



EUROPE

DAMVAD • ANALYTICS

Addressing societal challenges in Norway

Key trends, future scenarios, missions and structural measures

Salil Gunashekar, Emily Ryen Gloinson, Fay Dunkerley, Mann Virdee, Camilla d'Angelo, Carolina Feijao, Gemma-Claire Ali, Mikkel Skjoldager, Andrea Skjold Frøshaug and Torben Bundgaard Vad



**Foresight study for the
Research Council of
Norway to help inform
the future of research
and innovation in Norway**

RAND Europe team: Salil Gunashekar, Emily Ryen Gloinson, Fay Dunkerley, Mann Virdee, Camilla d'Angelo, Carolina Feijao and Gemma-Claire Ali

DAMVAD Analytics team: Mikkel Skjoldager, Andrea Skjold Frøshaug and Torben Bundgaard Vad

For more information on this publication, visit www.rand.org/t/RRA966-1

About RAND Europe

RAND Europe is a not-for-profit research organisation that helps improve policy and decisionmaking through research and analysis. To learn more about RAND Europe, visit www.randeurope.org.

Research Integrity

Our mission to help improve policy and decisionmaking through research and analysis is enabled through our core values of quality and objectivity and our unwavering commitment to the highest level of integrity and ethical behaviour. To help ensure our research and analysis are rigorous, objective, and nonpartisan, we subject our research publications to a robust and exacting quality-assurance process; avoid both the appearance and reality of financial and other conflicts of interest through staff training, project screening, and a policy of mandatory disclosure; and pursue transparency in our research engagements through our commitment to the open publication of our research findings and recommendations, disclosure of the source of funding of published research, and policies to ensure intellectual independence. For more information, visit www.rand.org/about/principles.

RAND's publications do not necessarily reflect the opinions of its research clients and sponsors.

Published by the RAND Corporation, Santa Monica, Calif., and Cambridge, UK

RAND® is a registered trademark.

Cover image: Adobe Stock

© Research Council Norway (2021)

All rights reserved. No part of this report may be reproduced in any form by any electronic or mechanical means (including photocopying, recording, or information storage and retrieval) without permission in writing from Research Council Norway.

Preface

As part of its current strategy (2020–2024), the Research Council of Norway (RCN) has three primary objectives: ground-breaking research and radical innovation, sustainable development, and restructuring of the business and public sectors. Against this backdrop, the RCN commissioned RAND Europe and DAMVAD Analytics to carry out a foresight study to help inform the future of research and innovation (R&I) in Norway. The work will contribute to the development of a robust evidence base for the RCN’s input to the revision of the Norwegian government’s Long-Term Plan for Research and Higher Education 2019–2028 (hereafter, LTP). The study will also help inform the RCN’s internal decision making, strategies and organisational activities.

The study focuses on the five strategic areas identified in the RCN’s current strategy: (i) oceans; (ii) green transition; (iii) health and welfare; (iv) cohesion and globalisation; and (v) technology and digitalisation. The specific aims of the study were to:

- Identify a set of potential priority missions or targeted, challenge-based policy actions within and across (or outside) the five strategic areas that the RCN, together with other stakeholders, could consider implementing in the future to help address societal challenges; and
- Identify system-level structural measures to potentially facilitate the development of a resilient R&I environment in Norway.

We adopted a mixed-methods, participatory approach to the research, involving a variety of methodologies, such as trend analyses, literature reviews, stakeholder interviews, focus groups, an online survey of the public, crowdsourcing ideas and information from experts, future scenario analyses and workshops. All of these methods are covered in this report.

We envisage that the research will be of interest to funders and academia, national and local government policymakers, innovators and practitioners, and industry, and, more broadly, to anyone – including the public – interested in R&I and wider societal challenges.

This overarching summary report is one in a series of nine reports presenting the key findings of the study. The other reports are as follows:

- Health and welfare: An analysis of trends, future directions and potential missions to address societal challenges in Norway
- Oceans: An analysis of trends, future directions and potential missions to address societal challenges in Norway
- Green transition: An analysis of trends, future directions and potential missions to address societal challenges in Norway
- Technology and digitalisation: An analysis of trends, future directions and potential missions to address societal challenges in Norway
- Cohesion and globalisation: An analysis of trends, future directions and potential missions to address societal challenges in Norway

- Structural measures to develop a resilient research and innovation environment in Norway
- A summary of potential cross-cutting missions to address future societal challenges in Norway
- Addressing future societal challenges in Norway: Detailed methodology report

We have been able to conduct this study because of the contributions of many individuals. We would like to thank the project team at the Research Council of Norway for their excellent guidance, support and advice over the course of the study. In particular, we would like to thank Stig Slipersæter and Philip Lorentzen. We are also grateful to the executive board of the RCN for constructively engaging with us at various points in the study. We would like to thank Andrew Curry (School of International Futures) for helping organise and run the stakeholder foresight workshops. We are grateful for the valuable inputs from the members of our advisory panel of experts, namely, Dr Sonja Marjanovic (RAND Europe, health and welfare expert), Stijn Hoorens (RAND Europe, cohesion and globalisation expert), Prof. Paula Kankaanpää (Marine Research Centre, the Finnish Environment Institute (Suomen ympäristökeskus, SYKE), oceans expert), Prof. Eeva Primmer (SYKE, green transition expert), Dr Jonathan Cave (University of Warwick, technology and digitalisation expert), Prof. Hakan Sicakkan (University of Bergen, cohesion and globalisation expert), and Mona Skaret (Bouvet ASA, research and innovation expert). We are also very grateful to the many stakeholders – across academia, industry, government, the third sector and the public – who kindly agreed to engage with the study at various stages. Finally, we would like to thank our quality assurance reviewers, Dr Susan Guthrie (RAND Europe) and Asbjørn Boye Knudsen (DAMVAD Analytics), for their valuable advice and critical review of the research.

RAND Europe is a not-for-profit research organisation that aims to improve policy and decision making in the public interest, through research and analysis. RAND Europe's clients include European governments, institutions, non-governmental organisations and firms with a need for rigorous, independent, multidisciplinary analysis. DAMVAD Analytics is a Nordic, research-based consultancy with offices in Copenhagen and Stockholm. DAMVAD's consultants have strong analytical and evaluation skills and specialised knowledge regarding research and innovation policy throughout the Nordic region, including Norway.

For more information about this document, please contact:

Dr Salil Gunashekar (Research Leader in Science
and Emerging Technology)
RAND Europe Westbrook Centre, Milton Road
Cambridge CB4 1YG, United Kingdom
Tel. +44 (1223) 353 2562
Email: sgunashe@randeurope.org

Torben Bundgaard Vad (VD, Partner, Ph.D.)
DAMVAD Analytics
Overgaden Oven Vandet 58A
1415 Copenhagen K, Denmark
Tel. +45 2444 7554
Email: tva@damvad.com

Table of contents

Preface	1
Figures	4
Tables	5
Boxes	6
Abbreviations	7
1. Introduction.....	8
1.1. Objectives of the study.....	9
1.2. Conceptual framework for the study	11
1.3. Summary of the methodology.....	12
1.4. Outline of the report.....	15
2. Trends shaping developments within the strategic areas.....	17
2.1. Oceans.....	17
2.2. Health and welfare.....	18
2.3. Green transition.....	19
2.4. Technology and digitalisation	20
2.5. Cohesion and globalisation	22
3. Future scenarios to examine potential missions and structural measures.....	24
3.1. Future scenarios to 2040.....	24
3.2. Summaries of the scenarios corresponding to the future scenario sets	25
4. Indicative priority missions within and across the RCN’s five main strategic areas	28
4.1. The need for missions to address future societal challenges in Norway	28
5. Structural measures for further consideration	35
5.1. Structural measures underpinning the missions.....	35
5.2. Key needs underpinning the proposed structural measures.....	35
5.3. Different archetypes of structural measures	36
5.4. Potential structural measures.....	37
6. Concluding remarks	39
Bibliography.....	41
Annex A. Future scenario narratives used in the study.....	46
A.1. Future scenario narratives for the scenario set pertaining to ‘Norway in a national context’ ...	47
A.2. Future scenario narratives for the scenario set pertaining to ‘Norway in a global context’	51
Annex B. Details of indicative mission areas	55

Figures

Figure 1. The RCN’s five strategic areas identified in its current strategy (2020–2024) and the respective visions for each area.....	9
Figure 2. Conceptual framework for the study.....	11
Figure 3. High-level overview of our approach to implementing the research	12
Figure 4. Main data collection activities undertaken in the research.....	13
Figure 5. Plausible future scenarios, presenting a wide range of potential future states	14
Figure 6. Concise summaries of scenarios corresponding to future scenario set 1: Norway in a national context	26
Figure 7. Concise summaries of scenarios corresponding to future scenario set 2: Norway in a global context	27
Figure 8. Indicative priority missions proposed within and across the RCN’s five strategic areas.....	30

Tables

Table 1. Summary of indicative mission ideas and corresponding exemplar targeted focus areas.....	31
Table 2. Overview of structural measure high-level archetypes.....	37
Table 3. Overview of potential structural measures.....	38

Boxes

Box 1. Summary of key trends related to the oceans strategic area	18
Box 2. Summary of key trends related to the health and welfare strategic area	19
Box 3. Summary of key trends related to the green transition strategic area	20
Box 4. Summary of key trends related to the technology and digitalisation strategic area	22
Box 5. Summary of key trends related to the cohesion and globalisation strategic area.....	23
Box 6. Key to the mission templates presented in the following sections.....	55

Abbreviations

3D	Three-dimensional
AI	Artificial intelligence
LTP	The Long-Term Plan for Research and Higher Education 2019–2028 – Meld. St. 4 (2018–2019) Report to the Storting (white paper)
OECD	Organisation for Economic Co-operation and Development
RCN	Research Council of Norway
R&D	Research and development
R&I	Research and innovation
SDGs	[United Nations] Sustainable Development Goals
SIVA	Selskapet for industrivekst [Industrial Development Corporation of Norway]
SME	Small to medium-size enterprise
UN	United Nations

1. Introduction

The research and innovation (R&I) landscape in Norway is underpinned by Norway's overarching ambition for research and higher education, which is to help facilitate growth in overall value creation, to create new and profitable jobs, to restructure the Norwegian economy and to help implement a transition towards a greener society (Ministry of Education and Research 2019). The development of a strong knowledge base through research is necessary to fulfil these ambitions and also to train the Norwegian workforce (Ministry of Education and Research 2019). The Long-Term Plan for Research and Higher education¹ (hereafter LTP) details the Norwegian government's ambitions and policy for research and higher education in Norway. The LTP establishes ten-year objectives and priorities and concrete goals for efforts in the upcoming four-year period. It sets the course for policy development and investments in research and higher education in Norway.

The Research Council of Norway (RCN) plays a critical role in the Norwegian and international research and innovation landscape as the national funding agency for R&I. In its current strategy (2020–2024), the RCN details priorities and goals to help realise the objectives of the LTP (Research Council of Norway 2020b). As part of its current strategy, the RCN has articulated the following three primary objectives, with the overarching view of achieving a 'well-functioning research and innovation system' (Research Council of Norway 2020b):

- Sustainable development;
- Ground-breaking research and radical innovation; and
- Restructuring of the business and public sectors.

Within this framework, the RCN has also identified five core 'strategic areas' (as shown in Figure 1 below), within which to focus its priorities and portfolio plans and within which to deliver high-impact research and innovation (Research Council of Norway 2020b). The five strategic areas are: (i) oceans; (ii) green transition; (iii) health and welfare; (iv) cohesion and globalisation; and (v) technology and digitalisation.

¹ The Long-Term Plan for Research and Higher Education 2019–2028 – Meld. St. 4 (2018–2019) Report to the Storting (white paper).

Figure 1. The RCN’s five strategic areas identified in its current strategy (2020–2024) and the respective visions for each area



Source: Adapted from (Research Council of Norway 2020a)

1.1. Objectives of the study

Against this backdrop, the RCN commissioned RAND Europe and DAMVAD Analytics to carry out a foresight study to contribute to the development of a robust evidence base for the RCN’s input to the 2022 revision of the Long-Term Plan for Research and Higher Education 2019–2028 (Ministry of Education and Research 2019). The study will also help inform the RCN’s internal decision making, strategies and organisational activities. The study focuses on the five main strategic areas identified in the RCN’s current strategy for the next ten years (Research Council of Norway 2020b) and is intended to help frame thinking

about the future of R&I in relation to these strategic areas in Norway. As noted above, the five strategic areas covered by this study are: (i) oceans; (ii) green transition; (iii) health and welfare; (iv) technology and digitalisation; and (v) globalisation and cohesion. In particular, the study aims to:

- Identify a set of potential priority missions or targeted, challenge-based policy actions within and across (or outside) the five strategic areas for the next ten years that the RCN, together with other stakeholders, could consider implementing in the future to help address societal challenges; and
- Identify a series of system-level structural measures to facilitate the development of a resilient R&I environment in Norway.

For this study, we regard missions as targeted, timebound, measurable priority actions to help solve one or more societal challenges that the RCN and other stakeholders could consider developing and implementing in the future. In the long term, the missions will help the RCN achieve its overarching objectives (over a roughly ten-year time frame) and eventually contribute to enriching lives locally, nationally and internationally.² Structural measures can be considered to be foundational, system-level instruments, policies or tools in the R&I landscape that contribute to the translation of R&I into wider societal benefits. In the context of this study, they are intended to be a range of measures (with varying levels of specificity and generally cutting across multiple strategic areas) that help develop a resilient R&I environment in Norway and also address the wider performance of the R&I system in terms of the RCN's three overarching objectives. Missions and structural measures will both require diverse stakeholders to be involved in their development and implementation. The interaction between missions and structural measures is discussed in more detail in our conceptual framework, in the next section.

This report, one in a series of nine reports, provides a high-level summary of key components of the study.³ It focuses on the findings related to the trends shaping the direction and development of the strategic areas, the set of indicative priority missions proposed within and across the strategic areas, suggested structural measures underpinning the missions, and the future scenarios that were developed to examine the ideas for missions and structural measures. More specific information and details related to the five strategic areas can be found in the respective strategic area reports. This report should be read in conjunction with the reports describing the cross-cutting missions (Gunashekar et al. 2021a), the structural measures (Skjoldager et al. 2021c), and the detailed methodology (Gunashekar et al. 2021b).

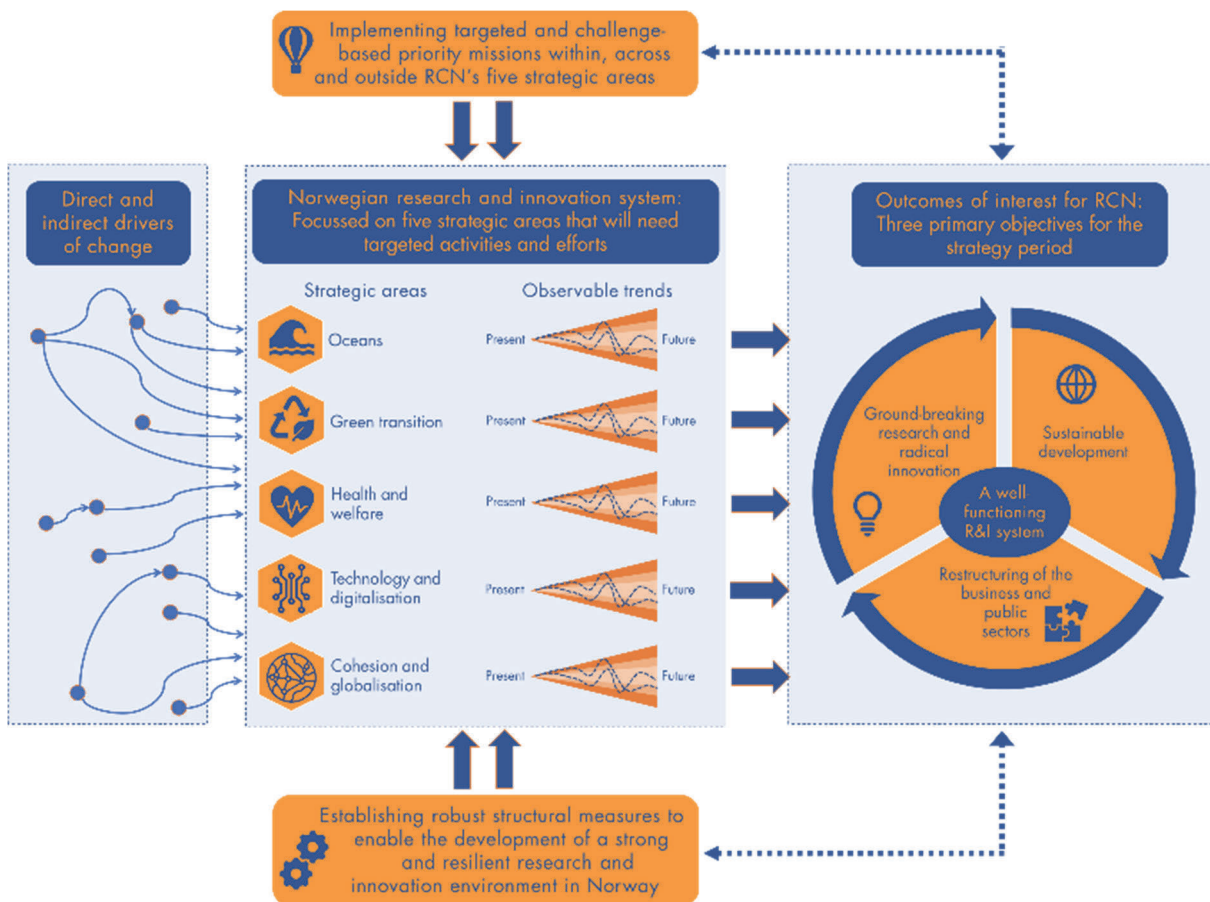
² More broadly, missions are systemic policies that operate both as a means of steering economic growth in a particular direction (by, for example, steering investments towards particular societal challenges) and as a tool that can be used to get there (by, for example, setting clear, problem-focused objectives) (Mazzucato 2018). Further details are provided in Chapter 4 of this report.

³ This report is one in a series of nine reports describing the findings of the study. The other reports are as follows: Health and welfare: An analysis of trends, future directions and potential missions to address societal challenges in Norway (Gloinson et al. 2021a); Oceans: An analysis of trends, future directions and potential missions to address societal challenges in Norway (Skjoldager et al. 2021b); Green transition: An analysis of trends, future directions and potential missions to address societal challenges in Norway (Skjoldager et al. 2021a); Technology and digitalisation: An analysis of trends, future directions and potential missions to address societal challenges in Norway (d'Angelo et al. 2021); Cohesion and globalisation: An analysis of trends, future directions and potential missions to address societal challenges in Norway (Gloinson et al. 2021b); Structural measures to develop a resilient research and innovation environment in Norway (Skjoldager et al. 2021c); A summary of potential cross-cutting missions to address future societal challenges in Norway (Gunashekar et al. 2021a); and Addressing future societal challenges in Norway: Detailed methodology report (Gunashekar et al. 2021b).

1.2. Conceptual framework for the study

Our overall conceptual framework (Figure 2) was targeted at providing a key analytical tool to enable us to carry out a rigorous, detailed and comprehensive futures analysis for the RCN. It is based on a participatory approach involving a range of diverse stakeholders, detailed trend analyses and rigorous scenario planning that contributed to the conceptualisation and achievement of the overarching aims of the study, i.e. to identify a set of potential priority missions related to the RCN's five strategic areas and underlying structural measures to enable the development of a robust, resilient and socially responsible research and innovation environment in Norway.

Figure 2. Conceptual framework for the study



Source: Study team analysis

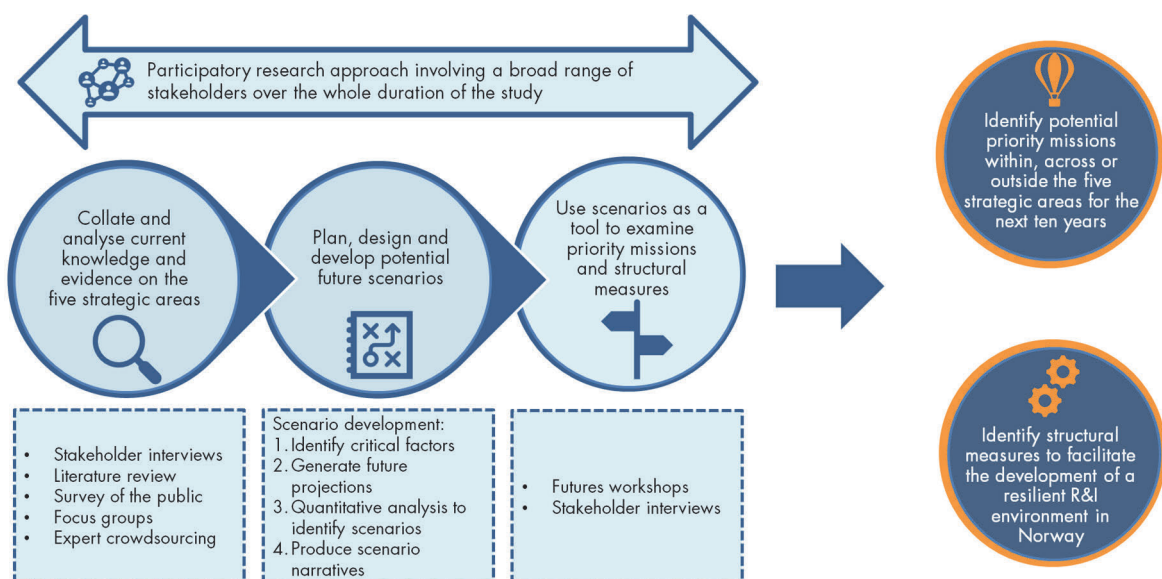
The conceptual framework for the study shown in Figure 2 provides a systems-level view of the various high-level interconnected components of the R&I ecosystem. A series of potentially interconnected drivers (as shown on the left of the figure) can either directly or indirectly influence or cause change in the wider Norwegian R&I system. The system itself is characterised by a series of observable trends or discernible patterns of change relating to the five strategic areas, as illustrated in the middle of the figure. An evidence-based foresight approach to explore a range of plausible futures can help the RCN arrive at decisions 'today' that will potentially mitigate future risks and enable future opportunities to be better anticipated. The conceptual framework therefore illustrates the importance not only of realising benefits for the Norwegian

R&I system, but also of managing and mitigating against risks. As shown on the right of the figure, the system is also composed of the main outcomes of interest to the RCN, which are their primary objectives over the current strategy period (2020–2024) (i.e. sustainable development, ground-breaking research and radical innovation, and restructuring of the business and public sectors). If these outcomes are achieved, this could help realise the RCN’s overarching desired outcome of a ‘well-functioning research and innovation system’. To accomplish these high-level goals, it is necessary to have a set of policy levers or actions that can help steer the system towards the outcomes of interest. Therefore, identifying and implementing a set of targeted, timebound and challenge-based actions – or priority missions – within and across (or even outside) the RCN’s strategic areas could form the basis for recognising concrete focus areas for the future. Furthermore, implementing the missions successfully will require the establishment or improvement – in parallel – of key underpinning structural measures at a systemic level. Thus, a mix of appropriate structural measures, together with a set of carefully developed priority missions – and both involving diverse stakeholders – could help the RCN meet its current objectives and ultimately contribute to enriching lives locally, nationally and internationally.

1.3. Summary of the methodology

This section provides a summary of the research approach and methodology. A detailed description of the methodology is provided in the accompanying methodology report (Gunashekar et al. 2021b). We adopted a mixed-methods, participatory approach to the research to achieve the study objectives, as illustrated in Figure 3. The methods included literature reviews, stakeholder interviews, focus groups, a survey of the public, crowdsourcing ideas and information from experts, future scenario analyses and workshops. Over the course of the study, we engaged with a broad range of stakeholders across academia, government, industry, the not-for-profit sector, the RCN and the public.

Figure 3. High-level overview of our approach to implementing the research

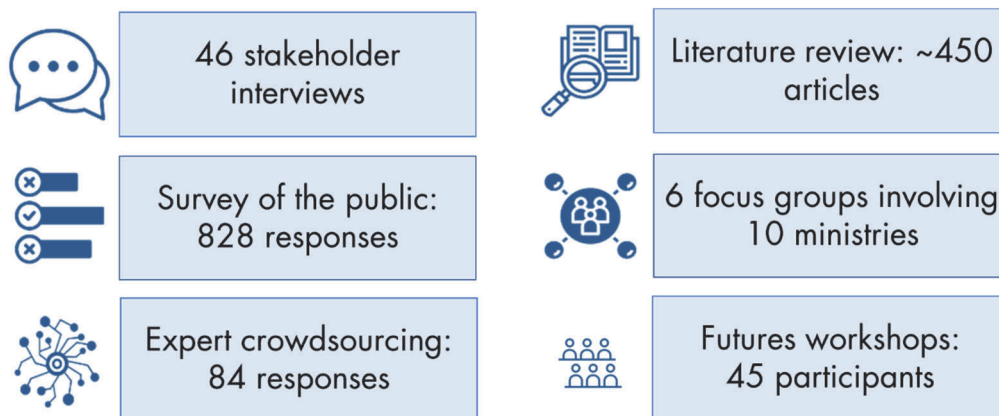


Source: Study team analysis

Trend analyses

As noted in the previous section, each strategic area is characterised by several trends that are shaping developments and driving change within those areas. In the first phase of the study, we carried out a detailed trend analysis for each strategic area, by collecting and analysing wide-ranging evidence to help develop a robust knowledge and information base. The information collected in the trend analysis enabled us to develop a deep and rounded understanding of the status quo and direction of travel within (and outside) the R&I landscape for each strategic area (oceans, green transition, health and welfare, technology and digitalisation, and globalisation and cohesion). Specifically, we identified the main trends, enablers, barriers and uncertainties that will potentially shape the strategic area over the next ten years or so. The trend analyses also directly informed the indicative priority missions⁴ and structural measures. The trend analysis synthesised evidence from the main data collection activities, as outlined in Figure 4.

