

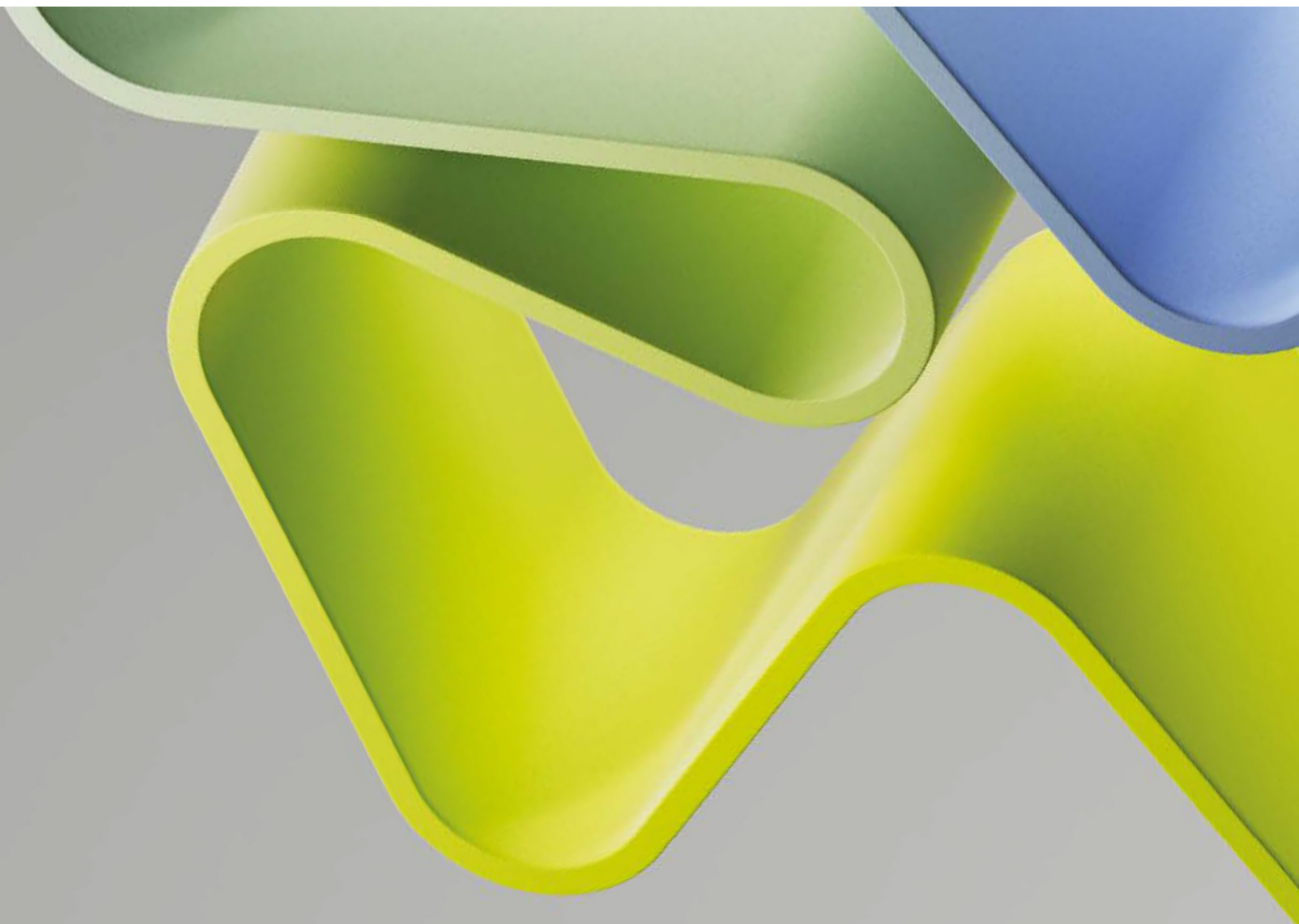
# **Evaluation of Natural Sciences 2022-2024**

