, a long-term perspective is required. This will raise the quality of the timber and reduce the felling costs in the long-term.

Trøndelag is Norway's largest peatland region, and peatland areas account for 17% of the total land area. Peat moss can store vast amount of carbon and can absorb water 25-40 times its dry weight, meaning the peatland areas have an important flood mitigation function. Norwegian wetlands are home to 47 of Europe's 50 peat moss species, which is an important element in complex ecosystems.

Biochar is a possible replacement for fossil coal in industrial processes. The close collaboration between industry and the research community is crucial in this respect, while public actors can also contribute.

Seaweed is currently cultivated in Trøndelag by both commercial operators and for research purposes. Seaweed biomass has the potential to be used in food and pharmaceutical products, as a feed resource and in biochemicals, fertilizers, pesticides and bioenergy.

Carbon sequestration is an area where the region can seek partners and participate in major R&D projects and innovation companies at a national and European level. Horizon Europe, the next EU funding programme for research and innovation (to be launched in 2021), contains mission areas related to seas/oceans and soil health.



CARBON SEQUESTRATION

How we do it in Trøndelag

- Develop technology and knowledge for the value chains related to agriculture, forestry and aquaculture to find new solutions linked to carbon sequestration
- Manage land areas to achieve the best possible production of biomass while safeguarding biodiversity
- Further develop the opportunities for compost-based soil to replace peat
- Preserve carbon-rich areas like peatlands and forests
- Rehabilitate peatland and wetland areas to increase carbon uptake
- Increase knowledge about processing and product development of residual raw materials as soil improvers
- Strengthen cooperation between scientific communities focusing on biodiversity, business/industry and municipalities with major sources of raw materials
- Strengthen efforts involving planting and forest culture to achieve sustainable forest management
- Increase the added value of the residual raw materials from the marine sector



MATERIALS & PLASTICS

In 2030, business/industry in Trøndelag will be based on environmentally friendly business development and technology.

Challenges

The current “throw-away society” is the root cause of some of the main environmental problems facing humanity. It has contributed to the earth’s critical load being exceeded. There is a risk that resources from non-renewable sources will be used up, while current waste management processes cause significant emissions and pollution.

As consumption of plastics increase, the emissions from various links of the plastics value chain increase. This includes the extraction of petroleum products, freight, refining and incineration of the plastic. The environmental costs related to plastic are damage and destruction caused by plastic debris in nature (especially in seas/oceans), greenhouse gas emissions from the incineration of plastic and health damage caused by hazardous substances in the plastic. An estimated 100,000 tonnes of plastic packaging end up Norwegian households every year. Approximately one-third of this is collected and 80% of this is sorted out and sent to Germany for material recycling (the Norwegian Climate Foundation, 2018).

Bales of roughage for livestock are currently wrapped in plastic foil, but much of the plastic sold for this purpose is not collected. Instead, it is burned or ends up in nature.

The climate risk from materials and plastics largely deals with vulnerability associated with long value chains that can be affected by extreme weather and climate change. The transition risk involves technological changes, as well as political decisions related to taxes and bans being placed on various substances and products.

Opportunities

Agriculture, aquaculture and fisheries, industrial processes, buildings, construction and property are especially important for a circular economy. Cooperation within and between value chains and industries will be key to unleashing the potential that exists here.

One opportunity for a circular economy is processing animal manure into biogas for heating and fuel. Another opportunity is achieving better utilisation of material resources such as buildings, vehicles and machinery through sharing, co-use and multi-use. A third opportunity is developing new, sustainable packaging solutions to replace plastic.

We also have examples in Trøndelag of how plastic can form the basis for a recycling industry.

MATERIALS & PLASTICS

How we do it in Trøndelag

- Include environmental requirements in public procurement processes to reduce material consumption and the plastic footprint
- Introduce waste sorting including plastic throughout the entire county
- Reduce the use of single-use plastic items to a minimum
- Contribute to developing and adopting good packaging solutions to prevent food waste
- Exploit the potential in the wood processing industry in Trøndelag to produce raw materials for plastic production, as well as contribute materials that are good alternatives to plastic
- Develop value chains for the recycling industry further



MEETING PLACES

In 2030, Trøndelag will be characterised by a good quality of life and diversity.