Figure 4. Main data collection activities undertaken in the research



Source: Study team analysis

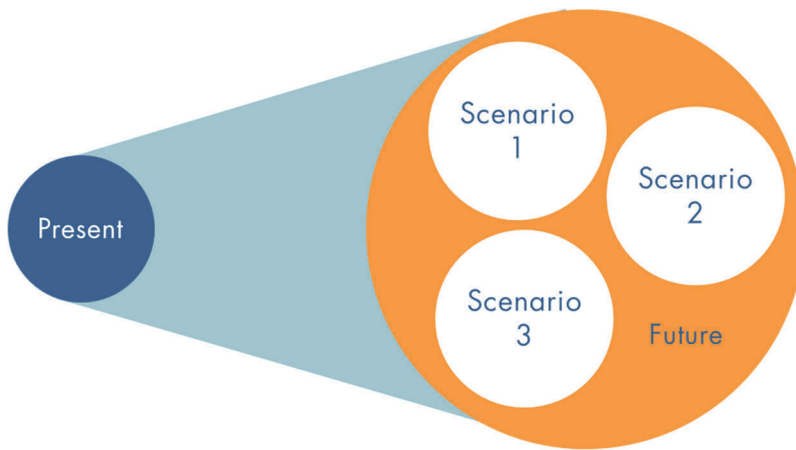
Scenario methodology

In the second phase of the study, we designed and developed plausible future scenarios using the information collected in the trend analyses (Figure 5). Scenarios are stories or narratives that are used to describe the alternative and possible ways in which a situation or environment might develop in the future (Government Office for Science 2017). Within each scenario, there is a complex network of influence factors⁵ that shape that future (Gausemeier et al. 1998).

⁴ For clarity and ease of reference, we reiterate what we mean by missions in the context of this study. We regard missions as targeted, timebound, concrete priority actions to help solve one or more societal challenges that the RCN, together with other stakeholders, could consider implementing in the future. The missions will help the RCN achieve its overarching objectives (over a roughly ten-year time frame) and eventually contribute to enriching lives locally, nationally and internationally. Further information is provided in Chapter 4 of this report.

⁵ In this study, the influence factors have been found based on the trends, barriers, enablers and uncertainties we identified in the trend analyses.

Figure 5. Plausible future scenarios, presenting a wide range of potential future states



To build scenarios of sufficient depth and distinctiveness, we used a rigorous and iterative process that involved the examination of the different factors, enablers, barriers and drivers of change that are shaping developments within, across and outside the five strategic areas. We generated two sets of scenarios by combining different aspects of the five strategic areas (in Figure 5, the orange area represents an exemplar set of three distinct future scenarios). Each scenario set comprised four distinct scenarios based on 15–20 prioritised political, economic, social, technological, legal and environmental (PESTLE) factors from the trend analyses that could influence the strategic areas (specifically, these factors were derived from the trends, enablers, barriers and uncertainties that were identified in the trend analyses). The two scenario sets were as follows:

- **Scenario set 1 (*Norway in a national context*):** The first scenario set broadly focuses on Norway in a national context, largely relating to the Norwegian domestic agenda. This scenario set encompasses health, welfare, education, work and skills, cohesion, and relevant aspects of technology and digitalisation, and it also covers some aspects related to green transition (for example, in relation to the circular economy).
- **Scenario set 2 (*Norway in a global context*):** The second scenario set focuses on Norway in an international or global context, primarily relating to Norway’s outward-facing role. It broadly covers themes related to climate, oceans, energy, transport, food, biodiversity, globalisation and relevant aspects of technology and digitalisation.

Examining potential missions and structural measures

The different scenarios facilitate the anticipation of what might happen in the next 20 years and help reflect changes in the R&I system as well as the wider, ‘macro’ environment. We used the scenario sets as the basis for discussions at two virtual foresight workshops, attended by a total of 45 stakeholders (across academia, industry, the third sector and the RCN). Using the scenarios to represent a range of distinct and plausible future states, workshop participants examined and validated a series of indicative priority missions and discussed potential structural measures. Following the workshops, a set of interviews were conducted with additional stakeholders and further desk research was carried out. The indicative missions and structural measures were further refined and updated based on feedback received at the workshops and on the additional desk research and interviews.

1.3.1. Caveats of the analysis

When reading and interpreting the analyses presented in this report, there are some caveats that need to be considered. The study analyses the trends, future directions, and potential missions regarding the five strategic area of the RCN's current strategy. Some of the strategic areas – notably, cohesion and globalisation, technology and digitalisation, and green transition – are wide-ranging, complex and rapidly evolving areas, both in Norway but also more broadly in a global context. To accomplish the key objectives of the study while implementing the research within the timelines, we have had to keep the research focused on key topics of importance, not aiming for a systematic coverage of all topics. While the areas of focus might not be exhaustive, as outlined in the previous section, we adopted a participatory approach to the study – involving a diverse range of stakeholders – and incorporated a variety of different methods to triangulate the evidence. This has enabled us to cover a wide spectrum of important issues related to the five strategic areas (and beyond) in the context of Norway.

The ideas for the priority missions and structural measures that we have articulated are not intended to be definitive or exhaustive. Each mission, for instance, is proposed as an indicative idea at this stage based on the evidence collected during the research. The missions were examined and validated at stakeholder workshops and then further updated based on feedback received at the workshops and from the RCN. The collection of missions that we have presented represent a broad spectrum of ideas for further consideration and exploration by the RCN – and other stakeholders – that might be involved in the process to implement any potential missions in the future. This is also the case with the structural measures, which are cross-cutting in nature and will need to involve multiple stakeholders. The potential structural measures we have suggested also differ in terms of their level of specificity and their relevance to the five strategic areas. Where possible, we have focused on proposing measures that are relevant to multiple strategic areas, whilst also being applicable to some of the wider R&I needs in Norway. For structural measures to be successful, they must therefore be conceptualised and understood in the Norwegian R&I context. Furthermore, some of structural measures we have suggested are new to the Norwegian context, while others are already employed to different degrees within the wider Norwegian R&I system. Based on our analysis, we suggest either scaling up or adjusting certain measures to ensure potentially greater impact in the Norwegian R&I system.

1.4. Outline of the report

The remainder of the report is structured as follows:

- In Chapter 2, we summarise the trends shaping developments in the five strategic areas (oceans, health and welfare, green transitions, technology and digitalisation, and cohesion and globalisation).
- In Chapter 3, we summarise the two scenario sets and the associated future scenarios we employed at the foresight workshops to examine the indicative missions and structural measures.
- In Chapter 4, we list the indicative priority missions (and associated targeted focus areas) that fall within and across the five strategic areas.
- In Chapter 5, we provide a high-level summary of suggested structural measures to enable the development of a resilient R&I environment in Norway.

- In the Annexes, we present (i) the comprehensive versions of the scenario narratives (Annex A); and further specific details related to the indicative priority missions (Annex B).

2. Trends shaping developments within the strategic areas

This chapter provides a high-level summary of the key trends influencing developments within the five strategic areas and their direction of travel. We have drawn on the published literature (both peer-reviewed and grey literature) and additional information and insights provided by a range of stakeholders across academia, industry, government, the third sector and the RCN. Detailed information related to the trends, as well as additional information on the important barriers, enablers and uncertainties, are included in the companion strategic area reports.⁶

2.1. Oceans

Ocean industries and the blue economy⁷ are key sectors for Norway. Ocean industries remain some of the largest industries and value creators for Norway in terms of exports and jobs (OECD 2018). At the same time, oceans are a large part of many Norwegians' everyday lives. To ensure a focused analysis in the study, a demarcation of the area is needed. This analysis will focus on trends in areas that can be considered Norwegian positions of strength as presented in the RCN strategy document and the portfolio board descriptions (Research Council of Norway 2020a). These include (for example) fishing, aquaculture, offshore petroleum extraction and shipping (Research Council of Norway 2020a). An increased impact from climate change, pollution and other types of anthropogenic effects acts as a backdrop to drive a lot of the changes in the area. This is especially important in a High North setting such as Norway's, where biodiversity is fragile (World Wide Fund for Nature 2018). Furthermore, the challenges and opportunities that face the strategic area are international not only in their scope, but also in their development (United Nations 2020). That means that international trends directly affect Norwegian oceans and industries, but also that Norwegian initiatives have the potential to impact beyond Norwegian borders.

In the box below, we summarise the key trends that were identified in relation to oceans.

⁶ The strategic area reports are as follows: Health and welfare: An analysis of trends, future directions and potential missions to address societal challenges in Norway (Gloinson et al. 2021a); Oceans: An analysis of trends, future directions and potential missions to address societal challenges in Norway (Skjoldager et al. 2021b); Green transition: An analysis of trends, future directions and potential missions to address societal challenges in Norway (Skjoldager et al. 2021a); Technology and digitalisation: An analysis of trends, future directions and potential missions to address societal challenges in Norway (d'Angelo et al. 2021); Cohesion and globalisation: An analysis of trends, future directions and potential missions to address societal challenges in Norway (Gloinson et al. 2021b).

⁷ The blue economy refers to all economic activities related to oceans, seas and coasts that together determine whether the use of resources from the ocean is sustainable (European Commission 2021; World Bank & United Nations Department of Economic and Social Affairs 2017). These activities can take place in the marine environment (which includes shipping, fisheries and energy generation) or on land (which includes ports, shipyards, land-based aquaculture and the production of algae) (European Commission 2021).

Box 1. Summary of key trends related to the oceans strategic area

- **Trend 1:** There is a demand for more data, more monitoring and more predictable models for understanding ocean dynamics.
- **Trend 2:** A rise in invasive alien species due to changing temperatures will pose threats to ecosystems.
- **Trend 3:** There is an increasingly higher demand for cybersecurity solutions in ocean industries.
- **Trend 4:** There is an increased focus on developing sustainable methods of petroleum extraction.
- **Trend 5:** Sustainable petroleum extraction is seen as a quick fix, not a solution for sustainability.
- **Trend 6:** Smarter and greener shipping will play an important role in the reduction in CO₂ in heavy transportation.
- **Trend 7:** There is an increased emphasis on the holistic nature of ecosystems in the ocean, which leads to new forms of regulation and an international focus.
- **Trend 8:** Norwegian aquaculture is seen as a potential solution to solving hunger and ensuring better nutrition worldwide.
- **Trend 9:** Buying local could potentially put great pressure on the Norwegian fish and aquaculture industries.
- **Trend 10:** Consumer demand for product labelling and traceability of product origins will play a greater importance in relation to fish products.

2.2. Health and welfare

Ensuring good health and access to welfare services is necessary to deal with demographic and social changes in the Norwegian population and globally (Research Council of Norway 2020a). Thematically, the health and welfare strategic area is broadly characterised as encompassing: ‘human health and health-promoting conditions, prevention, diagnostics, treatment of diseases and functional limitations, rehabilitation and organisation and streamlining of services in the health and care sector’ (Research Council of Norway 2020a). In the context of the RCN’s work, this applies to basic research, applied research and development, and innovation that is research-based (Research Council of Norway 2020a).

Norwegians lead longer and healthier lives than the citizens of many European countries (World Health Organization 2020b). Since the 2000s, life expectancy has increased consistently as a result of effective public health policy that has reduced the likelihood of risk factors having an impact on Norway, as well the health system’s capacity to deliver high-quality treatment and care to the population (OECD & European Observatory on Health Systems and Policies 2019). However, Norway spends more on health per capita than any other EU country with a significant share of funding dedicated to long-term health and welfare delivery (OECD & European Observatory on Health Systems and Policies 2019). Norway also faces additional challenges with an ageing population that is expected to put pressure on Norwegian health budgets and which requires strategies to improve effectiveness and to strengthen health and welfare for individuals with chronic illnesses (OECD & European Observatory on Health Systems and Policies 2019).

Other challenges relate to social inequality in health, education and living conditions in Norway and globally (World Health Organization 2020b).

The RCN notes that the provision of adequate health and welfare to a diverse population requires more research-based knowledge to facilitate the development of effective measures to reduce inequalities in health and living conditions (Research Council of Norway 2020a). These measures include ensuring adequate living conditions and educational opportunities for children and young people, and health promotion from a young age (Norden 2014; OECD & European Observatory on Health Systems and Policies 2019). Digital and technological solutions will also play an important role in the future of health and welfare (World Health Organization 2019). It is also necessary to strengthen the knowledge base and basic research to facilitate broad-based public health efforts that are cross-sectoral and to understand the best ways to protect the population from health threats both nationally and globally (Research Council of Norway 2020a).

In the box below, we summarise the key trends that were identified in relation to health and welfare.

Box 2. Summary of key trends related to the health and welfare strategic area

- **Trend 1:** Rapid developments in technological innovation and digitalisation are impacting health and welfare in Norway.
- **Trend 2:** Labour market needs are changing in Norway.
- **Trend 3:** Demographic changes in Norway increasingly present health, social welfare, and economic challenges.
- **Trend 4:** Increasing personalisation of medicine and healthcare presents several opportunities.
- **Trend 5:** Research and innovation related to welfare and health are dealing with more complex issues.
- **Trend 6:** Non-communicable diseases are having an increasingly significant impact in Norway.
- **Trend 7:** There has been a significant effort to reform and strengthen health and healthcare in Norway.
- **Trend 8:** There is increasing demand for qualified healthcare personnel in Norway.
- **Trend 9:** The prevalence of mental disorders in Norway is increasingly important.
- **Trend 10:** Education challenges are expected to grow as Norway upskills and employment market needs diversify.

2.3. Green transition

To effectively address climate change requires changes in the way we think about our lives, the economy and production. Green transition is a concept that encompasses these and other changes (European Commission 2019). The RCN's strategy for 2020–2024 details four key aims related to the RCN's investment in research and innovation for the green transition, to promote: (i) a rapid transition to a zero-emissions society and effective adaptation to climate change; (ii) a circular economy that is based on sustainable production, services and consumption; (iii) a sustainable bioeconomy and the responsible management of natural resources, nature and land areas, and the environment; and (iv) a competitive

business sector that delivers green energy, climate and environmental solutions to global markets (Research Council of Norway 2020a).

The green transition represents a broad range of different areas. In this report, we focus on a set of some of the important areas that are of particular interest in a Norwegian context and for the RCN. The focus is on trends that are observed within the space of circular economy, the use and reuse of resources, and new business models for green solutions. In addition, we also focus on how society and individuals are adapting to the changes that the green transition entails (Research Council of Norway 2020a). Changes in biodiversity and food production are also areas of focus. In addition, we account for the impact of climate change on the Arctic.

As an oil-exporting nation, Norway faces dilemmas in this transition that pose both challenges and opportunities that are specific to Norway (Morris 2019). However, the global nature of climate change means the Norwegian trends in the green transition will need to be viewed in an international context.

In the box below, we summarise the key trends that were identified in relation to the green transition.

Box 3. Summary of key trends related to the green transition strategic area

- **Trend 1:** The green transition is driven by more interconnectedness in the energy ecosystem, in the political system, and across sectors.
- **Trend 2:** Green innovation and new technologies are becoming more important.
- **Trend 3:** Individuals will become a larger part of the green transition, and active citizenship will play a bigger role.
- **Trend 4:** The green transition will increasingly be driven by city-level initiatives and locally produced goods.
- **Trend 5:** There will be an increased focus on the social and distributional impact of the green transition.
- **Trend 6:** The focus on biodiversity will challenge existing technologies, such as hydropower.
- **Trend 7:** There is potential for increased symbiosis between sectors (for example, to reuse by-products and excess energy).
- **Trend 8:** Business models and pressure for regulations regarding repair services will become of greater importance.
- **Trend 9:** Climate change leads to shifts in the way that food is produced, consumed and distributed.
- **Trend 10:** The increase in greenhouse gas emissions accelerates climate change in the Arctic.

2.4. Technology and digitalisation

Technology and digitalisation present enormous potential for growth and solving major societal challenges (DG GROW 2021). Key areas that present important opportunities include advanced technologies, such as the Internet of Things, industrial data, advanced manufacturing, robotics, 3D printing, blockchain technologies, and artificial intelligence (AI). Advanced technologies have been defined as a convergence of digital technologies with broad enabling technologies (e.g. biotechnology and nanotechnology). Advanced

technologies present a wide range of potential applications and ability to contribute to key changes and solutions in society and across multiple sectors (Research Council of Norway 2020c). Some changes in society and the wider economy that are driven by the rapid growth of these technologies include ‘industry 4.0’, and more recently ‘industry 5.0’ (that emphasises societal needs and sustainability), the green transition and restructuring in the private and public sector (Müller 2020; Research Council of Norway 2020a).

Today, the impacts of digitalisation are felt at differing stages of development, across many sectors including, agri-food, automotive and transportation, retail, health, banking, the media, music and gaming industries and many more (OECD 2019a). Digitalisation has been defined as the large-scale adoption of digital technologies (Randall and Berlina 2019). In the future, digitalisation is expected to underpin innovations across many sectors, including personalised solutions, greener solutions, new services, and lower production and service costs – leading to increased productivity (Research Council of Norway 2020a; Ministry of Local Government and Modernisation 2016).

Technology and digitalisation is expected to play a key role in Norway’s transition to a more knowledge-based economy (Ministry of Local Government and Modernisation 2016).⁸ In the Norwegian Government’s ‘Long-Term Plan for Research and Higher Education 2019–2028’, ‘enabling and industrial technologies’ is one of five priority areas (Ministry of Education and Research 2019). As part of the RCN’s strategy, the technology and digitalisation area will focus on developing three key technology areas that are deemed to be ‘enabling’ technologies⁹ (Research Council of Norway 2020c). Enabling technologies can underpin innovation across many different sectors and societal challenges (Research Council of Norway 2020b). The three key technology areas are digital technology,¹⁰ biotechnology and nanotechnology.

In the box below, we summarise the key trends that were identified in relation to technology and digitalisation.

⁸ Furthermore, in Norway, it is estimated that in 2060 there will be four people aged over 67 for every 10 people of working age, compared with 2.2 people in 2012 (Ministry of Local Government and Modernisation 2016). These changes entail a need for extensive adaptations. For example, the use of welfare technology and automation (i.e. robotics) could help assist the elderly (Ministry of Local Government and Modernisation 2016).

⁹ These can be defined as basic technologies that underpin innovations across multiple sectors and can contribute to major societal challenges.

¹⁰ Technologies that are based on data.

Box 4. Summary of key trends related to the technology and digitalisation strategic area

- **Trend 1:** Digitalisation is facilitating increasing convergence of technologies.
- **Trend 2:** Artificial intelligence, ‘big data’ and biotechnology will be central components of digitalisation.
- **Trend 3:** Digitalisation is shaping innovation processes to make them data-driven, swifter and more collaborative.
- **Trend 4:** Data-driven technologies and advanced materials are expected to reduce greenhouse gas emissions and help improve the environment.
- **Trend 5:** Digitalisation is expected to provide improved services in the public sector.
- **Trend 6:** Digital and enabling technologies are expected to underpin the development of medicines and diagnostic tools in health and healthcare.
- **Trend 7:** Biotechnology is expected to play an important role in the biomarine industry.
- **Trend 8:** Industrial biotechnology is expected to contribute to environmentally friendly industrial processes and products.
- **Trend 9:** Socially responsible research and innovation will be a key priority.

2.5. Cohesion and globalisation

In 2019, the government of Norway introduced a new priority area for its ‘Long-Term Plan for Research and Higher Education 2019–2028’: societal security and social cohesion in a globalised world (Ministry of Education and Research 2019). Globalisation refers to the increasing interdependence and connectedness of the world’s economies, cultures and populations, driven by cross-border trade in goods and services; technology; and flows of investment, people and information (Peterson Institute for International Economics (PIIE) 2018). At the same time, this interconnectedness has also brought with it a sense of anxiety regarding social cohesion, reflecting the uncertainties and perceived ill effects of globalisation. Jo Ritzen, former vice president of the World Bank, summarised it thus: ‘one of the paradoxes of our age is that the more things come together, the more they fall apart’ (Ritzen 2000). The Research Council of Norway’s strategy for 2020–2024 states that while the forces of globalisation, internationalisation and digitalisation have opened up economies, enhanced trade and increased the exchange of culture, they have also given rise to new types of criminal activity, methods of espionage and efforts to interfere in democratic processes (Research Council of Norway 2020a).

Norway is a welfare state that has been characterised by relatively small social differences, a high level of trust in public administration and a strong civil society. However, the RCN notes that an ageing and more socially and culturally heterogeneous population, together with increased economic inequality, may weaken support for and funding of the welfare society, and challenge the legitimacy of democratic institutions (Research Council of Norway 2020a). Therefore, the RCN intends to invest in research and innovation in order to: promote insight into global change processes and Norway’s influence on these, and into understanding how Norway is impacted by these processes in order to mitigate potential adverse effects; promote a robust democracy that enjoys a high level of trust and legitimacy; promote an inclusive, diverse

and equal society; and promote societal security based on effective preparedness and risk prevention (Research Council of Norway 2020a).

In the box below, we summarise the key trends that were identified in relation to cohesion and globalisation.

Box 5. Summary of key trends related to the cohesion and globalisation strategic area

- **Trend 1:** An increased global awareness of climate change may lead to a reduction in fossil fuel demand and consumption.
- **Trend 2:** The nature of work is changing.
- **Trend 3:** Demographic changes present challenges for cohesion in Norwegian society.
- **Trend 4:** The multilateral system and international cooperation, which Norway benefits from, are facing increasing pressure from new and emerging powers.
- **Trend 5:** Social inequalities in Norway are increasing.
- **Trend 6:** Global interconnectedness and interdependence are increasing, accompanied by shifts in the prominence of actors in international politics.
- **Trend 7:** The challenges to democracy and trust are increasing globally.

3. Future scenarios to examine potential missions and structural measures

This chapter presents the scenarios (to 2040) that were developed to examine the future of the different strategic areas and the wider R&I system in Norway. It is important to highlight that the scenarios are not intended to be predictions or forecasts of the future. Instead, they represent a range of plausible future states that have been generated using a combination of factors and future projections of the factors that could reasonably occur together. The scenarios represent a wide spectrum of possible futures that are sufficiently differentiated from each other. A summary of the approach to developing and using the scenarios is provided in Section 1.3 and further elaborated upon in the following sections. A detailed description of the methodology used to develop the scenarios is provided in the accompanying methodology report (Gunashekar et al. 2021b).

3.1. Future scenarios to 2040

As noted in Section 1.3, to build scenarios of sufficient depth and distinctiveness, we constructed two scenario sets, by combining various elements associated with the five strategic areas (oceans; green transition; technology and digitalisation; technology and digitalisation; and cohesion and globalisation). Each scenario set comprised four future scenarios based on 15–20 prioritised political, economic, social, technological, legal and environmental (PESTLE) factors from the trend analyses¹¹ that could influence the strategic areas (specifically, these factors were derived from the trends, enablers, barriers and uncertainties that were identified in the trend analyses).

By having two sets of scenarios, each with a relatively large number of PESTLE factors, we were able to maintain the detail and richness required in the scenarios to support the examination of meaningful missions and policy actions for each of the strategic areas, while at the same time allowing the missions to be set against a broader landscape. Furthermore, with the two sets of scenarios, we were able to effectively deal with the relatively wide-ranging strategic areas of cohesion and globalisation and technology and digitalisation (as well as green transition, to a degree).¹² Below we recap the two scenario sets:

- **Scenario set 1 (*Norway in a national context*):** The first scenario set broadly focuses on Norway in a national context, largely relating to the Norwegian domestic agenda. This scenario set encompasses such themes as health, welfare, education, work and skills, cohesion, and relevant aspects of technology and digitalisation, and it also covers some aspects related to green transition (for example, in relation to the circular economy).
- **Scenario set 2 (*Norway in a global context*):** The second scenario set focuses on Norway in an international or global context, primarily relating to Norway's outward-facing role. It broadly

¹¹ In the first phase of the study, we carried out a detailed trend analysis for each strategic area, by collecting and analysing wide-ranging evidence to help develop a robust knowledge and information base. Specifically, we identified the main trends, enablers, barriers, and uncertainties that will potentially shape the strategic area over the next ten years or so.

¹² These two strategic areas are very interconnected with different sectors, cut across the other strategic areas, and are inter-related with each other as well.

covers themes related to climate, oceans, energy, transport, food, biodiversity and globalisation, as well as relevant aspects of technology and digitalisation.

As noted above, we developed four distinct future scenarios to 2040 for each scenario set. Because of their cross-cutting and wide-ranging nature, the cohesion and globalisation and the technology and digitalisation strategic areas (and to some extent green transition as well), as well as the corresponding indicative missions, were discussed in relation to both scenario sets.¹³ The scenarios were used as methodological tools during two foresight workshops to examine a series of indicative priority missions and discuss ideas for potential structural measures.¹⁴ The workshops were attended by a range of diverse stakeholders from across academia, industry, the third sector and the RCN.

In the sections below, for both scenario sets, we provide the high-level summaries of the corresponding scenarios, followed by a table containing the key characteristics and underpinning factors of the four scenarios. In Annex A, we present more detailed, one-page narratives of the scenarios that have been developed.¹⁵

3.2. Summaries of the scenarios corresponding to the future scenario sets

In the figures below, we provide concise summaries of the narratives for the two scenario sets (see Annex B for the full scenario narratives).

