

European Master in Sustainable Energy System Management

(wo-master)

Hanze University of Applied Sciences

24 June 2015

1	Executive Summary	3
2	Procedure	6
	2.1 Process	6
	2.2 Panel	6
	2.3 Assessment framework	6
3	Programme	7
	3.1 Administrative data	7
	3.2 University	7
	3.3 Programme	7
4	Assessment	8
	4.1 Standard 1 – Intended learning outcomes	8
	4.2 Standard 2 – Teaching-learning environment	10
	4.3 Standard 3 – Assessment	13
	4.4 Standard 4 – Graduation guarantee and financial provisions	15
	4.5 Final conclusion	15
	4.6 Recommendations	16
	4.7 Advice on sector in the Central Register of Higher Education	16
5	Overview Assessment	17
	Annex 1 – Panel	18
	Annex 2 – Overview of the programme	20
	Annex 3 – Programme site visit	21
	Annex 4 – Documents reviewed	23
	Annex 5 – Abbreviations	24

1 Executive Summary

The European Master in Sustainable Energy System Management is offered as a joint European programme by Hanze University of Applied Sciences (HUAS), Groningen, in cooperation with the University of Pisa, Italy, and the University of Zaragoza, Spain. The partnership is embedded in EUREC (European Renewable Energy Research Centers).

Standard 1. Intended learning outcomes

The master programme Sustainable Energy System Management (SESyM) aims to deliver professionals who are able to develop, analyse and assess complicated business cases for energy transition projects and are also able to implement them. The programme targets students with a background in business or economics, who will be able to communicate effectively with technologists on the issues of energy systems. SESyM is a good complement to the technologically oriented EUREC MSc in Renewable Energy, also offered by HUAS. On the basis of the documentation and the interviews during the site visit, the panel concludes that the intended learning outcomes of the programme meet the international requirements of comparable programmes and that the programme used the EUREC partnership effectively to confirm this. The learning outcomes are linked to the Dublin descriptors and appropriate for a master programme. The programme aims to educate 'reflective practitioners' at an academic level who can contribute creative original research during their MSc project. The programme, however, does not constitute a research master, which is also reflected by the 90 EC length of the programme. The panel recommends formulating the academic orientation more explicitly in the intended learning outcomes. The Professional Board has been involved in developing the programme. The panel recommends adding a member from the public sector to cover the whole range of potential employment sectors for the prospective students.

The panel assesses standard 1 'Intended learning outcomes' as satisfactory.

Standard 2. Teaching-learning environment

The curriculum consists of 90 EC, spread over three semesters of 30 EC each. The panel has studied the curriculum and course descriptions and concludes that the structure of the curriculum is well thought out and that the contents enable the students to achieve the intended learning outcomes. The core modules of the first semester provide a firm basis in the field of energy transition and the related themes, preparing students for the specialisation in either Zaragoza or Groningen during the second semester. The third semester allows sufficient time to work on a substantive thesis project. The role of the Academic Board in approving project proposals is a strong point.

Students must spend at least one semester abroad, which fits with the international playing field of the energy market. The possibility of attracting more EUREC partners in SESyM in the future may broaden the options and strengthen the international experience even more.

An admission committee determines if there is a match between the student's expectations, background and motivation and the programme's academic orientation, ambition and multidisciplinary approach. A current point of attention is the entry requirements for admission to the programme. The entry requirement is BSc, which is from September 2015 possibly also from HUAS-level, whereas the MSc explicitly aims at university level. This can create a gap between the different students admitted to the programme. The programme addresses this possible tension with the admission committee that takes into account the broad background

of the students. The decision-making procedure leads to transparent decisions, but the panel recommends formulating the criteria more explicitly, so that admissions and rejections can be easier explained to applicants.

The didactical approach aims to encourage students to develop a creative and innovative approach by using multidisciplinary, multi-cultural group work. Teaching methods are a mix of lectures, classes and self-study, combined with tutorials and lab work. The panel recommends working out practical possibilities to bring technology and business students from the two EUREC MSc programmes together in joint activities, as this would strengthen the interdisciplinary nature of the programme.

The information provided and the interviews convinced the panel that the programme staff comprises a good mix of knowledge and experience. External staff is involved purposefully and strategically and includes professors from academic institutions. The intended teacher-student ratio is listed as 1:15, which the panel finds positive.

During the site visit the panel was shown around the research facilities of EnTranCe (Energy Transition Centre). These facilities have, and offer development possibilities for, state-of-the-art equipment for technical student projects, and provide a stimulating environment for SESyM students to work on energy system management oriented applied research projects. Students will have access to the general HUAS student facilities. International students will be assisted by the HUAS International Student Office.

The panel concludes that the curriculum, staff and programme-specific facilities constitute a coherent and attractive teaching-learning environment for the students. This enables the students to achieve the intended learning outcomes.

The panel assesses standard 2 'Teaching-learning environment' as satisfactory.

Standard 3. Assessment

The panel has checked the Teaching and Examination Regulations and found these to be in order. The panel has studied the assessment system and met with the examination committee. The panel concludes that the examination committee is independent and aware of its responsibilities and can be expected to be in control of the quality of assessment of the programme. For the assessment of the master thesis, the examiners are authorised by the examination committee. The panel recommends three examiners in total, including an external examiner who has not been involved in the project, from another department to safeguard academic independence. The examination committee also checks the level of MSc theses after completion. Exams are prepared by two examiners, which is well received by the committee.