Challenges

Societal transformation at the individual level is related to changing behaviour and reducing material consumption. Strong commercial forces are promoting a “throw-away mentality” and pushing down production costs. However, that is not compatible with the natural resource base or with social justice and decent work.

Global warming is an obstinate problem. There is no quick fix or single solution. Transformations in technology, infrastructure and economics are required. This will require technological solutions and behavioural changes. It’s a complex field with many causal connections. Conflicting interests are polarising the climate debate, even though voters across the party landscape perceive climate change as an important issue. Global warming has often been communicated in a technical way or by using doomsday images that make it hard for people to comprehend why it’s relevant to their everyday life. This complexity can create an inability to act.

Increasing loneliness and mental illnesses in children and youth show the importance of systematic work to achieve inclusion and strong communities. Consequently, the message from Trøndelag youth is important: they see reducing material consumption and buying pressure as ways to improve their lives.

The pace of change is accelerating in the Trøndelag society and the world in general. Meeting places where the various actors can get to know each other by collaborating on the development of solutions and building trust between industries and sectors is a fundamental requirement for transformations to mitigate climate change.

Urbanisation is a worldwide trend. Parts of the county are characterized by an aging population and people moving away. Centralisation of educational provisions and the labour market, combined with larger but fewer farms, will lead to changes in Trøndelag’s rural areas.





Opportunities

The municipalities can take a leading role in facilitating creative hubs for residents and business/industry to meet. Focusing on local quality based on local strengths and advantages in a vibrant local community contribute to sustainable development.

Attitudes are developed through collaborative action. By facilitating learning and implementing specific actions that reduce the climate footprint, an obstinate problem becomes more specific. The sharing economy describes how non-commercial actors share access to goods and services. Municipalities can facilitate a sharing economy by supporting schemes for sharing cars and boats, offices for commuters, grants for sports equipment storerooms or city/village bikes. Measures such as school gardens and community supported agriculture can become an important and meaningful leisure activity, while enabling children to gain insight into how food is produced.

Creative hubs for collaboration, volunteering and individual activities can strengthen the work involving local community development and societal transformation. Commitment to participation and other meaning making activities can contribute to joint solutions and taking an expanded social responsibility. Civic involvement can increase knowledge about, and thus acceptance of, local climate policy.

The UN Sustainable Development Goal 17, Partnerships for the Goals, is a critical success factor for achieving societal transformation. Increasing the pace of innovation requires creative hubs to serve as meeting places between regional actors, authorities and business/industry. The food system can become sustainable through such collaboration. There will be huge potential for development: new cross-sector solutions, digital platforms, new technology, new business models, systems and methods for collaboration and co-creation. The transformations also require good public discussion about the need for change and conservation. Trøndelag's high degree of confidence must be preserved.



MEETING PLACES

How we do it in Trøndelag

- Strengthen the Climate and Planning Committee's role as an advisory and coordinating body for dialogue between county politicians, the Norwegian Association of Local and Regional Authorities, the County Governor of Trøndelag and the Youth Council in the work involving societal transformation
- Strengthen and disseminate the platform of knowledge related to climate risk in municipalities and business/ industry
- Adopt collaborative models for transformation in the public and private sectors
- Learn through the Centre for Sustainable Development in Trondheim (Geneva UN Charter Centre of Excellence) how the municipalities' work involving the UN Sustainable Development Goals can be strengthened and specified
- Participate in networks for climate change adaptation and low emissions to gain access to updated knowledge and intermunicipal learning
- Mobilise business and industry actors in the municipality to participate in "Klimapartnere Trøndelag" (Climate partners Trøndelag)
- Facilitate broad involvement from all industries to create new solutions and attractive workplaces that can contribute to societal transformation
- Involve Sami language, culture and social understanding in the societal transformation
- Facilitate community supported agriculture, urban gardening and composting
- Use "Gården som pedagogisk ressurs" (the farm as an educational resource) – a general educational programme for primary and lower secondary school
- Further develop local and regional projects for societal transformation in the voluntary and public sectors:
 - REKO (fair consumption) rings
 - Public fridges for food that has recently passed its expiration date
 - Makerspaces to loan, fix and share
 - Small-scale kindergarten and school gardens



