# MASTER'S PROGRAMME

# ENVIRONMENTAL AND

# ENERGY MANAGEMENT

FACULTY OF BEHAVIOURAL, MANAGEMENT

AND SOCIAL SCIENCES

**UNIVERSITY OF TWENTE**

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This report was finalized on 3 September 2019.

# REPORT ON THE MASTER'S PROGRAMME ENVIRONMENTAL AND ENERGY MANAGEMENT OF THE UNIVERSITY OF TWENTE

This report takes the NVAO's Assessment Framework for the Higher Education Accreditation System of the Netherlands for limited programme assessments as a starting point (September 2018).

## ADMINISTRATIVE DATA REGARDING THE PROGRAMME

**Master's programme Environmental and Energy Management**

| | |
|---|---|
| Name of the programme: | Environmental and Energy Management |
| CROHO number: | 69319 |
| Level of the programme: | master's |
| Orientation of the programme: | academic |
| Number of credits: | 60 EC |
| Specializations or tracks: | Environmental management<br>Energy management<br>Water governance |
| Location: | Leeuwarden |
| Mode of study: | full time |
| Language of instruction: | English |
| Submission deadline NVAO: | 01/11/2019 |

The visit of the assessment panel Environmental and Energy Management to the Faculty of Behavioural, Management and Social Sciences of the University of Twente took place on 20 and 21 June 2019.

## ADMINISTRATIVE DATA REGARDING THE INSTITUTION

| | |
|---|---|
| Name of the institution: | University of Twente |
| Status of the institution: | publicly funded institution |
| Result institutional quality assurance assessment: | positive |

## COMPOSITION OF THE ASSESSMENT PANEL

The NVAO approved the composition of the panel on 11 June 2019. The panel that assessed the master's programme Environmental and Energy Management consisted of:

- Dr. HDR. I. (Isabelle) La Jeunesse, lecturer in Geography at the University of Tours (France) [chair];
- Prof. dr. D. (Diego) Vasquez-Brust, professor in Global Business Sustainability and Strategy at the University of Portsmouth (United Kingdom);
- Dr. G. (Gerard) Mullally, lecturer in Sociology of the Environment, Community, Sustainable Development and Climate Change at the Department of Sociology of University College Cork (Ireland);
- Drs. J.J. (Jan) Steen, consultant Quality of Education at Wageningen University;
- L.H. (Laura) Schumacher BSc, master's student Environmental Sciences at Wageningen University [student member].

The panel was supported by A. (Anke) van Wier MA, who acted as project manager and secretary in the site visit.

# WORKING METHOD OF THE ASSESSMENT PANEL

*Preparation*
On 13 May 2019 the panel chair was briefed by the project manager on the tasks and working method of the assessment panel and more specifically her role, as well as use of the assessment framework.

A schedule for the site visit was composed by the project leader in collaboration with the programme management. Prior to the site visit, representative partners for the various interviews were selected. See Appendix 4 for the final schedule.

Before the site visit, the programmes wrote a self-evaluation report and sent it to the project manager. She checked the report on quality and completeness, and sent it to the panel members. The panel members studied the self-evaluation report and formulated initial questions and remarks, as well as positive aspects of the programme.

The panel also studied a selection of theses. The selection consisted of 15 theses and their assessment forms, based on a provided list of graduates from the academic year 2017-2018. The selection included a variety of topics and tracks and a diversity of examiners. The project manager and panel chair assured that the distribution of grades in the selection matched the distribution of grades of all available theses.

*Site visit*
The site visit to the University of Twente took place on 20 and 21 June 2019. At the start of the site visit, the panel discussed its initial findings on the self-evaluation report and the theses, as well as the division of tasks during the site visit. The panel was also trained in the assessment framework during this meeting by the project manager. While the programme is offered in Leeuwarden, the site visit took place in Enschede. The programme management requested this location as the location Leeuwarden is mostly empty in June due to students being away on fieldwork. Since most of the programme's staff is based in Enschede it was more logical to have the site visit at this location. The programme showed a powerpoint presentation and a short video to inform the panel about the facilities in Leeuwarden.

During the site visit, the panel studied additional materials about the programmes and exams, as well as minutes of the Programme Committee and the Board of Examiners. An overview of these materials can be found in Appendix 5. The panel conducted interviews with representatives of the programmes: students and staff members, the programme management, alumni and representatives of the Board of Examiners and the Programme Committee. It also offered students and staff members an opportunity for confidential discussion during a consultation hour. No requests for private consultation were received.

The panel used the final part of the site visit to discuss its findings in an internal meeting. Afterwards, the panel chair publicly presented the panel's preliminary findings and general observations.

*Report*
After the site visit, the secretary wrote a draft report based on the panel's findings and submitted it to a colleague at QANU for peer assessment. Subsequently, the secretary sent the report to the panel. After processing the panel members' feedback, the project manager sent the draft report to the faculty in order to have it checked for factual irregularities. The project manager discussed the ensuing comments with the panel's chair and changes were implemented accordingly. The report was then finalised and sent to the Faculty of Behavioural, Management and Social Sciences and University Board.

*Definition of judgements standards*
In accordance with the NVAO's Assessment framework for limited programme assessments, the panel used the following definitions for the assessment of the standards:

**Generic quality**
The quality that, from an international perspective, may reasonably be expected from a higher education Associate Degree, Bachelor's or Master's programme.

**Meets the standard**
The programme meets the generic quality standard.

**Partially meets the standard**
The programme meets the generic quality standard to a significant extent, but improvements are required in order to fully meet the standard.