The panel assesses standard 3 'Assessment' as satisfactory.

Standard 4. Graduation guarantee and financial provisions

The panel has ascertained that HUAS and the Energy Academy Europe have invested considerably in the master programme SESyM, and is assured that HUAS will guarantee sufficient financial provisions in the case of start-up losses. The panel is, therefore, convinced of the viability of the programme.

The panel assesses standard 4 'Graduation guarantee and financial provisions' as satisfactory.

Given these considerations, the panel advises NVAO to take a positive decision regarding the quality of the new European Master in Sustainable Energy System Management offered by Hanze University of Applied Sciences.

The panel recommends the allocation of the programme to the sector Economy.

The Hague, 24 June 2015

Prof. dr. Fokko Mulder
(chair)

Dr. Marianne van der Weiden
(secretary)

2 Procedure

2.1 Process

Macro-efficiency	6 November 2014
Application	5 February 2015
Composition panel	20 April 2015
Site visit	11 June 2015 (Groningen)
Panel report	24 June 2015

2.2 Panel

Composition of the panel:

1. Prof. dr. F.M. (Fokko) Mulder, Professor of Materials for Integrated Energy Systems, Faculty of Applied Sciences, Delft University of Technology, the Netherlands (*chair*);
2. Prof. dr. G. (Gert) Brunekreeft, Professor of Energy Economics, Jacobs University Bremen, Germany;
3. Prof. dr. ir. G. (Gerrit) Brem, Professor in Energy Technology, University of Twente, Enschede, the Netherlands;
4. A.J. (Arie) van Scheepen B Eng, part-time student Public Administration and Organisation Science, Utrecht University, the Netherlands (*student member*).

Assisting staff:

- Dr. M.J.H. (Marianne) van der Weiden, secretary to the panel;
- Drs. F. (Fred) Mulder, policy advisor NVAO and process coordinator.

2.3 Assessment framework

The framework for limited assessments of new programmes (Stcrt. 2010, nr 21523) is used for institutions that have obtained a positive judgement following an institutional quality assurance assessment. The assessment is based on a discussion with peers regarding the content and quality of the programme. It focuses on five questions:

1. What is the programme aiming for?
2. How does the programme intend to achieve its objectives?
3. How does the programme intend to assess its performance?
4. If applicable, are the objectives achieved?¹
5. Does the programme have sufficient financial resources?

These questions have been translated into four standards. Regarding each of these standards, an assessment panel gives a substantiated judgement on a two-point scale: satisfactory or unsatisfactory. The panel subsequently gives a substantiated final conclusion regarding the quality of the programme, on the same two-point scale.

Generic quality – The quality that can reasonably be expected in an international perspective from a higher education bachelor's or master's programme.

Positive – The programme meets the generic quality standards.

Negative – The programme does not meet the generic quality standards.

¹

If the programme has already produced graduates, the panel assesses the achieved learning outcomes.

3 Programme

3.1 Administrative data

Country	The Netherlands
Institution	Hanze University of Applied Sciences (positive NVAO decision institutional quality assurance assessment: 26 April 2013)
Programme	European Master in Sustainable Energy System Management
Level	master
Orientation	academic (wo ²)
Credits	90 EC
Location	Hanze University of Applied Sciences, the Netherlands; University of Pisa, Italy; University of Zaragoza, Spain
Mode of study	full-time
Field of study	Economy (as advised by the panel)

3.2 University

Hanze University of Applied Sciences (HUAS) is the oldest multi-disciplinary University of Applied Sciences in the Netherlands, celebrating its 215th anniversary in 2013. Based in the city of Groningen, it has branches in Assen, Leeuwarden and Amsterdam, almost 27,000 students and over 2700 staff. HUAS, from its 17 schools, offers over 70 bachelor degree programmes, 8 associate degree programmes and 17 master degree programmes. HUAS also offers courses to people from trade and industry and has become a knowledge institution for applied research with 50 associate professorships and 6 Centres of Applied Research and Innovation. HUAS focuses on two strategic themes, closely linked to the northern Netherlands: Energy and Healthy Ageing.

3.3 Programme

The Joint European master programme in Sustainable Energy System Management (SESyM) is the initiative of three members of EUREC (European Renewable Energy Research Centers), an association of 45 leading, largely academic, research groups from across Europe, which conduct research, development and demonstrations of renewable energy technologies and energy efficiency. The programme objective is to address the growing need in society for new energy transition professionals with advanced knowledge of and insight in energy system analysis from an interdisciplinary perspective and with analytical tools to support business, new venture plans and their real-life operationalisation. HUAS cooperates with the universities of Pisa and Zaragoza who integrated their existing master programmes within SESyM. The programme is a one and a half year (90 EC) fulltime programme, to be conducted in English, and intends to start in September 2015 with a first intake of ten students.

² wo = wetenschappelijk onderwijs

4 Assessment

4.1 Standard 1 – Intended learning outcomes

The intended learning outcomes of the programme have been concretised with regard to content, level and orientation; they meet international requirements.

