The Research Council of Norway

Evaluation of Mathematics, ICT and Technology 2023-2024

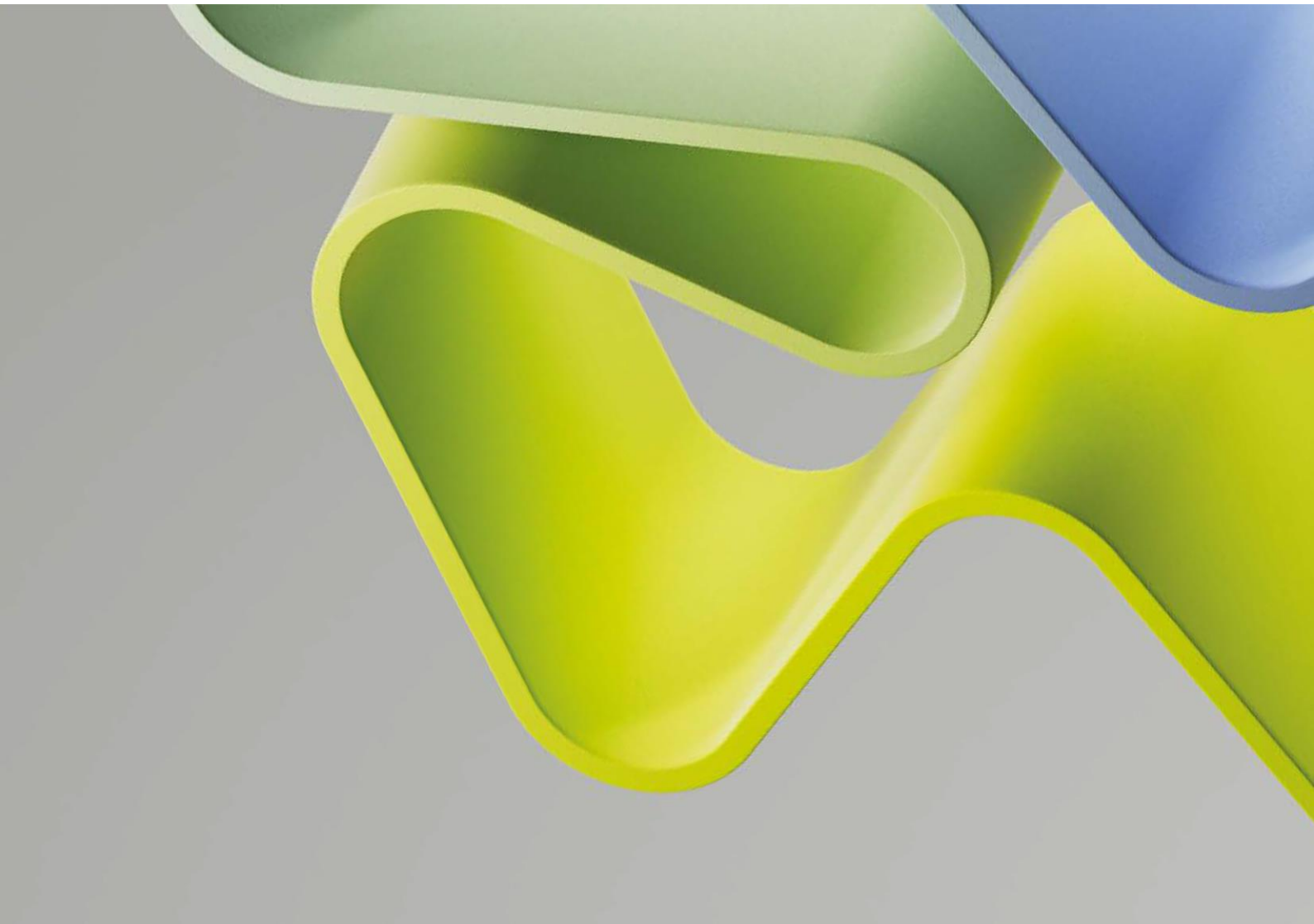
Evaluation Report for Administrative Unit

Administrative Unit: **Department of Built Environment (BE)**

Institution: **Oslo Metropolitan University, OSLOMET**

Evaluation Committee Higher Education Institutions 4

December 2024



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Statement from Evaluation Committee Higher Education Institutions 4

The members of this Evaluation Committee have evaluated the following administrative units at the higher education institutions/research institutes within Mathematics, ICT and Technology 2023-2024 and has submitted a report for each administrative unit:

- Department of Building, Energy and Material Technology, UiT the Arctic University of Norway
- Department of Architecture and Technology (IAT), Norwegian University of Science and Technology (NTNU)
- Department of Civil and Environmental Engineering (DCEE), Norwegian University of Science and Technology (NTNU)
- Department of Geoscience (IGV), Norwegian University of Science and Technology (NTNU)
- Department of Structural Engineering (KT), Norwegian University of Science and Technology (NTNU)
- Department of Manufacturing and Civil Engineering (IVB), Norwegian University of Science and Technology (NTNU)
- Department of Energy and Process Engineering (EPT), Norwegian University of Science and Technology (NTNU)
- Department of Built Environment (BE), Oslo Metropolitan University (OsloMet)
- Department of Energy and Petroleum Engineering (IEP), University of Stavanger (UiS)
- Department of Mechanical and Structural Engineering and Material Science (IMBM), University of Stavanger (UiS)
- Department of Process, Energy and Environmental Technology (PEM), University of South-Eastern Norway (USN)

The conclusions and recommendations in this report are based on information from the administrative units (self-assessment), digital meetings with representatives from the administrative units, bibliometric analysis and personnel statistics from the Nordic Institute for Studies of Innovation, Research, and Education (NIFU) and Statistics Norway (SSB), and selected data from the National survey for academic staff in Norwegian higher education and the National student survey (NOKUT). The digital interviews took place in the autumn 2024.