**Does not meet the standard**
The programme does not meet the generic quality standard.

The panel used the following definitions for the assessment of the programme as a whole:

**Positive**
The programme meets all the standards.

**Conditionally positive**
The programme meets standard 1 and partially meets a maximum of two standards, with the imposition of conditions being recommended by the panel.

**Negative**
In the following situations:
- The programme fails to meet one or more standards;
- The programme partially meets standard 1;
- The programme partially meets one or two standards, without the imposition of conditions being recommended by the panel;
- The programme partially meets three or more standards.

# SUMMARY JUDGEMENT

*Intended learning outcomes*
According to the panel, the master's programme in Environmental and Energy Management has a strong and unique profile. Its vision, international outlook, multidisciplinarity and bridging of the natural and social sciences in the area of management of socio-technological change for sustainable development make the programme unique within the Dutch environmental science programmes. The panel appreciates the implementation of the University of Twente's T-shape in the programme. It adds that the MEEM's M-shape of a constant integration between the three phases of the programme is a further asset. It feels that MEEM could do more to advertise and emphasise these strong elements in its external communications.

The panel considers the programme's intended learning outcomes to be satisfactory for an academic master's programme. It does stress, however, that the innovation, knowledge and expertise present at the curriculum level is not clearly present in these final qualifications. It therefore advises the programme management to update the programme's intended learning outcomes so they adequately reflect both the programme's unique profile and its innovative contents.

*Teaching-learning environment*
The panel is impressed with the curriculum of the master's programme Environmental and Energy Management. Its content is a clear reflection of the programme's specific profile and aims. The three distinct phases (the teaching phase, the case study and the thesis trajectory) clearly structure the curriculum, and the constant integration of these phases make sure that the programme offers a coherent learning experience. The structure and contents of the curriculum allow students to develop into the multidisciplinary experts on sustainability that the programme aims for. However, the panel recommends the programme to link the subject matter of the course on operational management more explicitly to sustainability challenges. It considers the choice for English as the level of instruction to be logical in light of the programme's aims.

The panel is very satisfied with the way the programme trains students in both academic and professional skills. The programme operationalises its aims of training students to understand and analyse sustainability challenges and to design and manage problems and solutions. In this regard, the panel especially values the case projects, which bring these aims together.

The programme's didactic approach is one of its strong elements. Its three main principles are clearly implemented in the programme. The programme has been able to build a strong learning environment that students and staff both enjoy working in. The panel is very impressed with the way the programme constantly stimulates integration, exchange and dialogue in its teaching. It considers the MEEM's international classroom a great asset.

The quality of teaching staff in the MEEM is high. The panel confirmed that their number and quality are sufficient to ensure a high standard of education. Many of the programme's lecturers are internationally renowned in their fields. The panel advises the programme to pay attention to the lack of involvement of early-career researchers on the teaching staff, with an eye to the sustainability of the programme. The panel advises the programme to contemplate possible adverse impacts teaching in a programme with a high amount of contact hours might have on their careers. The panel is satisfied with the level of English of the teaching staff.

The programme's facilities are adequate in the panel's view. Its location in Leeuwarden offers a number of advantages, such as its positive effects on group coherence and the proximity of other organisations that have relevant expertise, such as the Wetsus Institute.

The programme has a good system of student guidance and supervision in place. The panel praises the recent development to offer face-to-face opportunities with the study advisor in Leeuwarden. It is also appreciative of the improvement in the timely completion of the programme. It received mixed

signals about students' wishes concerning the slightly less intense start of the programme in phase one. In order to allow international students the time they need to get acclimatised, but also offer other students an extra challenge, it advises the programme to look into the use of MOOCs as an option to make the programme more demanding for students who desire this.

*Student assessment*
The panel confirmed that the MEEM has a good assessment system that fits with the educational philosophy of both the programme and the faculty of BMS as a whole. The assessment system is well-designed, properly implemented and contributes to the validity, reliability and transparency of assessment in the programme. The panel is impressed with the way the programme operationalises most of the guiding principles of this policy. A variety of types of assessment is used in the programme. The panel concluded that the programme's new assessment forms are a good fit to its intended learning outcomes and overarching profile. Students are trained in and assessed on relevant skills, and they receive valuable feedback from their tutors.

The panel has some recommendations that it feels would make assessment in the programme even stronger. The first concerns the use the programme makes of formative methods of assessment. The panel feels the programme could do more in this regard. Especially methods of peer-to-peer assessment could be used more often in its view. It would also like to see the programme modify its guidelines with regard to the grading of group projects. While the guidelines state that group projects are individually assessed, it observed that this does not happen in practice. It is convinced that the current practice is satisfactory because there are firm procedures in place for when problems occur and because it agrees with the programme that in many cases group-based grading is the more appropriate option. It would therefore advise the programme to modify its guidelines to reflect the ongoing practice. The final advice is that the programme formalise the two green-light moments in the thesis trajectory. The panel learned that, as a standing practice, the programme employs a green-light moment at the stage of the thesis proposal and at the stage of the final draft. It commends this practice and, for the sake of transparency, advises the programme to formalise it.

The Board of Examiners has a clear view of its tasks and responsibilities and carries out them in a proactive manner. Its half-yearly SAQ meetings with the programme management ensure that it is involved in the programme. Some recent improvements to the assessment procedures originated from these sessions.

*Achieved learning outcomes*
The panel concluded that graduates of the MEEM programme realise the intended learning outcomes. The quality of their final projects ranged from sufficient to high. It established that graduates of the programme generally find their way to relevant and diverse professional positions that match their degree level. The alumni are positive about how the programme prepared them for the professional field.