Findings

The master programme Sustainable Energy System Management (SESyM) aims to deliver graduates who are able to develop, analyse and assess complicated business cases for energy transition projects and are also able to implement them.

The information dossier lists the following generic and specific intended learning outcomes:

Generic learning outcomes:

- Management: to be able to plan, develop, analyse and manage multi-disciplinary/-level/-dimensional energy transition projects within time, budgetary, quality and personnel constraints;
- Teamwork: to be able to work in (inter)national and multidisciplinary teams effectively and efficiently;
- Creativity: to be able to use abstract, analytical thinking and creativity in the synthesis of ideas across disciplines;
- Scientific research: to be able to independently conduct scientific research on sustainable energy systems;
- Communication: to be able to communicate professionally in English (oral and written) using modern (social media based) communication tools;
- Entrepreneurial: to be able to demonstrate an entrepreneurial attitude.

Specific energy transition intended learning outcomes:

- Evaluation of energy system dynamics, innovation, business plans/cases, models, markets within socio-legal-economic contexts;
- Design and assessment of business plans/cases, models and scenarios for integration and optimisation and market management;
- Innovative project implementation, development and management.

In the information dossier these intended learning outcomes have been explicitly linked to the Dublin descriptors for a master programme and been translated into module learning outcomes for the core and the specialisation courses. This confirms that the learning outcomes are at the appropriate level for a master programme.

The academic orientation of the programme was a point of discussion in various interviews during the site visit. The learning outcomes as presented in the information dossier, especially the specific energy transition learning outcomes, seemed to focus on the graduates' professional skills at the expense of academic research skills. The interviews, however, clarified the academic orientation of the programme convincingly: students will be taught at a conceptual level, be stimulated to think critically, use up to date scientific knowledge from seminal works and recent literature in the modules. Before their start, thesis projects will only be approved by the Academic Board if they are potentially able to add new aspects to the relevant academic knowledge and create novel insights. Although graduates will be able to

proceed to a PhD project, the main aim is to deliver professionals at an academic level, suitably described as 'reflective practitioners'. The panel fully agrees that the complexity of the international energy market requires an academic level. The panel appreciates the role of the Academic Board, consisting of full and associate professors of the University of Groningen and HUAS.

Another point of discussion was the programme's target group and the balance between technological and economic/business knowledge. The field of renewable energy research and development needs professionals who understand the interactions between the main technical, legal and economic aspects of the energy value chain. One option is to acquaint technical BSc graduates with the economic, business and legal aspects. SESyM has opted for the alternative option, i.e. to educate economic and business BSc graduates to a more advanced level and to familiarise them with the field of energy transition, its possible scenarios and an integrated energy system approach. The panel found this a good choice, given the labour market for which SESyM wants to prepare its students. An additional argument is the complementarity of SESyM to the technologically oriented MSc in Renewable Energy, also offered by a number of EUREC (European Renewable Energy Research Centers) partners, including HUAS. The panel finds these two masters a strong combination, covering the full range from technology to business and catering to students from different backgrounds and also opening grounds for collaboration between the technical and business disciplines.

SESyM based the choice for an economics/business approach on a stakeholder assessment and discussions with partner universities in EUREC. The link with EUREC provides up to date insight in the development of international scenarios in energy transition and the demands of the international labour market and is, therefore, an asset to the programme. In addition, the programme has set up a Professional Board with eight members from relevant companies. Government or public organisations are not represented on the board, although energy policy making is one of the employment options mentioned in the information dossier. During the site visit the panel met four members of the Professional Board and appreciated their enthusiasm and involvement in the development of the programme.

Considerations

The panel has studied and discussed the aims of the programme and notes that the relevance of the subject and the multidisciplinary approach lead to a programme that is expected to be attractive for students and their future employers.

The panel concludes that the intended learning outcomes of the programme meet the international requirements of comparable programmes and that the programme used the EUREC partnership effectively to confirm this. The learning outcomes are linked to the Dublin descriptors and appropriate for a master programme. The academic orientation was clarified during the site visit. The panel advises formulating the academic orientation more explicitly in the intended learning outcomes, for the benefit of potential students and the relevant labour market.

The panel recommends adding a representation from government or a public organisation to the Professional Board to better reflect the potential employment opportunities for SESyM graduates.

Conclusion

The panel assesses standard 1 'Intended learning outcomes' as satisfactory.

4.2 Standard 2 – Teaching-learning environment

The curriculum, staff and programme-specific services and facilities enable incoming students to achieve the intended learning outcomes.

Findings

Structure and contents of the curriculum

The curriculum consists of 90 EC, spread over three semesters of 30 EC each. See Annex 2 for a schematic overview of the programme. The programme is a joint programme with two EUREC partners, the universities of Pisa and Zaragoza. The core programme (first semester) is offered by HUAS and the University of Pisa. Students can choose to start their studies in Groningen or in Pisa. They will be awarded the degree by the institution where they enrolled for their core programme. The second semester is the specialisation phase, offering the choice between HUAS and the University of Zaragoza. The third semester is used for the thesis project. Students must spend at least one semester abroad. Therefore, students who have done their core and specialisation in Groningen are required to do a master thesis project in an international company, research center or university. During the site visit the panel was informed that other EUREC partners may join SESyM in the future, thus offering a wider choice of specialisations and international experience.

