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MEMORANDUM

ATTENTION: Senate

TEL

FROM: Peter Keller, Vice-President, Academic and Provost, and Chair, SCUP

A handwritten signature in black ink, likely of Peter Keller, is written over the line.

RE: Establishment of the School of Sustainable Energy Engineering (SCUP 19-12)

DATE: March 13, 2019

TIME

At its March 13, 2019 meeting, SCUP reviewed and approved the proposal to establish the School of Sustainable Energy Engineering within the Faculty of Applied Sciences.

Motion:

That Senate approve and recommend to the Board of Governors the establishment of the School of Sustainable Energy Engineering within the Faculty of Applied Sciences.

c: E. Fiume
K. Oldknow



FACULTY OF APPLIED SCIENCES

OFFICE OF THE DEAN

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efume@sfu.cawww.sfu.ca/fasMEMORANDUM

ATTENTION	Dr. Peter Keller, Vice-President Academic	DATE	8 February 2019
FROM	Eugene Fiume, Dean	PAGES	1 
RE:	Submission to SCUP of a proposal to create a School of Sustainable Energy Engineering		

The Faculty of Applied Sciences has been working on a plan to transform the Sustainable Energy Engineering initiative from a *programme* to a *school*. In working with your staff, we have completed a proposal to accomplish the transformation. I am thus writing to request that you bring the enclosed proposal forward to SCUP for consideration.

I would also like to recommend a motion to SCUP as follows.

Motion: That SCUP approve and recommend to Senate the establishment of the School of Sustainable Energy Engineering within the Faculty of Applied Sciences.

Proposal to Establish the School of Sustainable Energy Engineering at SFU Surrey

**Submitted by Eugene Fiume, Dean, Faculty of Applied Sciences
8 February 2019**

Preamble

The idea of an engineering initiative in “Energy Systems” has been part of the Academic Planning landscape at Simon Fraser University in the Faculty of Applied Sciences (FAS) for several years. In 2016, various avenues of thought crystallized into a proposal to the Province of BC for Undergraduate and Graduate programs in Sustainable Energy Engineering (SEE). The SEE proposal itself is part of an ambitious strategic capital expansion of the SFU Surrey Campus, and was proposed to both the Province of BC and the Government of Canada’s Post-Secondary Institutions Strategic Investment Fund (SIF). In late 2016, approval was announced to construct a building in Surrey that would house the SEE Program, together with other academic initiatives in FAS, and more generally within SFU. This document provides an overview of the development of the SEE initiative, as well as a rationale for the creation of a new School of Sustainable Energy Engineering in the Faculty of Applied Sciences.

SEE Undergraduate and Graduate Programs

Undergraduate Program

In parallel with the SIF application and approvals timeline, a SEE Program Task Force was formed to develop the prospective program and its curriculum. A substantial survey of industry, government, and academic stakeholders was also conducted to ascertain market demand for the program and themes critical to its ultimate success. Following the Federal and Provincial governments’ announcement in late 2016 of SIF funding for the Surrey campus expansion, the Task Force completed the development of a Full Program Proposal for the SEE Undergraduate program. The proposed program passed through SFU governance, and was approved by the BC Ministry of Advanced Education, Skills and Training in June 2018, for a Fall 2019 launch.

The objective of the SEE program is to educate engineers who will lead the transition to sustainable distribution, utilization, transition, and management of energy and environmental resources through the development of engineering solutions for a sustainable world. The program will educate students in the scientific foundations, engineering principles, design practices, current technologies, economics and policies associated with the clean technology (cleantech) sector.

In addition to program approval, Provincial Government funding for 320 undergraduate seats (at steady state) was announced in 2018. The planned enrolment ramp included an expanded intake of 40 additional students into Applied Sciences in 2018/19, anticipating a Fall 2019 program launch. Target enrolment for the program (including internal transfers) in its first full year of operation is 120 students, building to steady state enrolment levels over the subsequent three years.

Graduate Programs

The proposed SEE initiative also includes graduate programs at both the master's and doctoral levels, with corresponding funding for 120 graduate seats (at steady state, building from an initial enrolment of 30 students) announced by the Ministry in conjunction with the undergraduate funding noted above.

As with the SEE Program Task Force mentioned above, an *ad hoc* Steering Committee was formed to develop the structure and anticipated research foci for thesis-based graduate programs. Full program proposals for MASc and PhD programs were approved by SFU Senate and Board of Governors in November 2018, again planning for Fall 2019 launch (pending Ministry approval).