The panel assesses the standards from the *Assessment framework for limited programme assessments* in the following way:

*Master's programme Environmental and Energy Management*

| | |
|---|---|
| Standard 1: Intended learning outcomes | meets the standard |
| Standard 2: Teaching-learning environment | meets the standard |
| Standard 3: Student assessment | meets the standard |
| Standard 4: Achieved learning outcomes | meets the standard |
| | |
| General conclusion | positive |

The chair, prof. Isabelle La Jeunesse, and the secretary, Anke van Wier MA, of the panel hereby declare that all panel members have studied this report and that they agree with the judgements laid down in the report. They confirm that the assessment has been conducted in accordance with the demands relating to independence.

Date: 3 September 2019

# DESCRIPTION OF THE STANDARDS FROM THE ASSESSMENT FRAMEWORK FOR LIMITED FRAMEWORK ASSESSMENTS

**Standard 1: Intended learning outcomes**
The intended learning outcomes tie in with the level and orientation of the programme; they are geared to the expectations of the professional field, the discipline, and international requirements.

**Findings**

*Profile*
The Master's in Environmental and Energy Management (MEEM) of the University of Twente (UT) is a multidisciplinary, one-year master's programme that aspires to train students to manage socio-technical change processes in the industrial, environmental, energy and water domains. It brings together perspectives from the social science disciplines of management, governance, policy and law, against a natural science background, with a global-local perspective, and is geared towards achieving improvements in practice. Graduates are able to tackle societal challenges related to technological change and innovation in the domains of energy, the environment and water, which form the three specialisations of the programme. The programme is offered by the faculty of Behavioural, Management and Social Sciences (BMS) of the University of Twente, but is located in Leeuwarden (see standard 2). MEEM is an internationally oriented programme and on average draws around 80% of its students from outside of Europe. Until 2017 it was offered as a post-graduate, non-funded programme, but as of March 2017 it has changed status to a publicly funded, regular master's programme.

All teaching at the University of Twente adheres to the principle of 'high tech, human touch'. With this approach, the UT strives for a synergy between technology and engineering on the one hand, and the humanities and social sciences on the other, creating a 'T-shaped' academic professional. The MEEM programme realises this T-shape in its programme by aiming for a 'general knowledge and understanding of the natural science (technology and ecology) background of sustainability challenges [the upper arm] and in-depth social science knowledge, understanding and skills to manage sustainability challenges (of environment, energy and water)' [the pillar of the T]. The panel clearly recognises this profile in the programme and appreciates the way the programme balances between the general and the specific. It adds that in addition to the T-shape, there is also an M-shape discernible in the programme's set-up. The programme constantly strives towards integration of its three core elements: the teaching phase, the case study and the thesis trajectory (see standard 2), thereby linking these three pillars together.

The panel observed that the programme management has a clear vision of its comparative strengths relative to similar programmes, and it appreciates the recent benchmark the programme carried out among other environmental science programmes in the Netherlands, as described in its self-evaluation. Overall, it is impressed by the strong profile and vision present in the MEEM programme. The programme's emphasis on multidisciplinary understanding of the societal embedding of socio-technological transitions within an international classroom is an asset in the field. It could, however, do more to emphasise these strong elements. Especially the combined T- and M-shapes in the programme could be highlighted more in the panel's view.

*Intended learning outcomes*
The programme's final qualifications can be found in appendix 2. The panel confirmed that the intended learning outcomes adhere to the domain-specific framework of reference for Dutch environmental science programmes. They are explicitly linked to the Dublin descriptors for master's programmes. They are divided into three categories. The first contains domain-specific final attainment targets, related to the domain-specific knowledge graduates are expected to possess in the field of environmental science. The next group is made up of the integration/multidisciplinarity-related final attainment targets, concerning multidisciplinary understanding and application. The last

category covers the academic and professional final attainment targets, geared towards academic and professional skills. The intended learning outcomes reveal that the programme explicitly aims to train students for careers both in academia and in the professional field.

The panel found that the level and orientation of the intended learning outcomes are appropriate for an academic master's programme. However, while they are generally appropriate, they do not quite reflect the programme's unique and strong profile. The final qualifications are quite broad in their formulation and could be updated. They do not fully reflect, in the sense of highlighting the specificities and assets, the knowledge, innovation and updated experience that the panel observed at the level of the individual courses and the three specialisations. The panel invites the programme management to update the intended learning outcomes and to make sure that the synergy between the curriculum contents and the formulated final qualifications is improved.

**Considerations**

According to the panel, the master's programme in Environmental and Energy Management has a strong and unique profile. Its vision, international outlook, multidisciplinarity and bridging of the natural and social sciences in the area of management of socio-technological change for sustainable development make the programme unique within the Dutch environmental science programmes. The panel appreciates the implementation of the University of Twente's T-shape in the programme. It adds that the MEEM's M-shape of a constant integration between the three phases of the programme is a further asset. It feels that MEEM could do more to advertise and emphasise these strong elements in its external communications.

The panel considers the programme's intended learning outcomes to be satisfactory for an academic master's programme. It does stress, however, that the innovation, knowledge and expertise present at the curriculum level is not clearly present in these final qualifications. It therefore advises the programme management to update the programme's intended learning outcomes so they adequately reflect both the programme's unique profile and its innovative contents.

**Conclusion**

*Master's programme Environmental and Energy Management:* the panel assesses Standard 1 as 'meets the standard'.

**Standard 2: Teaching-learning environment**

The curriculum, the teaching-learning environment and the quality of the teaching staff enable the incoming students to achieve the intended learning outcomes.

**Findings**

*Curriculum contents and design*

The one-year MEEM programme is divided into three distinct phases: the first phase consisting of course work, the second case-study phase, and the final phase during which students complete their master thesis projects.