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 Claudio Mazzotti, University of Bologna (Chair)

Professor David Baglee
University of Sunderland
Professor Sebastian Geiger
TU Delft
Professor Mohamed Pourkashanian,
University of Sheffield

Professor Elsa de Sá Caetano,
University of Porto
Professor Per Heiselberg
Aalborg University

Description of the Administrative Unit

The Department of Built Environment (BE) at the Oslo Metropolitan University includes the following scientific staff: 6.6 professors, 16 associate professors, 8.4 assistant professors, 2 postdocs, 7 research fellows, 5.6 technical staff and 1.2 academic management personnel. With 45% of professors being women, and approximately 25% of associate professors and assistant professors being women, the administrative unit (AU) demonstrates a balanced representation across academic positions, while continued efforts aims to increase representation in certain categories.

The organisation of research and innovation activities/projects at the AU is characterised by a combination of centralised and distributed leadership models, tailored to the needs and focus areas of each research group. The AU has a research coordinator responsible for coordinating activities within and between research groups. Research group leaders report to the research coordinator, while individual members are allowed autonomy to pursue research activities based on their interests.

The AU conducts research across diverse fields, including building technology, structural engineering, digital and sustainable construction, transport and urban development, as well as energy and environmental engineering. This research is organised into five research groups corresponding to these fields. For the EVALMIT evaluation, the following research groups are included, in line with the protocol requirements defined by the Research Council of Norway:

- Structural Engineering Research Group (SERG)
- Sustainable Built Environment (SustainaBuilt)

The AU's strategic goals align with broader institutional strategies, focusing on sustainability, digitalisation, and innovation to meet the evolving needs of the built environment sector. Over the next five years, research activities aim to address climate change by adapting buildings, decarbonising the built environment, and promoting sustainable practices, while emphasising digital twins, smart maintenance, and real-time monitoring to enhance construction efficiency, safety, and longevity. Each research group contributes to this vision: The Building Technology group prioritises climate adaptation and low-carbon materials; the Structural Engineering group advances concrete technology and structural health monitoring; the Digital & Sustainable Construction group develops real-time monitoring and integrates digitalisation in construction; the SustainBUILT group focuses on smart energy management and climate adaptation; and the Transport, Infrastructure, and Urban Development group supports national priorities in smart cities and resilient transport networks.

The AU engages in both national and international collaborations to strengthen research and bridge education with the professional realm. It works closely with municipalities, healthcare services, and businesses to create collaborative platforms and shared positions. Notably, it partners with Lillestrøm and Sør-Odal municipalities on the Technology Initiative, promoting the integration of indoor climate technology into municipal health services.

The AU also expands global strategic partnerships for joint research, projects, and publications. Collaborating with Konnekt, it fosters innovation, promotes business establishment, and contributes to the Oslo region's development. These efforts, including the Sustainnovation student competition, enhance research quality, promote innovation, and apply knowledge practically, benefiting both the AU and the broader Norwegian research system.

Overall Assessment

In the Terms of Reference, the Committee is asked to provide an assessment of the AU's performance, considering the current international trends, regarding the following aspects:

- Strategy, resources, and organisation
- Research production, quality and integrity
- Diversity and equality
- Relevance to institutional and sectoral purposes
- Relevance to society

In this assessment, the Committee is asked to consider the recent establishment of OsloMet as a university, as well as the development based on applied education for professional occupations, the practical approach to meet the needs of society and employers, and the ambitions to develop research relevant and capable of solving future societal challenges.

The assessment should respond to questions regarding:

- Professional Development and Academic Programmes
- Research and Knowledge Development
- Engagement and Partnerships
- Management and Resource Optimisation
- Global Reach and Internationalisation

The Department of Built Environment focuses on climate change adaptation and decarbonisation, advances in concrete, digital construction practices, and sustainable energy management.

The research at the Department of Built Environment of the Oslo Metropolitan University is organised into five groups:

- Building Technology, Building Materials and Building Physics Research Group
- Structural Engineering Research Group (SERG)
- Digital and Sustainable Construction Research Group (DiSCo)
- SustainaBuilt Research Group
- Transport, Infrastructure and Urban Development (TransFrUrban)

For the present assessment, the AU provides only information on two research groups: SERG and SustainaBuilt, as the other groups do not reach the conditions set by RCN to be considered research groups.

The AU was established in 2019. Overall, the strategy and organisation of the unit are good, aligning with the faculty goals and with international trends regarding research topics and sustainable goals.