¹³ The other strategic areas are health and welfare and oceans.

¹⁴ The two workshops covering the two scenario sets – Norway in a national context and Norway in a global context – were organised on 23 and 24 March 2021, respectively.

¹⁵ The scenario narratives were shared with the workshop participants in advance of the workshops and were discussed in detail during the workshops.

Figure 6. Concise summaries of scenarios corresponding to future scenario set 1: Norway in a national context

Protectionist decline



Against a backdrop of global protectionist trends, technology adoption and innovation in Norway's healthcare sector has stalled. Greater national spending on health and welfare has led to some advances in care but has so far failed to deliver a joined-up system. Despite increased growth in some sectors, such as domestic food production, overall productivity growth and labour force participation are low and trust in public institutions is declining.

Going green together



Sustainability, an inclusive society and local delivery of services are now at the core of Norway's approach. Healthcare has been decentralised, and, in common with other sectors, targeted use of technology is seen as a way to improve efficiency and reduce waste. There has also been a focus on education and digital competence to reduce social inequalities. Open science has been key to the success of green initiatives at the national and local level, from green builds and urban farms, as city living remains popular.

Slowly changing society



Norway has experienced only gradual change over the past several years. There has been some success in the healthcare sector in responding to more complex needs of a changing population, compounded by the effects of climate change. But limited interdisciplinary collaboration and cooperation with industry, as well as a lack of vision on green initiatives, give rise to concerns that Norway will not have the necessary skills to adapt to future changes in the national and global landscape.

Technological trajectory



Norway has focused on technological advances to promote economic growth and support its sustainability goals. Digital solutions have been extensively integrated into healthcare. Most Norwegians have internet access, but digital literacy and a willingness to share data are prerequisites for participation in many activities. The technological transformation of employment has also meant many Norwegians have been able to move out of cities to escape effects of climate change.

Source: Study team analysis

Figure 7. Concise summaries of scenarios corresponding to future scenario set 2: Norway in a global context

Protectionist decline



Political instability has led to a poorly performing global economy and protectionist attitudes towards trade and research and innovation. Even within Norway, there has been little progress so far on initiatives to green the economy, which continues to focus on developing the oceans.

Global greening



Products and services that have a low impact on the environment and climate are now central to the global economy. Change is being achieved through government-, industry- and consumer-led initiatives, with Norway at the forefront of all of these. There has been a focus on ensuring openness and transparency of research, seen as key to a green future.

Slowly shifting power



A lack of clear international vision has resulted in slow progress by 2040 on both climate change goals and transformational change from technology convergence, as research remains fragmented. Global trading patterns reflect the steady drift of economic power away from the west, while melting ice in the High North has created commercial opportunities and tensions for Norway.

Technological trajectory



By 2040, technology is all-pervasive: a key driver of economic growth, changing the nature of employment for many and impacting on daily life. Technological advances have not delivered on climate change goals and continue to be resource intensive. Norway is increasingly looking to new international partners for trade and research collaboration.

Source: Study team analysis

4. Indicative priority missions within and across the RCN's five main strategic areas

This chapter provides a summary of the key findings related to the indicative priority missions that have been proposed within and across the RCN's five strategic areas.

4.1. The need for missions to address future societal challenges in Norway

As noted previously, a set of policy levers or actions will be required by the RCN to help steer the R&I system towards its main outcome of interest (i.e. achieving a 'well-functioning research and innovation system') through its three overarching objectives for the current strategy period (i.e. ground-breaking research and radical innovation; sustainable development; and restructuring of the business and public sectors) (Research Council of Norway 2020a). Developing a series of strategically selected priority missions – within and across (or even outside) the RCN's five strategic areas – that could potentially be implemented over the next few years could help contribute to this. As noted previously, for this study, we regard missions as targeted, timebound, concrete priority actions to help solve one or more societal challenges that the RCN, together with other stakeholders, could consider implementing in the future. These challenge-based missions will help the RCN achieve its overarching objectives (over a roughly ten-year time frame) and eventually contribute to enriching lives locally, nationally and internationally. More generally, missions are systemic policies that operate both as a means of steering economic growth in a particular direction (by, for example, steering investments towards particular societal challenges) and as a tool that can be used to get there (by, for example, setting clear, problem-focused objectives) (Mazzucato 2018). Since missions are so closely connected to societal challenges, public purpose and societal impact lie at their heart. They also aim to generate innovation across sectors, actors and disciplines and to enable bottom-up solutions and experimentation across multiple sectors. Missions are challenges that cannot be solved by a single project in research and innovation, but, rather, require a portfolio of interacting projects as well as the implementation of wider policy measures.

In the sections below, we present a set of indicative priority missions within and across the five strategic areas (oceans; green transition; health and welfare; technology and digitalisation; and cohesion and globalisation). Missions, in general, cover numerous areas and sectors. Indeed, we propose several cross-cutting missions that are particularly comprehensive and could be relevant to all five strategic areas and potentially other areas of R&I as well. This is especially the case for the indicative missions that are related to the wide-ranging strategic areas of technology and digitalisation, cohesion and globalisation, and green transition. Nevertheless, some of the mission ideas we have suggested may be more strongly associated with certain strategic areas, as the trends and drivers of change associated with these missions are more applicable

to those strategic areas. Accordingly, the indicative missions that we have presented in this report have also been discussed in the relevant companion strategic areas.¹⁶

A preliminary set of priority missions and associated focus areas were discussed and validated by stakeholders (across academia, industry, the third sector and the RCN) at two foresight workshops to understand their implications (for example, in terms of impact and feasibility) against the RCN's objectives across the different futures exemplified in the scenarios.¹⁷ We also tested the mission ideas in interviews with a selection of stakeholders from academia, industry, the third sector and the public sector. Following the workshops, the indicative missions were refined based on feedback received at the workshops and from the RCN.

For each indicative mission presented below, we have also suggested a selection of potential targeted focus areas, in addition to highlighting broad links to the United Nations (UN) Sustainable Development Goals (SDGs) (United Nations 2021),¹⁸ the clusters under Pillar II of Horizon Europe (European Commission 2021),¹⁹ and other EU missions identified in Horizon Europe (European Commission 2021).²⁰ The focus areas²¹ are exemplar and are not intended to be definitive; rather, they represent a range of potential areas of emphasis in relation to the missions, for further consideration by the RCN and other stakeholders. It is important to note that each of the target focus areas presented below will need to be eventually specified with clear, measurable and timebound goals, arrived at by the stakeholders involved in selecting and implementing the missions. In the infographic below, we summarise all the indicative mission ideas that have been articulated within and across the RCN's five strategic areas (Figure 8).²² In the infographic, the priority missions have been structured according to the two high-level scenario sets discussed in Chapters 1 and 3. We also present the cross-cutting missions that apply to all the strategic areas (as well as potentially

¹⁶ The five strategic area reports are as follows: Health and welfare: An analysis of trends, future directions and potential missions to address societal challenges in Norway (Gloinson et al. 2021a); Oceans: An analysis of trends, future directions and potential missions to address societal challenges in Norway (Skjoldager et al. 2021b); Green transition: An analysis of trends, future directions and potential missions to address societal challenges in Norway (Skjoldager et al. 2021a); Technology and digitalisation: An analysis of trends, future directions and potential missions to address societal challenges in Norway (d'Angelo et al. 2021); Cohesion and globalisation: An analysis of trends, future directions and potential missions to address societal challenges in Norway (Gloinson et al. 2021b).

¹⁷ The two workshops covering the two scenario sets – Norway in a national context and Norway in a global context – were organised on 23 and 24 March 2021, respectively.

¹⁸ The UN SDGs are: SDG1: No poverty; SDG2: Zero hunger; SDG3: Good health and well-being; SDG4: Quality education; SDG5: Gender equality; SDG6: Clean water and sanitation; SDG7: Affordable and clean energy; SDG8: Decent work and economic growth; SDG9: Industry, innovation and infrastructure; SDG10: Reduced inequalities; SDG11: Sustainable cities and communities; SDG12: Responsible consumption and production; SDG13: Climate action; SDG14: Life below water; SDG15: Life on land; SDG16: Peace, justice and strong institutions; and SDG17: Partnerships for the goals.

¹⁹ The Horizon Europe Clusters under Pillar II includes: (1): Health; (2): Culture, Creativity and Inclusive Society; (3): Civil Security for Society; (4): Digital, Industry and Space; (5): Climate, Energy and Mobility; and (6): Food, Bioeconomy, Natural Resources, Agriculture and Environment.

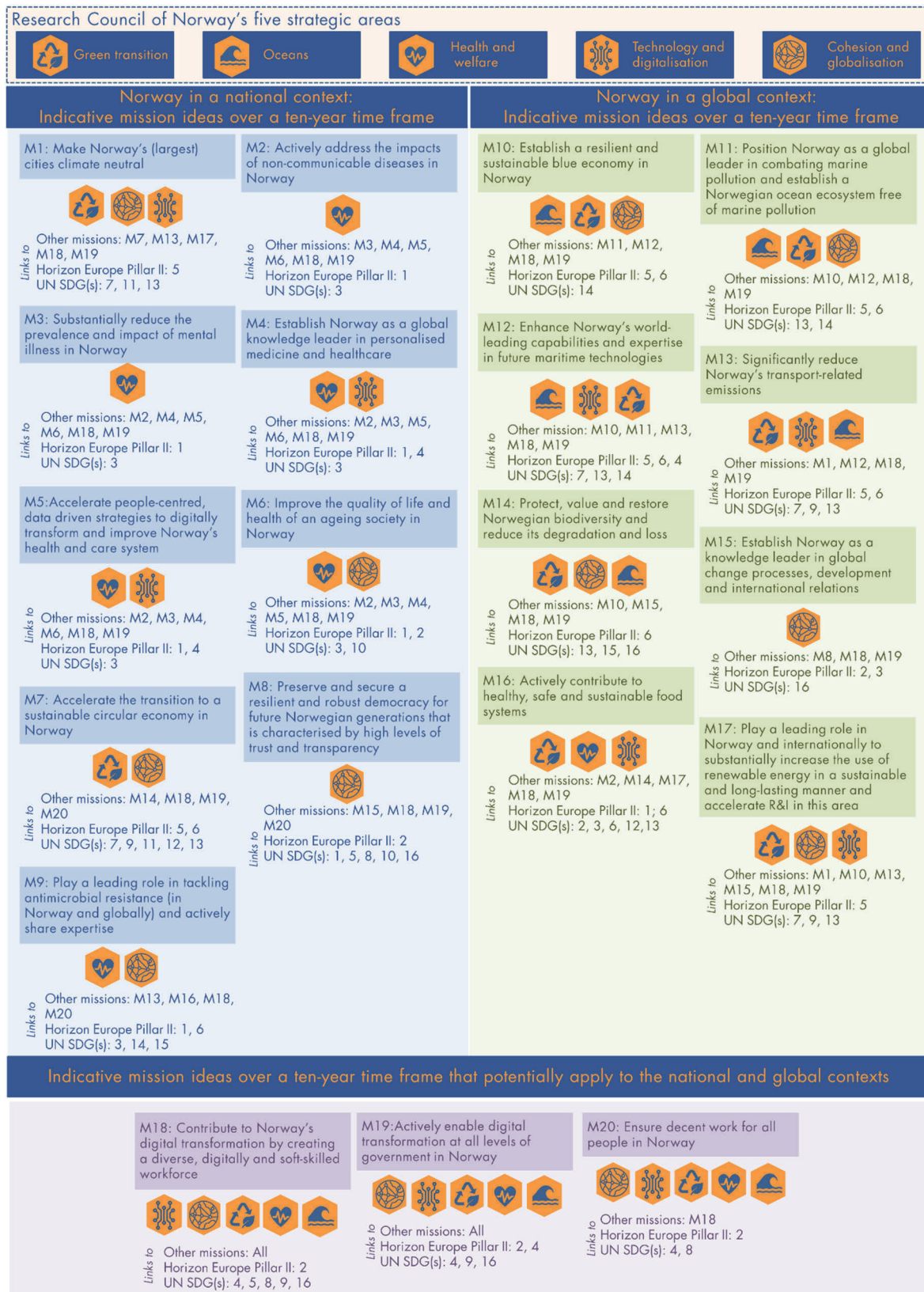
²⁰ Five EU mission areas have currently been proposed as part of Horizon Europe: (i) Conquering Cancer: Mission Possible; (ii) A Climate Resilient Europe – Prepare Europe for Climate Disruptions and Accelerate the Transformation to a Climate Resilient and Just Europe by 2030; (iii) Mission Starfish 2030: Restore our Ocean and Waters; (iv) 100 Climate-Neutral Cities by 2030 – By and for the Citizens; and (v) Caring for Soil Is Caring for Life.

²¹ To varying degrees, the missions and focus areas capture evidence analysed during the trend analyses. Specifically, we analysed the key trends, barriers, enablers and uncertainties identified in the trend analysis to suggest potential areas of focus for each priority mission.

²² As highlighted previously, all the missions span many areas, are cross-cutting in terms of potential sectors and disciplines involved, and will require a multi-stakeholder approach to be implemented.

to other areas of R&I). In Table 1, we present the corresponding exemplar targeted focus areas for each of the missions. In Annex B, we provide a detailed overview of all the indicative missions.

Figure 8. Indicative priority missions proposed within and across the RCN's five strategic areas



Source: Study team analysis

Table 1. Summary of indicative mission ideas and corresponding exemplar targeted focus areas

	Indicative missions and exemplar targeted focus areas (the mission ideas broadly related to Norway in a national context are highlighted in light blue; the mission ideas broadly related to Norway in a global context are highlighted in light green; the cross-cutting mission ideas that potentially apply to the national and global contexts are highlighted in light purple)
M1	<p>Make Norway's (largest) cities climate neutral</p> <p><i>Exemplar targeted focus areas:</i> Further reduce (X% reduction in) greenhouse gas emissions in key sectors across Norway's (largest) cities, aimed at ultimately achieving carbon neutrality; and implement sustainable, greener, resource-efficient and inclusive measures (for example, in relation to land use and transport, energy use in the built environment, consumption and waste, and adaptation to climate change).</p>
M2	<p>Actively address the impacts of non-communicable diseases in Norway</p> <p><i>Exemplar targeted focus areas:</i> Reduce (X% reduction in) the number of deaths caused by non-communicable diseases (NCDs); actively treat, prevent and reduce the prevalence of risk factors in the Norwegian population (e.g. harmful use of alcohol, physical inactivity, salt/sodium intake, tobacco use, raised blood pressure, diabetes, obesity, air pollution); improve system-wide responses, such as drug therapies (e.g. to prevent heart attacks and strokes), medicines and technologies to treat NCDs; and support and improve the quality of life of people affected by NCDs in Norway (across all segments of the population).</p>
M3	<p>Substantially reduce the prevalence and impact of mental illness in Norway</p> <p><i>Exemplar targeted focus areas:</i> Improve and ultimately transform the way in which mental illness in Norway is effectively prevented, detected, diagnosed (including early interventions), and treated, to help reduce its prevalence and impact throughout society (e.g. at home and in work environments); ensure that evidence-based research efforts are concentrated in these and other, related areas (such as the causes of mental illness and recovery from mental illness) and translated into practice (e.g. to improve the reach and outcome of mental health services throughout Norway); and support and improve the quality of life of people affected by mental illness in Norway (across all segments of the population).</p>
M4	<p>Establish Norway as a global knowledge leader in personalised medicine and healthcare</p> <p><i>Exemplar targeted focus areas:</i> Put Norway at the forefront of developing cutting-edge and responsible personalised medicine approaches and patient-centred care; translate these into practice to improve patient care and outcomes and to avoid unnecessary health costs; roll these out across all segments of the population in Norway; and actively address the potential ethical, societal and legal challenges involved in development and adoption.</p>
M5	<p>Accelerate people-centred, data-driven strategies to digitally transform and improve Norway's health and care system</p> <p><i>Exemplar targeted focus areas:</i> Further leverage Norway's research and innovation strengths in data-driven technologies (e.g. AI, machine learning, nanotechnology, biotechnology) and the translation of these into practice to improve the prevention, diagnosis and treatment of diseases and illnesses; actively address the potential ethical, societal and legal challenges involved in development and adoption; and ensure that all segments of the population in Norway are positively impacted.</p>
M6	<p>Improve the quality of life and health of an ageing society in Norway</p> <p><i>Exemplar targeted focus areas:</i> Ensure that people in Norway can live longer lives (e.g. X extra years) healthily and independently while reducing the inequalities between different parts of society; increase the number of healthcare personnel with relevant skills and capabilities to support an ageing population (and ensure the retention of these personnel); increase the adoption of relevant technologies and related services that contribute to healthier and independent living for the elderly (including helping with social connectedness and other areas related to improving quality of life); and ensure adequate support structures are established and available to all segments of Norwegian society.</p>

	<p>Indicative missions and exemplar targeted focus areas (the mission ideas broadly related to Norway in a national context are highlighted in light blue; the mission ideas broadly related to Norway in a global context are highlighted in light green; the cross-cutting mission ideas that potentially apply to the national and global contexts are highlighted in light purple)</p>
M7	<p>Accelerate the transition to a sustainable and circular economy in Norway</p> <p><i>Exemplar targeted focus areas:</i> Develop a sustainable and substantially circular economy in Norway, with progressively diminishing use of resources (X% reduction in resource use) as Norway progresses towards that target; improve circular business models and resource efficiency; reduce the extent of and dependence on extraction (e.g. of metals, minerals, fossil fuels); improve supply security; increase consumer awareness of the circular economy; and create a strong repair, reuse and recycling economy and improve circularity across specific sectors (e.g. housing, nutrition, mobility, services, consumables, healthcare and communication).</p>
M8	<p>Preserve and secure a resilient and robust democracy for future Norwegian generations that is characterised by high levels of trust and transparency</p> <p><i>Exemplar targeted focus areas:</i> Proactively facilitate broad-based political participation of Norwegian publics (e.g. by increasing voter turnout and representativeness); strengthen efforts to protect electoral processes (e.g. free and fair elections); increase transparency of targeted political content; support media freedom and pluralism; enhance efforts to counter the spread of disinformation; improve media literacy; ensure inclusive and participatory decision making at all levels; reduce segregation in the labour market; eliminate discrimination against migrants (e.g. in the labour market); and increase investment in R&I activities to better understand conditions to preserve an inclusive and diverse society.</p>
M9	<p>Play a leading role in tackling antimicrobial resistance (in Norway and globally) and actively share expertise</p> <p><i>Exemplar targeted focus areas:</i> Put in place systems to improve the effective diagnosis and surveillance of antibiotic-resistant infections and antibiotic use in Norway and internationally; contribute to further reducing the demand for (new) antibiotics; provide thought leadership to help improve awareness and understanding of antimicrobial resistance; actively share experiences, approaches and expertise in combating antimicrobial resistance internationally; and actively invest in developing alternatives to current antibiotics.</p>
M10	<p>Establish a resilient and sustainable blue economy in Norway</p> <p><i>Exemplar targeted focus areas:</i> Increase the sustainable use of ocean-based resources to achieve economic growth in Norway; preserve (and improve) the health of the coastal and marine environment around Norway; actively invest in ocean mapping and ocean management programmes; strengthen Norway's (international) position and expertise with regard to ocean ecosystems (including ocean governance); put Norway at the forefront of R&I activities associated with key sectors of strength (such as aquaculture, fisheries, petroleum and shipping); minimise the impacts of ocean acidification; examine and invest in opportunities for offshore renewable energy to enable coastal and maritime markets in the long term; actively support efforts to promote oceans as a sustainable and safe source of food; and ensure the inclusion and active participation of all societal groups.</p>
M11	<p>Position Norway as a global leader in combating marine pollution and establish a Norwegian ocean ecosystem free of marine pollution</p> <p><i>Exemplar targeted focus areas:</i> Leverage Norway's world-leading ocean management capabilities and expertise to substantially reduce the amount of marine pollution and hazardous substances (including plastics) entering the ocean environment around Norway (including those arising from land-based activities); remove/clean up marine pollutants (including plastics) that are already present in the ocean; spearhead international efforts in reducing global marine pollution; and reduce greenhouse gas emissions from marine activities, such as domestic shipping and fisheries.</p>

	<p>Indicative missions and exemplar targeted focus areas (the mission ideas broadly related to Norway in a national context are highlighted in light blue; the mission ideas broadly related to Norway in a global context are highlighted in light green; the cross-cutting mission ideas that potentially apply to the national and global contexts are highlighted in light purple)</p>
M12	<p>Enhance Norway's world-leading capabilities and expertise in future maritime technologies</p> <p><i>Exemplar targeted focus areas:</i> Put Norway at the forefront of successfully developing, deploying and scaling up a range of innovative, clean technology solutions applicable to the marine environment around Norway; responsibly use data to inform ocean management-related decision making; strengthen Norway's position as an international leader in green shipping; position Norway as a global leader in leveraging the opportunities offered by maritime technologies while addressing the risks and challenges associated with deploying these technologies; and actively promote cooperation (regional and international) between relevant stakeholders in this area.</p>
M13	<p>Significantly reduce Norway's transport-related emissions</p> <p><i>Exemplar targeted focus areas:</i> Considerably reduce (X% reduction in) greenhouse gas emissions from the entire transport sector in Norway (including terrestrial and maritime transport) and make it fully sustainable; promote and invest in R&I activities to develop and adopt climate-friendly technologies, innovations and infrastructure at scale across all segments of the transport value chain (e.g. including but not limited to making shipping and maritime passenger transport greener); and play a leading role in developing collaborations, improving education, understanding behavioural patterns, raising awareness and enhancing capacity-building measures related to climate change mitigation, adaptation and impact reduction.</p>
M14	<p>Protect, value and restore Norwegian biodiversity and reduce its degradation and loss</p> <p><i>Exemplar targeted focus areas:</i> Significantly reduce (X% reduction) and ultimately halt biodiversity loss in Norway's natural environment and farther afield that might result from Norwegian activities; actively engage in activities and play a leading role in actions and decision making that help sustainably use, conserve and appropriately restore well-functioning, diverse and healthy natural land and water ecosystems (e.g. through environmental conservation and ecological restoration activities, such as rewilding); promote growth of the green economy; and promote the importance of and integrate biodiversity values into national and international planning and activities.</p>
M15	<p>Establish Norway as a knowledge leader in global change processes, development and international relations</p> <p><i>Exemplar targeted focus areas:</i> Develop actionable insights (e.g. through evidence-based research) into and better understanding of international governance/leadership structures and how such issues as emergencies, conflict and other humanitarian crises affect the Norwegian and global population (and the potential links among these); mobilise governments, organisations and communities to test innovative solutions and new ideas to tackle these and other issues; promote fair and equitable partnerships; build capacity at all levels to increase the number of people in the Norwegian workforce who work in international organisations (e.g. in peacekeeping and international development); and stimulate broad participation and strengthen constructive cooperation/collaboration at the global and regional levels.</p>
M16	<p>Actively contribute to healthy, safe and sustainable food systems</p> <p><i>Exemplar targeted focus areas:</i> Increase sustainable, climate-resilient food production – nationally and globally; increase access to safe and healthy food while reducing food waste and loss; ensure that food production systems can provide food to improve quality of life and health; stimulate innovations/technology development and adoption to accelerate the transformation of food systems (e.g. in relation to improving productivity, supply chain efficiency and transparency); actively position Norway as an international thought and knowledge leader with regard to effective food systems governance; and promote international cooperation (e.g. in relation to R&D, agricultural practices) between stakeholders to stimulate the creation of economically, socially and environmentally sustainable food systems.</p>

	Indicative missions and exemplar targeted focus areas (the mission ideas broadly related to Norway in a national context are highlighted in light blue; the mission ideas broadly related to Norway in a global context are highlighted in light green; the cross-cutting mission ideas that potentially apply to the national and global contexts are highlighted in light purple)
M17	<p>Play a leading role in Norway and internationally to substantially increase the use of renewable energy in a sustainable and long-lasting manner and accelerate R&I in this area</p> <p><i>Exemplar targeted focus areas: Improve energy security by substituting fossil fuels with renewable sources across all sectors; improve access to modern, reliable and cost-effective clean energy sources across all segments of the population; substantially improve energy efficiency (e.g. in the built environment); accelerate R&I and increase public and private sector investment in renewable energy infrastructure and technology; mobilise knowledge exchange and cross-sectoral/international collaboration (e.g. to share lessons, reduce duplication); and provide thought leadership to help improve awareness and understanding.</i></p>
M18	<p>Contribute to Norway's digital transformation by creating a diverse, digitally and soft-skilled workforce</p> <p><i>Exemplar targeted focus areas: Progressively reduce and eliminate the shortage in advanced digital and soft skills, training and competencies, to enable people to work in and adapt to the rapidly evolving digital economy in Norway and globally (including upskilling and reskilling workers); and lead the way and demonstrate knowledge leadership in ensuring equal opportunities, eliminating disparities and overcoming bias and systemic barriers for all segments of the population working in the digital economy (e.g. women, minority ethnic communities, older people, the young workforce, disabled people).</i></p>
M19	<p>Actively enable digital transformation at all levels of government in Norway</p> <p><i>Exemplar targeted focus areas: Make better and more responsible use of a range of digital technologies, data and platforms as enablers of public services at both local and national level (to deliver more targeted, inclusive and user-centric services); improve operations, work processes, productivity, user experience, accountability, and transparency (and reduce risks); promote activities and behaviours that involve the responsible use of data and evidence to inform decision making; proactively focus on workforce development related to developing and maintaining skills (digital and soft); and promote cooperation/collaboration within and across ministries/municipalities and with other stakeholders (including the private sector) (e.g. to share learnings, to share good practice, to build capacity).</i></p>
M20	<p>Ensure decent work for all people in Norway</p> <p><i>Exemplar targeted focus areas: Promote and accelerate inclusive, diverse and decent work for all people in Norway across all segments of the population (including integration of immigrants into the labour market); increase youth employment; improve quality of work, working conditions, job satisfaction, etc.; ensure equal access; and achieve productive employment for the Norwegian workforce that can adapt to digitalisation/automation.</i></p>

Source: Study team analysis

5. Structural measures for further consideration

This chapter presents key findings related to the proposed structural measures.