The first phase consists of eight different courses, with study loads ranging from 2-4 European Credits (EC). In total, this phase lasts around 21 weeks and comprises 28 EC. The courses deal with the fields of law (especially environmental law), energy, ecology, policy/water, the environment, technology and operational management. This phase concludes with a course on academic research skills, during which students start developing a proposal for their thesis project. This course continues into the second phase. All students follow the courses together in the first phase, meaning that regardless of the specialisation they select for phases two and three, every MEEM graduate has at least a basis in the core domains of water, energy and environmental management. The panel greatly appreciates this integrated approach in this first phase and states that this ensures that the

programme lives up to its ambitions to train multidisciplinary experts in the field of sustainability challenges.

In phase two the students start their specialisation in the domains of water, energy or the environment. In this phase, which lasts 8 weeks and consists of 12 EC, they work in groups on a case project that is based on a real-life situation with an in depth investigation of the selected case study. During this phase they apply knowledge from earlier course work and deepen their knowledge within their field of specialisation. They also work on the research proposal for their thesis project, which starts in phase three.

Phase three lasts around 16 weeks (20 EC). This final phase can be conducted at the university or at an external organisation. As the programme attracts some students that already working, often in their home countries, these students of them go back to their employers and conduct their thesis research in those organisations.

The panel is very positive about the design and structure of the curriculum. The general start of the programme, followed by the two phases of specialisation, mean that the programme adheres to its aim of training T-shaped professionals (see standard 1). The students the panel spoke to also indicated that they experienced a clear increase in intensity of the programme, which they appreciated, with the second and third phases being more demanding than the first, although some students would like the first period to be more demanding as well. The panel appreciated the fact that students start early with their thesis project proposal, so that they are well-prepared to start working on the project when they enter phase three.

The programme's overarching intended learning outcomes are adequately operationalised at the course level according to the panel. Its assessment plan includes insightful curriculum matrices that link the final qualifications to the learning outcomes at the course level. In line with its remarks under standard 1, the panel observed that the course-level learning outcomes are often more advanced and innovative than the overarching intended learning outcomes. It also observed that, while its contents are appropriate for the programme, the management course from phase one does not explicitly link to the management of sustainability *per se*, but rather introduces students to management in general. The panel recommends that this course's subject matter be brought closer in line with the programme's overall aims of specifically managing sustainability challenges.

Students are adequately trained in both professional and academic skills throughout the programme. This is an operationalisation of the programme's aim to teach students not only to understand and analyse sustainability challenges, but also to design and manage the solutions to these problems. The panel appreciates the specific focus the programme places on this dimension in the course on academic research skills in phases one and two. This course is especially relevant in light of the programme's diverse student population, with many students hailing from different academic cultures and traditions. The panel appreciates that, especially at the research proposal stage, the programme actively protects students from external pressures when they conduct their thesis projects at external organisations. In this way the programme ensures the academic rigour of the student's projects.

The panel is pleased with the way students work on their skills during the case project period. In this phase they work in teams of 6-8 on a case taken from a real-life situation. The alumni the panel spoke to indicated that the work in these diverse teams, in terms of both culture and disciplinary background, greatly helped prepare them for their professional careers. Students and alumni also spoke highly about a workshop on intercultural communication the programme offers in the first phase, stating that this helped them during their studies and afterwards.

The MEEM is offered entirely in English. Because of the global nature of sustainability challenges, the panel considers this a logical choice. The programme's international outlook further justifies the choice of English as its language of instruction. As will be elaborated below, the programme explicitly

aims for diversity, certainly in terms of nationalities in its student population, as the international classroom underlies its didactic concept.

The panel confirms that the programme is aligned with the demands and expectations of the international professional field. The relations with the professional field are maintained through frequent guest lectures by practitioners, through case projects brought in by commissioners from the field, and by embedding students in organisations for their final thesis project. The programme's strong ties to its alumni also ensure that the connection to the professional field is maintained.

*Didactic approach*
Teaching within the MEEM adheres to three main principles: it promotes active learning by students; it builds on existing knowledge, experiences, skills, and professional and regional backgrounds; and it works on a structured development of competencies. The panel is positive about this didactic approach. The high number of contact hours (each EC point is on average accompanied by 1.5 day of contact hours) means that the MEEM is capable of building a very intensive learning environment.

Regarding the first principle, the panel confirmed that the programme uses a variety of active learning methods. It employs various assignments, workshops, interactive lectures and case projects that all stimulate students to participate actively. The panel learned about the phase one Academic research skills course, in which each student lectures an assigned part of the course material to the rest of the group. In its interviews with teaching staff, students and alumni, the panel confirmed that the MEEM succeeds in truly building a learning community. This is also linked to the second principle of the MEEM didactic approach: teaching in the MEEM is mainly classroom- and group-based, made possible by its relatively small scale. This means that students not only learn from their lecturers, but also from each other. The panel learned that the programme actively stimulates students with different cultural, geographical and disciplinary backgrounds to work together and to benefit from the knowledge, experience and competencies present within the student community. It is very impressed with the way the programme constantly stimulates integration, dialogue and exchange within its international classroom. The final principle, the structured development of competencies, is operationalised in the programme's three phases. In this structure, students first broaden and deepen their knowledge, then acquire research skills, and finally apply and deepen these skills and knowledge in the case project and the master thesis project.