The AU has access to relevant infrastructure and manages some facilities.

OsloMet has a history in education and defines its main goals as the education of professionals for the industry and the development of applied research. The AU supports bachelor, master, and PhD programmes.

The AU demonstrates the capacity to develop international research and has a relatively good publication record and citation level.

However, OsloMet is still fighting to identify its profile and position as a credible partner in the international landscape. The research group SERG is very small and deals with many topics, but it has yet to build synergies among its members to enhance its competitiveness. SustainaBuilt is more aligned with present research trends but seems not to have been able to attract PhD students.

Despite a good vision for research, the AU does not define clear benchmarks to help its staff position nationally and internationally.

The AU includes members who have strong links with the industry but seem not to be strongly involved in research. Therefore, research opportunities within the industry seem not to be sufficiently explored.

The AU shows awareness and recognises its fragilities regarding securing funding, particularly for PhDs, but also for projects at the national and international levels. This is also a consequence of the small percentage of time allocated for research of early-career researchers. Despite the difficulties in attracting research funding, it is positive and evidence of the existing capacity that the AU has managed to secure some international grants.

Despite the AU's support of cross-sectoral and interdisciplinary collaboration, most collaborations are established at the Master level and are not taken to PhD level.

The AU's focus on sustainable development leads to societal improvements in terms of safer and more resilient structures and infrastructures. However, all those impacts are defined in a general way in the self-assessment, and no real examples are provided.

The societal impact has a margin for improvement despite some identified constraints.

The Terms of Reference for the administrative unit is attached to the report.

Recommendations

1. The AU is still trying to find its profile and lacks a strategy for internal and external collaboration. The AU should reflect on its strengths and weaknesses and seek strategic collaborations nationally and internationally to enhance its progress as a new department. It is recommended to follow departments/units with similar characteristics that have already paved their way to be considered credible partners. Examples are University of Stavanger, Napier University, in Edinburgh, and Aalborg University, in Denmark. The analysis of such cases may help understand how to progress in a sustainable way and prioritise actions.
2. At the internal level, the two research groups are very different. Each of the groups has specific competencies and difficulties that do not intersect. Therefore, it would be very important to exploit each others' capacities to enhance the AU and engage its researchers more actively. Setting impact cases could be a way to strengthen the AU and foster interaction between researchers.
3. The attraction of PhD students is fundamental for research and needs to be enhanced. Exploration of PhDs in a non-academic environment, taking profit of existing industrial links should be enhanced.
4. The AU supports cross-sectoral and interdisciplinary collaboration as well as collaborations with non-academic/public partners. However, the collaborations established have mostly involved Master students. Such collaborations should be taken as much as possible to the PhD level.

5. In addition to mentoring and measures to increase funding applications, the time allocated for staff research should be increased.
6. Hiring postdoctoral researchers can contribute to increasing research and collaborations internally and externally.
7. Benchmarks for research should be defined more clearly.
8. The AU should select publication venues of high impact and prefer quality over quantity of publications in order to set its credibility.

1. Strategy, Resources, and Organisation of Research

The Department of Built Environment focuses on climate change adaptation and decarbonisation, advances in concrete, digital construction practices, and sustainable energy management.

The research at the Department of Built Environment of the Oslo Metropolitan University is organised into five groups:

- Building Technology, Building Materials and Building Physics Research Group
- Structural Engineering Research Group (SERG)
- Digital and Sustainable Construction Research Group (DiSCo)
- SustainaBuilt Research Group
- Transport, Infrastructure and Urban Development (TransFrUrban)

For the present assessment, the AU provides only information on two research groups: SERG and SustainaBuilt, as the other groups do not reach the conditions set by RCN to be considered research groups. SERG has strategic goals such as the advancement in concrete technology, structural innovation for a net-zero future, and digital-twin technology for structural health monitoring. SustainaBuilt aims to develop knowledge on smart energy management, decarbonisation of the built environment, smart buildings for health and efficiency, and climate adaptation.

The two research groups were founded in 2018 when OsloMet was established as a national public university. OsloMet resulted from the Oslo and Akerhus University Colleges merger.

Despite being formally founded in the same year as the university, the two research groups have different profiles and are in different stages of growth. SustainaBuilt already existed in 2002.The group has a consolidated view of research and is supported by relevant, well-equipped laboratories.

The research group SERG was created in correspondence with the launching of the MABY Master of Science course. Although having clear goals, the group is still in the phase of defining its areas of expertise, identifying many areas of intervention, such as Safety and Service Life; Buildings and Structure; Durability and Sustainability; Material characterisation and modelling; Digitalisation; Concrete; Steel; Floating Structures; Advanced Materials; Structural Dynamics. Other research groups actually cover several of these areas, so there is some overlap of research goals among the groups.

The research staff of the AU is composed of 47 researchers, of which only 7 are PhD students (15%). It is necessary to clarify that SERG and SustainaBuilt have 15 and 14 researchers, respectively, with 5 PhD students in SERG and no PhD researchers in SustainaBuilt. In the interview, it was clarified that the situation has changed since the self-assessment took place and some more PhD students have started their activity.

Even taking into account that the AU is small in size, the number of PhD students must be considered rather low.

