

## **SENATE QUALITY ASSURANCE AND PLANNING COMMITTEE**

### **Cyclical Review of the graduate program in Sustainable Energy Executive Summary and Final Assessment Report**

This Executive Summary and Final Assessment Report of the cyclical review of Carleton's graduate program in Sustainable Energy are provided pursuant to the provincial Quality Assurance Framework and Carleton's Institutional Quality Assurance Process (IQAP).

#### **EXECUTIVE SUMMARY**

The graduate program in Sustainable Energy is run jointly between the School of Public Policy and Administration in the Faculty of Public and Global Affairs, the Department of Mechanical and Aerospace Engineering and Department of Electronics, residing in the Faculty of Engineering and Design.

As a consequence of the review, the programs were categorized by Carleton University's Senate Quality Assurance and Planning Committee (SQAPC) as being of good quality. (Carleton's IQAP 7.2.13-7.2.14).

The External Reviewers' report offered a very positive assessment of the programs. Within the context of this positive assessment, the report nonetheless made a number of recommendations for the continuing enhancement of the programs. These recommendations were productively addressed by the unit and the Dean of the Faculty of Engineering and Design in responses to the External Reviewers' report and Implementation on Plan that was submitted to SQAPC on October 9, 2025.

## FINAL ASSESSMENT REPORT

### Introduction

The graduate program in Sustainable Energy is run jointly between the School of Public Policy and Administration residing in the Faculty of Public and Global Affairs, the Department of Mechanical and Aerospace Engineering and Department of Electronics, residing in the Faculty of Engineering and Design. This review was conducted pursuant to the Quality Assurance Framework and Carleton's Institutional Quality Assurance Process (IQAP). As a consequence of the review, the programs were categorized by Carleton University's Senate Quality Assurance and Planning Committee (SQAPC) as being of good quality. (Carleton's IQAP 7.2.13-14).

The site visit, which took place on May 7-9, 2025 was conducted by Dr. Hisham Zerriffi from the University of British Columbia and Dr. Andreas Athienitis from Concordia University. The site visit involved formal meetings with the Vice-Provost (Academic and Global Learning), the Associate Vice-President (Academic Programs and Strategic Initiatives), the Dean of the Faculty of Engineering and Design, the Associate Dean of the Faculty of Public and Global Affairs, the Vice-Provost (Graduate Studies), the Director of the School of Public Policy and Administration, and the Chair of the Department of Mechanical and Aerospace Engineering. The review committee also met with faculty members, staff, and graduate students.

The External Reviewers' report, submitted on June 6, 2025, offered a very positive assessment of the program.

This Final Assessment Report provides a summary of:

- Strengths of the programs
- Challenges faced by the programs
- Opportunities for program improvement and enhancement
- The Outcome of the Review
- The Implementation Plan

This report draws on five documents:

- The Self-study developed by members of the Review Team. (Appendix A)
- The Report of the External Review Committee (Appendix B).
- The response and implementation plan from the Governance Committee of Sustainable Energy (Appendix C)
- The Response from the Dean of the Faculty of Engineering and Design, and the Dean of the Faculty of Public and Global Affairs (Appendix D).
- The internal discussant's recommendation report (Appendix E).

Appendix F contains brief biographies of the members of the External Review Committee.

This Final Assessment Report contains the Implementation Plan (Appendix C) developed by the Governance Committee of Sustainable Energy and agreed to by the Dean of the Faculty of Engineering and Design for the implementation of recommendations for program enhancement identified as part of the cyclical program review process.

The Implementation Plan identifies who is responsible for implementing the agreed upon recommendations, as well as the timelines for implementation and reporting.

### **Strengths of the programs**

#### *Faculty*

Speaking with regard to faculty, the external reviewers' indicated that "They are leading experts at Carleton in these topics and well known and regarded within the field. There is an extensive list of affiliated faculty members with expertise in both the policy and engineering aspects of the program."

They also noted that

"There is clearly a commitment from participating departments and core faculty are available to teach courses and supervise students. As a result, there appears to be a low reliance on adjunct and limited-term appointments, particularly for teaching the core of the program and this is to be commended. The faculty supervising the capstone provide an excellent experiential learning opportunity to the students. Another experiential learning highlight are the field trips (and, arguably, the seminar series with external speakers from industry and government). This is a strength of the program and should be maintained or even expanded."