*Teaching staff*
The quality of teaching staff in the MEEM is high. The panel was pleased to note that the lecturers are very internationally oriented, in terms of both their national backgrounds and their research interests and activities. The teaching staff are all experts in fields relevant to the master's programme, and they actively engage in sustainability-related research themselves. Many of the programme's lecturers are internationally renowned in their fields. The panel appreciates the high staff-student ratio. However, it did observe a relative lack of involvement of early-career researchers in the teaching of the programme. It advises the programme to keep an eye on the sustainability of its teaching model and the teaching-research balance of its staff members, as it worries that the large number of contact hours in the MEEM make the programme an unattractive option to teach in for these younger researchers. Students the panel spoke also appreciated their lecturers' drive and enthusiasm. The programme draws on a rather small staff team. Consequently, the lines of communication are short, which is appreciated by the staff themselves as well as by the students. Students also valued the frequent use made of guest lecturers, from both academia and the professional field. The students the panel met with are satisfied with the level of English of their teachers. The panel confirmed that the programme has a solid policy in place to ensure that all teaching staff has an adequate level of English.

*Programme-specific facilities*
The programme is accommodated by the Department of Governance and Technology for Sustainability, and is located in the city of Leeuwarden. It makes use of the facilities of the Van Hall Larenstein (VHL) University of Applied Sciences. Here the programme has a classroom, some offices and a multi-purpose room that can be used for group work, individual talks, lunch breaks.

MEEM students have online and physical access to the UT library, but can also make use of the local library and the VHL library.

While the panel was initially worried that the location in Leeuwarden would be a disadvantage for the programme, during the site visit it learned that it can actually be considered a great asset. The small scale of the location and its relative insulation foster the connectedness and integration of the student community. In addition, the programme also enjoys a lot of support from the province of Fryslân, and especially the students in the water specialisation benefit from being close to Wetsus, a European centre of excellence for sustainable water technology. The presence of various organisations in the field of sustainability mean that the programme is frequently able to include field trips in its teaching.

*Study guidance and feasibility*
The programme provides students with adequate guidance throughout. The faculty of BMS has a dedicated study advisor that students can reach by Skype, phone or email. The panel appreciates that as of the academic year 2018-2019, the study advisor also has two office days per week in Leeuwarden, for face-to-face appointments. The students also spoke highly of the guidance offered by their teachers, which often continues after they graduate.

Recent changes in the programme have increased the proportion of students who graduate within a year. This is partially a result of the change from a post-graduate, non-funded programme to a publicly funded, regular master's programme, as students now have to pay extra tuition fees if they take longer than the prescribed time to finish it. The programme management stated that since these changes have been implemented, the programme has provided additional guidance to students who are at risk of delay. The panel also observed that the early start of the thesis trajectory helps students complete the programme within the allotted timeframe.

The panel feels that the programme's admission requirements are reasonable. It appreciates that the programme established a 30 EC premaster programme in 2017. This premaster trains students in both academic research and writing and the academic field of sustainable development studies.

Regarding work pressure, students indicated that the programme is intense and requires them to work hard. In general, the ones the panel spoke to indicated that the intensity of the programme is feasible. They stated that the small scale and strong community helped them succeed. Many international students appreciated the build-up in intensity and workload over the year, with a peak in phase two during the case study. Especially the slightly lower pressure in the first months allowed them to get settled in and acclimatised. However, the student chapter of the self-evaluation report and some students the panel spoke to would have liked the programme to be more demanding, especially in the first period. As the location of the programme in Leeuwarden makes it more difficult for these students to join in the honours programmes that the UT offers, the panel recommends that the programme look into other ways to challenge these students. The growing number of excellent massive open online courses (MOOCs) might be an interesting option to consider in this regard.

The programme has not offered any optional modules for students. In the interviews the panel learned that this is a conscious choice on behalf of the programme management. It values the interconnectedness of the programme and its three domains. It indicated that its classroom-learning concept and the strong integration of the cohorts would probably suffer from additional differentiation in the programme. The panel understands this reasoning and confirms that the three specialisations and the options the students have to follow their own interests in the thesis project allow them adequate opportunities to tailor their own learning experience. It later learned that the programme management has implemented a 4EC elective under the header of 'Professional Development Electives' that will commence in the academic year 2019-2020.

**Considerations**
The panel is impressed with the curriculum of the master's programme Environmental and Energy Management. Its content is a clear reflection of the programme's specific profile and aims. The three

distinct phases clearly structure the curriculum, and the constant integration of these phases make sure that the programme offers a coherent learning experience. The structure and contents of the curriculum allow students to develop into the multidisciplinary experts on sustainability that the programme aims for. However, the panel recommends the programme to link the subject matter of the course on operational management more explicitly to sustainability challenges. It considers the choice for English as the level of instruction to be logical in light of the programme's aims.

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**Conclusion**
*Master's programme Environmental and Energy Management:* the panel assesses Standard 2 as 'meets the standard'.

**Standard 3: Student assessment**
The programme has an adequate system of student assessment in place.

**Findings**

*Assessment plan and methods*
Assessment in the MEEM follows the UT central framework for assessment policy, as well as the BMS Faculty's assessment framework, as specified in the programme's assessment plan. The assessment plan was recently revised, and the panel confirmed that it ensures the constructive alignment of the programme. The new assessment plan is based on the following principles: diversity in testing; test appropriateness; test planning; use of both summative and formative assessment; integrating disciplinary competences; individual vs. group assessments and feedback; early provision of

information; and a system of quality assurance of assessment. The panel confirmed that assessment in the programme is valid, reliable and sufficiently independent. It observed that the programme's approach to assessment fits its didactic approach (see standard 2).