It should be noted that since the AU was established very recently, the statistics from NIFU may not entirely represent the present situation. In particular, the number of researchers in 2021 was listed as 21, distributed with a share of 24% for professors, 52% for associate professors, and 24% for PhD students.

The size of the teams of the two listed research groups are similar.

The AU's research strategy is aligned with the broader institutional strategies of OsloMet and the Faculty of Technology, Art and Design, namely regarding sustainability, digitalisation, and innovation priorities.

The AU ensures alignment with its strategy by allocating resources and promoting external funding initiatives that meet its goals.

According to the Terms of Reference, OsloMet emphasises developing applied education for professional occupations and using a practical approach to research. The organisation of research and innovation activities combines centralised and distributed leadership. The AU has a research coordinator responsible for the coordination of the activities of the different research groups. Inside the group, researchers identify their topics of investigation on an individual basis and write a statement of interest when they wish to apply for specific funding.

Within the research group SustainaBuilt, the research leader reports to the research coordinator, but internally, individual members can pursue their interests. Collaboration is encouraged. It is relevant to mention that some lecturers come from the industry, which contributes to connecting the university better with society.

SERG includes researchers with a very broad background who are still in the consolidation stage. The group has been highly involved in the new masters' programme MABY and has yet to build collaborations and networks.

1.1 Research Strategy

The AU's overall strategy is good and aligns with the institution and EU goals in aspects like climate change adaptation and decarbonisation, sustainability, and digitalisation. However, given the recent establishment of OsloMet as a university and the previous experience, the AU is still trying to find its profile.

Within the research groups, there is heterogeneity. SustainaBuilt has a consolidated status and a coherent strategy further enhanced by present trends in sustainability, climate adaptation, decarbonising the built environment, and smart energy management. SERG focuses on structural engineering, which is less trendy. SERG defines goals aligned with the general strategy of OsloMet, such as structural innovation for a net-zero future, digital twin for structural health monitoring, or advancements in concrete technology. However, these topics seem very dispersed and a bit incoherent.

The AU has a good vision for research but does not define clear benchmarks to help its staff position nationally and internationally.

<u>Recommendations</u> to the administrative unit.

- The AU should define benchmarks for research and work with the research groups to help them determine an identity so that they can be more competitive.

- Given the dimension of the AU, it would be better to focus on a narrower range of topics, specifically for SERG, and strive for a higher coherency and collaboration within the group.
- Given the past experience with an emphasis on education for professional occupations and the objectives defined in the ToR of developing a practical approach for research, the AU should define its scientific priorities with clarity. It is recommended to follow other departments/units with similar characteristics that have already paved their way to be considered credible partners. Examples are University of Stavanger, Napier University, in Edinburgh, or Aalborg University, in Denmark. The analysis of such cases may help understand how to progress in a sustainable way and prioritise actions

1.2 Organisation of Research

The centralisation of research by tailoring resources to a vision of the AU is an important aspect for a department at a former teaching college that is trying to build a research profile. A research coordinator is responsible for coordinating the activities within and between the research groups. It is also relevant that the allocation of new resources follows the institution's goals to help shape a profile for the AU.

Given the former role as a teaching college, education still occupies an important part of the time allocated to researchers. Therefore, only about 25% of scientific man-years are allocated to research overall, with the higher academic degrees reaching 45% of the time and the university lecturers 25%.

It is odd that the AU supports early-career researchers and encourages them to participate in competitive funding schemes when they have such a limited time allocation for research and no specific support for senior academics is mentioned.

Nevertheless, it is relevant that the AU offers mentorship and experience-sharing programmes to facilitate the professional growth of early-career researchers.

The AU engages in mobility research programmes, such as ERAMUS+ and Marie Sklodowska-Curie Actions, to foster collaboration, professional growth, and internationalisation.

Recommendations to the administrative unit.

- Since there exist lecturers coming from the industry among the staff, this circumstance should be regarded as an advantageous prerequisite to establish non-academic collaboration and increase research in a non-academic environment.
- The time allocated for early career researchers' research should be increased in order to optimise their participation in competitive funding opportunities.

1.3 Research Funding

The AU’s annual budget amounts to 40 MNOK.

The basic funding for the AU from 2018 to 2022 is 34.2 MNOK. Additional 5.1 MNOK are obtained from national grants (3.2 MNOK) and international grants (1.9 MNOK). Funding from RCN is 0.8 MNOK, representing 16% of the external funding. On average, the total research funding per staff member per year is about 0.02 MNOK, which is very low. It can be concluded that the AU depends essentially on basic funding (87%).

This low funding is linked to the low intensity of research of this AU.

There are inconsistencies between the funding reported by the AU and the research groups. According to the research group self-assessment reports, SERG has secured overall funding of 11 MNOK for the period 2018-2022, while SustainaBuilt has secured funding of 5.1 MNOK over the same period. This sums 16.1 MNOK, which is far from the referred 34.3 MNOK.

SERG has secured 7.3 MNOK in international grants. SustainaBuilt refers to having secured 4.0 MNOK from RCN, which exceeds the total declared by the AU. In the interview, it was clarified that such inconsistencies are related to the allocation year of the awarded grants.