The SEE graduate programs aim to offer a unique environment for advanced research in sustainable energy engineering. Through training in formal coursework and hands-on research, SEE graduates will be capable of working with integrity to invent, improve, design, and deploy sustainable technologies addressing both our current and future clean energy needs. Candidates will develop a strong aptitude for research and exceptional quantitative, analytical, and design skills in areas such as sustainable harvesting, conversion, storage, distribution, utilization, transition, and management of energy and environmental resources.

Anticipated areas of research activity

Broad themes of study in the undergraduate program will include smart cities, clean transportation, and sustainable manufacturing. These are broadly defined and will help to define senior technical elective courses that shape the educational experience. Correspondingly, various anticipated areas of graduate research were defined that build on current SFU strengths, anticipate future applied science research, reinforce the themes of academic program, and align with strategic foci that will be continuously evaluated and refined based on external advisory board input.¹ These areas include:

- Energy Materials and Storage,
- Net-Zero Buildings,
- Harvesting of Waste Heat,
- Power Engineering / Smart Grids,
- Renewable Hydrogen Systems,
- Sustainable Manufacturing and Design.

Rationale for a Separate Academic Unit

In early 2017, FAS began the implementation of the SEE academic initiative as a *program* situated at the Faculty level (i.e., administered by the Dean's Office). The intent was to keep the governance of the program nimble and thus responsive to evolving academic initiatives and priorities in a relatively new area of endeavour. It was thus felt that developing the SEE initiative as a *programmatic* academic unit without the additional structure of a school would be an appropriate solution. The undergraduate and graduate programs were to be components of the Program, and these initiatives indeed passed through SFU governance in this manner. As the

¹ Appendix 2 provides the current advisory board membership and terms of reference.

structures for the Program were being developed, which included the creation of advisory and steering committees, it became increasingly clear that the transformation of the SEE Program into a *School* was almost universally recommended by internal and external advisors alike². Indeed, all of the bespoke structures that were to have been created for the Program already had direct, well-developed analogues in the existing school model for our other three academic units.

The main challenges associated with mounting the SEE initiative as a stand-alone program derive from the clear distinctions in SFU policy, procedures, and practice between departmentalized and non-departmentalized Faculties. As a departmentalized Faculty, FAS does not have at its disposal the mechanisms to appoint faculty members directly into a program. As such, the only way forward is a secondment model, in which new faculty members are hired and placed in an existing unit (school), and assigned to the SEE program for the purpose of teaching and service assignments. As a consequence, faculty members associated with the SEE program would ultimately be reviewed by the Tenure and Promotion Committee (TPC) from the school in which they are placed. While efforts were being made to address this through a review mechanism that involves the SEE Steering Committee, it became clear that in real and practical terms there would be a tension as faculty members would face some ambiguity in their reporting relationships, and, potentially, direction received from both the SEE program Director and School director from their “home” unit. Additionally, there would be a real possibility that very valuable service contributions to the SEE program would not be recognized readily by their “home” TPC. These types of issues have been recognized and articulated with respect to secondment arrangements in other Faculties at SFU, and the lessons learned need to be incorporated into the way forward for the SEE initiative.

While the idea of a program remains attractive, the advantages of creating a School for Sustainable Energy Engineering then has considerable advantages. First, it would foster the creation of a distinct home and culture in this emerging area in which fully engineered and practical solutions are required. Second, it would be an equal partner among the other Schools in FAS with a strong sense of clarity and permanence, and therefore in a position to remain well resourced over the long term. Third, the branding of a School would be more attractive in recruiting more than twenty outstanding new faculty to SFU (as noted below). Fourth, it would facilitate uniform governance and career development of faculty and staff in the new School, across FAS, and across other units at SFU.

Alignment with the 2019-2024 VPA and Faculty Academic Plans

The creation of a School of Sustainable Energy Engineering aligns well with the VPA's 2019-2024 Academic Plan in the following ways.

- Students in the undergraduate and graduate SEE programs will enjoy a clearly identified home and emergent culture. In positioning SEE on an equal footing with current FAS units, point contacts for academic support will be crisply identifiable and understood by students seeking help and guidance. Increased clarity will also arise by establishing undergraduate and graduate student societies, creating a foothold, presence, and recognition, for example through funding opportunities and voting rights both internally at SFU, and engineering student associations across Canada.