## **Evaluation report**

### **Environmental Chemistry – MILK**

#### **Norwegian Institute for Air Research (NILU)**

January 2024



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## Statement from Evaluation Committee – Institute II

The members of this Evaluation Committee have evaluated the following administrative units at the research institutes within natural sciences in 2022-2023 and submitted a report for each administrative units:

- CICERO Centre for Climate Research
- Norwegian Meteorological Institute – Weather and Climate (MET)
- Norwegian Institute for Sustainability Research (NORSUS)
- Norwegian Research Centre (NORCE) – Climate and Environment
- Norwegian Institute for Air Research (NILU) – Environmental Chemistry Department
- Norwegian Institute for Air Research (NILU) – Atmospheric and Climate Research Department
- Norwegian Water Resources and Energy Directorate (NVE)
- Nansen Environmental and Remote Sensing Centre (NERSC)

The members of the Evaluation Committee are in collective agreement with the assessments, conclusions and recommendations presented in this report. None of the committee members has declared any conflict of interest.

The Evaluation Committee has consisted of the following members:

Professor **Mat Collins**, (Chair)

University of Exeter, United Kingdom

Professor **Dorthe Dahl-Jensen**,

Niels Bohr Institute, Denmark

Professor **Hayley Fowler**,

Newcastle University, United Kingdom

Professor **Martin Siegert**,

Imperial College London, United Kingdom

Professor **Thomas Jung**,

Alfred Wegener Institut, Germany

## Description of the administrative unit

The institute NILU consists of six research departments of which two were included in this evaluation: the Atmospheric and Climate Research Department (ATMOS) and the Environmental Chemistry Department (MILK). This evaluation report targets the administrative unit MILK.

In 2021, MILK had had 55 employees, out of which 22 were Scientists, four were PhD-scholars, 24 were engineers or technicians and five were support staff.

In their self-assessment, MILK identifies three fundamental values at the institute: Integrity, Competence and Benefit to society. In its strategy document 2018-2022, these include: (1) to be a research institute with high professional quality and relevant competence in its core research areas, (2) deliver services closely linked to their research, ensure the knowledge within their core research areas benefits society by making it visible and accessible, (3) to contribute to make society aware of the causes and consequences of climate change and pollution and to contribute to the development of the knowledge-based society through innovation. In the new wider NILU *strategy document 2023-2027 (not yet available)*, NILU's goal is competence in their specific scientific disciplines and competence in collaboration with other domains and disciplines, which is relevant for NILU MILK. Further, the strategy has an increasing focus on solving societal challenges through interdisciplinary collaboration. To this end, NILU states they have a strategic goal of targeted and long-term collaboration with Institutes and Universities to secure broader participation. NILU also has an overall ambition to follow the Open Access principles on free access to scientific publications. In relation to this, NILU has been increasing their number of Open Access (OA) publications. In 2012, only 15 out of 36 publications (41%) were OA publications, while in 2021, 38 out of 43 publications (88%) were OA.

In their self-assessment, MILK mentions that the benefit to society is one of the cornerstones of the research they perform. MILK states that they collaborate and work closely with Norwegian and international universities (e.g. UiT and UiO etc.), research institutes such as NIVA, NINA and the Norwegian Polar Institute, and the Norwegian Environment Agency (Miljødirektoratet). MILK states that an important part of their work directly contributes and impacts international regulatory assessments from UN protocols like the Geneva Convention on Long-Range Transboundary Air Pollution, the Minamata Convention on Mercury, the Stockholm Convention on POPs and the Scientific Committee for Antarctic Research.

In their self-assessment MILK assess what the present strengths that enable their future, including (1) internationally successful and good reputation, especially EU frameworks programs, (2) strong connections between analytical chemistry and modelling groups, (3) advanced, high-quality infrastructure in combination with skilled personnel, and (4) strong competence in scientific topics that include human health effects, human toxicology, nano/advanced materials, and environmental contaminants (covering measurements, fate, distribution, modelling). Moreover, they state that there are opportunities within the EU to focus on the Green Deal, zero-pollution strategy, the indoor environment, and consumer products. However, weaknesses such as tight budgets and expensive equipment, vulnerability due to the limiting nature of the name "Norwegian Institute for Air Research" and the amount of data that is published in reports rather than academic publications may determine the NILU-MILKs position in the future. In the new strategy (2023-2027), MILK focuses on strengthening scientific publications, dissemination, and reputation of MILK.