5.1. Structural measures underpinning the missions

Priority missions will need to be developed and built in addition to a set of robust and coordinated structural measures in the Norwegian R&I environment. Structural measures are system-level instruments and policies to help develop a resilient R&I environment in Norway and that also address the wider performance of the Norwegian R&I system in terms of the RCN's three overarching objectives. Establishing new and/or strengthening existing, underpinning structural measures will enable the development of a resilient, inclusive and thriving R&I environment in Norway, within which the missions can be effectively and efficiently implemented in the future.

5.2. Key needs underpinning the proposed structural measures

We have identified five underlying needs of the Norwegian R&I system. The needs fall under the larger umbrella of needing to align and unify R&I efforts across Norway. This notion has not been labelled as a need in itself as it serves, as a prerequisite for success overall. The proposed structural measures (summarised in Section 5.4) seek to meet one or more of the needs. The needs are summarised below:



No. 1: Increase access to and sharing of R&I data and knowledge

If Norway is to deliver solutions for societal challenges such as the green transition and develop new sustainable businesses and societies at pace, there is a need to increase the access to and sharing of data between public and private actors and across sectors in Norway. This includes stronger obligations for the actors to share R&I data and to further strengthen wider Open Science initiatives that are already in place in Norway.



No. 2: Support the development of a future-proof Norwegian workforce

Many Norwegians are currently employed in occupations that are likely to change radically or even disappear entirely over the next decades (Manyika et al. 2017; Næringslivets Hovedorganisasjon (NHO) 2018). To work more constructively on solving this challenge, there is a growing need for targeted research as well as innovative practical ideas that can support the development of a future-proof Norwegian workforce



No. 3: Promote collaborative, research-based and interdisciplinary innovation

Many of the significant future challenges identified across the five strategic areas (oceans, green transition, technology and digitalisation, health and welfare, and cohesion and globalisation) can only be solved through collaborative, research-based and interdisciplinary innovation. The Norwegian R&I system needs to experiment with new ways of supporting and promoting collaboration across different levels, sectors and disciplines.



No. 4: Support new industry development beyond the oil and gas sector

Over several decades, Norway has grown more dependent on the high revenues and returns from its strong oil and gas sector. However, with the long-term trend of production pointing downwards, uncertainty around oil prices and climate concerns, Norway could diversify its economy to non-oil activities (OECD 2019b). New industry development in other areas is needed to contribute to a more diversified and sustainable national economy. Hence, there is a need to strengthen the support for new industry development in the Norwegian R&I system (including but not limited to small to medium-size enterprises (SMEs) and start-ups) (OECD 2019b). To succeed, the initiatives have to be larger and more focused.



No. 5: Experiment with new types of regulatory practices and approaches

To keep up with the pace of change in technology while also fostering innovation and mitigating against potential risks, there is a need to experiment with new types of regulatory practices and approaches. This need has been articulated by many actors in the Norwegian R&I system over time, but it has not been straightforward to achieve. The Norwegian R&I system is competing with that of other countries on providing the best conditions for R&I. One competitive parameter is to provide 'lighter' regulatory spaces, within which research-based innovation can better thrive in delineated periods.

5.3. Different archetypes of structural measures

We have categorised the proposed structural measures into six high-level archetypes, or models, of the basic mechanisms that could be used as tools to implement the measures. These archetypes have been identified by grouping the structural measures in the long-list of structural measures we identified through the trend analysis, expert crowdsourcing exercise, interviews and expert foresight workshops. The archetypes are presented in the table below, providing an overview of possibilities and directions when working with and developing new structural measures and/or strengthening existing measures. Using a mix of different archetypes is important in order to achieve desired outcomes in terms of a balanced system, thus ensuring different mechanisms to support the future of R&I. Moreover, most structural measures will have to be cross-cutting in terms of their scope and applicability to different areas of R&I.

Table 2. Overview of structural measure high-level archetypes

Financial instruments	Governance and regulation	Cooperation and networks
<ul style="list-style-type: none"> Measures that include a monetary element addressing funding calls, funding schemes, funding programmes or the structure of the funding system, or that include other monetary incentives to realise an objective, such as tax incentives. 	<ul style="list-style-type: none"> Structural measures that address the governance system and structures, policies, and rule of law. 	<ul style="list-style-type: none"> Measures that encompass facilitation of collaborations, partnerships, networks, interaction capabilities across sectors and bilateral and multilateral agreements.
Knowledge	Education, training and skills	Data and infrastructure
<ul style="list-style-type: none"> Measures that are aimed at using existing knowledge and generating new knowledge. 	<ul style="list-style-type: none"> Measures that are aimed at generating particular abilities, competences and expertise for the job market, as well as general life skills. 	<ul style="list-style-type: none"> Measures that address the collection, use and sharing of data.

Source: Study team analysis

5.4. Potential structural measures

As noted above, we have characterised five overarching structural needs within the Norwegian R&I system, highlighting the challenges in the current R&I system that potentially require further attention. To help respond to the overarching needs, we have identified ten associated potential structural measures which provide direction and inspiration on how to respond to the needs. These are summarised in Table 2 below. While some structural measures may be more specific than others and possibly more applicable to certain strategic areas, more generally, they are intended to span the entire R&I system.²³ A mission-oriented approach enables the inclusion of a wide set of research and innovation activities. Solving grand challenges demands a systems perspective that includes broader involvement of actors and stakeholders that need to coordinate and collaborate strategically to create change, both within and outside the research and innovation system. These include a mix of public and private bodies with measures and instruments that cut across the policy apparatus. Public sector actors include the Research Council of Norway, Innovation Norway, the Industrial Development Corporation of Norway (SIVA), and educational institutions, as well as the regional health authorities and the research institutes. The private sector encompasses non-governmental organizations and industry, spanning larger firms and clusters to smaller start-ups. Mobilising citizen participation where possible is also central to achieving change and is an important component of a mission-oriented approach.

²³ More detailed information on each structural measure can be obtained from the companion report on structural measures (Skjoldager et al. 2021c). The report includes the following information: (i) the strategic area(s) the measure is specifically relevant to; (ii) the structural measure needs that are supported by the measure; (iii) the RCN strategic objective that the structural measure can help address in the future; (iv) the archetype it falls within (a list of the archetypes is provided in Table 2); and (v) an indicative list of potential actors that can be involved in implementing the structural measure.

Table 3. Overview of potential structural measures

Need 1: Increase access to and sharing of R&I data and knowledge
Structural measure 1: Establish a central knowledge and data repository.
Structural measure 2: Explore new data-sharing policies
Need 2: Support the development of a future-proof Norwegian workforce
Structural measure 3: Establish a future skills research centre
Structural measure 4: Make the education system more flexible and incorporate more entrepreneurial and innovation skills in the education system
Need 3: Support and promote collaborative, research-based and interdisciplinary innovation
Structural measure 5: Promote interdisciplinarity, collaborations and partnerships through funding requirements and specialised calls
Structural measure 6: Strengthen the Centres for Research-based Innovation (SFI) scheme ²⁴
Need 4: Support new industry development beyond the oil and gas sector
Structural measure 7: Promote fewer but stronger national industry clusters
Need 5: Experiment with new types of regulatory practices and approaches
Structural measure 8: Use policy labs to promote collaboration
Structural measure 9: Make increasing use of regulatory sandboxes that promote innovation in different sectors and areas
Structural measure 10: Create a new high-risk research funding body or funding scheme

Source: Study team analysis

²⁴ Research centres under the scheme are characterised as a ‘dedicated, long-term initiative designed to strengthen and further develop elite, creative research and innovation groups or to build up research groups in strategically important areas’ (Research Council of Norway 2019). The overarching aim of the scheme is to ‘enhance the ability of the business sector to innovate and create value through a greater focus on long-term research (Research Council of Norway 2019).

6. Concluding remarks

This study has focused on the RCN's five strategic areas in their current strategy: (i) oceans; (ii) green transition; (iii) health and welfare; (iv) cohesion and globalisation; and (v) technology and digitalisation. All five areas are intrinsically linked to societal challenges, both within and outside Norway. Some of these 'grand' challenges have become even more apparent in light of the COVID-19 pandemic. The pandemic, and the impact it has had on a global scale, has served as a stark reminder that these challenges need to be urgently addressed, not least to ensure that countries – and R&I systems – are better prepared for the future and to help build resilience.

We have analysed key components – trends, barriers, enablers and uncertainties – that are shaping R&I developments within these five strategic areas, as well as influencing the general direction of travel. To help address some of the societal challenges, we have identified a series of potential priority missions within and across the RCN's five strategic areas. We have also articulated a set of underpinning, system-level structural measures. The ideas for the missions, together with the structural measures, are aimed at informing different aspects related to the future of R&I in Norway and helping facilitate the development of a resilient Norwegian R&I environment. Despite the challenges and complexities, there is a great opportunity for the RCN to facilitate or actively participate in (and in some cases lead) the dialogue with other stakeholders about developing and implementing missions for Norway in the future.

Drawing on a multimethod, participatory research approach involving numerous stakeholders, we have proposed the mission ideas, as far as possible, in areas where Norway has competitive advantages, and in particular where its institutional capacities and capabilities are strong and where national, social, economic or environmental challenges are critical – nationally and, where relevant, internationally. The priority mission ideas we have highlighted are not intended to be definitive and are proposed as indicative ideas at this stage, based on the analysis of the evidence and inputs from stakeholders. Along with structural measures, they represent a broad spectrum of ideas for further consideration and exploration by the RCN and other stakeholders that might be involved in the process to conceptualise and implement potential missions in Norway in the future. Some mission ideas are wide ranging and cover one or more other strategic areas, while others are more specific. Furthermore, some missions overlap and interact with other missions. Moreover, some of the missions we have suggested could be made more specific, for example, by focusing on disease areas of key importance to Norway, such as cancer and dementia, in the mission on 'Actively addressing the impacts of non-communicable diseases in Norway'.

All the missions will require an active, multistakeholder approach to be implemented and are cross-cutting in terms of sectors and disciplines involved. In general, their implementation will also need to effectively incorporate relevant social sciences, humanities, legal and ethical perspectives – beyond the technological and innovation-related aspects. Each mission area will also need to be eventually specified with clear, measurable and timebound goals, arrived at by the stakeholders involved in selecting and implementing the missions. Additionally, it would be important to ensure that any future missions in Norway are aligned with missions-related work of international actors, such as the European Commission, as well as broader international frameworks, such as the UN Sustainable Development Goals. Learning from these other examples – while also considering the Norwegian context – will be vital. Finally, the missions must engage the public regularly and be evaluated against a set of clearly defined criteria, set out up-front.

While missions could help solve a number of important societal challenges, their successful implementation will also require a set of appropriate, coordinated structural measures to be established by the RCN and other stakeholders within the Norwegian R&I system. This could involve the establishment – in parallel with the conceptualisations of the missions – of novel structural measures or the improvement of existing measures. As with the missions, it will be important to understand what works and what does not work in the Norwegian context. Thus, a mix of underpinning structural measures, together with a set of carefully developed priority missions, could help the RCN meet its current objectives and ultimately contribute to enriching lives locally, nationally and internationally.

The findings from the research are primarily intended to contribute to the development of a wide-ranging and robust evidence base for the RCN's input to the revision of the Norwegian government's Long-Term Plan for Research and Higher Education 2019–2028. In addition, the findings will help inform the RCN's internal strategies, decision making and organisational activities. However, we envisage that the research will also be of interest to funders and academia, national and local government policymakers, innovators and practitioners, and industry, and, more broadly, to anyone – including the public – interested in R&I and wider societal challenges.

Bibliography

- Christensen, Tom, and Per Læg Reid. 2020. 'Balancing Government Capacity and Legitimacy: How the Norwegian Government Handled the COVID-19 Crisis as a High Performer.' *Public Administration Review* 80 (5): 774–79.
- Circle Economy, and Circular Norway. 2020. *The Circularity Gap Report: Closing the Circularity Gap in Norway*. Oslo: Circular Norway & Circular Economy. <https://www.circularity-gap.world/norway>.
- d'Angelo, Camilla, Emily Ryen Gloinson, Fay Dunkerley, Mann Virdee, Carolina Feijao, Gemma-Claire Ali, Mikkel Skjoldager, Andrea Skjold Frøshaug, Torben Bundgaard Vad, and Salil Gunashekar. 2021. *Technology and Digitalisation: An Analysis of Trends, Future Directions and Potential Missions to Address Societal Challenges in Norway*. Foresight Study for the Research Council of Norway to Help Inform the Future of Research and Innovation in Norway. Cambridge & Copenhagen: RAND Europe & DAMVAD Analytics.
- Department for Business, Energy & Industrial Strategy. 2021. *The Grand Challenge Missions*. London: Department for Business, Energy & Industrial Strategy. <https://www.gov.uk/government/publications/industrial-strategy-the-grand-challenges/missions>.
- DG GROW. 2021. 'Advanced Technologies.' European Commission. As of 7 July 2021: https://ec.europa.eu/growth/industry/policy/advanced-technologies_en.
- European Cluster Collaboration Platform. 2021. 'Norway Health Tech.' European Cluster Collaboration Platform. As of 7 July 2021: <https://clustercollaboration.eu/cluster-organisations/norway-health-tech>.
- European Commission. 2019. 'European Green Capital.' European Commission. As of 7 July 2021: <https://ec.europa.eu/environment/europeangreencapital/winning-cities/2019-oslo/>.
- . 2021a. 'Horizon Europe.' European Commission. As of 7 July 2021: https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe_en.
- . 2021b. 'Missions in Horizon Europe.' European Commission. As of 7 July 2021: https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/missions-horizon-europe_en.
- . 2021c. 'Sustainable Blue Economy.' European Commission. As of 7 July 2021: https://ec.europa.eu/oceans-and-fisheries/ocean/blue-economy/sustainable-blue-economy_en.
- Funka. 2021. 'Investigation of Digital Tools for Increased Citizen Dialogue.' Funka. As of 7 July 2021: <https://www.funka.com/en/research-and-innovation/position-of-trust-and-investigations/archive---commission-of-trust/investigation-of-digital-tools-for-increased-citizen-dialogue/>.
- Gausemeier, Juergen, Alexander Fink, and Oliver Schlake. 1998. 'Scenario Management: An Approach to Develop Future Potentials.' *Technological Forecasting and Social Change* 59 (2): 111–30. [https://doi.org/10.1016/S0040-1625\(97\)00166-2](https://doi.org/10.1016/S0040-1625(97)00166-2).
- Gloinson, Emily Ryen, Carolina Feijao, Fay Dunkerley, Mann Virdee, Camilla d'Angelo, Gemma-Claire Ali, Mikkel Skjoldager, Andrea Skjold Frøshaug, Torben Bundgaard Vad, and Salil Gunashekar. 2021a.

Health and Welfare: An Analysis of Trends, Future Directions and Potential Missions to Address Societal Challenges in Norway. Foresight Study for the Research Council of Norway to Help Inform the Future of Research and Innovation in Norway. Cambridge & Copenhagen: RAND Europe & DAMVAD Analytics.

Gloinson, Emily Ryen, Mann Virdee, Fay Dunkerley, Camilla d'Angelo, Carolina Feijao, Gemma-Claire Ali, Mikkel Skjoldager, Andrea Skjold Frøshaug, Torben Bundgaard Vad, and Salil Gunashekar. 2021b. *Cohesion and Globalisation: An Analysis of Trends, Future Directions and Potential Missions to Address Societal Challenges in Norway.* Foresight Study for the Research Council of Norway to Help Inform the Future of Research and Innovation in Norway. Cambridge & Copenhagen: RAND Europe & DAMVAD Analytics.

Government Office for Science. 2017. *The Futures Toolkit: Tools for Futures Thinking and Foresight Across UK Government.* London: Government Office for Science. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/674209/futures-toolkit-edition-1.pdf.

Gunashekar, Salil, Emily Ryen Gloinson, Fay Dunkerley, Mann Virdee, Camilla d'Angelo, Carolina Feijao, Gemma-Claire Ali, Mikkel Skjoldager, Andrea Skjold Frøshaug, and Torben Bundgaard Vad. 2021a. *A Summary of Potential Cross-Cutting Missions to Address Future Societal Challenges in Norway.* Foresight Study for the Research Council of Norway to Help Inform the Future of Research and Innovation in Norway. Cambridge, UK: RAND Europe & DAMVAD Analytics.

———. 2021b. *Addressing Future Societal Challenges in Norway: Detailed Methodology Report.* Foresight Study for the Research Council of Norway to Help Inform the Future of Research and Innovation in Norway. Cambridge & Copenhagen: RAND Europe & DAMVAD Analytics.

Kleven, Øyvinn. 2016. *Nordmenn På Tillitstoppen i Europa.* 2. Samfunnspeilet. Oslo: Statistics Norway. https://www.ssb.no/kultur-og-fritid/artikler-og-publikasjoner/_attachment/269579?_ts=1555305a1f0.

Manyika, James, Susan Lund, Michael Chui, Jacques Bughin, Jonathan Woetzel, Parul Batra, Ryan Ko, and Saurabh Sanghvi. 2017. 'What the Future of Work Will Mean for Jobs, Skills, and Wages: Jobs Lost, Jobs Gained | McKinsey.' As of 7 July 2021: <https://www.mckinsey.com/featured-insights/future-of-work/jobs-lost-jobs-gained-what-the-future-of-work-will-mean-for-jobs-skills-and-wages#>.

Mazzucato, Mariana. 2018. *Mission-Oriented Research and Innovation in the European Union: A Problem-Solving Approach to Fuel Innovation-Led Growth.* Brussels: European Commission. https://ec.europa.eu/info/sites/default/files/mazzucato_report_2018.pdf.

Ministry of Education and Research. 2019. *Long-Term Plan for Research and Higher Education 2019–2028.* Oslo: Ministry of Education and Research. <https://www.regjeringen.no/no/dokumenter/meld.-st.-4-20182019/id2614131/?ch=1>.

———. 2020. *NOU 2020: 2: Fremtidige kompetansebehov III – Læring og kompetanse i alle ledd.* Oslo: Ministry of Education and Research. <https://www.regjeringen.no/no/dokumenter/nou-2020-2/id2689744/>.

Ministry of Finance. 2018. *Meld. St. 13 (2018–2019): Melding Til Stortinget: Muligheter for Alle: Fordeling Og Sosial Bærekraft.* Oslo: Ministry of Finance. <https://www.regjeringen.no/contentassets/472d31ff815d4ce7909f5593bf7d79b8/no/pdfs/stm20182019013000dddpdfs.pdf>.

Ministry of Foreign Affairs. 2019. *Meld. St. 27 (2020–2021): Norway's Role and Interests in Multilateral Cooperation*. Oslo: Ministry of Foreign Affairs. <https://www.regjeringen.no/contentassets/5673dad917448148b491635289ac690/en-gb/pdfs/stm201820190027000engpdfs.pdf>.

Ministry of Health and Care Services. 2008. *Mental Health Services in Norway: Prevention – Treatment – Care*. Oslo: Ministry of Health and Care Services. <https://www.regjeringen.no/globalassets/upload/kilde/hod/red/2005/0011/ddd/pdfv/233840-mentalhealthweb.pdf>.

Ministry of Local Government and Modernisation. 2016. *Digital Agenda for Norway in Brief*. Oslo: Ministry of Local Government and Modernisation. <https://www.regjeringen.no/en/dokumenter/digital-agenda-for-norway-in-brief/id2499897/?ch=8>.

Morris, Craig. 2019. 'The Norwegian Dilemma: Fossil-Funded Energy Transition.' Energy Transition. As of 7 July 2021: <https://energytransition.org/2019/06/the-norwegian-dilemma-fossil-funded-energy-transition/>.

Müller, Julien. 2020. *Enabling Technologies for Industry 5.0: Results of a Workshop with Europe's Technology Leaders*. Luxembourg: Publications Office of the European Union. <https://op.europa.eu/en/publication-detail/-/publication/8e5de100-2a1c-11eb-9d7e-01aa75ed71a1/language-en>.

Mykletun, A., A.K. Knudsen, and K.S. Mathiesen. 2009. *Psykiske lidelser i Norge: Et folkehelseperspektiv*. Oslo: Norwegian Institute of Public Health. <https://www.fhi.no/publ/eldre/psykiske-lidelser-i-norge-et-folkeh/>.

Næringslivets Hovedorganisasjon (NHO). 2018. *Fremtidens arbeidsliv*. Oslo: Næringslivets Hovedorganisasjon. <https://www.nho.no/publikasjoner/p/naringslivets-perspektivmelding/fremtidens-arbeidsliv/>.

Norden. 2014. 'Recruitment and Retention of Health Care Professionals in Nordic Countries: A Cross-National Analysis.' Nordic Council of Ministers. As of 7 July 2021: <http://norden.diva-portal.org/smash/get/diva2:747320/FULLTEXT02.pdf>.

Nordic Health 2030. 2018. 'About the Movement – Nordic Health 2030.' As of 7 July 2021: <http://nordichealth2030.org/about/>.

Norwegian Institute of Public Health. 2014. 'Helse hos eldre.' Norwegian Institute of Public Health. As of 7 July 2021: <https://www.fhi.no/nettpub/hin/grupper/eldre/>.

———. 2016. *Mental Illness among Adults*. Oslo: Norwegian Institute of Public Health. <https://www.fhi.no/en/op/hin/mental-health/psykisk-helse-hos-voksne/>.

Norwegian Labour and Welfare Administration. 2018. 'Flere uføretrygdede med psykiske lidelser.' nav.no. As of 7 July 2021: <https://www.nav.no/no/nav-og-samfunn/statistikk/aap-nedsatt-arbeidsevne-og-uforetrygd-statistikk/relatert-informasjon/flere-uforetrygdede-med-psykiske-lidelser>.

Nujhat, Sanjana, Wafa Alam, Ayushka Parajuli, Wagdi Ali Mohammad Mohsen, Laurent Banyira, Rajat Das Gupta, Ipsita Sutradhar, Mehedi Hasan, and Malay Kanti Mridha. 2020. 'Prevalence of Risk Factors

for Non-Communicable Diseases in a Rural Population of Bangladesh: A Cross-Sectional Study.’ *The Lancet Global Health* 8 (April): S21. [https://doi.org/10.1016/S2214-109X\(20\)30162-5](https://doi.org/10.1016/S2214-109X(20)30162-5).

OECD. 2018. ‘Norway (NOR) Exports, Imports, and Trade Partners.’ OECD. As of 7 July 2021: <https://oec.world/en/profile/country/nor?depthSelector1=HS4Depth>.

———. 2019a. *Digital Innovation: Seizing Policy Opportunities*. Paris: OECD. <http://www.oecd.org/publications/digital-innovation-a298dc87-en.htm>.

———. 2019b. *OECD Economic Surveys: Norway*. Paris: OECD. https://www.oecd-ilibrary.org/economics/oecd-economic-surveys-norway_19990383.

OECD, and European Observatory on Health Systems and Policies. 2019. *State of Health in the EU: Norge Landprofil 2019*. Paris: OECD & European Observatory on Health Systems and Policies. <https://www.oecd-ilibrary.org/docserver/f922a4d1-no.pdf?expires=1607336233&id=id&accname=ocid56013842&checksum=BF212A55DEAF4F221E5F54FB6B1C2443>.

Peterson Institute for International Economics (PIIE). 2018. ‘What Is Globalization?’ PIIE. As of 7 July 2021: <https://www.piie.com/microsites/globalization/what-is-globalization>.

Randall, Linda, and Anna Berlina. 2019. *Governing the Digital Transition in Nordic Regions: The Human Element*. Stockholm: Nordregio. <http://norden.diva-portal.org/smash/get/diva2:1295022/FULLTEXT01.pdf>.

Research Council of Norway. 2019. ‘SFI Centre for Research-Based Innovation.’ Research Council of Norway. 3 July. As of 7 July 2021: <https://www.forskingsradet.no/en/call-for-proposals/2019/centre-for-research-based-innovation/>.

———. 2020a. *Empowering Ideas for a Better World: Strategy for the Research Council of Norway 2020–2024*. Oslo: Research Council of Norway. <https://www.forskingsradet.no/om-forskingsradet/publikasjoner/2020/empowering-ideas-for-a-better-world/>.

———. 2020b. ‘Enabling Technologies.’ Research Council of Norway. As of 7 July 2021: <https://www.forskingsradet.no/en/about-the-research-council/Portfolios/enabling-technologies/>.

———. 2020c. ‘Portfolio Plan for Enabling Technologies.’ Research Council of Norway. As of 7 July 2021: <https://www.forskingsradet.no/om-forskingsradet/portefoljer/muliggjorende-teknologier/portefoljeplanen-for-muliggjorende-teknologier/>.

Ritzen, Jo. 2000. *Social Cohesion, Public Policy, and Economic Growth: Implications for OECD Countries*. Paris: OECD. As of 7 July 2021: <https://www.oecd.org/education/innovation-education/1825690.pdf>.