Regarding the first principle, diversity in testing, the panel confirmed that the programme uses a wide variety of types of assessment, such as exams, papers, case reports, presentations and group assignments. The students are satisfied with this diversity and indicated in the interview with the panel that the diversity accommodates different learning styles. The panel is confident that the programme also lives up to the second principle of its assessment plan: the tests employed are appropriate in relation to the course aims. The programme has a clear overview of the linkages between the intended learning outcomes, course learning objectives and the chosen method of assessment. The relationships between these components are established in every course's test plan. The panel looked at some existing test plans and found that they provide course coordinators and lecturers with useful tools to formulate the individual tests.

The programme aims for a mixture of both formative and summative assessment, as indicated by the fourth principle of its assessment policy. While the panel observed some strong forms of summative assessment, it believes that the programme could do more to integrate forms of formative assessment. It especially feels that the programme could do more to include peer-to-peer evaluations and feedback in its teaching. This would enable students to learn from each other's work. The students stated that the assessment is transparent and fair in their eyes. They appreciate the clear feedback that they receive on their work, and value the learning opportunities that this offers. The panel observed on the assessment forms of the theses it examined that the feedback is invariably systematic, supportive, constructively critical, measured and considered from a quality perspective. The assessment criteria used are transparent, and allow staff to provide an objective assessment of quality with a view to maintaining the highest standards.

There is a mix of individual and group assessment in the programme. The interviewed students appreciate this mixture. The panel found a good balance between these two forms of assessment. It did observe that, while the assessment guidelines state that contributions to the case project are individually assessed, this practice is not actually maintained. The programme explained that they consider group-based grading the best choice for group assignments, with which the panel agrees. Nevertheless, safeguards need to be in place to avoid problems usually associated with group-based grading like free-riding behaviour. After speaking to the teaching staff, the programme management, the Board of Examiners and students, the panel is confident that the programme has solid procedures in place for addressing free-riding behaviour in group projects. Because of the intensive nature of the programme and the close ties between the students and case project supervisors, problems of this nature will be identified at an early stage and appropriate measures are defined, communicated to students and taken. The panel therefore recommends reformulating the assessment guidelines to reflect the practice of group-based grading with the aforementioned safeguards.

The MEEM final thesis is assessed by two internal examiners using a recently revised assessment form. The panel is appreciative of the changed form, as it initially had some concerns regarding the distribution of weight across the various categories of the old assessment form. The new forms alleviate these concerns, as they reduce the relative weight of elements such as writing style in the overall assessment of the final works.

As of the academic year 2019-2020, the programme will add a mandatory public defence (if necessary via Skype) to the thesis assessment procedure. The panel learned that many students would appreciate this, and supports this decision. While it is convinced of the quality and thoroughness of the assessment system and procedures, it advises the programme to be watchful for possible adverse effects of their change in status and funding. This change might place pressure on examiners to pass students who would otherwise have to pay an additional period of tuition fees. The panel would also like to see the programme formalise a practice regarding the assessment of final works. The programme has two informal green-light moments, at the stage of the thesis

proposal and at the stage of the final draft. For the sake of transparency, the panel advises the programme to formalise these stages in the thesis trajectory.

The panel is convinced of the thorough safeguarding of the quality of assessment. It praises the programme for the recent steps it has taken, such as the introduction of a peer-review principle in test formulation. It also praises the programme for the calibration sessions it holds for thesis assessment and the sampling of a third of all completed MEEM theses to check for deviant grading.

*Examination board*
The MEEM falls under the auspices of the BMS Examination Board for Governance Studies. The examination board consists of six members, including an external member. One of the board's members also teaches in the MEEM programme. The examination board has a standing practice of holding a safeguarding assessment quality (SAQ) meeting with the programme management every six months. During this meeting, issues surrounding assessment policy and planning, specific tests and some individual cases are discussed.

The panel interviewed members of the Board of Examiners. It concluded that they have a clear view of their tasks and responsibilities and that the Board works hard to guarantee the quality of assessment for all of the programmes it is responsible for. It confirmed that the Board's recommendations are adequately taken up by the programme management. Many of the recent changes in assessment policy, such as the peer-review principle in test formulation and the new thesis assessment form, were developed as a result of discussions in the SAQ meetings.

**Considerations**
The panel confirmed that the MEEM has a good assessment system that fits with the educational philosophy of both the programme and the faculty of BMS as a whole. The assessment system is well-designed, properly implemented and contributes to the validity, reliability and transparency of assessment in the programme. The panel is impressed with the way the programme operationalises most of the guiding principles of this policy. A variety of types of assessment is used in the programme. The panel concluded that the programme's new assessment forms are a good fit to its intended learning outcomes and overarching profile. Students are trained in and assessed on relevant skills, and they receive valuable feedback from their tutors.

The panel has some recommendations that it feels would make assessment in the programme even stronger. The first concerns the use the programme makes of formative methods of assessment. The panel feels the programme could do more in this regard. Especially methods of peer-to-peer assessment could be used more often in its view. It would also like to see the programme modify its guidelines with regard to the grading of group projects. While the guidelines state that group projects are individually assessed, it observed that this does not happen in practice. It is convinced that the current practice is satisfactory because there are firm procedures in place for when problems occur and because it agrees with the programme that in many cases group-based grading is the more appropriate option. It would therefore advise the programme to modify its guidelines to reflect the ongoing practice. The final advice is that the programme formalise the two green-light moments in the thesis trajectory. The panel learned that, as a standing practice, the programme employs a green-light moment at the stage of the thesis proposal and at the stage of the final draft. It commends this practice and, for the sake of transparency, advises the programme to formalise it.

The Board of Examiners has a clear view of its tasks and responsibilities and carries out them in a proactive manner. Its half-yearly SAQ meetings with the programme management ensure that it is involved in the programme. Some recent improvements to the assessment procedures originated from these sessions.