## Overall assessment

MILK has established a specific role in Norwegian environmental sciences and are happy with their size and both scientific and real-world impact. This is to be commended. They seem like a well- run organisation.

They could engage more with university partners and bring in postdocs and PhD students who could translate their analytical work into high profile papers.

The evaluation committee agreed with the group assessment to develop a better articulation of its contribution in a range of areas e.g. partnerships, paper publications (specifically authorship), advice; such that they are better able to highlight their success and achieve their strategic targets.

Gender balance and proportion of Open Access publications are strengths of MILK.

## Recommendations

The evaluation committee has several recommendations for MLK that include:

- 1) Engaging more in ESFRI and in European funding to better underpin their strategic equipment acquisition and support.
- 2) Building more networks with other similar research organisations and stakeholders to raise their profile.
- 3) Continuing their efforts to maintain a well-motivated staff base with good equality, diversity, and inclusion policies and statistics.
- 4) Continue with their strategy for research at the interface of society and policy.

The evaluation committee agreed with the group recommendation to develop a better articulation of its contribution in a range of areas e.g. partnerships, paper publications (specifically authorship), advice; such that they are better able to highlight their success and achieve their strategic targets.

They also agreed that MILK should undertake a review of long-term data sets they have and evaluate these for potential for high impact papers outlining trends and pressures in the environment.

This TOR has requested the committee to assess of MLK as a whole in relation to its strategic targets. The table below presents the specific aspects of the evaluation the administrative unit requested the evaluation explore and indicated where these are addressed in more detail in the subsequent report.

<b>Specific Request from the Unit's Terms of Reference (strategic targets)</b>	<b>Where it is addressed in the report</b>
Chemical analysis, data interpretation and research in connection with national monitoring and screening programs	Addressed in sections 1.3-1.5
Monitoring and research on Emerging environmental contaminants	Addressed in sections 4&5

Health effects from environmental contaminants, including chemical in Air Pollution	Addressed in sections 4&5
Research and provision of services based on previous research and monitoring	Addressed in 1.2-1.5

## 1. Strategy, resources, and organisation of research

MILK is a small but successful unit that does work at the interface of science and society. They have good partnerships and are successful in winning research funding. They have a reputation which sees them involved in several international programmes and activities. They have a diverse workforce that is well managed.

They rely a lot on 'soft money' for staffing and equipment. Hence it is difficult to see how they would be able to develop a long-term strategy to grow into new areas or establish themselves as an essential component of the Norwegian environmental research base.

### 1.1 Research Strategy

The strategy and Terms of Reference for the unit has four pillars under the headings of (i) Chemical analysis, data interpretation and research, (ii) Monitoring and research on emerging environmental contaminants, (iii) Health effects from environmental contaminants, (iv) Research and provision of services based on previous research. There is a strong emphasis on solving societal challenges through interdisciplinary collaboration.

The unit has good expertise in scientific topics stated in the ToR, including health effects, toxicology, nanomaterials, and environmental contaminants modelling. This puts them in a good position going forward as these issues are not going away soon. It does not seem that the unit have any real ambition to expand on these areas and grow bigger, but rather to maintain their current size and continue to deepen their expertise.

The Research Group Assessment found this a favourable strategy but identified two areas for improvement around highlighting success and reviewing long-term datasets. The evaluation committee felt that these were both important recommendations.

The SWOT analysis gives the impression that they feel like they are something of a small unit that is under threat from being overtaken by a larger organisation. It would be useful if they could better promote their reputation to guard against this.