The programme covers four themes: Energy Technology, Energy Business & Society, Energy Models and Energy Innovation. Both the core and the specialisation offer a module in each of these themes, helping students to develop specialist knowledge. As an introduction, the first semester starts with an extensive overview of the themes. The core programme ends with a generalist module on Communication and Project Management, including research methodology and a capstone assignment.

During the second semester the students can either choose the specialisation System Integration & Optimisation (SIO), offered by HUAS, or Sustainable Energy Management (SEM), offered by the University of Zaragoza. The Zaragoza specialisation focuses on markets and management, while the focus of HUAS is on system integration. Content-wise the specialisations are fairly similar, both offering modules on the four themes mentioned above. The second semester of the SIO specialisation ends with an International Case, including the development of a business plan and an applied research project. Similarly, the final module of the SEM specialisation requires students to prepare an energy management project plan for a real business or building. These concluding modules provide a practical opportunity to bring together the components of the previous learning modules.

The third semester is dedicated to the master thesis project. The students conduct a six month applied research project. The project must be sufficiently challenging and be directly related to sustainable energy system transition issues. It should enable the student to demonstrate mastery of all programme learning outcomes at the final level, i.e. worthy of achieving the Master of Science degree. Before they can start their project work, students need approval

from the Academic Board that judges the potential of the project to make a contribution to advancing academic knowledge. The thesis must contain a clear conceptual framework, methodology and problem description, a thorough discussion of the relevant literature and theories, advanced modelling and use of analytical tools and generalisable conclusions. The thesis must aim to contribute novel knowledge on aspects of the relevant academic field. The panel finds these requirements suitable and proper for an academic master programme.

The EUREC partnership and, more specifically, the MSc in Renewable Energy in which HUAS participates, offer the students a number of opportunities to meet and to exchange knowledge and experiences with other students in the broad field of energy. The programme starts with a kick-off at the premises of EUREC in Brussels where students from both MSc programmes are welcomed. At the end of the programme a joint presentation day is organised, for graduates to present their thesis work. At HUAS, joint activities for students of both masters are seen as an opportunity (common classes, cooperation in projects, excursions), but have not yet been worked out.

The panel has looked into the teacher manuals for all modules, provided during the site visit. The panel also checked the study materials (books, articles, reports) and found these to be up to date and of an appropriate level. The contents of the various modules enable the students to achieve the learning outcomes.

The admission criteria and procedure are described in the information dossier and were explained during the site visit. Applicants register with EUREC. After completion of the admission file, EUREC forwards it to the core provider where the applicant wants to study (HUAS or University of Pisa). The core provider is responsible and takes the admission decisions. Entry requirements at HUAS as a core provider are a BSc degree in Engineering Management, Business, Economics or an equivalent level with appropriate work experience. There are no additional requirements for applicants with a bachelor's degree from universities of applied sciences. From September 2015 onwards, BSc degrees from a professional education like HUAS will also be legally admissible. Applicants have to provide documentation concerning their academic career, English language proficiency, affinity with quantitative methods and motivation. An admission committee of five staff members will try to determine if there is a match between the student's expectations, background and motivation and the programme's academic orientation, ambition and multidisciplinary approach. Decisions are taken on a consensus basis. The panel was reassured that this decision-making procedure leads to transparent decisions. The criteria for judging the adequacy of motivation and background are not strictly formulated and give scope for different interpretations. Therefore the commission advises firming up the admission criteria.

Didactical approach

In the Vision on the development of the programme's profile (provided as one of the annexes) the educational approach is described. The programme aims to stimulate the students to use their natural inclination for investigation and their creative, innovative and entrepreneurial skills.

In the first semester (core) thirty per cent will be spent on tutorials and lab work, while the remaining seventy per cent is for lectures, classes and self-study. In the second semester (specialisation) this distribution is reversed: thirty per cent on classes and lectures and seventy per cent to be spent on research projects and lab experiments (in teams) researching and analysing real-life business cases. Working in multidisciplinary, multi-cultural teams is an

important teaching method. Using their different educational backgrounds, small teams of students will have to learn how to optimise their working methods and communication techniques to achieve shared objectives.

The master students will participate in seminars, peer reviews and supervision offered by PhD students who are linked to the Kenniscentrum Energie (KCE, Knowledge Center Energy) of HUAS and to the Energy Academy Europe (EAE), which is an initiative of the HUAS, University of Groningen, Energy Valley and GasTerra. The panel is convinced that the described teaching methods are suitable for this academic master programme.

Staff

The information dossier provides a list of staff members who will be involved in the programme. Extensive curricula vitae of all staff members were made available as well. The intended teacher-student ratio is listed as 1:15, which the panel finds positive.

During the site visit, the panel had an interview with a number of developers and lecturers of the core and the SIO specialisation and, also, with representatives from the universities of Pisa and Zaragoza. Staff members are not only selected for their specific content expertise, but also taking into account their educational and didactic qualifications and their English language proficiency. External staff is involved purposefully and strategically and includes professors from academic institutions. The information provided and the interviews convinced the panel that the programme staff comprises a good mix of knowledge and experience.