#### *Students*

The external reviewers noted that the outputs of students are of high quality. They indicated that The use of seminars and field visits provide students with concrete connection to the field and to practitioners and is to be commended and possibly strengthened. There is also an active alumni group and a high success rate in job placement in relevant areas post-graduation."

#### *Curriculum*

*The externals noted that "The overall quality of the programs is high."*

*They also noted that "Overall the program structure and requirements do meet the program-level learning outcomes and graduate Degree Level Expectations. The curriculum does address the current state of the discipline as students are required to learn about both the technical and policy aspects of sustainable energy. The energy transition is a socio-technical problem requiring multiple perspectives and approaches and requiring both technological solutions and policy and regulatory solutions to work hand-in-hand."*

### **Opportunities for program improvement and enhancement**

The External Reviewers' Report made five recommendations for improvement:

1. **Introducing a Doctoral Program:** Introduce a PhD program that builds on the current programs. Similar programs exist in the USA and Europe and there is an urgent need for them in Canada. This would also raise the profile of all three programs by helping provide more research assistantships to students and attract top Canadian students. Top MASc/MPP students could possibly transfer into this program or continue after completing the initial degree. The PhD program could be a single new joint program with potentially different requirements depending on the student's background (eg: additional math of statistics

courses for policy students and additional policy courses for engineering students) or could be separate PhDs similar to the current Master's program. Each of their advantages and disadvantages that would need to be explored.

2. **Improved Recruitment:** Systematic efforts to improve recruitment such as improved website and profile of the programs as described in the report above. Ideally, this is supported by either the Faculties and/or the central University communications and marketing teams.
3. **Providing a Methods Bootcamp:** SERG 5003 provides the students an introduction to various tools and methods. However, some students may require additional early support. In particular, policy students require a working knowledge of algebra and an undergraduate economics course. It may be useful, especially for students returning to school after an absence, to introduce mathematics 'bootcamp' or short introductory course on statistics for MPP students. This would help MPP students better integrate quantitative decision making in their work. Conversely, students entering the engineering degrees will be provided with a background in policy issues through SERG 5001 but not an exposure to qualitative research methods and policy tools as SERG 5003 focuses on quantitative approaches. A qualitative methods bootcamps for these students would be useful to understand the value and applicability of qualitative methods when understanding and evaluating energy policies.
4. **Increased Interdisciplinarity:** Public Policy and Engineering need to be better integrated in order to move from a multidisciplinary approach to an interdisciplinary approach. The existing early orientation session should be strengthened so that students understand the scale and scope of the energy/climate problem and how their graduate program prepares them to contribute to solutions. However, this should also be extended to the structure of the program itself and the core courses. Currently students are still taking separate courses until their second term and not working closely together until their fourth term (and that is only the MPP/Meng). Related to this, a broader set of relevant case studies, field trips and invited distinguished lectures could be used to support increased interdisciplinarity.
5. **Expanded Disciplinary Scope:** the program is currently limited to students in three degrees spread over two departments. The content covered and skills learned in the program would be relevant to a broader set of departments and faculties at Carleton. The program should explore expansion to other disciplines as this would strengthen the program by bringing in additional knowledge/expertise as well as broaden the base of potential students. There are, however, recognized challenges to implementing this recommendation with regard to institutional structures and administrative workload.

### **The Outcome of the Review**

As a consequence of the review, the graduate program in Sustainable Energy was categorized by Carleton University's Senate Quality Assurance and Planning Committee (SQAPC) as being of **GOOD QUALITY** (Carleton's IQAP 7.2.13-14).

### **The Implementation Plan**

The recommendations that were put forward as a result of the review process were productively addressed by the unit and the Dean of the Faculty of Engineering and Design in responses to the External Reviewers' report and Implementation Plan that was considered by SQAPC on October 9, 2025. The unit agreed unconditionally to recommendation #4 and agreed in principle to

recommendation #5. They also agreed to recommendations #1, 2, and 3 while noting that additional resources could help facilitate these recommendations.

It is to be noted that Carleton's IQAP provides for the monitoring of implementation plans. A monitoring report is to be submitted by the academic units and Faculty Dean and forwarded to SQAPC for its review by June 30, 2027.

### **The Next Cyclical Review**

The next cyclical review of the graduate program in Sustainable Energy will be conducted during the 2030-31 academic year.