² Please see the letters of support from the Directors of existing Schools within the Faculty of Applied Sciences, as well as the Chair of the SEE Research Advisory Board, as provided in Appendix 1.

- A clear and identifiable structure will also give rise to robust and reliable alignment of resources with academic programming for SEE. This will ensure that the unit is able to deliver curriculum meeting the high standards of academic quality that will be demanded by students, industry, and bodies responsible for licensing and accreditation.
- The spirit and envisioned embodiment of the SEE initiative involves a substantial level of community engagement, including the prospect of student driven community-based sustainability projects as a recognizable part of the academic program, and related work integrated learning opportunities. Placing SEE in focus for the community as an easily understood and recognizable entity on the University landscape will provide an effective avenue for engagement of the community in this way.
- An aspect that will be central to the SEE initiative is the notion of interdisciplinarity, both in research and academic programming. This is evidenced in the design of the undergraduate program, and is anticipated in research activities of SEE faculty. Motivating interdisciplinarity in a genuine and meaningful way requires an explicit statement in the evaluation process (vis a vis TPC). To this end, the creation of a School with its own TPC will permit the development of criteria for faculty review that promote and enhance interdisciplinarity as an intended outcome.
- Ultimately, the success of the SEE initiative will be a direct consequence of the quality of people that can be attracted to it. Looking specifically at faculty hiring, establishing a School demonstrates a deep commitment to the SEE initiative, which will be capable of supporting and stimulating successful academic careers. Indeed, even faculty candidates interviewed thus far have tended to refer to SEE as a School regardless of the description and language with which they are presented, demonstrating clear perception. Furthermore, faculty development and career progression will be enhanced through clarity of reporting relationships, service assignments, and criteria for evaluation.

The creation of this new School aligns strongly with the Faculty level 2019-2024 Academic Plan for Applied Sciences (*Technology for Social Good*), which includes the following areas (amongst several others) as focal points.

- Students and Academic Programs:
 - Expansion of graduate professional programs and certificates,
 - Expansion of regular graduate programs,
 - Expansion and diversification of undergraduate programs.
- New Scholarly Priorities:
 - Sustainable Energy Engineering Program.
- Challenges:
 - Diversity.
 - Course/program accessibility, and over-crowding.
 - Faculty retention and career development.
 - Staff development and retention.
 - Campus Inequity.
 - Lack of "Brand Recognition".
 - Re-imagining the experiential/co-op student experience.

Noting that the SEE program itself is a key priority in the FAS Academic Plan, the creation of a School will serve further enhance several of these priorities. In addition to the points already made above, it is worth noting that the norm across Canadian Universities that host engineering programs is a departmentalized structure, with several departments under a Faculty of Applied Science or Faculty of Engineering, representing the various disciplines and program areas. In alignment with this, creation of a new School will serve to enhance brand recognition for FAS in general, and at the Surrey campus more specifically (serving to increase campus equality).

Academic and Administrative Resources

Faculty & staff hiring plan

As the SEE program is mounted, new faculty will be hired to teach required courses, and to develop state-of-art laboratories for research in the areas of clean technologies and sustainable energy. The Faculty of Applied Sciences plans to implement a graduated hiring plan of 22 new faculty and 16 new staff (eight administrative and eight technical) in conjunction with mounting and deploying the SEE undergraduate and graduate programs. The following is the approximate timeline for expected faculty hires:

- 2018/19 Fiscal year: 6 new faculty positions.
- 2019/20 Fiscal year: 8 new faculty positions.
- 2020/21 Fiscal year: 4 new faculty positions.
- 2021/22 Fiscal year: 4 new faculty positions.

In order to provide the expertise needed to cover required teaching areas, it is anticipated that incoming faculty will be balanced across the broad areas of thermo-fluids, electrical engineering and power systems, bio-process and renewable energy systems, advanced materials, mechanical design, and manufacturing. In order to support and supervise graduate research in harmony with anticipated SEE research foci, it is further expected that faculty members will have research agendas relating to the areas noted above.

The target timeframe for faculty hiring, together with the challenges and advantages noted above, motivate the creation of the new School in the very near timeframe, ideally allowing for new faculty to be appointed directly into the School. For any hires that are completed sooner than this, it is intended that the incoming faculty will be placed in the School of Computing Science as a temporary home prior to being moved into the new School once established.