Services and facilities

During the site visit the panel was shown around the research facilities of EnTranCe (Energy Transition Centre). EnTranCe is an initiative of HUAS in cooperation with a number of industrial partners (BAM, GasTerra, Gasunie and Imtech) and linked to KCE and EAE. These facilities have state-of-the-art equipment and provide a stimulating environment for students to work on applied research projects, ranging from large multi-stakeholder projects to projects from small and medium enterprises. The programme evidently profits from the investments made by HUAS and the northern Netherlands in developing Energy as a strategic theme.

Students will have access to the general HUAS student facilities, such as the library and the electronic learning environment. International students will be assisted by the HUAS International Student Office with their application and admission procedures and with practical matters, such as finding accommodation in Groningen, getting the right insurance, obtaining a visa and obtaining residence and work permits.

Considerations

The panel has studied the curriculum and course descriptions and concludes that the structure of the curriculum is well thought out and that the contents enable the students to achieve the intended learning outcomes. The core modules provide a firm basis in the field of energy transition and the related themes, preparing students for the specialisation in either Zaragoza or Groningen. The third semester allows sufficient time to work on a substantive thesis project. The role of the Academic Board in approving project proposals is a strong point.

The panel appreciates the emphasis on an international approach and the requirement that students have to go abroad for at least one semester. After all, the energy market and its innovations can only be understood on an international level. The specialisation SEM in Zaragoza offers the students a good opportunity for such an international experience, but the

panel thinks the difference in content between the specialisations SIO and SEM is not large enough to make students move to Zaragoza for content reasons. The possibility of attracting more EUREC partners in SESyM may broaden the options and further strengthen the international experience.

The panel recommends working out practical possibilities to bring technology and business students from the two EUREC MSc programmes together in joint activities, as this would strengthen the interdisciplinary nature of the programme.

The programme aims to attract BSc graduates with a background in economics and management. The admission criteria relate to disciplinary knowledge and experience, English proficiency, ability to handle quantitative methods and motivation, but are not formulated very specifically. This allows the admission committee to look into each application individually and avoids a mechanistic approach. The panel is convinced that decisions are taken conscientiously. Nevertheless, the panel recommends formulating the criteria more explicitly, so that admissions and rejections can be easier explained to applicants.

The programme can draw on capable and enthusiastic staff members, covering the different themes and bringing in relevant (academic) networks.

Energy as a strategic theme has attracted additional resources and stimulated new partnerships, such as EnTranCe. These facilities are innovative and provide excellent possibilities for students to work on research projects.

The panel concludes that the curriculum, staff and programme-specific facilities constitute a coherent and attractive teaching-learning environment for the students. This enables the students to achieve the intended learning outcomes.

Conclusion

The panel assesses standard 2 'Teaching-learning environment' as satisfactory.

4.3 Standard 3 – Assessment

The programme has an adequate assessment system in place.

Findings

System of assessment

The information dossier and the OER/TER (Onderwijs- en Examenreglement, Teaching and Examination Regulations) describe the assessment system of the programme. Each module will be assessed by multiple types of assessment and by two examiners, in line with the assessment system of HUAS and the EUREC criteria. The information dossier provides a grid, linking the generic and specific learning outcomes with the assessment in the various modules. The assignments of the final core and specialisation modules (Capstone assignment and International case) assess the degree in which students are able to integrate and apply their knowledge of previous modules. The testing and assessment workbook was available for the panel during the site visit. Examiners are appointed by the examination committee. All staff

members are trained for their assessment tasks and will be formally qualified (BKE, Basiskwalificatie Examinering, Basic Qualification Assessment) by September 2016. On the basis of this information, the panel expects that the procedures will guarantee reliability, validity and transparency of the assessments.

The assessment in Zaragoza is described in the information dossier. Evaluation criteria for each module are explained to the student in advance. A table of equivalence for marks is used to translate marks between the Spanish and Dutch system. The panel is assured this will work out as expected.

The Academic Board is responsible for the academic quality of the thesis project proposals, the examination committee for the final marks. The Academic Board intends to monitor the academic level of the programme by reading all theses and advising the examination committee, if necessary. The mark for the thesis project is based on the written report and on the project presentation during the EUREC Master Project Presentation days in Brussels. The thesis will be assessed by two examiners, usually one from the core and one from the specialisation, taking into account the advice from the host organisation where the student has done the project work. The presentation will be assessed by the HUAS supervisor, in consultation with the specialisation supervisor and a representative of another partnering university, using the EUREC Marking Scheme for Project Presentations. Both the marks and the argumentations are archived. The panel finds these procedures generally well-considered, although the panel would expect an external examiner to be involved in the thesis assessment.

Examination Committee

During the site visit, the panel met with the chair of the examination committee. The committee is independent and has been appointed for both EUREC MSc programmes. It has formulated criteria for the appointment of examiners, both for module assessments and for the assessment of the thesis. As mentioned above, examiners must be formally qualified by September 2016. Thesis supervisors must have a PhD degree or be in an advanced stage of their PhD project. The examination committee also checks the level of MSc theses after completion. The panel thinks the examination committee is sufficiently in control to guarantee the level of the degree.

Considerations

The panel has checked the Teaching and Examination Regulations 2015-2016, and found these to be in order. The panel has studied the assessment system and met with the examination committee during the site visit. The panel concludes that the examination committee is independent and aware of its responsibilities and can be expected to be in control of the quality of assessment of the programme. For the assessment of the master thesis, the examiners are authorised by the examination committee. The panel recommends three examiners in total, including an external examiner who has not been involved in the project, from another department to safeguard academic independence.