USEFUL LINKS

[ENOVA: STØTTEORDNINGER FOR GRØNN OMSTILLING](#)

[MILJØDIREKTORATET: STØTTEORDNING KLIMASATS I KOMMUNER](#)

[SJEKKLISTE FOR KLIMALEDELSE I KOMMUNER](#)

[KOMMUNALBANKEN OM KLIMARISIKO](#)

[KALKULER KLIMAFOTAVTRYKK-Ducky](#)

[STRØM EN KLIMAFROKOST](#)

[MILJØDIREKTORATETS WEBINARER OM KLIMA](#)

[VEILEDER KLIMABUDSJETT](#)

[KLIMASØKSMÅLET](#)

[PÅDRIV-nettverket](#)



ELECTED LINKS FROM THE STRATEGY'S PLATFORM OF KNOWLEDGE

[KLIMAVERKSTED FOR TRØNDESK UNGDOM](#)

[KLIMAKUR 2030](#)

[NORSK STRATEGI FOR SIRKULÆR ØKONOMI](#)

[EUs HANDLINGSPLAN FOR SIRKULÆR ØKONOMI](#)

[EUs FARM to FORK. Strategi bærekraftig verdikjede for matproduksjon](#)

[- Nasjonale forventninger regional og kommunal planlegging](#)

[- Trøndelagsplanen](#)

[- Strategi for innovasjon og verdiskaping](#)

[- Samferdselsstrategien med underliggende delstrategier](#)

[- Regionalt forskningsfond, prioriteringer og utlysninger](#)

[ENOVAs Framtidsbilder av lavutslippssamfunnet mot 2050](#)

[Konsekvenser av klimaendringer i Norge](#)

[Grønn konkurransekraft 2016, Rapport fra Regjeringens Ekspertutvalg for grønn konkurransekraft](#)

[Klimastiftelsen, 2018: Plast og klima -to sider av samme sak.](#)

[- Noregs Lågutsleppsstrategi mot 2050 \(vedlegg 1\)](#)

[- Miljødirektoratet faktaark vippepunkter](#)

[- Landbruk og klimaendringer, Ekspertgruppe 2016](#)

[- Teknisk arbeidsgruppe jordbruk og klima 2018](#)

[- Faktaark Naturpanelets rapport 2019](#)

[- Faktaark 1,5 graders rapport IPCC](#)

[- Faktaark spesialrapport arealbruk og klimaendringer](#)

[- Arealendringer og observerte klimaendringer](#)

[- Faktaark spesialrapport hav og klimaendringer](#)

[- Grønn vekst, Stoknes, Magma 2018](#)



DEFINITIONS

Biochar: Biochar is charred residues of biomass converted to inorganic carbon through a process of pyrolysis. This leads to the formation of stable biochar which, when stored in soil, can contribute to carbon sequestration and reduce greenhouse gas emissions. Biochar is also a measure for climate change adaptation in agriculture because it contributes to increasing the soil's ability to retain water and nutrients.

Biodiversity: Biodiversity is the diversity of life on earth. This term covers living organisms (the species), the habitats (the ecosystems) these species live in and the diversity within and between the species. In other words, biodiversity is all the forms of life in nature, such as plants, animals and their habitats.

Sustainable development: Sustainable development is development that satisfies current needs without destroying the opportunities for future generations to satisfy their needs.

Direct greenhouse gas emissions: Emissions that occur as a direct result of an action at a physical place, including all forms of combustion and decaying processes. For indirect emissions, see climate footprint.

Catch crop: A fast-growing plant that is grown between annuals to prevent surface runoff, erosion and nitrate leaching. Catch crops means the soil is covered by crops for a higher proportion of the year because they continue growing after the main crop has been harvested. Catch crops absorb nutrients and bind nutrients in the soil, which prevents the runoff and leaching of the nutrients.

UN Global Development Goals: A global blueprint to eradicate poverty, reduce inequalities and combat climate change by 2030. There are 17 main goals and 169 sub-goals.

Reuse: Items that have become surplus to requirements or unnecessary are reused instead of being disposed of. Recycling is the reprocessing of an item into a raw material for use in a new product.

Co-use: Buildings can serve several functions (school, banqueting hall and clubhouse).