### 1.2 Organisation of research

The unit is organised into six research sections and the Research Group Assessment concluded that this seems to be working well with evidence from collaborative projects and success in funding. They strategically target research partners in other institutes and universities to bolster their own core expertise.

Research is largely organised through a project matrix framework, where scientists (project leaders) have opportunities and are expected to take responsibilities to generate R&D funding, and the research tasks are solved through involvement of needed competences and capacities at the department as well as beyond the department level. Overall responsibility for all activities,

including acquisition, resource allocations planning, scientific achievements etc. is given to the Research Director. Given the size of the unit, this seems a reasonable management structure.

An important contribution of their work comes from their engagement in international scientific assessment from UN protocols such as the Geneva Convention on Long-Range Transboundary Air Pollution, the Minamata Convention on Mercury, the Stockholm Convention on POPs and the Scientific Committee for Antarctic Research. Thus, there are international drivers for their research.

### 1.3 Research funding

MILK receives a significant part of NILU's basic grant funding, but the majority of the funding is still from competitive sources. The largest funding source for the unit is the Norwegian Environment Agency (Miljødirektoratet). The Norwegian long term monitoring programme on Atmospheric contaminants is led by and mainly conducted at the department. The agency furthermore funds important projects on screening for emerging contaminants in the environment and various other monitoring programmes focusing on environmental contaminants in urban areas, freshwater lakes, etc in which their department has leading or co-leading roles. Funding from the Research Council of Norway (RCN) is also important.

The unit has produced a strategy for acquiring expensive pieces of equipment and have developed a way of 'saving up' the funds to buy them. Also, they have a relatively high proportion of funding from NILU.

However, a lot of funding for staff comes through competitive routes. This makes it harder to ensure career stability for staff and to provide long-term monitoring and datasets. Nevertheless, they seem to have good success in competitive funding streams – both national and EU.

### 1.4 Use of infrastructures

The unit does not list any equipment under national infrastructures, international infrastructures nor any participation in the ESFRI roadmap. Nevertheless, the Research Group Assessment lists several facilities in Tromsø and in the main office in Kjeller/Lillestrøm.

The evaluation committee wondered if more stable funding for infrastructure maintenance and upgrades might come if they engaged more with these national and international infrastructure programmes.

## 1.5 National and international collaboration

The unit has an extensive list of collaborators in both private and academic partners, from inside Norway and internationally. Notable examples include Norwegian universities (UiT and UiO) and research institutes such as NIVA, NINA and the Norwegian Polar Institute. Collaboration seems natural for them and essential to their work.

## 1.6 Research staff

In 2021, MILK had had 55 employees, out of which 22 were scientists, four were PhD students, 24 were engineers or technicians and five were support staff.

The Research Group Assessment notes “successful recruitment processes and well-planned career paths for early carrier[sic] researchers attract young talent interested in environmental chemistry. There is a high proportion of women so there is a positive outlook on gender equality. The group should continue this good work by addressing other aspects of Equality Diversity and Inclusion.”

The evaluation committee agreed with this assessment. The committee got the impression of a happy, motivated body of staff who are well-supported by management.

## 2. Research production, quality and integrity

Publication numbers are relatively low in comparison with the sector but are of high quality and are well cited. Their open science policy has resulted in a good trend towards OA publications. In the most recent year for which we have data (2021), nearly 90% of publications are OA. This is a great result.

The Research Group Assessment also rates the analytical work of the unit highly. It particularly notes the contribution MILK makes to international committees and the impact these have on policy and wider society.

### 2.1 Research quality and integrity

The MILK Department is comprised of a single research group.

The research and publications of the MILK Department and its provision of research services are of a very high standard. The MILK Department has a clear strategy including analysis, monitoring, health effects and services to address contamination issues. MILK is well resourced with high-end analytical tools; they deploy these to good effect leading to high impact research which has given them an international standing supported by EU grants. The group is well established and consequently attracts new talent, the high number of women in the workforce is noteworthy. MILK staff actively engage with policy advice enabling societal safeguards to be established.