Skjoldager, Mikkel, Andrea Skjold Frøshaug, Torben Bundgaard Vad, Emily Ryen Gloinson, Fay Dunkerley, Mann Virdee, Camilla d’Angelo, Carolina Feijao, Gemma-Claire Ali, and Salil Gunashekar. 2021a. *Green Transition: An Analysis of Trends, Future Directions and Potential Missions to Address Societal Challenges in Norway*. Foresight Study for the Research Council of Norway to Help Inform the Future of Research and Innovation in Norway. Cambridge & Copenhagen: RAND Europe & DAMVAD Analytics.

———. 2021b. *Oceans: An Analysis of Trends, Future Directions and Potential Missions to Address Societal Challenges in Norway*. Foresight Study for the Research Council of Norway to Help Inform the Future of Research and Innovation in Norway. Cambridge & Copenhagen: RAND Europe & DAMVAD Analytics.

———. 2021c. *Structural Measures to Develop a Resilient Research and Innovation Environment in Norway*. Foresight Study for the Research Council of Norway to Help Inform the Future of Research and Innovation in Norway. Cambridge & Copenhagen: RAND Europe & DAMVAD Analytics.

Stiftung, Bertelsmann. 2020. 'SGI 2018 | Norway | Quality of Democracy.' As of 7 July 2021: https://www.sgi-network.org/2018/Norway/Quality_of_Democracy.

United Nations. 2020. 'Challenges | United Nations Educational, Scientific and Cultural Organization.' United Nations. As of 7 July 2021: <http://www.unesco.org/new/en/natural-sciences/ioc-oceans/focus-areas/rio-20-ocean/ocean-governance/>.

———. 2021. 'The 17 Goals | Sustainable Development.' United Nations. As of 7 July 2021: <https://sdgs.un.org/goals>.

World Bank, and United Nations Department of Economic and Social Affairs. 2017. *The Potential of the Blue Economy: Increasing Long-Term Benefits of the Sustainable Use of Marine Resources for Small Island Developing States and Coastal Least Developed Countries*. Washington, DC: World Bank. <https://sustainabledevelopment.un.org/content/documents/2446blueeconomy.pdf>.

World Health Organization. 2019. *Future of Digital Health Systems: Report on the WHO Symposium on the Future of Digital Health Systems in the European Region*. Geneva: World Health Organization Regional Office for Europe. <https://www.euro.who.int/en/health-topics/Health-systems/digital-health/publications/2019/future-of-digital-health-systems-report-on-the-who-symposium-on-the-future-of-digital-health-systems-in-the-european-region-copenhagen,-denmark,-68-february-2019>.

———. 2020a. *Non-communicable Disease Progress Monitor 2020*. Geneva: World Health Organization. <https://www.who.int/publications/i/item/ncd-progress-monitor-2020>.

———. 2020b. 'Norway: Health System Review.' 22 (1). Geneva: World Health Organization. <https://www.who.int/publications/i/item/HiT-22-1-2020>.

World Wide Fund for Nature. 2018. 'Arctic Biodiversity in the Spotlight.' World Wide Fund for Nature. As of 7 July 2021: <https://arcticwwf.org/newsroom/the-circle/arctic-biodiversity/>.

Annex A. Future scenario narratives used in the study

In this annex, we present the comprehensive versions of the future scenario narratives across both scenario sets (i.e. Norway in a national context and Norway in a global context). The scenarios were used in the foresight workshops as a tool to examine and debate a set of potential priority missions and discuss ideas for wider structural measures. The narratives were shared with the workshop participants in advance of the workshops. Because of their cross-cutting nature, the cohesion and globalisation, as well as the technology and digitalisation strategic areas (and to some extent green transition as well), were covered by both scenario sets. To aid the reader, before presenting the detailed scenario narratives, we again outline the two broad scenario sets:

- **Scenario set 1 (*Norway in a national context*):** The first scenario set, consisting of four future scenarios, broadly focuses on Norway in a national context, largely relating to the Norwegian domestic agenda. This scenario set encompasses health, welfare, education, work and skills, cohesion, and relevant aspects of technology and digitalisation, and it also covers some aspects related to green transition (for example, in relation to the circular economy).
- **Scenario set 2 (*Norway in a global context*):** The second scenario set, consisting of four future scenarios, focuses on Norway in an international or global context, primarily relating to Norway's outward-facing role. It broadly covers themes related to climate, oceans, energy, transport, food, biodiversity, and globalisation, and it also covers relevant aspects of technology and digitalisation.

Alongside each scenario narrative, we also outline the associated key characteristics and underpinning factors of the scenarios.²⁵

²⁵ The arrows in the scenario narratives signify as follows: An upwards-facing arrow indicates an increase in the projection/future direction of travel for the factor, a downwards-facing arrow indicates a decrease in the projection/future direction of travel for the factor, and an arrow that goes in both directions horizontally indicates that the projection/future direction of travel for the factor remains the same as the current situation.

A.1. Future scenario narratives for the scenario set pertaining to ‘Norway in a national context’

Scenario 1: Protectionist decline

Global developments

Shifts in geopolitical power in the 2020s led to a period of political instability over the next decade with serious implications for global trade. Struggling to maintain supply chains, countries increasingly put pressure on locally based companies to serve their needs first. Many countries have adopted a protectionist approach, increasingly looking inwards to protect their own populations. As a result, Norway has become increasingly dependent on primary exports. Even within the EU, which initially sought to maintain a united front, there are divergent views on how to tackle current problems of climate change and stagnant economic growth.

Health and welfare in Norway

The delivery of health and welfare in Norway has also been affected by protectionism. Unable to make proper use of collaboration and imports of medical equipment from other countries, the Norwegian government has struggled to use technology and innovation to meet the complex health needs of the Norwegian population. However, there has been increased national spending on the healthcare sector in terms of research and training, as well as frontline delivery, although medical and care services have not been linked up. Approaches to complex health needs related to an overall increase in life expectancy, population ageing and immigration are largely reactive, with limited capability in preventative strategies. Protectionism presents a significant impediment to pharma and life sciences, hindering the development of industries that thrive on collaboration and sharing.

Societal and economic development

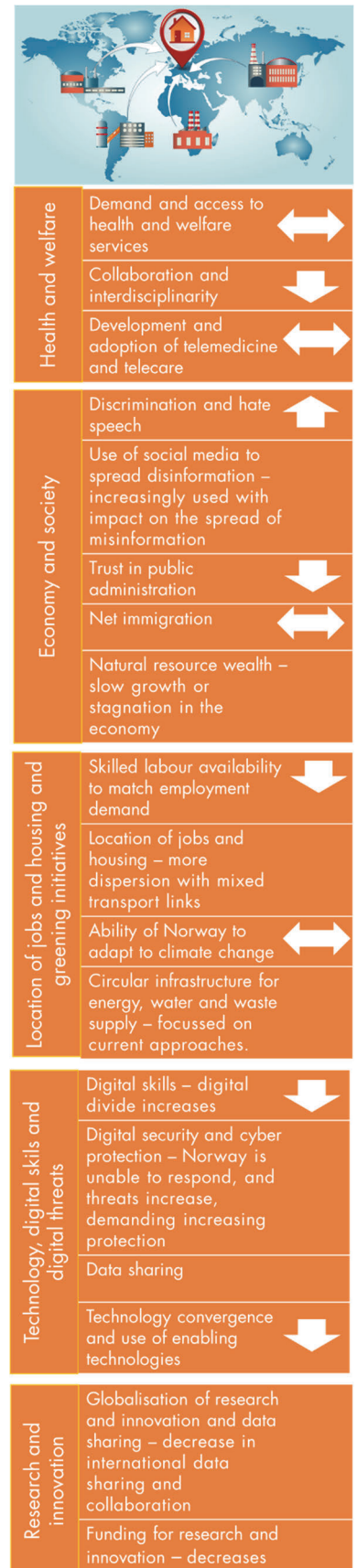
With the slowdown in sovereign wealth fund growth and unpredictability in global markets, Norwegian business and consumer confidence is low. At the same time, the ageing population in Norway has increased spending on social services and pensions. Norway has continued to accept some migrants from countries affected by instability or the effects of climate change, from a pragmatic perspective – to not make the current international situation worse – and to meet some of its labour shortages. However, reduced cooperation with the EU means that skilled labour is generally in short supply. Despite increased growth in some sectors, such as domestic food production, overall productivity growth and labour force participation are low and trust in public institutions is declining. Stagnant economic growth has also reduced much-needed investment in a digital infrastructure that facilitates data sharing, adequately deals with cyber and privacy protection threats, and helps increase the digital skills of the Norwegian population. There is a lack of transnational cooperation of social media, and social media continues to be used extensively to influence public debate on immigrants, spread hate speech and polarise Norwegian society.

The location of jobs and housing and greening initiatives

With limited employment opportunities in urban areas, where the effect of increasing temperatures is also more apparent, Norwegians are dispersing across smaller cities and towns. However, this dispersal is limited by a lack of investment in public transport and digital connectivity. The decrease in urbanisation has positive impacts on health outcomes of populations, with less traffic and pollution. Recent investments have also improved access to health and welfare services across different geographical locations in Norway, although research and training still tends to be city based. There have been some successes in greening domestic energy and linking up waste and energy across the public sector, but the circular economy is not seen as the way forward by politicians or citizens.

Research and innovation

Overall, funding in the R&I sector has reduced, and it is fragmented due to general mistrust of the government and international actors. Norwegian actors are finding it difficult to compete in the world market. These issues are further amplified by the absence of coordination and collaboration across stakeholders in the R&I system in a national and international arena, as well as limited data sharing. Furthermore, the lack of relevant competencies in the labour market required for meeting current and future demands of the sector has created longer-term challenges. In Norway, the absence of infrastructure and funding to support partnerships, combined with restrictions on data access and sharing, has prevented Norway from leveraging and capitalising on the data economy and on the digitalisation trends in the health, pharma and life sciences.



Scenario 2: Going green together

Global developments

During the 2020s there was a realisation across governments, industry leaders and populations that the relationship with the planet is key and resources and time are finite. This led to efforts at the international level and activism at the local level to build a green agenda. Norway, already a leader in renewable energy and decarbonised transport, has focused on further reducing its environmental and climate impact.

Health and welfare in Norway

Norway has undergone significant demographic changes, with a shift towards a higher number of senior citizens. This has created pressure for the healthcare system due to increased demand for services. On the other hand, there is increased access to health and welfare services as a result of policies promoting decentralisation towards municipalities and increasing digitalisation of the healthcare sector. Telehealth has become the default option, allowing for a more targeted and less resource-intensive provision of services, reducing unnecessary travel. Access to healthcare has also improved through strategies focused on reducing and preventing social inequalities in health, such as prevalence of risk factors in population sectors with lower income and education. Alongside these changes, there has been an increase in digital skills across the Norwegian population due to efforts from the government to build digital competence by adapting the education curricula and providing adequate training across all age groups and sectors. These educational programmes have also sought to develop other relevant employment skills as the economy continues to move from a consumption to a green approach.

Societal and economic development

Norway has seen a decline in hate speech and discrimination, partly as a result of interventions, such as the increased capacity of authority to tackle these issues, especially in the online environment. Internet and smartphone use remain high in Norway. With the higher level of digital competence across all demographics and improved data security and ethics standards, social media is generally seen as a reliable source, used to facilitate a range of peer-to-peer activities and communications, from grassroots to government. Pockets of misinformation remain, however, and attract a vocal minority. Data security standards have also created tensions given the overregulation perceived by the Norwegian population.

The location of jobs and housing and greening initiatives

The success of Norway's approach is reflected in the level of trust in Norway's public administration, which continues to grow. This has been important in fostering green transition initiatives through the interconnection between citizens, local governments and local businesses. Cross-sectoral cooperation and cooperation across different governance levels have promoted a circular economy at national, regional and local levels. The Government Pension Fund of Norway has managed to adequately manage climate risks by investing in climate change policy and new technology. This is particularly the case within regions with higher population density, such as cities, where the adaptation of the built environment has been an important priority for the green transition, and green initiatives, such as urban farming and 'green builds' that are fully carbon neutral, have become more widespread. Additionally, citizens have a more prominent role in the green transition through higher levels of engagement in innovation and green entrepreneurship, as well as through local activism. There are, however, challenges in fostering behavioural change; older generations show more reluctance to adapting to new social norms, while younger generations feel they are being asked to pay too much of the price for climate change.

Research and innovation

Open science and increased data sharing have made research more accessible to citizens and policy makers, which has been particularly beneficial in supporting evidence-based policy for the green transition. Increased data availability has also allowed researchers to better evaluate the effectiveness and acceptability of initiatives, and to determine how Norway can best leverage and adapt to these. Aligned with the focus on cybersecurity in the EU Framework Programme, Norway has made a key priority to embed data protection and information security in its information and communications technology policy strategy, which has allowed for a better response to digital and cyber security threats, which have now decreased. Additionally, the green transition has led to a redistribution of jobs, away from jobs in a fossil-fuelled industry towards jobs in a green economy.



Health and welfare	Demand and access to health and welfare services	↑
	Collaboration and interdisciplinarity	↑
	Development and adoption of telemedicine and telecare	↑
Economy and society	Discrimination and hate speech	↓
	Use of social media to spread disinformation – increasingly used, but little impact on the spread of disinformation	
	Trust in public administration	↑
	Net immigration	↓
	Natural resource wealth – steady growth in the economy, greater share of wealth from sustainable sources	
Location of jobs and housing and greening initiatives	Skilled labour availability to match employment demand	↑
	Location of jobs and housing – located in big cities and transport-friendly locations	
	Ability of Norway to adapt to climate change	↑
	Circular infrastructure for energy, water and waste supply – develop rapidly and are implemented at national, regional and local levels	
Technology, digital skills and digital threats	Digital skills – decrease, digital divide increases	
	Digital security and cyber protection – Norway is better able to respond, decreasing threats	
	Data sharing	↑
Research and innovation	Technology convergence and use of enabling technologies	↑
	Globalisation of research and innovation and data sharing – increasing international data sharing and collaboration (open and distributed)	
	Funding for research and innovation – sufficient and continuous	

Scenario 3: Slowly changing society

Global developments

The mid- to late 2020s saw a return to business as usual for most of the world and Norway. Strategic alliances have largely remained the same, and there is a slow but steady drift of economic power and influence away from Western powers. Although there have been periods of strong support for environmental activism, particularly in Europe, this has not been sustained, and internationally there has not been a real impetus for change. There has been some progress towards reducing emissions, but without a clear vision at the international level, this progress has not been sufficient, and the impacts of climate warming are starting to be felt.

Health and welfare in Norway

Trends towards technological innovation and digitalisation in the healthcare system in Norway have continued, and there are areas of Norway where there is strong technological innovation. However, these are not widely rolled out across different regions in Norway, and there are challenges with collaboration between the private and public sectors. Some private initiatives exist in the healthcare sector, but the Norwegian system continues to rely heavily on public funds, and measures to improve care coordination have been only partly successful. The healthcare workforce has been only partly able to meet the growing health and long-term care needs that have resulted from Norway's ageing population, increased immigration, and the effects of climate change. There is also a reluctance to address the underlying issues of social inequalities in life expectancy, disparities among income groups, and behavioural risk factors.

Societal and economic development

Regional conflicts and climate change have created increased pressure on immigration globally, but Norway has always had strong measures in place to ensure education and employment for migrants. Despite this, tensions still exist, particularly with regard to cultural integration. With only incremental changes in the make-up of the Norwegian welfare provision and labour markets, trust in public institutions remains relatively high, but there is concern about Norway's strategy for ensuring it has the necessary digital and employment skills to deal with changes in the national and global landscape. Although there is good digital provision in Norway, lack of appropriate regulation of the digital space means that social media continues to be a source of misinformation, feeding potential social divisions.

The location of jobs and housing and greening initiatives

There has been an increasing concentration of the Norwegian population in urban areas, as a thicker labour market in the cities has been better able to meet the demand of workers with specific qualifications. At the same time, commercial activity has opened up in the Arctic following the lack of impetus to deal with climate change internationally, which has accelerated the melting of the sea ice in the Arctic. This has accelerated economic growth in counties in northern Norway, but challenges persist with ensuring that there is access to labour with the necessary skills and expertise to make use of an improved knowledge base and value creation in the North. Regional development initiatives also remain weakly connected and do not really support the Sami community and their employment and business opportunities. Because Norwegians are concentrated in cities, it has been easy to join together energy and waste initiatives across hospitals and public sector buildings. This has also facilitated the creation of city-led initiatives, but their wider take-up has not been incentivised. Many Norwegians feel that they are already playing their part with renewable energy and electric vehicle use. Although people have greater access to services in urban areas, the concentration of people in cities also means that there are increased pressures of mass marketing, availability of unhealthy food choices and access to transport, which all have an effect on lifestyles and negative health outcomes.

Research and innovation

National and international collaboration for R&I continues to increase, but researchers continue to voice concerns about data sharing, and funding for interdisciplinary research is limited. The lack of collaboration between industry and the higher education sectors also poses key challenges for Norway. The skills that Norwegians obtain through higher education are not fully aligned with the skills needed in the labour market, particularly as new areas of innovation open up and automation, the application of artificial intelligence and broader technology convergence start to change the nature of employment. There is a fragmented funding landscape that is largely focused on excellent science, while the translation into innovation outputs is limited. In health, Norway concentrates health R&D in university research, and there is weak coordination between the different key actors in the R&D health system, which has had resulted in a lack of cost-effectiveness in the development of pharmaceuticals in Norway.



Health and welfare	Demand and access to health and welfare services	↔
	Collaboration and interdisciplinarity	↔
	Development and adoption of telemedicine and telecare	↔
Economy and society	Discrimination and hate speech	↔
	Use of social media to spread disinformation – increasingly used, with impact on the spread of disinformation	
	Trust in public administration	↔
	Net immigration	↔
Location of jobs and housing and greening initiatives	Natural resource wealth – steady growth in the economy, no change in share of wealth from sustainable sources	
	Skilled labour availability to match employment demand	↔
	Location of jobs and housing – located in big cities and transport-friendly locations	
	Ability of Norway to adapt to climate change	↔
	Circular infrastructure for energy, water and waste supply – rapid development, but implementation localised	
Technology, digital skills and digital threats	Digital skills – remains as now	
	Digital security and cyber protection – Norway is unable to respond, demanding increased protection	
	Data sharing	↑
Research and innovation	Technology convergence and use of enabling technologies	↔
	Globalisation of research and innovation and data sharing – increase in international data sharing and collaboration	
	Funding for research and innovation – fragmentation	

Scenario 4: Technological trajectory

Global developments

In line with the prevailing international view, Norway has focused on technological advances to promote economic growth and support its sustainability goals. Technology and the knowledge-based economy have been the main tenets of the Norwegian R&I agenda, from both an international and a domestic perspective, with new technologies and their convergence having brought about significant advances in health and welfare. However, changes in employment have created new social inequalities.

Health and welfare in Norway

Many digital solutions have been integrated into health and welfare services, which has helped to address the continued demand and pressure for these services. Automation and artificial intelligence are commonplace in healthcare, and telehealth has become the default option for health and welfare. Digital technology, such as robotics, is used to help support the autonomy of older people. Thanks to its comprehensive health databases and its ability to exploit large amounts of patient data, Norway was able to rapidly digitalise the health sector. In addition, health data; an improved focus on funding; and developments in and convergence of bioinformatics, genetic engineering, biotechnology and nanotechnology have enabled Norway to move towards personalised medicine, which has made great strides since the 2020s. Overall, this has led to a more patient-centred health system. However, there are concerns that the health system is becoming 'twin-track', because users have to be digitally competent and willing to share personal data to access it and because some advanced treatments are only available privately.

Societal and economic developments

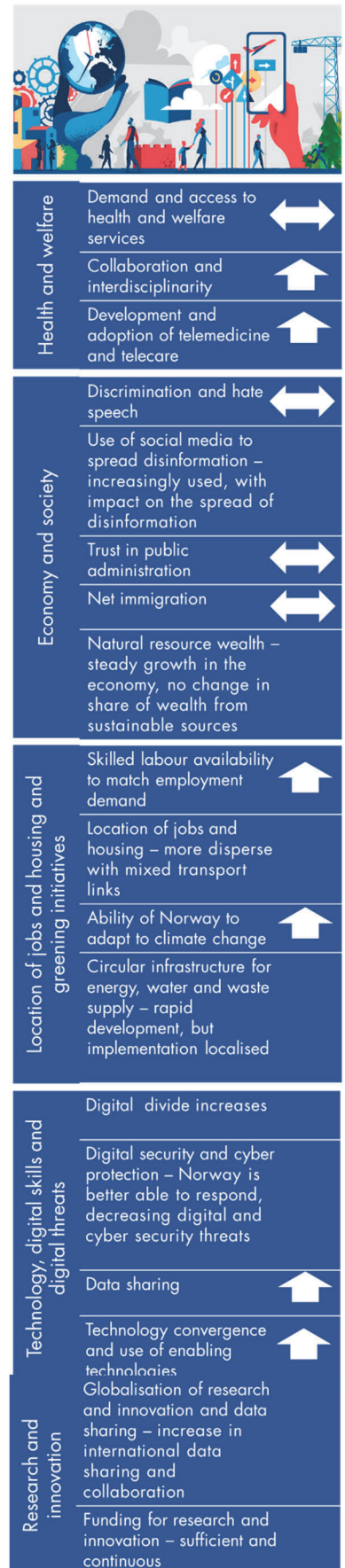
Although a substantial part of the Norwegian population now has access to Internet and service industries, such as banking, finance and tourism, have achieved efficiency gains and improved their business processes, some people are being left behind in terms of their digital skills even though the economy is doing well. Technology convergence and development has been led by Norwegian industry, and central and local government and other public sectors have not fully integrated common systems for user-friendly digital services. There is acceptance from the public that data generally has to be shared to access services and participate in society, and the Norwegian population continues to have a relatively stable level of trust in its public institutions. However, trust in government has, at the same time, not increased, and the perceived lack of control around data privacy and security issues threatens to reduce it further. The application of advanced technologies has contributed to efficiencies in transport, health, agriculture and food, and manufacturing industries, at the same time transforming employment in these industries. Norway has actively addressed these changing employment needs through education and training policies. Although overall immigration to Norway has remained stable, there has been a shift in the type of immigrant, to higher-skilled, wealthier immigrants. However, the need for some low-skilled labour remains, and political tensions around the role of immigrants in the Norwegian economy and society persist.

The location of jobs and housing and greening initiatives

Remote working has been the norm since the 2020s. Investment in digital infrastructure has continued, and many Norwegians have moved out of urban centres to smaller cities and towns, where the impacts of climate change are currently more supportable. The Internet and social media are key elements of this lifestyle, with vast amounts of data changing hands and control of platforms still in the hands of Big Tech companies that actively resist regulation. Norway is not alone in struggling to police misinformation, and it has invested heavily with partners in cyber security prevention.

Research and innovation

The increased use of artificial intelligence, big data and genomics in Norwegian society has been associated with a steadily rising demand for data and data sharing both nationally and internationally. Norway has been able to widely deploy technologies across sectors due to increasing collaboration and funding for collaboration across sectors. However, R&I initiatives for developments in technology tend to be geared towards developments in the natural sciences. There is a lack of recognition of the human, ethical and legal challenges that emerge with increased data sharing and resulting privacy and cyber security threats, which contributes to a growing distrust of pervasive technology in Norway.



A.2. Future scenario narratives for the scenario set pertaining to 'Norway in a global context'

Scenario 1: Protectionist decline

Global landscape

Shifts in geopolitical power that came to the fore in the 2020s led to a period of political instability over the next decade, with serious implications for global trade. Struggling to maintain supply chains, countries increasingly put pressure on locally based companies to serve their needs first. By 2040, this has led to mistrust even among former close allies. Many countries have adopted a protectionist approach, increasingly looking inwards to protect their own populations. Even within the EU, which initially sought to maintain a united front, member states have divergent views on how to tackle current problems of climate change and stagnant economic growth. At the international level, cooperation on climate goals has plummeted and targets agreed at the last United Nations Climate Change Conference, five years ago, look increasingly unattainable. The negative impacts of climate change have been limited only by the poorly performing global economy.

Trade and availability of skilled labour

The uncertainty in global trade has seen countries re-shore food production and manufacturing. In Norway, as elsewhere, there has been investment in automation and additive manufacturing to support this move. Although there has been an increase in immigration from countries affected by instability or climate effects, reduced cooperation with the EU means that skilled labour is in short supply. Norway remains a trusted partner for energy, but export demand for the industry has fallen, and some countries have chosen to invest in home-grown renewable energy to secure their supply. Demand for Norwegian seafood products and shipping in global markets is also down, and Norway's imports of manufactured items have also declined.

Circular initiatives

Despite Norway's success in greening its domestic energy and transport sectors, successive governments have found it increasingly difficult to encourage further behavioural change through circular economy initiatives when consumption is down and many in the population are worrying about how to pay their bills. Stagnant economic growth has meant that much-needed investment in digital infrastructure has also stalled. Compounding this, the levels of public trust in science and technology are at an all-time low, and a few high-profile cyber-attacks have dominated the headlines.

Research and innovation

Research and innovation in Norway has been affected by reduced funding and the loss of some external collaborators, as mistrust also pervades this sector; long-term investment in research loses out to short-term policy needs as both governments and industry tighten their belts. Most funding now comes from national bodies and aims at least to facilitate collaboration between public and private sectors domestically. Opportunities are seen to develop the ocean and onshore environments for food and energy production. There is also an ambition to develop new applications using skills and innovations from the petroleum sector that could boost the economy.