**Conclusion**
*Master's programme Environmental and Energy Management:* the panel assesses Standard 3 as 'meets the standard'.

**Standard 4: Achieved learning outcomes**
The programme demonstrates that the intended learning outcomes are achieved.

**Findings**

*Theses*
Prior to the site visit, the panel studied a selection of 15 theses from the academic year 2017-2018 and their accompanying assessment forms. In general, the theses demonstrated that MEEM graduates meet the programme's intended learning outcomes. The panel noted a natural variety in their quality, with the sampled theses from the energy domain generally being very strong and the sampled theses from the domains of environment and water ranging from good to marginal passes. The panel is confident however about the overall quality of the final works. It also noted some diversity regarding the nature of the final projects; while some theses could have served as the basis for a PhD project, others took a more professional orientation, the panel appreciates the way in which projects of both natures show graduates reach the programme's intended learning outcomes. This diversity reflects the dual nature of the programme, which has an emphasis on both academic and professional education.

*Graduate performance*
The panel confirmed that graduates of the programme do well in the labour market in this field. Based on an alumni survey the programme conducted, around 73% of graduates between 2014 and 2019 found a job in a field that is related to the programme. Employed graduates work in organisations in the public and private sector, with around 58% returning to work in their home country, 22% working in the Netherlands and 20% in other countries. Around 40% of employed MEEM graduates returned to their former employer, all of them either in the same or a higher position. Around 10% of recent graduates continued on to do a PhD. The panel is impressed by these numbers and by the alumni it spoke with. They greatly valued the programme and stated that it helped them achieve their personal and professional goals. Several of students stressed that the ethos and philosophy of MEEM programme continues to, or is envisaged as, informing their values and practices post-graduation.

**Considerations**
The panel concluded that graduates of the MEEM programme realise the intended learning outcomes. The quality of their final projects ranged from sufficient to high. It established that graduates of the programme generally find their way to relevant and diverse professional positions that match their degree level. The alumni are positive about how the programme prepared them for the professional field.

**Conclusion**
*Master's programme Environmental and Energy Management:* the panel assesses Standard 4 as ' meets the standard'.

# GENERAL CONCLUSION

The panel's judgement on standards 1, 2, 3 and 4 for the master's programme Environmental and Energy Management of the University of Twente is 'meets the standard'. Therefore, according to the rules of the Accreditation Organisation of the Netherlands and Flanders, the general and final judgement is 'positive'.

**Conclusion**
The panel assesses the *master's programme Environmental and Energy Management* as 'positive'.

# APPENDICES

# APPENDIX 1: BRIEF CHARACTERIZATION OF THE PROGRAMME

MEEM is a social-science master programme that uniquely combines a focus on sustainable development through managing socio-technical change in three domains of ecological concern (i.e. Environment, Energy and Water), with a multi-disciplinary approach particularly from the social science disciplines of management, governance, policy and law, against a natural science background, with a global-local perspective and geared at achieving improvements in practice – all of which in a one-year programme. Graduating in MEEM will prepare students for working in multidisciplinary teams in business, government, consultancy or research anywhere in the world.

To achieve this the programme offers students an integrated set of knowledge (interactive courses), skills (individual and team assignments) and competences (working on real life problems in the case projects and researching in the master thesis), on the basis of cross-fertilization between disciplines and through in-class collaboration between students in multi-disciplinary teams. Thus the MEEM-programme equips students to convert global challenges, such as the United Nation's Sustainable Development Goals (SDG's) into manageable local solutions, carried by industries, societal organizations, regions, states and transnational entities. The intensity of the programme brings that students will grow into sustainability professionals in one year, with a specialization in one of the three ecological domains.

# APPENDIX 2: INTENDED LEARNING OUTCOMES

| Table 1.1 - MEEM Final attainment targets / Programme level intended learning outcomes | |
|---|---|
| ***Domain Specific Final attainment targets*** **(DS1-4: domain knowledge)** | |
| 1 (DS1) | Graduates have knowledge of and insight in the relevant key concepts and theories of policy studies and law and can describe and categorize relevant policy instruments, describe the legal basis of common policy instruments used in environmental, water and energy management and are able to assess their usefulness and feasibility in various contexts. |
| 2 (DS2) | Graduates have basic knowledge of and insight in a variety of clean(er) and treatment technologies relevant for environmental, water and energy management, and tools that can be used for assessing the options for improving the environmental and energy impacts of products and production processes. They are able to make basic calculations for some of these tools and to make judgements about what technological solutions are appropriate for specific situations. |
| 3 (DS3) | Graduates have knowledge of and insight in relevant key terms and concepts of organizational theory, operations management and financial analysis. They are able to apply these to analyse (energy, water and environmental projects in) an organization, define needs for change and advise about implementation. |
| 4 (DS4) | Graduates have knowledge of and insight in the relevant key concepts, theories and tools, strategies and management systems for corporate environmental, water and energy management, including Corporate Social Responsibility. Graduates are able to analyse an existing situation and design solutions for (a specific issue in) environmental, water or energy management. |
| ***Integration / multidisciplinarity related final attainment targets*** **(MUA1-2: multidisciplinary understanding & application)** | |
| 5 (MUA1) | Graduates understand the concept of sustainable development and the relationships between resource utilization, production processes, societal processes and environmental pressure and are able to apply combinations of concepts and theories in environmental, water and energy management to the situation in the home country or other specific real life situations. |
| 6 (MUA2) | Graduates are able to integrate knowledge from various disciplines and to understand interrelationships in sustainable development processes, and are capable of formulating an action programme, policy, project or recommendations for environmental, water or energy management issues in their context based on this integrated knowledge. |
| ***Academic and Professional Final attainment targets*** **(APS: Academic and professional Skills)** | |
| 7 (APS1) | Graduates have academic and research skills like critically reflecting on literature, designing a research proposal and executing and reporting on an (applied) research project. |
| 8 (APS2) | Graduates are able to independently access relevant scientific literature to obtain additional knowledge and apply this to the problem at hand. |
| 9 (APS3) | Graduates take the responsibility for the continuous development of their own knowledge and skills. |
| 10 (APS4) | Graduates are able to make a relevant contribution as an individual or as a member of an multidisciplinary team to analysing and solving complex environmental , water or energy problems in an organization or region. They are able to function in an international team, with English as the language of communication. |
| 11 (APS5) | Graduates are able and willing to recognize the ethical aspects related to their activities. |
| 12 (APS6) | Graduates are able to give a structured written and oral presentation in English about individual or team work. They also adhere to existing academic traditions, such as providing proper credits and references. |
| 13 (APS7) | Graduates are able to reflect on matters and issues in the domain, are able to form an opinion and to contribute to both scientific and practitioners' discussions and e.g. to critically reflect on the role of technology in the process towards sustainable development |
| 14 (APS8) | Graduates have knowledge of the principles of relevant professional skills, like communication, management and consulting skills, and have some basic experiences in applying these |