Conclusion

The panel assesses standard 3 'Assessment' as satisfactory.

4.4 Standard 4 – Graduation guarantee and financial provisions

The institution guarantees students that they can complete the entire curriculum and makes sufficient financial provisions available.

Findings

The information dossier describes the graduation guarantee and financial provisions of the programme. The programme has been developed with the financial support from the Energy Academy Europe and expects the financial balance to be positive from 2017-2018 with an annual enrolment of approximately 25 students. The negative results in the first years have been approved by the Chair of the Executive Board of HUAS and can be covered by the general reserves. The proposed budget looks feasible to the panel. The panel expects that the programme could be attractive to a sufficient number of qualified students to make the programme viable.

HUAS guarantees that the MSc in Sustainable Energy System Management will be offered for a long enough period of time for students to complete their degree programme. The Dean of the School of Engineering guarantees sufficient staff and resources to deliver the programme.

Considerations

The panel has ascertained that HUAS and the Energy Academy Europe have invested considerably in the master programme SESyM, and is confident that HUAS will guarantee sufficient financial provisions in the case of start-up losses. The panel is, therefore, convinced of the viability of the programme.

Conclusion

The panel assesses standard 4 'Graduation guarantee and financial provisions' as satisfactory.

4.5 Final conclusion

On the basis of the information dossier and the discussions during the site visit, the panel concludes that the academic European master programme Sustainable Energy System Management is an ambitious programme in a societally relevant domain, using a multidisciplinary approach and supported by regional industrial and academic partners. Students are educated to be 'reflective practitioners', professionals at an academic level. The intended learning outcomes reflect the contents and approach of the programme and are in line with the requirements of similar international programmes.

The structure and contents of the curriculum are well considered. The core and specialisation semesters prepare the students for their master thesis project in the third semester. The EUREC context offers a truly international environment. The didactic approach with small-group work helps the students to develop into creative and innovative professionals. The Academic Board guarantees the academic quality of the thesis projects. The admission criteria are appropriate, but could be formulated more explicitly. The quality of the teaching staff and the services and facilities constitute a coherent teaching-learning environment for the students. The programme management and staff members are enthusiastic and qualified.

The examination committee guarantees the quality of supervisors and examiners. The assessment procedures are in line with the HUAS and EUREC assessment systems. The Teaching and Examinations Rules and the thesis guidelines are in order.

HUAS guarantees that students who have been admitted to the programme, can complete the entire curriculum. The financial provisions are sufficient.

The panel's final conclusion therefore is satisfactory.

4.6 Recommendations

The panel recommends:

- formulating the academic orientation more explicitly in the intended learning outcomes, for the benefit of potential students and the relevant labour market;
- adding a representation from government or a public organisation, for instance policy makers, to the Professional Board to better reflect the potential employment opportunities for SESyM graduates;
- working out practical possibilities to bring technology and business students from the two EUREC MSc programmes together in joint activities, as this would strengthen the interdisciplinary nature of the programme;
- formulating the admission criteria more explicitly, so that the process of admissions and rejections becomes more transparent for applicants;
- a total of three examiners, including an external examiner from another department and one who has not been involved in the project, for the assessment of the master thesis.

4.7 Advice on sector in the Central Register of Higher Education

Findings

HUAS proposes that the European master programme Sustainable Energy System Management be registered in the sector Technology or Economy.

Considerations

On the basis of the programme's contents and the proposed target group, the panel concludes that the master programme Sustainable Energy System Management fits best in the sector Economy. The programme focuses on business and economics. Graduates are expected to be able to communicate effectively with technologists, but are not educated to be technologists themselves.

Conclusion

The panel advises the allocation of sector: Economy.

5 Overview Assessment

STANDARD		ASSESSMENT
1 Intended learning outcomes	The intended learning outcomes of the programme have been concretised with regard to content, level and orientation; they meet international requirements.	satisfactory
2 Teaching-learning environment	The curriculum, staff and programme-specific services and facilities enable incoming students to achieve the intended learning outcomes.	satisfactory
3 Assessment	The programme has an adequate assessment system in place.	satisfactory
4 Graduation guarantee and financial provisions	The institution guarantees students that they can complete the entire curriculum and makes sufficient financial provisions available.	satisfactory
FINAL CONCLUSION		SATISFACTORY

Annex 1 – Panel

Prof. dr. F.M. (Fokko) Mulder (chair)

Fokko Mulder is professor of Materials for Integrated Energy Systems located at the Delft University of Technology within the 3TU Federation that is established between the three Dutch Technical Universities. He developed the 3TU MSc Sustainable Energy Technology (SET) as director of education between 2006 and 2011 which has now grown to ~100 students in Delft, and is active in teaching and developing renewable energy topical courses. He has a PhD in physics (Leiden) and has currently published more than 120 scientific papers in the field of functional and energy storage and conversion materials. His current research concerns electricity storage and conversion materials.