Green transition	Demand and support for circular initiatives	↓
	Circular infrastructure for energy, water and waste supply – remains focussed on current approaches	
	Investments/innovations to reduce emissions from oil	↓
	Ability of Norway to adapt to climate change	↓
	Food security and supply – Norway maintains security of food supply with higher share of domestic production	
Oceans	Low-carbon business models (international) – no change in emergence	
	Sustainable aquaculture – little expansion in the aquaculture sector	
Globalisation and society	Norwegian shipping industry – greening of international shipping industry remains as now	
	Norway's trade linkages with other countries	↓
	Norwegian cooperation with EU/EEA	↓
	Natural resource wealth – slow growth or stagnation	
	Make up of geopolitical landscape – the geopolitical landscape becomes less stable with a shift in global power	
Research and innovation	Skilled labour availability (to match employment demand)	↓
	Technology convergence and the use of enabling technologies	↓
	Globalisation of research and innovation and data sharing – decrease in international data sharing and collaboration	
	Funding for research and innovation – decreases	

Scenario 2: Global greening

Global developments

During the 2020s, there was a further realisation across governments, industry leaders and populations that their relationship with the planet is key and resources and time are finite. This led to efforts at the international level and activism at the local level to build a green agenda. The EU sees the benefits not only of greater internal cooperation, but also of building external relations and leading by example. Relations between major powers have improved as these countries see value in pursuing a 'green economy' approach, focusing on innovative solutions for all sectors, rather than securing ownership of rapidly depleting resources. Regions like Africa and South America are now recognised for their valuable resources, but regional disparities still remain. The impacts of climate change are happening at a slower rate, but the longer-term focus is on adaptation, as the current trajectory, tracking close to a 2°C increase, looks hard to maintain.

Circular economy

The top-down approach means that low-carbon business models have developed across many sectors where there are international trade sectors, and this is matched by a demand within Norway, in Europe, and internationally for products and services that have a low impact on the environment and climate. A circular economy approach has been central to this. Some change has been industry led, some has been driven by international agreements and legislation; Norway has worked hard within supra-national institutions to further this agenda and support regional change through overseas aid. But changing consumer attitudes has also been key, and top-down approaches are balanced against initiatives driven by communities and government at the local level, where quality of life is displacing consumption as a measure of success and there is a focus on local production and consumption. Yet tensions persist among different stakeholder groups, with some advocating a more relaxed approach to the environment given the gains made in recent years.

Renewable energy

There has been a rapid move away from fossil fuel dependence to electricity from renewables, linked to expanding regional grids. The Government Pension Fund of Norway has managed to adequately manage climate risks by investing in climate change policy and new technology. International travel and transport of goods have not returned to levels seen in the 2010s. Norway has invested heavily in offshore renewables and is a key proponent of greener and smarter shipping – one area where hydrogen has taken off.

Circular initiatives and technology in Norway

In Norway, circular initiatives have been introduced in relation to key sectors of energy, waste and water by the government, but there is also a supportive environment for local solutions, resulting in a boom in green entrepreneurship that enjoys easy access to European markets. Technology and data are seen as key to sustainable solutions, from food to retail, with many of these starting at a small scale, seizing supply chain opportunities offered by a move to low-carbon business models by bigger companies at the national and international level and the public sector. However, technology is seen as the means and not the end. Norway has also seen its aquaculture exports expand, although for fresh products these have focused on EU markets, and the domestic share of food production has also increased.

Research and innovation

There has been investment in research, which is seen as key to a green future, both within the EU and in Norway. This has been accompanied by greater collaboration between these partners and internationally. To facilitate openness in research and innovation, the EU has also worked together with industry and national governments to develop protocols for data sharing, improved data security and authentication. While there has been action to re-align education and training to better match skills to the changing employment opportunities in Norway, these systems are still seen as being slow to respond. Collaborative research in social sciences has also been important to maintain momentum towards climate goals and global stability, keeping citizens educated and engaged.



Green transition	Demand and support for circular initiatives ↑
	Circular infrastructure for energy, water and waste supply – develop rapidly and implement at national, regional and national levels
	Investments/innovations to reduce emissions from oil ↑
	Ability of Norway to adapt to climate change ↑
	Food security and supply – Norway maintains security of food supply with higher share of domestic production
Oceans	Low-carbon business models (international) – rapid emergence
	Sustainable aquaculture – expanded aquaculture sector with expanded share of sustainable farming
Globalisation and society	Norwegian shipping industry – greening of international shipping industry is extensive
	Norway's trade linkages with other countries ↑
	Norwegian cooperation with EU/EEA ↑
	Natural resource wealth – steady growth, with greater share from sustainable sources
	Make-up of geopolitical landscape – more stable, with greater cooperation and stability in Norway's partner countries
Research and innovation	Skilled labour availability (to match employment demand) ↑
	Technology convergence and the use of enabling technologies ↑
	Globalisation of research and innovation and data sharing – increase in international data sharing and collaboration (open and distributed)
	Funding for research and innovation – sufficient and continuous

Scenario 3: Slowly shifting power

Global developments

The mid- to late 2020s saw a return to business much as usual for most of the world. Although Britain's exit from the European Union did result in a small shift in trading patterns, strategic alliances have largely remained unchanged, and the slow but steady drift of economic power and influence away from Western powers has continued. Regional conflicts rumble on, but wider geopolitical tensions, for a while the focus of global attention, have now largely eased. The intervening years have seen the usual rounds of climate and trade summits, but existing supra-national structures are losing their relevance. Although there have been periods of strong support for environmental activism, particularly in Europe, this had not been sustained, and internationally, it has not led to impetus for real change. There has been some steady progress towards reducing carbon emissions, but, as foreseen, without a clear vision at the international level, this has not been sufficient, and the impacts of climate warming are starting to be felt.

Economic trends

Economic trends towards increasing supply chain efficiencies through automation, artificial intelligence, and distributed ledger technologies have continued, as have efforts to decarbonise the transport and energy sectors. Electric cars are now increasingly widespread, but there is a lack of consensus on greening international shipping and aviation. Progress in other sectors, which depend on commercial incentives for citizens and businesses, is more limited. The circular economy is still seen as a key solution by the EU, but it has not gained much traction across member states, especially when other problems seem more pressing.

Oceans

The ocean has become an important focus for the Norwegian economy. There is continued demand for sustainable gas from Norway's key partners as they transition towards net-zero, and Norway has expanded its ocean-bed carbon storage capability to decarbonise its gas exports. Other offshore technologies, such as solar panels and wave energy convertors, are being explored to supplement its hydropower and offshore wind farms. As a knowledge leader in the oceans sector, Norway has exported these solutions, often as part of its efforts to support developing countries. At the same time, Norway has seen increased demand for seafood, leading to an expansion in that sector. However, by 2040, the ability of the ocean to sustain all this activity is not clear. The impacts of climate change are particularly felt in the High North, and these changes have accelerated changes in Arctic ecosystems and the loss of sustainable habitats for Arctic species. Norway is increasingly looking to Europe and the Nordics for collaboration to solve some of these challenges. The rapid melting of the sea ice in the Arctic in recent years has reduced some of the natural ice borders between countries, creating a renewed focus on opportunities for commercial activity in the region but also tensions with other nations.

The circular economy in Norway

Norway has opted for a government-led approach to the circular economy, mainly focusing on its energy and waste sectors as areas where these approaches could be the most beneficial. Local initiatives aimed at reducing consumption through reuse, repairing and recycling are encouraged but currently not incentivised, and many Norwegians feel that by leading on renewable energy and electric vehicle use, they are already playing their part. Green shipping is one area where Norway is leading the way again, having introduced electric batteries and carbon capture technologies into its domestic fleet.

Research and innovation

Funding for research and development has remained fragmented both within Norway and externally. Norway has continued to co-operate closely with its EU/EEA partners. Substantial funding has been available in some areas, but the closed nature of collaboration between institutions and the lack of focus on monitoring and data sharing have meant that resources have not been targeted appropriately; there has been a lack of investment in interdisciplinary collaboration; and challenges remain with the translation of excellent science into innovations. Norwegian efforts in technology convergence have remained broad, covering energy, electronics and optics, the environment, and health. But because much research is still undertaken by the private sector and because the humanities, social science and legal perspectives on technology have not been systematically addressed, this has so far not led to the expected transformational change.



	Demand and support for circular initiatives	↓
Green transition	Circular infrastructure for energy, water and waste supply – focussed on current approaches to water/energy/waste	
	Investments/innovations to reduce emissions from oil	↔
	Ability of Norway to adapt to climate change	↓
	Food security and supply – maintains food supply with same share of production as now	
	Low-carbon business models (international) – no change in emergence	
Oceans	Sustainable aquaculture – expanded aquaculture sector, with expanded share of sustainable farming	
	Norwegian shipping industry – greening of international shipping industry remains as now	
Globalisation and society	Norway's trade linkages with other countries	↔
	Norwegian cooperation with EU/EEA	↔
	Natural resource wealth – steady growth, but no change in share from sustainable sources	
	Make-up of geopolitical landscape – no change in the stability of the geopolitical landscape	
	Skilled labour availability (to match employment demand)	↔
	Technology convergence and the use of enabling technologies	↔
Research and innovation	Globalisation of research and innovation and data sharing – increase in international data sharing and collaboration (closed)	↑
	Funding for research and innovation – fragmentation	

Scenario 4: Technological trajectory

Global developments

After some turbulence at the start of the 2020s, the focus has been on revitalising the global economy, which is seen as a key driver for reducing global inequalities and achieving inter-regional stability. As economic and geopolitical power has continued to shift towards the BRIC (Brazil, Russia, India and China) countries, Western democracies have looked to establish new regional relationships that have opened up opportunities for Norway for trade, investment and R&I collaboration. Norway has continued to play an active role in international institutions, but the prevailing international view has been that climate change goals can be achieved through digitalisation and technological advances. Consumption is still regarded as an important driver of economic growth, and the green agenda has somewhat taken a back seat. This is reflected in the current pace of environmental change, with the result that by 2040, there is a growing clamour for more action.

The use of technology

Technology has played a key role in recent economic growth, impacting on many areas of daily life as using the Internet for entertainment, socialising shopping, working, accessing services and education has become the norm. Automation and AI are commonplace across a range of sectors, and technology convergence has led to a re-alignment in the transport, health, agriculture, food and manufacturing industries, resulting in new players and new business models. Although the perception is that power remains in the hands of a few, rapid regional expansions have created new firms. Technology has contributed to reducing carbon emissions, from large-scale carbon capture and storage and green hydrogen generation, to small-scale urban farming. Innovative technological solutions have also been implemented to both reduce and remove marine biowaste and plastics. But technology is now seen by some as a problem too in terms of resource and energy use. The past decade has also seen considerable movement of goods and people across the planet, as well as continued urbanisation. And, while changes in employment brought about by technological advances have been accommodated in some countries through forward-looking skills and education strategies, this is by no means the norm, potentially introducing new inequalities.

The Norwegian economy

The Norwegian economy has also shown strong growth, fuelled by a continued close relationship with Europe but also by new trade links, providing technology partners and new markets for seafood products and energy solutions. Norway has invested in integrating energy and waste systems at a national level, collaborating closely with European neighbours on these and exporting this expertise. It has also continued to expand its carbon capture and storage capability, but hydrogen from sea-splitting, first trialled as part of shipping, is a potential new export. There has also been rapid growth in green initiatives in other areas that are often technology led. There is demand for sustainable solutions at the European level, but without real cross-sectoral synergies, it remains difficult for new green companies to expand outside Norway.

Research and innovation

Technology and the knowledge-based economy have been the main tenets of the Norwegian R&I agenda both from an international and from a domestic perspective, with technology seen to underpin many sustainability objectives. To promote openness and transparency in international data sharing and collaboration, public funding from national bodies and the EU has been supplemented by the development of new relationships with universities and research institutes, including in South-east Asia and South America. This has resulted in a rapid expansion in the research base, without having to be overly dependent on a small number of foreign economies and the private sector. A key part of the agenda has also been developing a base of highly skilled workers, both through an open-door policy for overseas researchers and an agile, responsive higher education sector. But less focus has been placed on training for those who have seen their jobs displaced.



Green transition	Demand and support for circular initiatives	↔
	Circular infrastructure for energy, water and waste supply – rapid development, but implementation remains localised	
	Investments/innovations to reduce emissions from oil	↔
	Ability of Norway to adapt to climate change	↓
	Food security and supply – maintains food supply with same share of production as now	
Oceans	Low-carbon business models (international) – emergence in some sectors	
	Sustainable aquaculture – expanded aquaculture sector, with no change in share of sustainable farming	
Globalisation and society	Norwegian shipping industry – greening of international shipping industry increases	
	Norway's trade linkages with other countries	↑
	Norwegian cooperation with EU/EEA	↑
	Natural resource wealth – steady growth, but no change in share from sustainable sources	
	Make-up of geopolitical landscape – no change in the geopolitical landscape	
	Skilled labour availability (to match employment demand)	↑
Research and innovation	Technology convergence and the use of enabling technologies	↑
	Globalisation of research and innovation and data sharing – increase in international data sharing and collaboration (open and distributed)	
	Funding for research and innovation – sufficient and continuous	

Annex B. Details of indicative mission areas

In this section, using a standard template as outlined in the box below, we present specific details of the indicative missions that have been articulated within and across the RCN's five strategic areas (oceans; green transition; health and welfare; technology and digitalisation; and cohesion and globalisation).

Box 6. Key to the mission templates presented in the following sections

- **Key challenges that the mission aims to address:** Details some of the challenges that the mission will contribute to addressing.
- **Exemplar targeted focus areas:** Lists a selection of potential targeted focus areas for the mission. Implementing the priority missions will require the design and implementation of a portfolio of diverse projects involving multiple stakeholders, ideally, as noted previously, in areas where Norway demonstrates strengths and has competitive advantages. The exemplar targeted focus areas could be used to inform the development of potential R&I projects. Furthermore, it is important to note that each of the target focus areas will need to be specified with clear, measurable and timebound goals that are decided by the stakeholders involved in implementing the mission.
- **Links to RCN strategic areas:** Specifies the links to the strategic area(s) identified in the RCN's current strategy for the next ten years (Research Council of Norway 2020a).
- **Links to UN Sustainable development goals (SDGs):** Specifies the UN SDG(s) that the priority mission is linked to (United Nations 2021).
- **Links to clusters of Horizon Europe's Global Challenges pillar (Pillar II):** Specifies the cluster(s) within Pillar II of Horizon Europe) (Global Challenges and European Industrial Competitiveness) that the mission is linked to (European Commission 2021a).
- **Intersection with other priority missions:** Specifies the other indicative priority mission(s) that the priority mission is interconnected with.
- **Involvement of key stakeholders:** Implementing this priority mission will require targeted research, innovation and investment from the RCN and other potential stakeholders (e.g. the public sector; the private sector and industry; civil society organisations; citizens). Importantly, it will also necessitate catalysing active cooperation and collaboration among these diverse stakeholders (including public engagement). In this section, we list some of these potential key stakeholders.

Priority mission area 1: Make Norway's (largest) cities climate neutral

Key challenges that the mission aims to address²⁶	
<ul style="list-style-type: none"> • Reducing greenhouse gas (GHG) emissions through urban planning and housing development; • Improving urban environments; • Counteracting the negative effects of climate change; • Improving land use and energy efficiency in buildings; • Improving consumption and waste practices; and • Improving adaptation to climate change. 	
Exemplar targeted focus areas	
<ul style="list-style-type: none"> • Further reduce (X% reduction in) greenhouse gas emissions in key sectors across Norway's (largest) cities, aimed at ultimately achieving carbon neutrality; and • Implement sustainable, greener, resource-efficient and inclusive measures (for example, in relation to land use and transport, energy use in the built environment, consumption and waste, and adaptation to climate change). 	
Links to RCN Strategic Areas	Links to UN SDGs
<ul style="list-style-type: none"> • Green transition (primary link) • Cohesion and globalisation • Technology and digitalisation 	<ul style="list-style-type: none"> • SDG 7: Affordable and Clean energy • SDG 11: Sustainable Cities and Communities • SDG 13: Climate Action
Links to clusters of Horizon Europe's Global Challenges Pillar II	Links to EU mission areas identified in Horizon Europe
<ul style="list-style-type: none"> • Climate, Energy and Mobility 	<ul style="list-style-type: none"> • A Climate Resilient Europe – Prepare Europe for Climate Disruptions and Accelerate the Transformation to a Climate Resilient and Just Europe by 2030 • 100 Climate-Neutral Cities by 2030 – By and for the Citizens
Intersection with other priority mission(s) identified in this study	
<ul style="list-style-type: none"> • Accelerate the transition to a sustainable and circular economy in Norway • Significantly reduce Norway's transport-related emissions • Play a leading role in Norway and internationally to substantially increase the use of renewable energy in a sustainable and long-lasting manner and accelerate R&I in this area • Contribute to Norway's digital transformation by creating a diverse, digitally and soft-skilled workforce • Actively enable digital transformation at all levels of government in Norway 	
Involvement of key stakeholders	
<ul style="list-style-type: none"> • Sectors (e.g. energy, transport, food, environment, technology, building, construction, hospitality, retail) • Norwegian national agencies (e.g. Ministry of Trade, Industry and Fisheries, Ministry of Transport, Ministry of Climate and Environment, Ministry of Petroleum and Energy, Ministry of Finance, Ministry of Local Government and Modernisation, Waste Norway, Bane Nor, Norwegian Climate and Pollution Agency, Norwegian Association of Local and Regional Authorities, Industrial Development Corporation of Norway) • International organisations (e.g. United Nations Environmental Assembly, World Bank, OECD, European Commission, World Economic Forum) • Voluntary organisations (e.g. Frivillighet Norge, European Network of National Civil Society Associations, Miljøagentene, Norges Naturvernforbund, Norsk Friluftsliv, Natur og Ungdom) • The Research Council of Norway and Innovation Norway 	

²⁶ Although the focus of this mission is on factors related to the green transition (and incorporates aspects of technology and digitalisation and cohesion and globalisation), the mission could be designed and implemented in such a way that it would also encompass key issues related to the urban–rural divide and to connectivity and cohesion among Norway's (largest) cities and rural areas.

Priority mission area 2: Actively address the impacts of non-communicable diseases in Norway

Key challenges that the mission aims to address	
<ul style="list-style-type: none"> • Reducing deaths caused by non-communicable diseases in Norway²⁷; • Reducing non-communicable disease risk factors (e.g. high blood pressure, high blood glucose concentrations, dietary habits, physical inactivity, tobacco use and alcohol consumption)²⁸; • Improving the overall quality of life of people impacted by NCDs; and • Reducing the overall number of premature deaths resulting from non-communicable diseases. 	
Exemplar targeted focus areas	
<ul style="list-style-type: none"> • Reduce (X% reduction in) the number of deaths caused by non-communicable diseases; • Actively treat, prevent and reduce the prevalence of risk factors in the Norwegian population (e.g. harmful use of alcohol, physical inactivity, salt/sodium intake, tobacco use, raised blood pressure, diabetes, obesity, air pollution); • Improve system-wide responses, such as drug therapies (e.g. to prevent heart attacks and strokes), medicines and technologies to treat NCDs; and • Support and improve the quality of life of people affected by NCDs in Norway (across all segments of the population). 	
Links to RCN Strategic Areas	Links to UN SDGs
<ul style="list-style-type: none"> • Health and welfare (primary link) 	<ul style="list-style-type: none"> • SDG 3: Good Health and Well-being
Links to clusters of Horizon Europe's Global Challenges Pillar II	Links to EU mission areas identified in Horizon Europe
<ul style="list-style-type: none"> • Health 	<ul style="list-style-type: none"> • Conquering Cancer: Mission Possible
Intersection with other priority mission(s) identified in this study	
<ul style="list-style-type: none"> • Substantially reduce the prevalence and impact of mental illness in Norway • Establish Norway as a global knowledge leader in personalised medicine and healthcare • Accelerate people-centred data-driven strategies to digitally transform and improve Norway's health and welfare system • Improve the quality of life and health of an ageing society in Norway • Contribute to Norway's digital transformation by creating a diverse, digitally and soft-skilled workforce • Actively enable digital transformation at all levels of government in Norway 	
Involvement of key stakeholders	
<ul style="list-style-type: none"> • Sectors (e.g. health, social care, welfare, pharmacy, life sciences) • Norwegian higher education institutions and research organisations • International organisations (e.g. WHO, Global Asthma Network, Non-communicable Disease Alliance, World Bank, OECD, Unicef, World Cancer Research Fund, European Commission) • National and regional government health agencies (e.g. Ministry of Health and Care Services, Norwegian Institute of Public Health, Norwegian Medicines Agency, Norwegian Directorate of Health, Central Norway Pharmaceutical Trust, Northern Norway Regional Health Authority, Southern and Eastern Norway Regional Health Authority, Western Norway Regional Health Authority, Industrial Development Corporation of Norway) • Voluntary organisations (e.g. Frivillighet Norge, European Network of National Civil Society Associations, Aurora, Barnekreftforeningen, Blå Kors Norge, Internasjonal helse- og sosialgruppe, Kreftforeningen, Nasjonalforeningen for folkehelsen, Mat&Atferd, Norsk Helse- og Avholdsforbund) • The Research Council of Norway and Innovation Norway 	

²⁷ In Norway, 87 per cent of all deaths are caused by NCDs, which is higher than the global average (World Health Organization 2020a). NCDs account for over 70 per cent of all annual deaths on a global scale, presenting both a public health and economic challenge across all countries (World Health Organization 2020a). The World Health Organization has published a set of monitoring indicators to assess progress of countries in implementing recommended interventions to prevent and tackle NCDs (World Health Organization 2020a).

²⁸ See, for example Nujhat et al. (2020).

Priority mission area 3: Substantially reduce the prevalence and impact of mental illness in Norway

Key challenges that the mission aims to address	
<ul style="list-style-type: none"> • Reducing mental health disorders, a key issue faced by other European countries and Norway^{29,30}; • Reducing mental disorder risk factors (e.g. the rise in the number of new disability pensions due to mental disorders); and • Improving the knowledge base on mental illnesses. 	
Exemplar targeted focus areas	
<ul style="list-style-type: none"> • Improve and ultimately transform the way in which mental illness in Norway is effectively prevented, detected, diagnosed (including early interventions), and treated, to help reduce its prevalence and impact throughout society (e.g. at home and in work environments); • Ensure that evidence-based research efforts are concentrated in these and other, related areas (such as the causes of mental illness and recovery from mental illness) and translated into practice (e.g. to improve the reach and outcome of mental health services throughout Norway); and • Support and improve the quality of life of people affected by mental illness in Norway (across all segments of the population). 	
Links to RCN Strategic Areas	Links to UN SDGs
<ul style="list-style-type: none"> • Health and welfare (primary link) 	<ul style="list-style-type: none"> • SDG 3: Good Health and Well-being
Links to clusters of Horizon Europe's Global Challenges Pillar II	Links to EU mission areas identified in Horizon Europe
<ul style="list-style-type: none"> • Health 	<ul style="list-style-type: none"> • Conquering Cancer: Mission Possible
Intersection with other indicative priority mission(s) identified in this study	
<ul style="list-style-type: none"> • Actively address the impacts of non-communicable diseases in Norway • Establish Norway as a global knowledge leader in personalised medicine and healthcare • Accelerate people-centred data-driven strategies to digitally transform and improve Norway's health and care system • Improve the quality of life and health of an ageing society in Norway • Contribute to Norway's digital transformation by creating a diverse, digitally and soft-skilled workforce • Actively enable digital transformation at all levels of government in Norway 	
Involvement of key stakeholders	
<ul style="list-style-type: none"> • Sectors (e.g. health, social care, technology, education, employment) • Norwegian higher education institutions and research organisations • International health agencies (e.g. World Health Organization, OECD, European Commission) • National and regional government health and welfare agencies (e.g. Ministry of Health and Care Services, Norwegian Institute of Public Health, Norwegian Medicines Agency, Norwegian Directorate of Health, National Insurance Administration, Norwegian Board of Health, Norwegian Labour and Welfare Organisation, National Centre for Suicide Research and Prevention, the Central Norway Pharmaceutical Trust, Northern Norway Regional Health Authority, Southern and Eastern Norway Regional Health Authority, Western Norway Regional Health Authority, district psychiatric centres, Industrial Development Corporation of Norway) • Voluntary organisations (e.g. Frivillighet Norge, European Network of National Civil Society Associations, Aurora, Blå Kors Norge, Internasjonal helse- og sosialgruppe, Nasjonalforeningen for folkehelsen, Mat&Atferd, Norsk Helse- og Avholdsforbund) • The Research Council of Norway and Innovation Norway 	

²⁹ In Norway, approximately 16–22 per cent of the adult population will experience a mental disorder in a 12-month period. This encompasses anxiety disorders, depression, and substance use disorders (Norwegian Institute of Public Health 2016).

³⁰ See, for example Mykletun et al. (2009), Norwegian Labour and Welfare Administration (2018), Norwegian Institute of Public Health (2016) and Ministry of Health and Care Services (2008).