# APPENDIX 3: OVERVIEW OF THE CURRICULUM

**Table 2.2 – Schematic representation of the MEEM programme**

1st week → 52nd week

| Course work (±21 wks) | Case projects (±8 wks) | MSc Master thesis projects (±16 wks) |
|---|---|---|
| 1.5 - law; 1.2 - energy; 1.7 - ecology | 2.1 - Environment | 3.1 - Environment |
| 1.1 -policy/water; 1.3 - environment | OR 2.2 - Energy | OR 3.2 - Energy |
| 1.6 - technology; 1.4 - management | OR 2.3 - Water | OR 3.3 - Water |
| 1.8 - ac. research skills; incl. thesis proposal | | |
| **Joint programme** | **Specialisation phase (choice 1 of 3 domains)** | |
| In class work lectures, assignments (no. 2 extends into case study period) | Group work with tutor | Individual thesis work with 2 supervisors |

**Table 2.1 - Programme curriculum**

| Unit code | Name | EC |
|---|---|---|
| | **Courses** | |
| [1.1] 201700115 | Policy Strategies and Implementation for Water Governance and other Sustainability Issues | 4 |
| [1.2] 201700116 | Energy Management | 4 |
| [1.3] 201700114 | Sustainable Management Strategies and Innovations | 4 |
| [1.4] 201700136 | Management: operations, organizations and financial analysis | 4 |
| [1.5] 201700113 | Environmental Law | 2 |
| [1.6] 201700134 | Science Backgrounds: Environment and Technology | 4 |
| [1.7] 201700133 | Science Backgrounds: Ecology, Society and Sustainable Development | 2 |
| [1.8] 201700043 | Academic Research Skills | 4 |
| | **Case project** | |
| [2.1-3] 201700159/157/160 | Case project (Environmental, Energy or Water Management) | 12 |
| | **Thesis project** | |
| [3.1-3] 201700211 | Thesis project (Environmental, Energy or Water Management) | 20 |

# APPENDIX 4: PROGRAMME OF THE SITE VISIT

**Day 1 - 20 June 2019 (Upark Hotel)**

| | | |
|---|---|---|
| 16.00 | 19.00 | Intern start discussion panel |
| 19.00 | 21.00 | Dinner panel |

**Day 2 - 21 June 2019**

| | | |
|---|---|---|
| 09.00 | 10.00 | Panel arrival/welcome |
| 10.00 | 11.00 | Interview of MEEM management |
| 11.00 | 11.15 | Short break |
| 11.15 | 12.00 | Talk with students / alumni |
| 12.00 | 12.15 | Lunch / panel deliberation |
| 12.15 | 13.00 | Talk with lecturers |
| 13.00 | 13.30 | Short break |
| 13.30 | 14.15 | Examination board |
| 14.15 | 14.30 | Short break |
| 14.30 | 15.15 | Follow-up talk with MEEM management |
| 15.15 | 16.30 | Formulation of conclusion |
| 16.30 | 16.45 | Preparing oral conclusions |
| 16.45 | 17.00 | Oral conclusions / drinks |
| 17.00 | 18.00 | Development talk (MEEM management asks advice from panel) |

# APPENDIX 5: THESES AND DOCUMENTS STUDIED BY THE PANEL

Prior to the site visit, the panel studied 15 theses of the master's programme Environmental and Energy Management. Information on the selected theses is available from QANU upon request.

During the site visit, the panel studied, among other things, the following documents (partly as hard copies, partly via the institute's electronic learning environment):

- MEEM self-evaluation report + appendices
- Annual reports from the programme committee and examination board
- Course evaluation questionnaires and outcomes
- Digital access to the programme's digital learning environment CANVAS
- Links to the MEEM website
- Powerpoint presentation and video about the Leeuwarden location
- Video about student life in Leeuwarden
- Course guides and course literature and sample exams for the following courses:
  - Policy Strategies and Implementation for Water Governance and other Sustainability Issues
  - Energy management
  - Sustainable management strategies and innovations
  - Management: operations, organizations and financial analysis
  - Environmental law
  - Science Backgrounds: Environment and Technology
  - Science Backgrounds: Ecology, Society and Sustainable Development
  - Academic Research Skills
  - Case project: environmental management
  - Case project: energy management
  - Case project: water management
  - Thesis project (environmental/energy/water management)