Prof. dr. G. (Gert) Brunekreeft

Gert Brunekreeft is professor of energy economics at Jacobs University Bremen in Germany and head of the research group Bremen Energy Research. Before joining Jacobs University, he was senior economist for the energy company EnBW AG (Germany) and held research positions in applied economics at Freiburg University (Germany), Tilburg University (Netherlands) and the University of Cambridge (UK). Gert's main research interests are in industrial economics, regulation theory and competition policy of network industries, especially electricity and gas markets. Current issues concern market design, economics of smart grids and infrastructure investment. He is the author of several books and published in academic journals, including Journal of Regulatory Economics, Utilities Policy, Oxford Review of Economic Policy and Energy Journal. Apart from his academic background, Gert has wide experience with consulting various stakeholders in energy sectors in different countries. He holds a degree in economics from the University of Groningen and a PhD from Freiburg University, both in economics.

Prof. dr. ir. G. (Gerrit) Brem

Since 2000, Gerrit Brem has been a professor in Energy Technology and chair holder of the Thermal Engineering department at the University of Twente (NL). He is an expert in the field of thermal and thermochemical conversion of biomass and waste. In his previous job he was a senior consultant at TNO, a contract research institute in the Netherlands, and in 2009 appointed by TNO as a Senior Research Fellow. He has carried out a large number of commercial research and development projects for national and international clients. He also has developed new advanced conversion technologies and demonstrated them in practice. He has written more than 70 scientific publications on combustion, gasification and pyrolysis, and owns around 10 patents. Furthermore, he is Scientific Director of the PDEng programme (Professional Doctorate in Engineering) on Energy and Process Technology. The PDEng programme is a two year post-Master designer programme at the University of Twente. He is also a member of the Dutch Certification Committee for Technological Design Programs (CCTO). Since 2015, he is Scientific Director of the new Science Based Engineering Institute of the University of Twente.

A.J. (Arie) van Scheepen B Eng (student member)

Arie van Scheepen (born 1987) is a part-time student of Public Administration and Organisation Science at the Utrecht University School of Governance, Utrecht, The Netherlands. Before that, he was a Bachelor Student Energy Technology at the University of Applied Sciences Utrecht. During his Bachelor he followed the Minor Industrial Sales and

Engineering at the Turku University of Applied Sciences, Turku, Finland. He has been an Audit Panel Member (student member) at the Accreditation Organisation of the Netherlands (NVAO) since December 2011. He participated in several NVAO audits including: the institutional audit of the HAN University of Applied Sciences, several Initial accreditations of new programmes and the accreditation of an existing programme at the special request of the Dutch government.

Assisting staff:

- Dr. M.J.H. (Marianne) van der Weiden, secretary to the panel;
- Drs. F. (Fred) Mulder, policy advisor NVAO and process coordinator.

All panel members and the secretary signed a declaration of independence and confidentiality prior to the assessment process.

Annex 2 – Overview of the programme

Semester 1 Provided by HUAS and Pisa	EC	Semester 2 Provided by HUAS	EC	Semester 3 Provided by research center of company or university	EC
Core	30	Specialisation System Integration & Optimisation (SIO)	30	Thesis	30
Overview Sustainable Energy Sources, Technologies, Systems, Environmental Issues European Experiences and History (F1)	5	System Model Application (G1)	5	Choice by student in consultation with, and after approval from HUAS	
Technologies, Plants & Integration at different scales (F2)	5	Infrastructures and Renewables (G2)	5		
System Innovation Processes (F3)	5	Intelligent Information Services (G3)	5		
Markets, Business Economics & Law (F4)	5	Business Case Economics and Law (G4)	5		
Models & Scenarios for Strategic Decision Making (F5)	5	International System case Part 1: (Energy) Business Plan Development (G5)	5		
Communication and (Project) Management (F6)	5	International case Part 2: Applied Research in Sustainable Systems (G6)	5		
		Semester 2 Provided by Zaragoza			
		Specialisation Sustainable Energy Management (SEM)			
		Socio-economic Aspects of Energy (H1)	5		
		Renewable Energy Markets (H2)	5		
		Electricity and efficiency energy markets (H3)	5		
		Systems and Tools for energy management (H4)	10		
		Start up and Management of Energy Service Companies (ESCOs) and Projects (H5)	5		

Annex 3 – Programme site visit

Date: June 11th 2015
 Location: Hanze University of Applied Sciences Groningen, Zernikeplein 11,
 School of Engineering
 Interview room: School of Engineering, first floor, Greenroom, C103