Priority mission area 4: Establish Norway as a global knowledge leader in personalised medicine and healthcare

Key challenges that the mission aims to address	
<ul style="list-style-type: none"> Improving the prediction and prevention of disease, precision diagnostics, tailored interventions and a more active role for participants in managing their own healthcare needs; Furthering Norway's strong position in personalised medicine, with population-based healthcare administrative registers, biobanks, and the potential for collaboration with other Nordic countries given similarities between health systems; and Improving the links between digitalisation targets and patient treatment targets, strengthening teams-based and multidisciplinary care provision, rolling out personalised medicine across Norway's regions, and contributing to developing population-oriented information. 	
Exemplar targeted focus areas	
<ul style="list-style-type: none"> Put Norway at the forefront of developing cutting-edge and responsible personalised medicine approaches and patient-centred care; Translate these into practice to improve patient care and outcomes and to avoid unnecessary health costs; roll these out across all segments of the population in Norway; and Actively address the potential ethical, societal and legal challenges involved in development and adoption. 	
Links to RCN Strategic Areas	Links to UN SDGs
<ul style="list-style-type: none"> Health and welfare (primary link) Technology and digitalisation 	<ul style="list-style-type: none"> SDG 3: Good Health and Well-being
Links to clusters of Horizon Europe's Global Challenges Pillar II	Links to EU mission areas identified in Horizon Europe
<ul style="list-style-type: none"> Health Digital, Industry and Space 	<ul style="list-style-type: none"> Conquering Cancer: Mission Possible
Intersection with other priority mission(s) identified in this study	
<ul style="list-style-type: none"> Actively address the impacts of non-communicable diseases in Norway Substantially reduce the prevalence and impact of mental illness in Norway Accelerate people-centred data-driven strategies to digitally transform and improve Norway's health and welfare system Improve the quality of life and health of an ageing society in Norway Contribute to Norway's digital transformation by creating a diverse, digitally and soft-skilled workforce Actively enable digital transformation at all levels of government in Norway 	
Involvement of key stakeholders	
<ul style="list-style-type: none"> Sectors (e.g. health, social care, life sciences and pharmaceuticals, technology) International organisations (e.g. World Health Organization, OECD, European Commission, United Nations) National and regional government health agencies (e.g. Ministry of Health and Care Services, Norwegian Institute of Public Health, Norwegian Medicines Agency, Norwegian Directorate of Health, Norwegian Association of General Medicine, Norwegian Data Protection Authority, Central Norway Pharmaceutical Trust, Northern Norway Regional Health Authority, Southern and Eastern Norway Regional Health Authority, Western Norway Regional Health Authority, National Centre for eHealth Research, Industrial Development Corporation of Norway) Voluntary organisations (e.g. Frivillighet Norge, European Network of National Civil Society Associations, Aurora, Barnekreftforeningen, Blå Kors Norge, Internasjonal helse- og sosialgruppe, Kreftforeningen, Nasjonalforeningen for folkehelsen, Mat&Atferd, Norsk Helse- og Avholdsforbund) The Research Council of Norway and Innovation Norway 	

Priority mission area 5: Accelerate people-centred, data-driven strategies to digitally transform and improve Norway's health and welfare system

Key challenges that the mission aims to address	
<ul style="list-style-type: none"> Improving telehealth and welfare offerings across Norway³¹; Improving data and image sharing among healthcare and welfare providers in Norway; and Contributing to new data models, increased collaboration, and transformation towards a preventative approach. 	
Exemplar targeted focus areas	
<ul style="list-style-type: none"> Further leverage Norway's research and innovation strengths in data-driven technologies (e.g. AI, machine learning, nanotechnology, biotechnology, etc.) and the translation of these into practice to improve the prevention, diagnosis and treatment of diseases and illnesses³²; Actively address the potential ethical, societal and legal challenges involved in development and adoption; and Ensure that all segments of the population in Norway are positively impacted. 	
Links to RCN Strategic Areas	Links to UN SDGs
<ul style="list-style-type: none"> Health and welfare (primary link) Technology and digitalisation 	<ul style="list-style-type: none"> SDG 3: Good Health and Well-being
Links to clusters of Horizon Europe's Global Challenges Pillar II	Links to EU mission areas identified in Horizon Europe
<ul style="list-style-type: none"> Health Digital, Industry and Space 	<ul style="list-style-type: none"> Conquering Cancer: Mission Possible
Intersection with other indicative priority mission(s) identified in this study	
<ul style="list-style-type: none"> Actively address the impacts of non-communicable diseases in Norway Substantially reduce the prevalence and impact of mental illness in Norway Establish Norway as a global knowledge leader in personalised medicine and healthcare Improve the quality of life and health of an ageing society in Norway Contribute to Norway's digital transformation by creating a diverse, digitally and soft-skilled workforce Actively enable digital transformation at all levels of government in Norway 	
Involvement of key stakeholders	
<ul style="list-style-type: none"> Sectors (e.g. health, social care, life sciences, pharmaceuticals, education and learning, technology, environment, climate) Norwegian higher education institutions and research organisations International organisations (e.g. World Health Organization, OECD, European Commission, United Nations) National and regional government health agencies (e.g. Ministry of Health and Care Services, Norwegian Institute of Public Health, Norwegian Medicines Agency, Norwegian Directorate of Health, Norwegian Association of General Medicine, Norwegian Data Protection Authority, Central Norway Pharmaceutical Trust, Northern Norway Regional Health Authority, Southern and Eastern Norway Regional Health Authority, Western Norway Regional Health Authority, National Centre for eHealth Research, Industrial Development Corporation of Norway) Voluntary organisations (e.g. Frivillighet Norge, European Network of National Civil Society Associations, Aurora, Barnekreftforeningen, Blå Kors Norge, Internasjonal helse- og sosialgruppe, Kreftforeningen, Nasjonalforeningen for folkehelsen, Mat&Atferd, Norsk Helse- og Avholdsforbund) The Research Council of Norway and Innovation Norway 	

³¹ See, for example Department for Business, Energy & Industrial Strategy (2021), European Cluster Collaboration Platform (2021) and Nordic Health 2030 (2018).

³² Norway can also further leverage data-driven strategies and data spaces for technologies related to cloud, data and artificial intelligence, to create registries that can benefit research and innovation in other sectors where Norway has competitive advantages (i.e. health, earth observation and the Arctic, maritime through Barentswatch, and energy).

Priority mission area 6: Improve the quality of life and health of an ageing society in Norway

Key challenges that the mission aims to address³³	
<ul style="list-style-type: none"> • Providing solutions to the demographic challenges that Norway faces in the coming years; • Ensuring that Norwegians can stay independent for longer; • Ensuring that Norwegians can participate through their employment and their communities and can remain connected to others in society; • Ensuring that solutions for the ageing population are spread out across Norway's regions; • Ensuring a reduction in chronic diseases among the elderly; and • Improving the balance between demand and supply of health and care workers on a national level. 	
Exemplar targeted focus areas³⁴	
<ul style="list-style-type: none"> • Ensure that people in Norway can live longer lives (e.g. X extra years) healthily and independently while reducing the inequalities between different parts of society; • Increase the number of healthcare personnel with relevant skills and capabilities to support an ageing population (and ensure the retention of these personnel); • Increase the adoption of relevant technologies and related services that contribute to healthier and independent living for the elderly (including helping with social connectedness and other areas related to improving quality of life); and • Ensure adequate support structures are established and available to all segments of Norwegian society. 	
Links to RCN Strategic Areas	Links to UN SDGs
<ul style="list-style-type: none"> • Health and welfare (primary link) • Cohesion and Globalisation 	<ul style="list-style-type: none"> • SDG 3: Good Health and Well-being • SDG 10: Reduced Inequalities
Links to clusters of Horizon Europe's Global Challenges Pillar II	Links to EU mission areas identified in Horizon Europe
<ul style="list-style-type: none"> • Health • Culture, creativity and inclusive society 	<ul style="list-style-type: none"> • Conquering Cancer: Mission Possible
Intersection with other indicative priority mission(s) identified in this study	
<ul style="list-style-type: none"> • Actively address the impacts of non-communicable diseases in Norway • Substantially reduce the prevalence and impact of mental illness in Norway • Establish Norway as a global knowledge leader in personalised medicine and healthcare • Accelerate people-centred, data-driven strategies to digitally transform and improve Norway's health and welfare system • Contribute to Norway's digital transformation by creating a diverse, digitally and soft-skilled workforce • Actively enable digital transformation at all levels of government in Norway 	
Involvement of key stakeholders	
<ul style="list-style-type: none"> • Sectors (e.g. health, social care, life sciences, pharmaceuticals, technology, education and learning, finance, transport) • Norwegian higher education institutions and research organisations • International organisations (e.g. World Health Organization, OECD, European Commission, United Nations) • National government health agencies (e.g. Ministry of Health and Care Services, Norwegian Institute of Public Health, Norwegian Medicines Agency, Norwegian Directorate of Health, Norwegian Association of General Medicine, Norwegian Data Protection Authority, Central Norway Pharmaceutical Trust, Northern Norway Regional Health Authority, Southern and Eastern Norway Regional Health Authority, Western Norway Regional Health Authority, National Centre for eHealth Research, Industrial Development Corporation of Norway) • Voluntary organisations (e.g. Frivillighet Norge, European Network of National Civil Society Associations, Aurora, Barnekreftforeningen, Blå Kors Norge, Internasjonal helse- og sosialgruppe, Kreftforeningen, Nasjonalforeningen for folkehelsen, Mat&Atferd, Norsk Helse- og Avholdsforbund) • The Research Council of Norway and Innovation Norway 	

³³ See, for example Department for Business, Energy & Industrial Strategy (2021), European Cluster Collaboration Platform (2021), Ministry of Education and Research (2020) and Norwegian Institute of Public Health (2014).

³⁴ Potentially, Norway can improve bottom-up and top-down R&D by, for example, leveraging the Health&Care21 process.

Priority mission area 7: Accelerate the transition to a sustainable and circular economy in Norway

Key challenges that the mission aims to address³⁵	
<ul style="list-style-type: none"> • Increasing the percentage of materials consumed each year in Norway that make it back into the economy; • Improving consumer awareness of the circular economy; • Reducing per-capita consumption rates; • Improving overall recycling rates; and • Improving circularity in key sectors, including housing, nutrition, mobility, services, consumables, healthcare and communication. 	
Exemplar targeted focus areas³⁶	
<ul style="list-style-type: none"> • Develop a sustainable and substantially circular economy in Norway with progressively diminishing use of resources (X% reduction in resource use) as Norway progresses towards that target; • Improve circular business models and resource efficiency; reduce the extent of and dependence on extraction (e.g. of metals, minerals, fossil fuels); • Improve supply security; increase consumer awareness of the circular economy; and • Create a strong repair, reuse and recycling economy and improve circularity across specific sectors (e.g. housing, nutrition, mobility, services, consumables, healthcare and communication). 	
Links to RCN Strategic Areas	Links to UN SDGs
<ul style="list-style-type: none"> • Green transition (primary link) • Cohesion and globalisation 	<ul style="list-style-type: none"> • SDG 7: Affordable and Clean Energy • SDG 9: Industry, Innovation and Infrastructure • SDG 11: Sustainable Cities and Communities • SDG 12: Responsible Consumption and Production • SDG 13: Climate Action
Links to clusters of Horizon Europe's Global Challenges Pillar II	Links to EU mission areas identified in Horizon Europe
<ul style="list-style-type: none"> • Climate, Energy and Mobility • Food, Bioeconomy, Natural Resources, Agriculture and Environment 	<ul style="list-style-type: none"> • A Climate Resilient Europe – Prepare Europe for Climate Disruptions and Accelerate the Transformation to a Climate Resilient and Just Europe by 2030
Intersection with other indicative priority mission(s) identified in this study	
<ul style="list-style-type: none"> • Protect, value and restore Norwegian biodiversity and reduce its degradation and loss • Contribute to Norway's digital transformation by creating a diverse, digitally and soft-skilled workforce • Actively enable digital transformation at all levels of government in Norway • Play a leading role in Norway and internationally to substantially increase the use of renewable energy in a sustainable and long-lasting manner and accelerate R&I in this area 	
Involvement of key stakeholders	
<ul style="list-style-type: none"> • Sectors (e.g. energy, transport, development, hospitality, housing, health, communication, construction, urban, forestry) • Norwegian higher education institutions and research organisations • International organisations (e.g. United Nations Environment Programme, OECD, European Commission, World Wildlife Fund, Food and Agriculture Organization of the United Nations, International Union for Conservation of Nature, World Nature Organization, Intergovernmental Panel on Climate Change, Global Environment Facility, Earth Systems Governance Project, Industrial Development Corporation of Norway) • National government agencies (Norwegian Environment Agency, Norwegian Ministry of Climate, Climate and Pollution Agency, Norwegian Ministry of Finance, the Norwegian tax authorities) • Voluntary organisations (e.g. Frivillighet Norge, European Network of National Civil Society Associations, Miljøagentene, Norges Naturvernforbund, Norsk Friluftsliv, Natur og Ungdom) • The Research Council of Norway and Innovation Norway 	

³⁵ See, for example Circle Economy and Circular Norway (2020).

³⁶ Potentially Norway can improve bottom-up and top-down R&D by for example leveraging the Health&Care21 process).

Priority mission area 8: Preserve and secure a resilient and robust democracy for future Norwegian generations that is characterised by high levels of trust and transparency

Key challenges that the mission aims to address ³⁷	
<ul style="list-style-type: none"> • Strengthening Norway's outcomes in the categories for quality of democracy, electoral processes, access to information, rule of law, civil rights and political liberties; • Decreasing gender segregation and other discrimination; • Decreasing corruption in overseas Norwegian business activities; • Maintaining strong public trust in Norway; • Improving media literacy; and • Improving transparency of political content. 	
Exemplar targeted focus areas	
<ul style="list-style-type: none"> • Proactively facilitate broad-based political participation of Norwegian publics (e.g. by increasing voter turnout and representativeness); • Strengthen efforts to protect electoral processes (e.g. free and fair elections); • Increase transparency of targeted political content; support media freedom and pluralism; enhance efforts to counter the spread of disinformation; • Improve media literacy; • Ensure inclusive and participatory decision making at all levels; • Reduce segregation in the labour market; • Eliminate discrimination against migrants (e.g. in the labour market); and • Increase investment in R&I activities to better understand conditions to preserve an inclusive and diverse society. 	
Links to RCN Strategic Areas	Links to UN SDGs
<ul style="list-style-type: none"> • Cohesion and globalisation (primary link) 	<ul style="list-style-type: none"> • SDG 1: No Poverty • SDG 5: Gender Equality • SDG 8: Decent Work and Economic Growth • SDG 10: Reduced Inequalities • SDG 16: Peace, Justice and Strong Institutions
Links to clusters of Horizon Europe's Global Challenges pillar	Links to EU mission areas identified in Horizon Europe
<ul style="list-style-type: none"> • Culture, Creativity and Inclusive Society • Civil Security for Society 	<ul style="list-style-type: none"> • A Climate Resilient Europe – Prepare Europe for Climate Disruptions and Accelerate the Transformation to a Climate Resilient and Just Europe by 2030
Intersection with other priority mission(s) identified in this study	
<ul style="list-style-type: none"> • Ensure decent work for all people in Norway • Establish Norway as a knowledge leader in global change processes, development and international relations • Contribute to Norway's digital transformation by creating a diverse, digitally and soft-skilled workforce • Actively enable digital transformation at all levels of government in Norway 	

³⁷ See, for example, Ministry of Finance (2018); Kleven (2016); Stiftung (2020); Funka (2121); Christensen and Læg Reid (2020).

Involvement of key stakeholders

- All sectors
- Norwegian higher education institutions and research organisations
- International organisations (e.g. United Nations (i.e. United Nations Development Programme and the Security Council), World Bank, International Labour Organisation, World Health Organization, European Commission, OECD, International Organization for Democracy and Human Rights)
- National government agencies (Norwegian Agency for Development Cooperation, Ministry of Foreign Affairs, Norwegian Investment Fund for Developing Countries, Industrial Development Corporation of Norway)
- Voluntary organisations (e.g. Frivillighet Norge, European Network of National Civil Society Associations, Amnesty International Norge, CISV Norge, Norwegian Helsinki Committee, Compassion Norge, Europabevegelsen Norge, Kirkens Nødhjelp, Foreningen Norden, Norsk Folkehjelp, Stiftelsen Flyktningshjelpen)
- The Research Council of Norway and Innovation Norway

Priority mission area 9: Play a leading role in tackling antimicrobial resistance (in Norway and globally) and actively share expertise

Key challenges that the mission aims to address	
<ul style="list-style-type: none"> • Reducing the number of healthy people colonised with resistant bacteria and the number of patients who have infections caused by these bacteria in Norway and globally; • Preventing infections and limiting antibiotic consumption; • Reducing the use of antibiotics in animals in Norway and globally; • Increasing surveillance for safe delivery of medical treatment in the future; • Addressing the challenge of stalled antibiotics development internationally; • Increasing knowledge about what causes the development and spread of antibiotic resistance; and • Contributing to Norway's existing role a driving force in international and normative work to strengthen access, responsible use and development of new antibiotics, vaccines and better diagnostic tools. 	
Exemplar targeted focus areas	
<ul style="list-style-type: none"> • Put in place systems to improve the effective diagnosis and surveillance of antibiotic-resistant infections and antibiotic use in Norway and internationally; • Contribute to further reducing the demand for (new) antibiotics; • Provide thought leadership to help improve awareness and understanding of antimicrobial resistance; • Actively share experiences, approaches and expertise in combating antimicrobial resistance internationally; and • Actively invest in developing alternatives to current antibiotics. 	
Links to RCN Strategic Areas	Links to UN SDGs
<ul style="list-style-type: none"> • Health and welfare (primary link) • Cohesion and globalisation 	<ul style="list-style-type: none"> • SDG 3: Good Health and Well-being • SDG 14: Life Below Water • SDG 15: Life on Land
Links to clusters of Horizon Europe's Global Challenges pillar	Links to EU mission areas identified in Horizon Europe
<ul style="list-style-type: none"> • Health • Food, Bioeconomy, Natural Resources, Agriculture and Environment 	<ul style="list-style-type: none"> • A Climate Resilient Europe – Prepare Europe for Climate Disruptions and Accelerate the Transformation to a Climate Resilient and Just Europe by 2030 • Mission Starfish 2030: Restore our Ocean and Waters • Caring for Soil Is Caring for Life
Intersection with other priority mission(s) identified in this study	
<ul style="list-style-type: none"> • Protect, value and restore Norwegian biodiversity and reduce its degradation and loss • Actively contribute to healthy, safe and sustainable food systems • Contribute to Norway's digital transformation by creating a diverse, digitally and soft-skilled workforce • Actively enable digital transformation at all levels of government in Norway 	
Involvement of key stakeholders	
<ul style="list-style-type: none"> • Sectors (e.g. health, farming, husbandry, care, hospitality, environment, food, agriculture) • Higher education institutions and research organisations • Norwegian national agencies (National Institute of Public Health, Ministry of Health and Care Services, Ministry of Trade, Industry and Fisheries, Ministry of Agriculture and Food, Norwegian Food Safety Authority) • International organisations (European Commission, European Centre for Disease Prevention and Control, Food and Agricultural Organization of the United Nations, World Organisation for Animal Health, World Health Organization, Industrial Development Corporation of Norway) • Voluntary organisations (e.g. Frivillighet Norge, European Network of National Civil Society Associations, Miljøagentene, Norges Naturvernforbund, Norsk Friluftsliv, Natur og Ungdom) • Research Council of Norway and Innovation Norway 	

Priority mission area 10: Establish a resilient and sustainable blue economy in Norway

Key challenges that the mission aims to address	
<ul style="list-style-type: none"> • Helping reduce the negative anthropogenic impacts on the ocean ecosystem; • Improving the sustainable management of ocean ecosystems (including coastal areas); • Developing and sustaining competitive ocean-based industries in Norway (e.g. seafood); • Developing Norway's participation in the United Nations Decade of Ocean Science for Sustainable Development; • Developing impactful technologies and innovations (e.g. for green shipping); • Developing and scaling up sustainable solutions for the blue economy; and • Improving Norway's position as a global leader in relation to the ocean ecosystem. 	
Exemplar targeted focus areas³⁸	
<ul style="list-style-type: none"> • Increase the sustainable use of ocean-based resources to achieve economic growth in Norway; • Preserve (and improve) the health of the coastal and marine environment around Norway; • Actively invest in ocean mapping and ocean management programmes; • Strengthen Norway's (international) position and expertise with regard to ocean ecosystems (including ocean governance); • Put Norway at the forefront of R&I activities associated with key sectors of strength (such as aquaculture, fisheries, petroleum and shipping); • Minimise the impacts of ocean acidification; • Examine and invest in opportunities for offshore renewable energy to enable coastal and maritime markets in the long term; • Actively support efforts to promote oceans as a sustainable and safe source of food; and • Ensure the inclusion and active participation of all societal groups. 	
Links to RCN Strategic Areas	Links to UN SDGs
<ul style="list-style-type: none"> • Oceans (primary link) • Green transition • Cohesion and globalisation 	<ul style="list-style-type: none"> • SDG 14: Life Below Water
Links to clusters of Horizon Europe's Global Challenges pillar	Links to EU mission areas identified in Horizon Europe
<ul style="list-style-type: none"> • Climate, Energy and Mobility • Food, Bioeconomy, Natural Resources, Agriculture and Environment 	<ul style="list-style-type: none"> • Mission Starfish 2030: Restore our Ocean and Waters by 2030
Intersection with other priority mission(s) identified in this study	
<ul style="list-style-type: none"> • Position Norway as a global knowledge leader in combating marine pollution and establish Norwegian ocean ecosystems free of marine pollution • Enhance Norway's world-leading capabilities and expertise in future maritime technologies • Contribute to Norway's digital transformation by creating a diverse, digitally and soft-skilled workforce • Actively enable digital transformation at all levels of government in Norway 	
Involvement of key stakeholders	
<ul style="list-style-type: none"> • Sectors (e.g. energy, aquaculture, development, shipping, petroleum, seafood, technology, chemical industry, biotech) • Norwegian higher education institutions and research organisations • Norwegian national agencies (e.g. Ministry of Trade, Industry and Fisheries, Ministry of Transport, Ministry of Petroleum and Energy, Norwegian Petroleum Directorate, Ministry of Local Government and Modernisation, Ministry of Foreign Affairs, Industrial Development Corporation of Norway) • International organisations (e.g. United Nations Environment Programme, International Water Association, Food and Agricultural Organisation of the United Nations, European Commission) • Voluntary organisations (e.g. Frivillighet Norge, European Network of National Civil Society Associations, Miljøagentene, Norges Naturvernforbund, Norsk Friluftsliv, Natur og Ungdom, Strømmestifelsen) • The Research Council of Norway and Innovation Norway 	

³⁸ For example, improve bottom-up and top-down R&D processes with a variety of different stakeholders to ensure the sustainable use of ocean resources (e.g. leveraging the Ocean21 process).