In terms of publications, the total number and author shares are rather low in comparison with other organisations. However, the citation metrics and international authorship are high. This



indicates a considerable contribution to advancing the state-of-the-art. Focussing on a lower number of good-quality publications should be commended.

The real strength of the unit is in the translation of their scientific work into policy and regulation.

## 2.2. Open Science

NILU has been increasing their number of Open Access (OA) publications. In 2012, only 15 out of 36 publications (41%) were OA publications, while in 2021, 38 out of 43 publications (88%) were OA. This trend is in the right direction and the policy seems to be working. The unit is an exemplar of Norwegian science when it comes to OA.

## 3. Diversity and equality

MILK has a strong policy on EDI which is working given, for example, their excellent gender balance. Areas such as reporting on and protecting against the discrimination of protected characteristics, dealing with personnel issues, setting salaries, and having processes for progression and promotion have recently been revised by a group that included managers, staff, and union representatives.

The evaluation committee found all this to be in order.

## 4. Relevance to institutional and sectorial purposes

MILK has strong collaborative relationships with both public and private organisations in Norway and in Europe. Wider international partnerships beyond Europe are fewer, and this could be a focus for the future to help them achieve a higher profile.

Delivery of services for environmental monitoring, such as dust fallout collectors, analysis of products and environmental samples for private sector is also important for MILK. In addition to providing a surplus to the institute and thus supporting new research, the services themselves are important and valuable to the customers, and thus the society. Provision of reliable research-based services to private sector helps customers control contaminants levels in their products, monitor their emissions, etc.

The research does not naturally lead to commercialisation opportunities as it is more focused toward the public good.

## 5. Relevance to society

A real strength of the unit is in the translation of their scientific work into impact on society. Data is delivered to national and international regulatory organisations. Their scientists are active on international committees and action groups. Providing a benefit to society is one of their three key cornerstones and many examples are given. The impact case study provides an exemplar.

### **Comments to impact case 1**

In February 2023, Norway together with Sweden, Denmark, The Netherlands, and Germany proposed a European ban of the large group of Per- and polyfluoroalkyl substances (PFAS). This is linked to a significant body of work carried out by NILU MILK.

The evaluation committee found this to be an excellent impact case study. The work of the unit has led directly to a change in policy in multiple countries.

## List of administrative unit's research groups

<b>Institution</b>	<b>Administrative Unit</b>	<b>Research Groups</b>
Norwegian Institute for Air Research (NILU)	Environmental Chemistry – MILK	Environmental Chemistry

## Methods and limitations Methods

The evaluation is based on documentary evidence and online interviews with the representatives of Administrative Unit.

The documentary inputs to the evaluation were:

- Evaluation Protocol (see appendix 3 Evaluation Protocol) that guided the process
- Terms of Reference
- Administrative Unit's self-assessment report
- Administrative Unit's impact cases
- Administrative Unit's research groups evaluation reports
- Bibliometric data
- Personnel and funding data
- Data from Norwegian student and teacher surveys

After the documentary review, the Committee held a meeting and discussed an initial assessment against the assessment criteria and defined questions for the interview with the Administrative Unit. The Committee shared the interview questions with the Administrative Unit two weeks before the interview.

Following the documentary review, the Committee interviewed the Administrative Unit in an hourlong virtual meeting to fact-check the Committee's understanding and refine perceptions. The Administrative Unit presented answers to the Committee's questions and addressed other follow-up questions.

After the online interview, the Committee attended the final meeting to review the initial assessment in light of the interview and make any final adjustments.

A one-page summary of the Administrative Unit was developed based on the information from the self-assessment, the research group assessment, and the interview. The Administrative Unit had the opportunity to fact-check this summary. The Administrative Unit approved the summary virtually without adjustments.

### **Limitations**

The Committee judged the information received through documentary inputs and the interview with the Administrative Unit sufficient to complete the evaluation.

## Appendices (link to website)

1. Description of the evaluation of EVALNAT
2. Invitation to the evaluation including address list
3. Evaluation protocol
4. Self-assessment administrative units
5. Grading scale for research groups

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