**SERG**  
**Unit Response to External Reviewers' Report & Implementation Plan**  
**Programs Being Reviewed:**

**Note: This document is forwarded to Senate, the Quality Council and posted on the Vice- Provost's external website.**

**Introduction & General Comments**

Please include any general comments regarding the External Reviewers' Report. You may also highlight anything noteworthy which you would like included as part of your final assessment report and executive summary.

We were pleased to receive the External Reviewers' very positive report on June 12, 2025. The report contained excellent feedback that aligns with our vision of how our program should evolve and expand over the coming years. This document contains a point-by-point response to the Report.

For each recommendation **one** of the following responses must be selected:

**Agreed to unconditionally:** used when the unit agrees to and is able to take action on the recommendation without further consultation with any other parties internal or external to the unit.

**Agreed to if additional resources permit:** used when the unit agrees with the recommendation, however action can only be taken if additional resources are made available. Units must describe the resources needed to implement the recommendation and provide an explanation demonstrating how they plan to obtain those resources. In these cases, discussions with the Deans will normally be required and therefore identified as an action item.

**Agreed to in principle:** used when the unit agrees with the recommendation, however action is dependent on something other than resources. Units must describe these dependencies and determine what actions, if any, will be taken.

**Not agreed to:** used when the unit does not agree with the recommendation and therefore will not be taking further action. A rationale must be provided to indicate why the unit does not agree (no action should be associated with this response).

**Calendar Changes**

If any of the action items you intend to implement will result in calendar changes, please describe what those changes will be. To submit a formal calendar change, please do so using the Courseleaf system.

**Hiring**

Where an action item requires additional hiring (faculty or staff) the owner should at minimum include the Dean of the faculty and member of the unit.

## UNIT RESPONSE AND IMPLEMENTATION PLAN

Programs Being Reviewed: The Graduate Program in Sustainable Energy

Prepared by (name/position/unit/date): Ahmed Abdulla, Associate Professor, Mechanical and Aerospace Engineering (27 June 2025)

<b>External Reviewer Recommendation &amp; Categorization</b> <b>Note: Recommendations highlighted in yellow were also made as part of a previous review</b>	<b>Unit Response (choose only one for each recommendation):</b> 1- Agreed to unconditionally 2- Agreed to if additional resources permit (describe resources) 3- Agreed to in principle 4- Not agreed to Rationales are required for categories 2, 3 & 4	<b>Action Item</b>	<b>Owner</b>	<b>Timeline</b>	<b>Will the action described require calendar changes? (Y or N)</b>
<b>1. Introducing a Doctoral Program:</b> Introduce a PhD program that builds on the current programs. Similar programs exist in the USA and Europe and there is an urgent need for them in Canada. This would also raise the profile of all three programs by helping provide more research assistantships to students and attract top Canadian students. Top MAsc/MPP students could possibly transfer into this program or continue after completing the initial degree. The PhD program could be a single new joint program with potentially different requirements depending on the student's background (e.g. additional math or statistics courses for policy students and additional policy courses for engineering students) or could be separate PhDs similar to the current Master's program. Each of their advantages and disadvantages that would need to be explored. (Opportunity)	<b>Agreed to if additional resources permit.</b> <i>The Units thank the Reviewers for highlighting this opportunity and, while faculty members are enthusiastic about it, we agree that it should be explored in greater detail before any decisions are made regarding the introduction of new degree programs. It would be administratively easier to introduce separate PhDs, though we acknowledge that this would conflict with everyone's aim of further entrenching interdisciplinary training.</i>	1. Graduate advisors from both units will meet in Summer 2025 to explore what a potential doctoral program might look like. Their proposal will be presented to the governance committee in the fall and, if the feedback garnered is positive, the governance committee will take further steps to introduce the program.	Graduate supervisors	Fall 2025	N
<b>2. Improved Recruitment:</b> Systematic efforts to improve recruitment such as improved website and profile of the programs as described in the report above. Ideally, this is supported by either the Faculties and/or the central University communications and marketing team. (Concern)	<b>Agreed to if additional resources permit.</b> <i>The website was thoroughly revamped last year and is being migrated to the new cuTheme soon. Efforts will be made to update the website consistently, including with research highlights and videos by faculty and students. Both FPGA</i>	1. Update website more consistently.  2. Plan a webinar + seminar tour for Fall 2025 and Winter 2026.	1. Program administrator  2. Core SERG faculty	1. Fall 2025  2. Fall 2025 and Winter 2026	N