Despite the small funding of 2018, when OsloMet was established as a university, the overall funding remains low, variable, heterogeneous within the two research groups, and very much determined by basic funding. SERG has obtained about 65% of its total funding from international grants, which is relevant. SustainaBuilt has secured funding from international grants since 2021.

Overall, it can be concluded that the low funding reflects the low intensity of the AU's research. This low intensity of research is motivated by the limited amount allocated for research. Although the AU mentions the support given to early-career researchers in preparing grant applications, the excessive teaching duties may limit the success of such initiatives. Nevertheless, the capacity to secure international funding signals the quality of some of the research that has been developed within the AU.

Recommendations to the administrative unit.

- Although the AU is still striving to determine its position, increasing links with the industry is important to diversify research funding.
- The two research groups must establish research projects and PhD grants to build their research and increase external funding opportunities. In this context, SERG's effort to gain international funding is relevant and should continue.
- In order for young researchers to participate more in research, it is vital that a lesser percentage of their time is dedicated to education.
- The AU should explore collaborations and follow the examples of strategies for funding adopted by other similar universities that were former colleges.

1.4 Research Infrastructures

OsloMet does not participate in national or international infrastructures but offers researchers access to high-performance computers and data storage through Sigma2.

SustainaBuilt has significant laboratory facilities to support research and education. SERG refers to four laboratories but does not describe them nor their management and funding. In the interview, it was clarified that, besides the university labs, researchers also have access to the Norwegian Public Roads Administration, the Norwegian Geotechnical Institute, and a virtual design lab for teaching at Construction City, funded by OBOS. It was further explained that a combination of internal and external funding, including faculty and institute grants, industry sponsorship and investments from research projects, supports the infrastructure funding.

The AU is working to ensure compliance with FAIR principles. According to the self-assessment, OsloMet has a policy for data management, which is at the level of implementation by the AU.

Recommendations to administrative unit.

- The AU should more clearly describe and showcase the available facilities, as these could attract contracts from the industry in Norway.

1.5 National and international collaboration

The AU and the university engage in national and international collaborations.

Since the university was recently established, the level of collaboration is still limited, essentially consisting of national entities and a few partnerships with international universities.

The following national collaborations are described:

- The project Konnekt, regarding the development of competencies within the national transportation sector
- The Norwegian Geotechnical Institute, regarding the development of competencies in geotechnics, supporting the master programme
- Promoting student projects in collaboration with StatsBygg, to contribute to more environmentally friendly, digital, and responsible construction
- SINTEF, regarding energy and indoor climate
- Oslo Municipality, through student and research projects
- OBOS, regarding fostering close connections with key players in the construction and building industry.
- International collaborative research has been established with the National University of Singapore (floating solar panels), Chalmers University of Technology (GIS, transport systems, urban mobility, and structural design), the National Technical University of Athens (HYPERION project), the University College of Dublin (teaching academics in Oslo), the Iowa State University, and the Technology Centre for Offshore and Marine, Singapore (float solar panels). Recent partnerships with the industry have been communicated during the interview. Nevertheless, even if the collaboration profile is positive and strengthens the AU, these initiatives seem scattered and based on individual initiatives rather than being defined on a strategic basis. Furthermore, in many cases the level of research has been limited, and enabled only the involvement of master students.
- The AU supports cross-sectoral and interdisciplinary collaboration as well as collaborations with non-academic/public partners, which has established several of the above-mentioned partnerships.

Recommendations to administrative unit.

- The research level of the mentioned collaborations is small, and only in a few cases has there been participation in research projects. Instead, most collaborations occur at national level within student projects. It is recommended that some of those initiatives should be taken to the PhD level, exploring collaboration with the industry.
- The international collaborations seem a bit scattered and defined on an individual basis. They could be further promoted with a more integrated view of research.

1.6 Research staff

The research staff is diverse in terms of position, age, and gender. The NIFU data indicates that the research staff's average age is 40 years.

The AU has about 47 research members. Considering the NIFU data, 19 researchers were registered in the years 2017 and 21 in 2021.

The number of PhD students was in the order of 5 to 7 when the self-assessment was delivered. This number represents a PhD/permanent staff ratio of the order of 0.2 to 0.3 and has not greatly changed since 2017. This number is very low compared to other AUs.

Using the information in the self-assessment report, the distribution of staff members is 14% professors, 34% associate professors, 22% researchers and postdocs, and 15% PhD students. The share of women among the research staff is 12%, although it is noticed that in contrast to the usual, the share of women as professors is 45%, and the share of women as PhD students is 14%.

It is further noticed that in the research group reports, SERG mentions the presence of 5 PhD students, and SustainaBuilt mentions no PhD students, which also represents an imbalance within the AU.

The percentage of researchers with foreign PhD defined in the NIFU data 2021 was 56%, possibly indicating a team with a strong level of internationalisation.

Recommendations to the administrative unit

- The AU needs to increase the number of PhD students by attracting research projects and promoting research among final-year students. Since the topics of research are aligned with present trends, multiple funding opportunities at the international level should be explored and exploited.