Program location and facilities

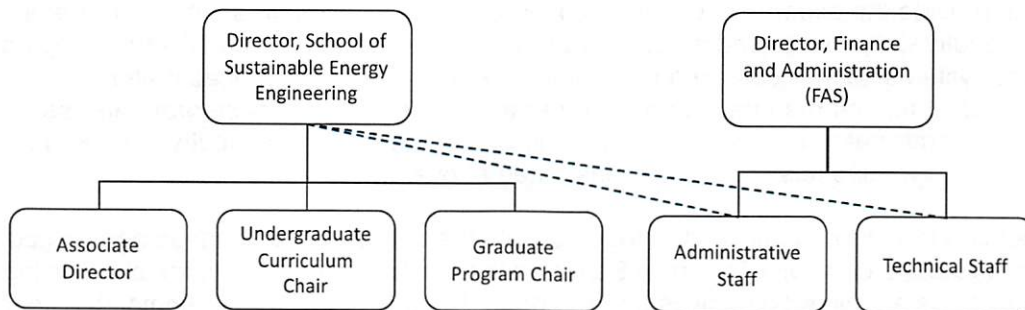
The Sustainable Energy Engineering program will be hosted in a new building expansion to the Surrey Campus that is being purpose-built to deliver a cutting-edge engineering program with a focus on sustainable energy. The building is intended to serve as a living lab for participating students and as a sustainable design showcase for SFU, the City of Surrey and the Province. Its proximity to the existing SFU Surrey campus, Surrey City Hall, and the developing cleantech industry clusters within the South Fraser region, will allow for enhanced collaboration in the provision of a sustainably oriented, industry-aware undergraduate and graduate engineering programmes.

Academic governance

An inaugural director of the SEE Program was appointed in May 2018 for a five year term; this appointment will bridge the formation of the new School, and the incumbent will continue (appointed by the Dean of Applied Sciences) for the remainder of the original appointment term as Director of the newly formed School.

Unit-level academic governance for the SEE program currently rests in its Steering Committee, with first committee members appointed in December 2018 for a two-year term.³ Its initial committee membership comprises faculty members from existing FAS units. As the program is mounted, additional Steering Committee members will be appointed from the SEE faculty complement. As specified in the Steering Committee's Terms of Reference³, once the committee has reached its full complement of seven members (plus the chair) its composition is intended to ensure gender diversity and balanced representation amongst tenure track and teaching faculty members. This is reflective of an intent to pursue diversity generally in the SEE School, and more specifically in the faculty hiring process. In the meantime, an emphasis on gender diversity is reflected in the composition of the Research Advisory Board.

As the SEE faculty cohort grows, governance will transition to the traditional SFU-school model including Executive, Undergraduate Curriculum and Graduate Program committees, as well as other committees as needed and articulated in the School's articles of governance. Administrative positions held by faculty will include the roles of Associate Director, Undergraduate Curriculum Chair, and Graduate Program Chair as shown in the following basic organizational chart.



The initial staff hiring will include an administrative and technical complement that ensures high quality academic programming and student support, that establishes and maintains a safe teaching and research environment, and that supports the administrative needs of the initiative (including all systems and record keeping associated with engineering accreditation). This includes administrative support for undergraduate and graduate programs launching in Fall 2019, as well as the build-out and commissioning of all equipment across the required teaching, research, and project lab infrastructure. As additional faculty are hired and the student population approaches steady state, the staff complement will similarly ramp to the levels described above

³ Appendix 3 provides the current steering committee membership and terms of reference.

Relationship to Existing Schools

Whether ensconced within a school or a program, the Sustainable Energy Engineering initiative is intended to balance multiple goals: to develop a culture for an emerging discipline, to harmonise its offerings and collaborate with our existing schools, and to foster interdisciplinary relationships throughout the university. We believe that a cohort of more than twenty faculty is sufficient critical mass to warrant the creation of a school, while recognising the opportunity to create joint or cross appointments across schools and faculties. Although we continue to be open to myriad cross relationships, the feedback we have frequently received has pointed to a governance model based on a school, as few obvious benefits were perceived in using a program model.