Institutionalise: Used to get something into a fixed, rule-governed form or turn it into an institution, i.e. establish it as a fundamental and normative service, alignment or factor in the society or organisation. Examples of this include how responsibilities and roles are distributed (organisation) and budget processes are organised, which funding schemes and competence development programmes are available, and how these are organised. Without systematic institutionalisation, change processes can often be limited to engagement and debate and not produce definitive results.

Carbon Capture and Storage (CCS): Capture of CO₂ from a process

Climate budget: A climate budget shows how much greenhouse gas emissions must be reduced to achieve the municipality's climate target. The budget also shows how effective various measures are, so the correct measures may be prioritised. A climate budget provides an overview and makes it clear who is responsible for the various measures.

Climate footprint: A calculation of the total impact on the climate from an action or good/service. This includes the entire value chain, i.e. everything related to production, transport, storage and disposal.

The Climate Change Act: The Act relating to Norway's climate targets (Climate Change Act) was passed by the Norwegian parliament, the Storting, in 2017. The Ministry of Climate and Environment has the overarching responsibility for Norwegian climate policy. The policy is rooted in the Storting through two cross-party agreements on climate policy (in 2008 and 2012) and several White Papers, the latest in 2018.

Emission permit: A permit to emit 1 tonne of CO₂. Emission permits have a market price and may be traded. The EU Emissions Trading Scheme is designed to contribute to reducing emissions cost-effectively.

Climate neutrality: Not contributing to global warming. This can be achieved by having net zero emissions or by compensating for emissions by buying emission permits or investing in measures to reduce emissions or remove CO₂ from the atmosphere.

Transformation: Measures that reduce greenhouse gas emissions and adapt for climate change. There are three levels of measures: improving efficiency, development and transformation. Measures leading to profound innovation will be necessary to succeed in the transformation to a low-emission society.

Climate change profile: Such profiles provide a summary of the current climate, expected climate change and climate challenges. They focus on changes from the current climate (1971-2000) to the end of the century (2071-2100) and describe expected climate change with high greenhouse gas emissions. This corresponds to the emissions continuing to increase at the same rate as in recent decades. This choice was made because, in the White Paper on Climate Change Adaptation, the Government states that as a "precautionary", high greenhouse gas emissions from the national climate projections shall be used as a basis for assessing the consequences of climate change. The climate change profiles provide a platform of knowledge about climate challenges for the overarching planning.

Climate accounts: Climate accounts show the total greenhouse gas emissions in a life cycle perspective, including both direct and indirect emissions. The basis for calculating emissions is existing account information, physical data for energy consumption, fuel and waste, as well as the number of flights.

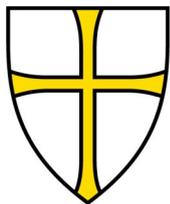
Climate risk: describes the consequences of global warming in relation to four risk categories: physical risk, transition risk, liability risk and litigation risk.

Linear economy: The traditional market economy is characterised by the production of goods in a straight line without reuse and recycling. However, the Earth's ecosystems have limited capacity to absorb resources that we don't utilise in our economic system. As consumption and interference with nature continues to increase, the ecosystems are changing. This reduces the possibilities for a continuation of the stable framework for the human way of life.

Circular economy: The goal in a circular economy is that "waste" will be a virtually unknown concept because these resources are used in the economy. The path towards zero waste starts with the source of the waste – the extraction of raw materials. A circular economy can reduce the extraction of what are traditionally called primary raw materials or natural resources. The goal in a circular economy is that these are replaced by using

residual raw materials from the production, repairing and reusing products and finally recycling resources into new products, so residual raw materials and waste gain new value and become a resource. When resources are injected back into the economy and used in production again, they are called secondary raw materials.

The Paris Agreement: The Paris Agreement is an international agreement on climate policy. It was adopted as a legally binding agreement under the UN Framework Convention on Climate Change at a climate summit in Paris on 12 December 2015. Through the Paris Agreement, Norway has an obligation to reduce its emissions by at least 50% by 2030 compared to 1990 levels. This means that some of the emission reductions can be implemented in other European countries.



Trøndelag fylkeskommune
Trööndelagen fylhkentjielte



WE ARE MAKING
HISTORY