1.7 Open Science

OsloMet has a policy for Open Science. The university has embraced the FAIR data storage and sharing principles, but implementation is still ongoing.

OsloMet has maintained an Open Digital Archive since 2012 and mandates that all employees' articles be available in this archive.

The NIFU data shows that from 2013 to 2022, archived data increased from 33.3% to 56.5%, and golden access publications increased from 0% to 29.4%. Therefore, non-open-access publications decreased from 66.7% to 14.1%. Compared with the national average for archive, golden access, and non-open access (41.5%, 35.3%, and 23.2%), it can be concluded that a lower percentage of publications from the AU is still non-open access.

Recommendations on how to promote open science

- The AU should maintain its good performance regarding open access to publications.
- Golden access publications have a potential to increase in numbers, but the AU should choose prestigious journals to set high-quality standards of publications.

2. Research production, quality and integrity

Publications from the AU are classified mainly in Construction Engineering. Multidisciplinary Technologies is a second area of publication. At a third level, Energy, Chemistry and Material Sciences, Multidisciplinary natural sciences, and Geosciences are topics of publication.

Although the AU has publications in reputed journals, such as Engineering Structures or Energy and Buildings, many other publications appear in less reputed journals and in conference proceedings.

According to the NIFU data, the number of publications of the AU grew from 34 in 2019 to 85 in 2022. This represents a publication rate of 1.8 papers per research member per year, and the percentage of all author shares is 0.8%. These numbers put the AU at a mid-level in terms of the national average, which is positive considering the low level of funding. However, an adequate selection of publication venues must be made to guarantee the credibility of the developed research.

The cited numbers above align with the 9.5% participation in the 10% most cited papers and the normalised citation index of 108 in 2023.

Regarding collaborations in publications at national and international levels, the AU has a share of 25.9% for the first and 64.7% for the latter. The first number is similar, and the second is larger than the national averages of 24.3% and 56.9%, respectively. Over the 2019-2022 period, these numbers have been stable.

National collaborations involve mostly NTNU and SINTEF. International collaborations involve diverse universities.

2.1 Research quality and integrity

The AU follows the university's general policy for research integrity. The AU is committed to high standards and research integrity and follows the policy shaped by OsloMet guidelines and ethical frameworks.

The two research groups are producing quality research, but they are not able to secure relevant funding, and they have a very small number of PhD students and postdoctoral researchers. They have generally demonstrated the capacity to produce research at an international level, reaching relatively good citation levels and producing a relatively high number of papers. They still do not have strong networks of collaboration, although their collaboration in papers at the international level is fair.

The SERG group is relatively small and dispersed in its activities. It seems to have a very strong involvement in education, so the time allocated to research is limited. The group publishes papers in good journals, but the scientific impact is yet to be defined. The group has a very low number of PhD students and has been unable to attract relevant funding, although it has international collaborations. There is very little collaboration within the group. The group is still striving to define its profile and establish itself as a credible partner at national and international levels.

The SustainaBuilt group has a higher consistency and a more defined profile than SERG, as it was established earlier. Its research topics are very much aligned with present challenges at international level. It has good laboratory facilities and good collaborations at national level. It has shown the capacity to produce research outputs in leading international peer-reviewed journals, as well as excellent education capacity but it has not been able to attract PhD students. The group has very few international collaborations and has not been able to secure significant funding from international projects.

Research group SERG overall assessment

This research group operates at the national level in a teaching university and needs time to develop its identity. Much more work is needed for its development so as to create a strong regional group to compete at national level. Presently, a wide range of topics are covered, linked to individual members’ expertise, but research is not articulated in any detail but rather in general terms.

The group has well-defined strategic objectives and goals, but it is not clear how these are aligned with institutional priorities. Its benchmarks are listed but not quantified so based on these it is not easy to assess how well the group is performing.

The publications reflect the general fields of the research of the group. The papers listed are in good journals and some of the descriptions refer to their impacts. The papers overall show good significance, but the scientific impact of their results also needs to be identified.

The external research income is rather modest for a group of this size and research facilities, with a few exceptions, mostly typical of facilities found in teaching universities.

There is some evidence of limited international collaboration and of collaboration within the group. Their main societal contribution is attributed to their educational role, but examples of specific contributions are missing.

Compared to other national and international research environments, the level of research is still low and limited by the group's dimension and history.

Research group SustainaBuilt overall assessment

The self-assessment of the SustainaBuilt research group is detailed, accurate and well structured. It provides complete information about the vision, the strategy, and the activities of the group.

The group has clearly demonstrated its good capacity to produce research outputs in internationally leading scientific peer-reviewed journals. Research topics are original and innovative, in line with European and international trends. The group also seems to have a good ability to attract national funding, but limited European and industrial funding.

The group has also clearly demonstrated its very good capacity in teaching activities, but the attraction of PhD students and young researchers is limited.

The group's overall performance is good, especially considering that it is a quite small group. However, the group seems to be too much Norway-focused and it needs to improve its societal contribution.