Furthermore, the clarity provided by a school model allows our existing schools to pursue complementary avenues in their academic plans. In particular, our School of Mechatronic Systems Engineering will now have the ability to focus its efforts on developing an advanced manufacturing initiative, which is outlined in its academic plan. We fully intend to optimise the scheduling of SEE courses so that they harmonise with offerings in MSE in Surrey, and ENSC in Burnaby. This will help to address a difficulty that many of our engineering undergraduate face when, for example, their co-op work terms cause a return to academic studies on a term when a crucial course is unavailable. The additional graduate courses that will be offered through SEE will naturally be available for credit to students in all our schools.

The advent of the SEE initiative will bring about a considerable flow of resources in the way of new staff. This will provide us with an opportunity to improve service across all schools and campuses by harmonising important functions such as integrated course scheduling across the three schools at Surrey, more efficient access to infrastructure through shared research and teaching laboratories, and a wider range of services available to students and faculty.

We are guided by a fundamental principle in the Faculty of Applied Sciences: to foster the development of people. This includes students, staff, and faculty. The school model for SEE provides all of them with better opportunities for personal growth.

Conclusion

In proposing the creation of a new School of Sustainable Energy Engineering in the Faculty of Applied Sciences, our academic goals remain unchanged: to develop an internationally-renowned academic unit that collaboratively explores sustainable energy from the perspectives of science, applied science, business, environment, and policy; to develop attractive, socially relevant educational programmes that at the undergraduate level would be amenable to accreditation by the Canadian Engineering Accreditation Board (CEAB); and research-intensive and applied-research graduate programs would perform research of the highest order. We believe a School for Sustainable Energy Engineering will provide the best foundation upon which to build academic initiatives of true excellence.

Appendices

Appendix 1: Letters of Support

Appendix 2: Research Advisory Board Members and Terms of Reference

Appendix 3: Steering Committee Members and Terms of Reference

Appendix 1

Letters of Support

- **Dr. Farid Golnaraghi**

Director, School of Mechatronic Systems Engineering
Faculty of Applied Sciences
Simon Fraser University

- **Dr. Mohamed Hefeeda**

Director, School of Computing Science
Faculty of Applied Sciences
Simon Fraser University

- **Dr. Glenn Chapman, Director**

School of Engineering Science
Faculty of Applied Sciences
Simon Fraser University

- **Dr. Ned Djilali**

Chair, Sustainable Energy Engineering Research Advisory Board

Professor and Canada Research Chair in Energy System Design and Computational Modelling
Department of Mechanical Engineering
Faculty of Engineering
University of Victoria



FACULTY OF APPLIED SCIENCE
School of Mechatronic Systems Engineering

Farid Golnaraghi, Ph.D., P. Eng., FCSME
Director, School of Mechatronic Systems Engineering
Burnaby Mountain Research Chair

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BY E-mail: Eugene Fiume <eugene_fiume@sfu.ca>

February 5, 2019

To: Dr. Eugene Fiume
Professor and Dean
Faculty of Applied Sciences
Simon Fraser University
8888 University Drive
Burnaby, BC V5A 1S6

Re: Support letter for establishing a new School of Sustainable Energy Engineering in FAS

Dear Dr. Fiume:

I am writing this letter in support for the establishment of a new School of Sustainable Energy (SEE) Engineering in the Faculty of Applied Sciences (FAS).

Over the past eight years, we have worked hard at all levels at SFU to create the SEE program. As this initiative has now become a reality, to enhance its recognition and reputation, there is a need to create a clear and unambiguous identity for the program. As such, I am convinced that having an independent school is the only way to go if we want to create another strong program within the faculty of Applied Sciences. Having an independent school would also provide the opportunity to establish adequate and appropriate resourcing from the outset, to enable its long-term success. It would also strengthen the Faculty of Applied Sciences presence at the Surrey Campus.

As you know, the SEE program was initially envisaged to be a part of the School of Mechatronic Systems Engineering (MSE). In fact, during our last external review exercise, the external review panel recommended that the SEE should be housed within the MSE. However, over the past recent years, with the positive environment that has created the opportunity for MSE to move squarely into Advanced Manufacturing, it would make more sense for the SEE program to become an independent school to create a better clarity and focus for both units. The move will also help to avoid possible confusion concerning faculty administration, development, tenure, and promotion.

It is expected that SEE and MSE will continue to have strong synergies, and are expected to be working closely in research (particularly in energy-related manufacturing) and teaching (staggered offering of harmonised courses and shared teaching lab infrastructure).