Priority mission area 11: Position Norway as a global leader in combating marine pollution and establish Norwegian ocean ecosystems free of marine pollution

Key challenges that the mission aims to address	
<ul style="list-style-type: none"> • Clearing ocean environments (including coastal areas) of waste; • Ensuring improved and sustainable management of (plastic) waste; • Conserving marine resources and environments and improving their protection; • Supporting communities that are dependent on the marine ecosystem; and • Improving Norway's position as a global leader in relation to the ocean ecosystem. 	
Exemplar targeted focus areas	
<ul style="list-style-type: none"> • Leverage Norway's world-leading ocean management capabilities and expertise to substantially reduce the amount of marine pollution and hazardous substances (including plastics) entering the ocean environment around Norway (including those arising from land-based activities); • Remove/clean up marine pollutants (including plastics) that are already present in the ocean; • Spearhead international efforts in reducing global marine pollution; and • Reduce greenhouse gas emissions from marine activities, such as domestic shipping and fisheries. 	
Links to RCN Strategic Areas	Links to UN SDGs
<ul style="list-style-type: none"> • Oceans (primary link) • Green transition • Cohesion and globalisation 	<ul style="list-style-type: none"> • SDG 13: Climate Action • SDG 14: Life Below Water
Links to clusters of Horizon Europe's Global Challenges pillar	Links to EU mission areas identified in Horizon Europe
<ul style="list-style-type: none"> • Climate, Energy and Mobility • Food, Bioeconomy, Natural Resources, Agriculture and Environment 	<ul style="list-style-type: none"> • Mission Starfish 2030: Restore our Ocean and Waters by 2030
Intersection with other priority mission(s) identified in this study	
<ul style="list-style-type: none"> • Establish a resilient and sustainable blue economy in Norway • Enhance Norway's world-leading capabilities and expertise in future maritime technologies • Contribute to Norway's digital transformation by creating a diverse, digitally and soft-skilled workforce • Actively enable digital transformation at all levels of government in Norway 	
Involvement of key stakeholders	
<ul style="list-style-type: none"> • Sectors (e.g. technology, waste, shipping, energy, chemical industry, biotech) • Norwegian higher education institutions and research organisations • Norwegian national agencies (e.g. Ministry of Trade, Industry and Fisheries, Ministry of Transport, Ministry of Petroleum and Energy, Norwegian Petroleum Directorate, Ministry of Local Government and Modernisation, Ministry of Foreign Affairs, Industrial Development Corporation of Norway) • International organisations (e.g. United Nations Environmental Assembly, International Water Association, Food and Agricultural Organization of the United Nations, World Bank, United Nations Development Programme, European Commission) • Voluntary organisations (e.g. Frivillighet Norge, European Network of National Civil Society Associations, Miljøagentene, Norges Naturvernforbund, Norsk Friluftsliv, Natur og Ungdom) • The Research Council of Norway and Innovation Norway 	

Priority mission area 12: Enhance Norway's world-leading capabilities and expertise in future maritime technologies

Key challenges that the mission aims to address	
<ul style="list-style-type: none"> • Ensuring effective surveillance and monitoring of the oceans; • Reducing some of the challenges associated with large-scale fishing that have an impact on climate change; • Ensuring sustainable offshore aquaculture; • Ensuring innovative modes of transport, such as autonomous or electric ferries; • Developing green shipping solutions; • Developing new wave and wind technologies; • Supporting communities that are dependent on the marine ecosystem; and • Improving Norway's position as a global leader in relation to the ocean ecosystem. 	
Exemplar targeted focus areas	
<ul style="list-style-type: none"> • Put Norway at the forefront of successfully developing, deploying and scaling up a range of innovative, clean technology solutions applicable to the marine environment around Norway; • Responsibly use data to inform ocean management-related decision making; • Strengthen Norway's position as an international leader in green shipping; • Position Norway as a global leader in leveraging the opportunities offered by maritime technologies while addressing the risks and challenges associated with deploying these technologies; and • Actively promote cooperation (regional and international) between relevant stakeholders in this area. 	
Links to RCN Strategic Areas	Links to UN SDGs
<ul style="list-style-type: none"> • Oceans (primary link) • Technology and digitalisation • Green transition 	<ul style="list-style-type: none"> • SDG 7: Affordable and Clean energy • SDG 13: Climate Action • SDG 14: Life Below Water
Links to clusters of Horizon Europe's Global Challenges pillar	Links to EU mission areas identified in Horizon Europe
<ul style="list-style-type: none"> • Digital, Industry and Space • Climate, Energy and Mobility • Food, Bioeconomy, Natural Resources, Agriculture and Environment 	<ul style="list-style-type: none"> • Mission Starfish 2030: Restore our Ocean and Waters by 2030
Intersection with other priority mission(s) identified in this study	
<ul style="list-style-type: none"> • Establish a resilient and sustainable blue economy in Norway • Position Norway as a global leader in combating marine pollution and establish Norwegian ocean ecosystems free of marine pollution • Significantly reduce Norway's transport-related emissions • Contribute to Norway's digital transformation by creating a diverse, digitally and soft-skilled workforce • Actively enable digital transformation at all levels of government in Norway 	
Involvement of key stakeholders	
<ul style="list-style-type: none"> • Sectors (e.g. energy, aquaculture, development, shipping, petroleum, seafood, technology, chemical industry, biotech) • Norwegian higher education institutions and research organisations • Norwegian national agencies (e.g. Ministry of Trade, Industry and Fisheries, Ministry of Transport, Ministry of Petroleum and Energy, Norwegian Petroleum Directorate, Ministry of Local Government and Modernisation, Ministry of Foreign Affairs) • International organisations (e.g. United Nations Environmental Assembly, International Maritime Organisation, International Water Association, Food and Agricultural Organization of the United Nations, World Bank, United Nations Development Programme, European Commission, Industrial Development Corporation of Norway) • Voluntary organisations (e.g. Frivillighet Norge, European Network of National Civil Society Associations, Miljøagentene, Norges Naturvernforbund, Norsk Friluftsliv, Natur og Ungdom) • The Research Council of Norway and Innovation Norway 	

Priority mission area 13: Significantly reduce Norway's transport-related emissions

Key challenges that the mission aims to address	
<ul style="list-style-type: none"> Establishing low-emissions pathways in the transport sector, including in fisheries and machinery, passenger cars and aviation; Sustainably meeting Norwegian transport demand; Fully phasing in biogas, hydrogas and electric vehicles; Reducing traffic congestion; Increasing Norway's share of worldwide light vehicles; and Introducing innovative mobility solutions. 	
Exemplar targeted focus areas	
<ul style="list-style-type: none"> Considerably reduce (X% reduction in) greenhouse gas emissions from the entire transport sector in Norway (including terrestrial and maritime transport) and make it fully sustainable; Promote and invest in R&I activities to develop and adopt climate-friendly technologies, innovations and infrastructure at scale across all segments of the transport value chain (e.g. including but not limited to making shipping and maritime passenger transport greener); and Play a leading role in developing collaborations, improving education, understanding behavioural patterns, raising awareness and enhancing capacity-building measures related to climate change mitigation, adaptation and impact reduction. 	
Links to RCN Strategic Areas	Links to UN SDGs
<ul style="list-style-type: none"> Green transition (primary link) Technology and digitalisation Oceans 	<ul style="list-style-type: none"> SDG 7: Affordable and Clean energy SDG 9: Industry, Innovation and Infrastructure SDG 13: Climate Action
Links to clusters of Horizon Europe's Global Challenges pillar	Links to EU mission areas identified in Horizon Europe
<ul style="list-style-type: none"> Climate, Energy and Mobility Food, Bioeconomy, Natural Resources, Agriculture and Environment 	<ul style="list-style-type: none"> Prepare Europe for Climate Disruptions and Accelerate the Transformation to a Climate Resilient and Just Europe by 2030 100 Climate-Neutral Cities by 2030 – By and for the Citizens
Intersection with other priority mission(s) identified in this study	
<ul style="list-style-type: none"> Make Norway's (largest) cities climate neutral Enhance Norway's world-leading capabilities and expertise in future maritime technologies Play a leading role in Norway and internationally to substantially increase the use of renewable energy in a sustainable and long-lasting manner and accelerate R&I in this area Contribute to Norway's digital transformation by creating a diverse, digitally and soft-skilled workforce Actively enable digital transformation at all levels of government in Norway 	
Involvement of key stakeholders	
<ul style="list-style-type: none"> Sectors (e.g. energy, transport, logistics, food, environment, technology, building, construction, hospitality, retail) Norwegian national and regional agencies (e.g. Norwegian regional authorities, Norwegian Ministry of Climate and Environment, Norwegian Ministry of Finance, Ministry of Petroleum and Energy, Norwegian Climate and Pollution Agency, Ministry of Local Government and Modernisation, Ministry of Transport, Norwegian Ministry of Health and Care Services, Railway Directorate, Industrial Development Corporation of Norway) International organisations (e.g. United Nations Environmental Assembly, World Bank, OECD (e.g. International Transport Forum), European Commission, World Economic Forum) Voluntary organisations (e.g. Frivillighet Norge, European Network of National Civil Society Associations, Miljøagentene, Norges Naturvernforbund, Norsk Friluftsliv, Natur og Ungdom) The Research Council of Norway and Innovation Norway 	

Priority mission area 14: Protect, value and restore Norwegian biodiversity and reduce its degradation and loss

Key challenges that the mission aims to address	
<ul style="list-style-type: none"> • Improving integration between key sectors, i.e. biodiversity and farming; • Sustainably managing nature and ecosystem services to improve well-being; • Improving resilience to climate change; • Improving ecosystem services; • Growing the green economy; and • Integrating biodiversity values into national and international planning and activities. 	
Exemplar targeted focus areas	
<ul style="list-style-type: none"> • Significantly reduce (X% reduction in) and ultimately halt biodiversity loss in Norway's natural environment and farther afield that might result from Norwegian activities; • Actively engage in activities and play a leading role in actions and decision making that help sustainably use, conserve and appropriately restore well-functioning, diverse and healthy natural land and water ecosystems (e.g. through environmental conservation and ecological restoration activities, such as rewilding); • Promote growth of the green economy; and • Promote the importance of and integrate biodiversity values into national and international planning and activities. 	
Links to RCN Strategic Areas	Links to UN SDGs
<ul style="list-style-type: none"> • Green transition (primary link) • Cohesion and globalisation • Oceans 	<ul style="list-style-type: none"> • SDG 13: Climate Action • SDG 14: Life Below Water • SDG 15: Life on land
Links to clusters of Horizon Europe's Global Challenges pillar	Links to EU mission areas identified in Horizon Europe
<ul style="list-style-type: none"> • Food, Bioeconomy, Natural Resources, Agriculture and Environment 	<ul style="list-style-type: none"> • A Climate Resilient Europe – Prepare Europe for Climate Disruptions and Accelerate the Transformation to a Climate Resilient and Just Europe by 2030 • Mission Starfish 2030: Restore our Ocean and Waters by 2030 • Caring for Soil Is Caring for Life
Intersection with other priority mission(s) identified in this study	
<ul style="list-style-type: none"> • Establish a resilient and sustainable blue economy in Norway • Establish Norway as a knowledge leader in global change processes, development and international relations • Contribute to Norway's digital transformation by creating a diverse, digitally and soft-skilled workforce • Actively enable digital transformation at all levels of government in Norway 	
Involvement of key stakeholders	
<ul style="list-style-type: none"> • Sectors (e.g. agriculture, biotechnology, environment, industry, public sector, energy) • Norwegian higher education institutions and research organisations • Norwegian national agencies (Ministry of Trade, Industry and Fisheries, Ministry of Transport, Ministry of Petroleum and Energy, Norwegian Petroleum Directorate, Ministry of Local Government and Modernisation, Ministry of Foreign Affairs, Industrial Development Corporation of Norway) • International organisations (World Wildlife Fund, Conservation International, Fauna & Flora International, United Nations Environment Programme, Food and Agricultural Organization of the United Nations, Wildlife Conservation Society, European Commission) • Voluntary organisations (e.g. Frivillighet Norge, European Network of National Civil Society Associations, Miljøagentene, Norges Naturvernforbund, Norsk Friluftsliv, Natur og Ungdom) • The Research Council of Norway and Innovation Norway 	

Priority mission area 15: Establish Norway as a knowledge leader in global change processes, development and international relations

Key challenges that the mission aims to address³⁹	
<ul style="list-style-type: none"> • Improving understanding of international governance/leadership structures; • Improving understanding of international challenges and solutions; • Increasing mobilisation to test solutions and ideas; • Building capacity; • Increasing the number of Norwegians working in international organisations; and • Improving participation and constructive cooperation/collaboration. 	
Exemplar targeted focus areas	
<ul style="list-style-type: none"> • Develop actionable insights into (e.g. through evidence-based research) and better understanding of international governance/leadership structures and how such issues as emergencies, conflict and other humanitarian crises affect the Norwegian and global population (and the potential links among these); • Mobilise governments, organisations and communities to test innovative solutions and new ideas to tackle these and other issues; • Promote fair and equitable partnerships; • Build capacity at all levels to increase the number of people in the Norwegian workforce who work in international organisations (e.g. in peacekeeping and international development); and • Stimulate broad participation and strengthen constructive cooperation/collaboration at the global and regional levels. 	
Links to RCN Strategic Areas	Links to UN SDGs
<ul style="list-style-type: none"> • Cohesion and globalisation (primary link) 	<ul style="list-style-type: none"> • SDG 16: Peace, Justice and Strong Institutions
Links to clusters of Horizon Europe's Global Challenges pillar	Links to EU mission areas identified in Horizon Europe
<ul style="list-style-type: none"> • Culture, Creativity and Inclusive Society • Civil Security for Society 	<ul style="list-style-type: none"> • A Climate Resilient Europe – Prepare Europe for Climate Disruptions and Accelerate the Transformation to a Climate Resilient and Just Europe by 2030
Intersection with other priority mission(s) identified in this study	
<ul style="list-style-type: none"> • Preserve and secure a resilient and robust democracy for future Norwegian generations that is characterised by high levels of trust and transparency • Contribute to Norway's digital transformation by creating a diverse, digitally and soft-skilled workforce • Actively enable digital transformation at all levels of government in Norway 	
Involvement of key stakeholders	
<ul style="list-style-type: none"> • Sectors (e.g. public sector, workplace, education, voluntary/civic sector, civil society) • Norwegian higher education institutions and research organisations • International organisations (e.g. United Nations (i.e. United Nations Development Programme and the Security Council), World Bank, International Labour Organisation, World Health Organization, European Commission, OECD, International Organization for Democracy and Human Rights, Industrial Development Corporation of Norway) • National government agencies (Norwegian Agency for Development Cooperation, Ministry of Foreign Affairs, Norwegian Investment Fund for Developing Countries) • Voluntary organisations (e.g. Frivillighet Norge, European Network of National Civil Society Associations, Amnesty International Norge, CISV Norge, Norske Helsingforskomite, Compassion Norge, Europabevegelsen Norge, Kirkens Nødhjelp, Foreningen Norden, Norsk Folkehjelp, Stiftelsen Flyktningshjelpen) • The Research Council of Norway and Innovation Norway 	

³⁹ See, for example, Ministry of Foreign Affairs (2019).

Priority mission area 16: Actively contribute to healthy, safe and sustainable food systems

Key challenges that the mission aims to address	
<ul style="list-style-type: none"> • Improving ecological farming; • Improving sustainable food movements; • Increasing the number of innovative solutions (e.g. local food systems, producer cooperatives, calculators of food footprints); • Improving the sustainability of fish farming; • Improving knowledge among consumers and the food retail sectors; • Improving the safeguarding of water, soil and air quality, while minimising greenhouse gas emissions; and • Reducing food loss and waste. 	
Exemplar targeted focus areas	
<ul style="list-style-type: none"> • Increase sustainable, climate-resilient food production – nationally and globally; • Increase access to safe and healthy food while reducing food waste and loss • Ensure that food production systems can provide food to improve quality of life and health; • Stimulate innovations/technology development and adoption to accelerate the transformation of food systems (e.g. in relation to improving productivity, supply chain efficiency and transparency); • Actively position Norway as an international thought and knowledge leader with regard to effective food systems governance; and • Promote international cooperation (e.g. in relation to R&D, agricultural practices) between stakeholders to stimulate the creation of economically, socially and environmentally sustainable food systems. 	
Links to RCN Strategic Areas	Links to UN SDGs
<ul style="list-style-type: none"> • Green transition (primary link) • Health and welfare • Technology and digitalisation 	<ul style="list-style-type: none"> • SDG 2: Zero Hunger • SDG 3: Good Health and Well-being • SDG 6: Clean Water and Sanitation • SDG 12: Responsible Consumption and Production • SDG 13: Climate Action
Links to clusters of Horizon Europe's Global Challenges pillar	Links to EU mission areas identified in Horizon Europe
<ul style="list-style-type: none"> • Health • Food, Bioeconomy, Natural Resources, Agriculture and Environment 	<ul style="list-style-type: none"> • Caring for Soil Is Caring for Life
Intersection with other priority mission(s) identified in this study	
<ul style="list-style-type: none"> • Actively address the impacts of non-communicable diseases in Norway • Protect, value and restore Norwegian biodiversity and reduce its degradation and loss • Play a leading role in tackling antimicrobial resistance (in Norway and globally) and actively share expertise • Contribute to Norway's digital transformation by creating a diverse, digitally and soft-skilled workforce • Actively enable digital transformation at all levels of government in Norway 	
Involvement of key stakeholders	
<ul style="list-style-type: none"> • Sectors (e.g. retailers, farmers, fish farming, seafood, health, environment, public, leisure) • Norwegian higher education institutions and research organisations • International organisations (e.g. Food and Agricultural Organization of the United Nations, International Fund for Agricultural Development, World Food Programme, World Health Organisation, OECD) • National government agencies (Norwegian Farmer's Union, Ministry of Agriculture and Food, Norwegian Food Safety Authority, Ministry of Climate and Environment, Ministry of Foreign Affairs, Ministry of Justice and Public Security, Industrial Development Corporation of Norway) • Voluntary organisations (e.g. Frivillighet Norge, European Network of National Civil Society Associations, Miljøagentene, Norges Naturvernforbund, Norsk Friluftsliv, Natur og Ungdom) • The Research Council of Norway and Innovation Norway 	

Priority mission area 17: Play a leading role in Norway and internationally to substantially increase the use of renewable energy in a sustainable and long-lasting manner and accelerate R&I in this area

Key challenges that the mission aims to address	
<ul style="list-style-type: none"> Increasing the percentage of electricity production that comes from renewable energy sources; Making all new passenger cars and light vans zero-emissions vehicles and make buses and lorries emissions free; Improving reuse, recycle and repurpose strategies across different sectors; Improving and creating a fluctuating renewable energy supply; Increasing investment in (for example) solar panels, hydropower and wind parks; Improving tenant electricity models, car sharing, bicycle schemes and home storage systems; and Improving the smart grid and solutions for flexibility and integration of different power systems where renewables can dominate 	
Exemplar targeted focus areas	
<ul style="list-style-type: none"> Improve energy security by substituting fossil fuels with renewable sources across all sectors; Improve access to modern, reliable and cost-effective clean energy sources across all segments of the population; substantially improve energy efficiency (e.g. in the built environment); Accelerate R&I and increase public and private sector investment in renewable energy infrastructure and technology; Mobilise knowledge exchange and cross-sectoral/international collaboration (e.g. to share lessons, reduce duplication); and Provide thought leadership to help improve awareness and understanding. 	
Links to RCN Strategic Areas	Links to UN SDGs
<ul style="list-style-type: none"> Green transition (primary link) Cohesion and globalisation Technology and digitalisation 	<ul style="list-style-type: none"> SDG 7: Affordable and Clean Energy SDG 9: Industry, Innovation and Infrastructure SDG 13: Climate action
Links to clusters of Horizon Europe's Global Challenges pillar	Links to EU mission areas identified in Horizon Europe
<ul style="list-style-type: none"> Climate, Energy and Mobility 	<ul style="list-style-type: none"> A Climate Resilient Europe – Prepare Europe for Climate Disruptions and Accelerate the Transformation to a Climate Resilient and Just Europe by 2030 100 Climate-Neutral Cities by 2030 – By and for the Citizens
Intersection with other priority mission(s) identified in this study	
<ul style="list-style-type: none"> Establish a resilient and sustainable blue economy in Norway Significantly reduce Norway's transport-related emissions Establish Norway as a knowledge leader in global change processes, development and international relations Contribute to Norway's digital transformation by creating a diverse, digitally and soft-skilled workforce 	
Involvement of key stakeholders	
<ul style="list-style-type: none"> Sectors (e.g. energy, transport, development, technology, ocean, business, building, hospitality, retail) Norwegian higher education institutions and research organisations Norwegian national agencies (e.g. Ministry of Trade, Industry and Fisheries, Ministry of Transport, Ministry of Petroleum and Energy, Ministry of Local Government and Modernisation, Waste Norway, Bane Nor, Industrial Development Corporation of Norway) International organisations (e.g. United Nations Environment Programme, International Water Association, United Nations Development Programme, European Commission) Voluntary organisations (e.g. Frivillighet Norge, European Network of National Civil Society Associations, Miljøagentene, Norges Naturvernforbund, Norsk Friluftsliv, Natur og Ungdom) The Research Council of Norway and Innovation Norway 	

Priority mission area 18: Contribute to Norway's digital transformation by creating a diverse, digitally and soft-skilled workforce

Key challenges that the mission aims to address	
<ul style="list-style-type: none"> • Ensuring that the education systems adapts to developments in the digital economy; • Filling skills gaps in key industries, including (but not limited to) healthcare, financial services and retail; • Ensuring the effective use of skills; • Ensuring the active supply of skills; • Contributing to the governance arrangements of Norway's skills system; • Engaging stakeholders in the entire policy cycle; and • Building integrated information systems. 	
Exemplar targeted focus areas	
<ul style="list-style-type: none"> • Progressively reduce and eliminate the shortage in advanced digital and soft skills, training and competencies, to enable people to work in and adapt to the rapidly evolving digital economy in Norway and globally (including upskilling and reskilling workers); and • Lead the way and demonstrate knowledge leadership in ensuring equal opportunities, eliminating disparities and overcoming bias and systemic barriers for all segments of the population working in the digital economy (e.g. women, minority ethnic communities, older people, the young workforce, disabled people). 	
Links to RCN Strategic Areas	Links to UN SDGs
<ul style="list-style-type: none"> • Technology and digitalisation (primary link) • Cohesion and globalisation • Health and welfare • Oceans • Green transition 	<ul style="list-style-type: none"> • SDG 4: Quality Education • SDG 5: Gender Equality • SDG 8: Decent Work and Economic Growth • SDG 9: Industry, Innovation and Infrastructure • SDG 16: Peace, Justice and Strong Institutions
Links to clusters of Horizon Europe's Global Challenges pillar	Links to EU mission areas identified in Horizon Europe
<ul style="list-style-type: none"> • Culture, Creativity and Inclusive Society • Digital, Industry and Space 	<ul style="list-style-type: none"> • Conquering Cancer: Mission Possible • A Climate Resilient Europe – Prepare Europe for Climate Disruptions and Accelerate the Transformation to a Climate Resilient and Just Europe by 2030 • Mission Starfish 2030: Restore our Ocean and Waters • 100 Climate-Neutral Cities by 2030 – By and for the Citizens • Caring for Soil Is Caring for Life
Intersection with other priority mission(s) identified in this study	
All indicative priority missions	
Involvement of key stakeholders	
<ul style="list-style-type: none"> • All sectors • Norwegian higher education institutions and research organisations • Norwegian national agencies (e.g. Ministry of Labour and Social Affairs, Ministry of Local Government and Modernisation, Ministry of Education and Research, Sami Parliament, Industrial Development Corporation of Norway) • International organisations (e.g. United Nations, World Bank, OECD, European Commission, World Economic Forum) • Voluntary organisations (e.g. Frivillighet Norge, European Network of National Civil Society Associations) • The Research Council of Norway and Innovation Norway 	

Priority mission area 19: Actively enable digital transformation at all levels of government in Norway

Key challenges that the mission aims to address	
<ul style="list-style-type: none"> • Countering the fragmented implementation of digital technologies across the public sector; • Providing key institutional actors with the means to promote the use of common guidelines, standards and digital solutions in different policy sectors; • Responding to changing citizen and business needs and expectations; • Strengthen coordination and synergies with local government; • Increasing the priority assigned to the development of digital and data-related leadership and skills; and • Simplifying and streamlining data-sharing practices. 	
Exemplar targeted focus areas	
<ul style="list-style-type: none"> • Make better and more responsible use of a range of digital technologies, data and platforms as enablers of public services at both local and national level (to deliver more targeted, inclusive and user-centric services); • Improve operations, work processes, productivity, user experience, accountability and transparency (and reduce risks); • Promote activities and behaviours that involve the responsible use of data and evidence to inform decision making; • Proactively focus on workforce development related to developing and maintaining skills (digital and soft); and • Promote cooperation/collaboration within and across ministries/municipalities and with other stakeholders (including the private sector) (e.g. to share learnings, to share good practice, to build capacity). 	
Links to RCN Strategic Areas	Links to UN SDGs
<ul style="list-style-type: none"> • Technology and digitalisation (primary link) • Cohesion and globalisation • Health and welfare • Oceans • Green transition 	<ul style="list-style-type: none"> • SDG 4: Quality Education • SDG 9: Industry, Innovation and Infrastructure • SDG 16: Peace, Justice and Strong Institutions
Links to clusters of Horizon Europe's Global Challenges pillar	Links to EU mission areas identified in Horizon Europe
<ul style="list-style-type: none"> • Culture, Creativity and Inclusive Society • Digital, Industry and Space 	<ul style="list-style-type: none"> • Conquering Cancer: Mission Possible • A Climate Resilient Europe – Prepare Europe for Climate Disruptions and Accelerate the Transformation to a Climate Resilient and Just Europe by 2030 • Mission Starfish 2030: Restore our Ocean and Waters • 100 Climate-Neutral Cities by 2030 – By and for the Citizens • Caring for Soil Is Caring for Life
Intersection with other priority mission(s) identified in this study	
All indicative priority missions	
Involvement of key stakeholders	
<ul style="list-style-type: none"> • All sectors • Norwegian higher education institutions and research organisations • Norwegian national agencies (e.g. Difi – Agency for Public Management and eGovernment, Norwegian Association of Local and Regional Authorities, Ministry of Local Government and Modernisation, Ministry of Finance, Ministry of Research and Education, Agency for Financial Management, Industrial Development Corporation of Norway) • International organisations (e.g. United Nations, World Bank, OECD, European Commission, World Economic Forum) • Voluntary organisations (e.g. Frivillighet Norge, European Network of National Civil Society Associations) • The Research Council of Norway and Innovation Norway 	

Priority mission area 20: Ensure decent work for all people in Norway

Key challenges that the mission aims to address	
<ul style="list-style-type: none"> • Increasing youth employment; • Improving integration of immigrants into the labour market; • Improving aspects of work, such as quality of work, working conditions, job satisfaction; • Improving equal access to the employment market; and • Improving productive employment. 	
Exemplar targeted focus areas	
<ul style="list-style-type: none"> • Promote and accelerate inclusive, diverse and decent work for all people in Norway across all segments of the population (including integration of immigrants into the labour market); • Increase youth employment; • Improve quality of work, working conditions, job satisfaction, etc.; • Ensure equal access; and • Achieve productive employment for the Norwegian workforce that can adapt to digitalisation/automation. 	
Links to RCN Strategic Areas	Links to UN SDGs
<ul style="list-style-type: none"> • Cohesion and globalisation (primary link) • Health and welfare • Oceans • Green transition • Technology and digitalisation 	<ul style="list-style-type: none"> • SDG 4: Quality Education • SDG 8: Decent Work and Economic Growth
Links to clusters of Horizon Europe's Global Challenges pillar	Links to EU mission areas identified in Horizon Europe
<ul style="list-style-type: none"> • Culture, Creativity, and Inclusive Society 	<ul style="list-style-type: none"> • A Climate Resilient Europe – Prepare Europe for Climate Disruptions and Accelerate the Transformation to a Climate Resilient and Just Europe by 2030
Intersection with other priority mission(s) identified in this study	
<ul style="list-style-type: none"> • Contribute to Norway's digital transformation by creating a diverse, digitally and soft-skilled workforce 	
Involvement of key stakeholders	
<ul style="list-style-type: none"> • All sectors • Norwegian higher education institutions and research organisations • International organisations (e.g. World Bank, International Labour Organisation, European Commission, OECD, United Nations Development Programme, International Organisation of Employers) • National government agencies (Ministry of Research and Education, Ministry of Labour and Social Affairs, Norwegian Labour and Welfare Administration, Ministry of Children and Families, Industrial Development Corporation of Norway) • Voluntary organisations (e.g. Frivillighet Norge, European Network of National Civil Society Associations) • The Research Council of Norway and Innovation Norway 	