The main **strengths** of the group are:

- the group promoted the creation of a start-up incubator
- the group has a very clear research vision and a very clear strategy to make human resources grow
- the group has an attractive and detailed web page
- the group has demonstrated its capacity to organise international conferences
- the quality of publications is very good at international level

The main **weaknesses** of the group are:

- limited number of PhD candidates and young researchers (post-doc)
- limited funding from European projects
- limited funding from industries

3. Diversity and equality

OsloMet has a policy against any form of discrimination and actively promotes diversity.

The university has a dedicated position for diversity. The person responsible for that position is also the chair of OsloMet's diversity committee. This committee is responsible for a plan of action for diversity and equality and the corresponding implementation.

The analysis of gender balance and degree of internationalisation from statistics of the AU shows an inverse pattern to the usual in terms of gender representation, where the lowest shares of women appear at the lower level of academic position and the highest at the top level. However, given the small dimension of the AU and the low number of positions, this result may not really indicate a trend.

Regarding the presence of international staff members, it can be indirectly assessed from the percentage of staff members with foreign PhD. This percentage grew from 31% in 2017 to 56% in 2021, indicating a growing presence of international researchers.

4. Relevance to institutional and sectorial purposes

Considering the former role as a teaching university, it is understandable that OsloMet has a major impact in the education sector. In effect, the AU supports bachelor, master and PhD educational programmes.

To a lesser degree, the AU contributes to the economic development of Norway by means of practical applications of research results in the construction, transportation and infrastructure sectors.

The AU's focus on sustainable development leads to societal improvements in terms of safer and more resilient structures and infrastructures. However, all those impacts are defined in a general way in the self-assessment, and no real examples are provided.

5. Relevance to society

In view of the history of the research groups, the activities developed have a major impact on education. Research within the research groups is aligned with modern trends, particularly those linked with resilience and sustainability of the built environment.

In this context, the two impact cases submitted by the research groups illustrate such alignment, evidencing the potential of international collaboration, the capacity to develop research at an international level, and the societal impact of the project results. The latter is more difficult to assess for the HYPERION project and is more relevant for the ventilation project, leading to design guidelines.

5.1. Impact cases

Comments to impact case 1: HYPERION "Development of a decision support system for improved resilience and sustainable reconstruction of historic areas to cope with climate change and extreme events based on novel sensors and modelling tools: the HYPERION approach"

The HYPERION project was a research project launched between 2019 and 2023 aiming to enhance resilience and reduce the vulnerability of historic areas concerning climate change and various natural hazards. The project involved an international collaboration between 19 entities and research centred on four case studies in different countries, including Norway.

The research had the merit of stimulating international collaborations and research on climate change, building physics, and instrumentation, although the actual impact on the sites and the tools that have been developed are more difficult to assess.

As a research project, valuable data has been collected and processed, giving origin to added knowledge. Six papers were published in generally very good journals. Policy makers and stakeholders improved their ability to make decisions, emphasising the relevance of collaboration with different entities for knowledge transfer.

Comments to impact case 2: Improved building operation and air quality of buildings with demand-controlled ventilation

This impact case consists of the development of competencies for improving indoor air quality. The achievement was based on two research projects supported by RCN and launched between 2009 and 2013 (reDuCeVentilation) and between 2016 and 2019 (BestVent). The projects are quite old considering the evaluation assessment, although it is claimed that their impact can be defined in the period 2013-2022. In the interview, the focus was put on the second project to justify the inclusion as an impact case. The objectives of the two projects were to improve indoor air quality with improved ventilation design and reduce operational costs.

The project had an important societal impact, consisting of the results in terms of improved indoor air quality at a more rational cost. The added knowledge from the project enabled the production of practical guidelines for implementing and maintaining ventilation systems. Therefore, it enabled the transfer of knowledge to the society.

Internally, the project had the merit of involving several master's students, postdoctoral researchers, and professors to produce research results. It also contributed to funding for the research unit and with publications in journals and technical articles.

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 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 (only for HEI's)

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 three weeks before the interview.

Following the documentary review, the Committee interviewed the Administrative Unit in an hour-long 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 with some adjustments.

Limitations

The Committee judged that the Administrative Unit's self-assessment report was insufficient to assess all evaluation criteria fully, and some information gaps remained after the interview with the Administrative Unit.

List of administrative unit's research groups

Institution	Administrative Unit	Research Groups
Oslo Metropolitan University, OSLOMET	Department of Built Environment (BE)	Structural engineering Research group (SERG)
		Sustainable Built Environment (SustainaBuilt)

Terms of Reference (ToR) for the administrative unit

The board of Faculty of Technology, Art and Design (TKD), Oslo Metropolitan University (OsloMet) mandates the evaluation committee appointed by the Research Council of Norway (RCN) to assess Department of Built Environment based on the following Terms of Reference.

Assessment

You are asked to assess the organisation, quality and diversity of research conducted by the Department of Built Environment as well as its relevance to institutional and sectoral purposes, and to society at large. You should do so by judging the unit's performance based on the following five assessment criteria (a. to e.). Be sure to take current international trends and developments in science and society into account in your analysis.

a) Strategy, resources and organisation

b) Research production, quality and integrity

c) Diversity and equality

d) Relevance to institutional and sectoral purposes

e) Relevance to society

For a description of these criteria, see Chapter two of the mathematics, ICT and technology evaluation protocol. Please provide a written assessment for each of the five criteria. Please also provide recommendations for improvement. We ask you to pay special attention to the following five aspects in your assessment:

Concerning the establishment of OsloMet as a Universty.