	<p><i>and FED have provided some funding to advertise the program; additional efforts are being planned next year, including more aggressive recruitment plans that including webinars and faculty travel to various campuses for recruitment event. However, these efforts require additional financial resources, and we will only proceed if these resources are made available.</i></p>				
<p><b>3. Providing a Methods Bootcamp:</b> SERG 5003 provides the students an introduction to various tools and methods. However, some students may require additional early support. In particular, policy students require a working knowledge of algebra and an undergraduate economics course. It may be useful, especially for students returning to school after an absence, to introduce a mathematics “bootcamp” or short introductory course on statistics for MPP students. This would help MPP students better integrate quantitative decision making in their work. Conversely, students entering the engineering degrees will be provided with a background in policy issues through SERG5001 but not an exposure to qualitative research methods and policy tools as SERG5003 focuses on quantitative approaches. A qualitative methods bootcamp for these students would be useful to understand the value and applicability of qualitative methods when understanding and evaluating energy policies. (Need / opportunity)</p>	<p><b>Agreed to if additional resources permit.</b>  <i>Faculty have developed an initial proposal to restructure core courses: this restructuring will seek to provide a common base of both qualitative and quantitative methods. We will consider how SERG 5001 might integrate a bootcamp for policy students returning to school, and perhaps a bootcamp on qualitative methods (and writing skills) for engineering students. Since these changes would require financial support, we will also explore curriculum changes that accomplish a similar goal without expending additional resources.</i></p>	<p><i>1. Develop draft course outlines for a revised core course sequence and bring these to the governance committee for discussion and possible calendar changes.</i></p>	<p><i>Graduate supervisors; Core SERG faculty</i></p>	<p><i>Winter 2026</i></p>	<p><i>N (Not now; potentially in future)</i></p>
<p><b>4. Increased Interdisciplinarity:</b> Public Policy and Engineering need to be better integrated in order to move from a multidisciplinary approach to an interdisciplinary approach. The existing early orientation session should be strengthened so that students understand the scale and scope of the energy/climate problem and how their graduate program prepares them to contribute to solutions. However, this should also be extended to the</p>	<p><b>Agreed to unconditionally.</b>  <i>As the reviewers indicate, discussions are being had among faculty to restructure the sequence of core courses—SERG 5001, 5002, and 5003—to increase interdisciplinarity. The next step in the process is to develop draft course outlines for the new sequence and determine whether there are any difficulties associated with executing it. One concern that has already been raised in</i></p>	<p><i>1. Develop draft course outlines for a revised core course sequence and bring these to the governance committee for discussion and possible calendar changes.</i></p>	<p><i>Core SERG faculty</i></p>	<p><i>Winter 2026</i></p>	<p><i>N (Not now; potentially in future)</i></p>

<p>structure of the program itself and the core courses. Currently students are still taking separate courses until their second term and not working closely together until their fourth term (and that is only the MPP/MEng). Related to this, a broader set of relevant case studies, field trips and invited distinguished lecturers could be used to support increased interdisciplinarity. (Concern)</p>	<p><i>preliminary discussions is how teaching assignments could be made equitably across the two Units, since the revised sequence might require both public policy and engineering professors to co-teach the same course(s).</i></p>				
<p><b>5. Expanded Disciplinary Scope:</b> The program is currently limited to students in three degrees spread over two departments. The content covered and skills learned in the program would be relevant to a broader set of departments and faculties at Carleton. The program should explore expansion to other disciplines as this would strengthen the program by bringing in additional knowledge/expertise as well as broaden the base of potential students. There are, however, recognized challenges to implementing this recommendation with regard to institutional structures and administrative overhead. (Need / opportunity)</p>	<p><b>Agreed to in principle.</b> <i>The Units agree that additional disciplines should be integrated into the program, but Carleton’s institutional structures inhibit (if not prevent) innovative program delivery of the kind envisioned by the reviewers. Moreover, a program with expanded disciplinary scope would likely require a reimagining of the degrees awarded. Nonetheless, we will continue to engage in discussions with administrators on how to expand the disciplinary scope and the number of units involved without expanding the administrative burden imposed by Carleton’s institutional structures.</i></p>	<p><i>1. Include “expanding the disciplinary scope” as a core agenda item in governance committee meetings, from Fall 2025 onwards. This will allow the governance committee to discuss administrative developments across the University and exploit opportunities to invite Units to join SERG.</i></p>	<p>Governance committee</p>	<p>Fall 2025 onwards</p>	<p>N</p>