In the end, I reiterate my wholehearted support for the SEE to become an independent school at the SFU Surrey campus.

Sincerely,

A handwritten signature consisting of several slanted, parallel strokes, likely representing the name Farid Golnaraghi.

Farid Golnaraghi, Ph.D., P. Eng.
Professor and Director
School of Mechatronic Systems Engineering



COMPUTING SCIENCE

Wednesday, February 6, 2019

Letter of Support

BURNABY

9971 Applied Sciences Building
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Canada

SURREY

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Canada

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The School of Computing Science strongly supports the proposal by the Faculty of Applied Sciences to create the School of Sustainable Energy Engineering (SEE) at the SFU Surrey campus. A separate school is essential to provide a clear identity for the programs that will be offered, and it will enhance the recognition and reputation of these programs. A separate school (in contrast to a program) is also critical for the long-term success of the SEE initiative, as it will ensure that this school gets allocated the appropriate resources from the start, facilitate the budget allocation across various units within the Faculty of Applied Sciences, and avoid potential confusion with respect to faculty administration, development, tenure, and promotion.

In addition, the creation of an additional school at the Surrey campus will strengthen the presence of SFU and Faculty of Applied Sciences in Surrey, since there will be three schools: Computing Science, Mechatronic Systems Engineering, and Sustainable Energy Engineering. This will create more opportunities for collaboration in research and teaching programs, better students' experience, and stronger engagement with the City of Surrey and the community in general.

Sincerely,

A handwritten signature in blue ink that reads "Hefeeda".

Mohamed Hefeeda, Ph.D.
Professor and Director
School of Computing Science
Simon Fraser University, Canada
mhefeeda@sfu.ca

MEMORANDUM

TO: Dr. Eugene Fiume, Dean, Faculty of Applied Sciences

FROM: Glenn Chapman, Director, School of Engineering Science

DATE: Feb. 7, 2018 *Glenn Chapman*

SUBJECT: Letter of support for the formation of the School of Sustainable Energy Engineering

On behalf of the School of Engineering Science we would like to express our highest support for the creation of a new separate School of Sustainable Energy Engineering within the Faculty of Applied Science.

In ENSC's opinion the creation of a separate School of SEE within FAS offers a number of advantages both to SEE itself, the other engineering schools within FAS and Simon Fraser University. First it creates a clear separate engineering department focused on Sustainable Energy education and research which allows our Engineering Science department to easily show to prospective students and employers the differences in educational concentration, philosophy, and research with the new program. While our two programs are complementary, creating that distinction will students make the right choice when entering SFU. Second adding a third separate school changes the SFU reputation from that of a small engineering program with a limited number of specialized departments to a midsized Engineering faculty with several significant sized departments, like most other Canadian Engineering university, but one with specialized modern disciplines rather than the traditional schools.

All engineering schools in Canada are accredited by the Canadian Engineering Accreditation Board (CEAB). It is important that this new school be established with sufficient resources to meet the CEAB standards. This needs to be done without transferring resources from ENSC and MSE as doing so would threaten those schools' own accreditation. The new SEE will be reviewed separately by the CEAB and will only receive approval for tentative accreditation if SFU shows it has supplied the program with sufficient resources. Moreover this is not some artificial criteria imposed by an external body on a university. Engineering programs are very intensive, requiring strong student faculty interactions in both the classroom and laboratory, with heavy on hands experience, and the CEAB targets are those to create a quality student experience that will generate well trained young professional engineers. It is important to recognize that these standards will apply the new programs as well as the old – to weaken one will damage all the schools.

Having SEE in a new building on the Surrey campus will significantly increase the Faculty of Applied Sciences presence on the Surrey Campus. This will expand Engineering in Surrey to close to the size of the School of Engineering Science on the main campus, raising the profile of SFU Engineering in both locations.

While SEE will be separate from Engineering Science we have built into the academic plans of both departments a strong cooperation in both teaching and research. For example the SEE program will have a 4th year option which will take Engineering Science courses in such areas as chip design, and advanced circuits. ENSC will be tailoring some of our senior year courses to

offer, for example, energy saving design techniques in the our VLSI chip design course. In our Microfabrication course we will offer hands on experience in building, and characterizing, solar cells in addition to transistor circuits currently fabricated by the students. We would expect that many graduate students in both departments will be interested in taking courses in both areas, and expect thesis projects involving co supervisors from both faculty.