Time+loc.	Subject	Names
08.15-08.45	Reception + preparation meeting accreditation panel and consultation of documents	
08.45-09.00	Pitch Master in Sustainable Energy System Management, by prof. dr. mr. C.J. (Catrinus) Jepma and prof. dr.ir. J.C. (Han) Brezet	
09.00-09.30	Interview of HUAS Board	<ul style="list-style-type: none"> • Mrs. drs. M.C.J. (Marian) van Os (vice chairman of the Executive Board of HUAS) • Mr. dr. Ir. J (Jan-jaap) Aué, director Centre of Expertise Energy • Mr. drs. B.A. (Bram) ten Kate, leading dean Energy Education HUAS
<i>15 min break</i>		
09.45-10.30	Interview Programme Development	<ul style="list-style-type: none"> • Mr. dr. ir. W.J.T. (Wim) van Gemert (leading professor Hanze Centre of Applied Research and Innovation (EKC) and Academic Director) • Mr. ir. G. (Gerrit) Kuiken (Programme Director) • Mrs. drs. J.J.A. (Jarry) Scheepens-Hasek (International relations manager)
10.30-11.00	Interview with EUREC	<ul style="list-style-type: none"> • Mrs. N. (Nathalie) Richet M.A. (Master Programme Manager EUREC, Brussels)
<i>15 min break</i>		
11.15-11.45	Interview with Core provider PISA and Specialisation provider Zaragoza	<ul style="list-style-type: none"> • Mr. Prof. dr. S. (Stefano) Barsali MSc (Università di Pisa) • Mr. M.M. (Miguel Marco) Fondevilla (University of Zaragoza)
11.45-12.00	Interview with potential European Master student	<ul style="list-style-type: none"> • Student Mr. M. (Marro) Mijmans
12.00-13.30	A walk to Entrance, lunch and Presentation Entrance	
13.30-14.15	Interview with representatives of developers/lecturers Core and SIO specialisation HUAS	<ul style="list-style-type: none"> • Mr. prof. dr. Mr. C.J. (Catrinus) Jepma • Mr. dr. ir. J. (Jan) Bekkering • Mr. dr. eur. ing. J.D. (Koos) Lok MBA (Lector HUAS) • Mr. dr.ir. J.P. (Peter) Joore (Lector NHL) • Mr. prof. dr.ir. J.C. (Han) Brezet • Mr. ir. A.E. (Arno) Scheepens (PhD can) • Mr. prof dr.ir. J.C. (Hans) Wortmann • Mr. ir. W. (Wim) Timmerman (PhD can)
<i>15 min break</i>		

Time+loc.	Subject	Names
14.30-15.00	Interview with representatives Academic Board	<ul style="list-style-type: none"> • Mr. prof. Dr. Ir. J.C. (Hans) Wortmann • Mr. prof. dr. H.C. (Henk) Moll • Mr. dr.ir. J.P. (Jan Peter) Nap (Lector HUAS) • Mr. dr.ir. W. (Wim) van Gemert (leading lector KCE)
<i>15 min break</i>		
15.15-15.45	Interview with representatives Professional Board	<ul style="list-style-type: none"> • Mr. dr. ir J (Jörg) Gigler (Director TKI Gas) • Mr. ir. M.J.J. (Martin) Scheepers (ECN Biomass & Energy Efficiency) • Mr. ing. H. (Hielke) Westra (Ekwadraat Advies B.V.) • Mr. ir. R. (Robbert) Wittmaekers (Volker Wessels Telecom)
<i>15 min break</i>		
16.00-16.30	Committee representatives	<ul style="list-style-type: none"> • Mrs. F.H. (Francoise) van der Boom-Binkhorst (examination committee) • Mr. ir. W. (Wim) Timmerman (programme committee) • Mr. ir. G. (Gerrit) Kuiken (admission committee) • Mrs. drs. J.J.A. (Jarry) Scheepens-Hasek (Steering Committee member) • Mrs. drs. I.M.A. (Inge) Hiemstra (Quality Assurance and programme manager)
16.30-17.30	Closed deliberations of the panel	<i>Drinks and snacks</i>
17.30-17.45	Presentation of initial findings	<ul style="list-style-type: none"> • Mr. dr. Ir. J (Jan-jaap) Aué, director Centre of Expertise Energy • Mr. drs. B.A. (Bram) ten Kate, leading dean Energy Education HUAS • Mr. dr. ir. W.J.T. (Wim) van Gemert (leading professor Hanze Centre of Applied Research and Innovation (EKC) and Academic Director) • Mr. ir. G. (Gerrit) Kuiken (Programme Director) • Mrs. drs. J.J.A. (Jarry) Scheepens-Hasek (International relations manager)

Annex 4 – Documents reviewed

- Information Dossier including annexes
- Study materials: books, articles and reports
- Teacher manuals for all modules, including master thesis
- Examples of master theses supervised by SESyM staff
- Testing and assessment handbook
- Letters of support
- Curricula vitae of SESyM staff members
- Brochure SESyM
- Brochure EnTranCe
- Brochure Energy Academy Europe

Annex 5 – Abbreviations

ba	bachelor
BKE	Basiskwalificatie Examinering (Basic Qualification Assessment)
EAE	Energy Academy Europe
EC	European Credit
EnTranCe	Energy Transition Centre
EUREC	European Renewable Energy Research Centers
HUAS	Hanze University of Applied Sciences
KCE	Kenniscentrum Energie
ma	master
NVAO	Nederlands-Vlaamse Accreditatieorganisatie (Accreditation Organisation of the Netherlands and Flanders)
PBL	Problem Based Learning
SESyM	Sustainable Energy System Management
wo	wetenschappelijk onderwijs

This panel report was commissioned by NVAO for the initial accreditation of the wo-master's programme European Master in Sustainable Energy System Management of Hanze University of Applied Sciences.

NVAO
Accreditation Organisation of the Netherlands and Flanders
Parkstraat 28
P.O. Box 85498
2508 CD THE HAGUE

Tel. +31 70 312 23 00
Fax. +31 70 312 23 01
E-mail info@nvaio.net
Web www.nvaio.net

Application number 003706