OsloMet - Oslo Metropolitan University was established with status as a national public University on 1. January 2018. Prior to the University status, the institution was the largest University College in Norway, known as Oslo and Akershus University College (HiOA). Oslo and Akershus University College was a result of many previous mergers of different educational institutions of applied sciences over several decades.

The Faculty of Technology, Art and Design (TKD) was established in 2011, when the Oslo and Akershus University Colleges were merged. The faculty consists of Artistic Research, applied Art, Art in education and Design, in addition to the Engineering and Technology departments (Mechanical-, electronic- and chemical engineering, Information Technology and Building and Engineering).

The recent establishment of OsloMet as a University and its context is relevant for assessing the conditions as research performing organization. The development, based on its´ history, is with an emphasis on developing applied education for professional occupations. The research focuses on the professions that are part of the faculties study program portfolio. In addition to research on working life and professions in general. Our research has a practical approach to meet the needs of society and employers, and our research ambitions is to have a close relation with professional practice and up-to-date, student-active forms of learning. Ideally our research will be relevant and capable of solving future societal challenges, and the graduates will be educated with relevant expertise in their fields of professions.

In this context we ask you to pay a particular attention to the following aspects:

1. Professional Development & Academic Programs:

- Does the department actively support faculty members' professional growth, and what specific improvements could enhance this support?
- Are the department's industry-oriented programs effectively bridging the academia-industry gap, and how well does educational research cater to student recruitment, retention, and program evaluation?

2. Research and Knowledge Development

- Is the department's research focus aligned with competencies, balancing applied research and academic excellence? How satisfactory is interdisciplinary collaboration and our strategic contributions to the Faculty of Technology, Art, and Design?
- How effectively does the department connect research with student education? Is Ph.D. recruitment beneficial for industry and academia, and does the department facilitate effective knowledge transfer to industry and stakeholders?

3. Engagement and Partnerships

- How actively does the department pursue research collaborations with industry, and how can these be improved for student benefit?
- How effectively does the department balance publications, engagement, and outreach? How can it enhance engineers' involvement to amplify benefits for students?

4. Management and Resource Optimization

- Does the department have well-structured plans for academic and infrastructure developments aligned with its long-term OsloMet goals?
- How well are research groups operated and how can their functionality be improved? Are resources effectively utilized, balancing teaching, research, and administrative demands?

5. Global Reach and Internationalization

- How aligned are the department's efforts with societal needs like UN SDGs and the needs of the building, construction, transport, and energy industry?
- How can the department optimize the balance between national and international focus, and how can it better support English-speaking staff engaging with Norwegian-speaking networks?

[To be completed by the board: specific aspects that the evaluation committee should focus on – they may be related to a) strategic issues, or b) an administrative unit’s specific tasks.]

In addition, we would like your report to provide a qualitative assessment of the Department of Built Environment as a whole in relation to its strategic targets. The committee assesses the strategy that the administrative unit intends to pursue in the years ahead and the extent to which it will be capable of meeting its targets for research and society during this period based on available resources and competence. The committee is also invited to make recommendations concerning these two subjects.

Documentation

The necessary documentation will be made available by the mathematics, ICT and technology secretariat at Technopolis Group.

The documents will include the following:

- a report on research personnel and publications within mathematics, ICT and technology commissioned by RCN
- a self-assessment based on a template provided by the mathematics, ICT and technology secretariat
- OsloMet Strategy 2017-2020
- OsloMet Strategy 2020-2024
- TKD R&D Strategy

Interviews with representatives from the evaluated units

Interviews with the Department of Built Environment will be organised by the evaluation secretariat. Such interviews can be organised as a site visit, in another specified location in Norway or as a video conference.

Statement on impartiality and confidence

The assessment should be carried out in accordance with the *Regulations on Impartiality and Confidence in the Research Council of Norway*. A statement on the impartiality of the committee members has been recorded by the RCN as a part of the appointment process. The impartiality and confidence of committee and panel members should be confirmed when evaluation data from the Department of Built Environment are made available to the committee and the panels, and before any assessments are made based on these data. The RCN should be notified if questions concerning impartiality and confidence are raised by committee members during the evaluation process.

Assessment report

We ask you to report your findings in an assessment report drawn up in accordance with a format specified by the mathematics, ICT and technology secretariat. The committee may suggest adjustments to this format at its first meeting. A draft report should be sent to the Department of Built Environment and RCN]. The Department of Built Environment should be allowed to check the report for factual inaccuracies; if such inaccuracies are found, they should be reported to the mathematics, ICT and technology secretariat within the deadline given by the secretariat. After the committee has made the amendments judged necessary, a corrected version of the assessment report should be sent to the board of Faculty of Technology, Art and Design, Oslo Metropolitan University and the RCN no later than two weeks after all feedback on inaccuracies has been received from Department of Built Environment.

Appendices

1. Description of the evaluation of EVALMIT
2. Invitation letter to the administrative unit including address list
3. Evaluation protocol
4. Template of self-assessment for administrative unit (short-version)

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