It would present significant problems for the new faculty in the SEE if it was created as a program rather than a School in its own right. The new faculty would need to reside in one of the two existing schools and this would create problems for them at times of tenure and promotion as different research areas value publishing and research (say identifying the best journals) differently. It is far better for those SEE faculty to be judged by their peers.

In conclusion we do not see the SEE school as a rival to Engineering Science, but as a new way to strengthen all of Engineering at SFU and make our university a greater Professional Engineering program within Canada.



February 5, 2018

Dr. Eugene Fiume
Dean, Faculty of Applied Sciences
Simon Fraser University

Re: Proposed School of Sustainable Energy Engineering

Dear Dr. Fiume,

The launch of SFU's Sustainable Energy Engineering (SEE) program is one of the most exciting initiative in the academic landscape of British Columbia, with a huge potential impact on the training of a new breed of engineers and on research that will help put BC and Canada on a more sustainable trajectory.

The timely and consequential funding of this initiative by the provincial government provides a unique opportunity to break new ground in sustainable energy education. The SEE Advisory Board that I chair is very excited about the proposed SEE program structure and philosophical underpinnings. In particular, the program addresses societal needs and challenges by fostering a "Systems" approach integrating the social, environmental and economic aspects of sustainability with energy technologies. Another key element of the program is the problem-based learning environment that promotes a multi-disciplinary approach to design and contextual application of knowledge. This combination is quite unique in an undergraduate energy program and distinguishes SFU-SEE significantly from other engineering programs in BC and at other Canadian universities.

To ensure successful deployment and growth of the program in keeping with these principles and philosophy requires the right people, resources and an appropriate governance structure. The current leadership and planned hiring will fulfill the first requirement. The SEE program funding provides a very healthy foundation. Administratively, while embedding the SEE program within an existing academic unit would be the most expedient and perhaps (at least initially) the most efficient approach to deploying the program, it would entail a high risk of dilution of the distinctive and innovative program features, and create pressures to respect existing modus operandi.

While the initial developments of SEE as a program under the umbrella of the Faculty made perfect sense, as the program enters an intense phase of recruitment of faculty, staff and students it is essential that these identify with a "home", where they can collegially develop a program "culture" that will have long lasting impacts. With proper leadership, a SEE academic unit will avoid problems such as split accountability, inertia in curriculum evolution, or hirings priorities stemming from compromises between the needs of multiple programs.



The evolution of the SEE Program into a *School* within the Faculty is therefore a logical step that will ensure the healthy development of this program and of the Faculty: it will confer the program a status and visibility equal to the other programs, conveying the commitment of SFU in making SEE an area of excellence; it will foster balanced interactions between programs/units; it will provide clarity and a sense of belonging to faculty, staff and students; and it will facilitate innovation from the ground up with less resistance to change that is inherent to any existing organization.

The pace of adoption of low-carbon and higher efficiency energy solutions in BC and globally will depend to a large extent on the availability of graduates combining interdisciplinary “system thinking” with creativity. The SEE program is aimed at producing such graduates. The choice of governance structure for the program is critical to ensure the curricula, research priorities, hiring plans and overall mandate are successfully implemented.

Sincerely,

A handwritten signature in blue ink, consisting of a large 'D' followed by a stylized 'J' and 'L'.

Ned Djilali, PhD PEng FCAE FRSC
Canada Research Chair and Professor of Mechanical Engineering
Chair, Research Advisory Board, SFU SEE Program

Appendix 2

Sustainable Energy Engineering

Research Advisory Board Members and Terms of Reference

- **Alex Boston**
Executive Director, Renewable Cities
Fellow, Morris J Wosk Centre for Dialogue
Simon Fraser University
- **Dr. Ned Djilali (Chair)**
Professor and Canada Research Chair in Energy System Design and Computational Modelling
Department of Mechanical Engineering
Faculty of Engineering
University of Victoria
- **Fiona Famulak**
President
Vancouver Regional Construction Association
- **Ron Klopfer**
CEO
Etalim Inc.
- **Raymond Lings**
President & CEO
Powertech Labs Inc.
- **Anna Mathewson**
Manager of Sustainability
City of Surrey
- **Dr. Ged McLean**
Associate Director
Pacific Institute for Climate Solutions (PICS)
- **Dr. Kevin Oldknow**
Associate Dean, Faculty of Applied Sciences
Director, Sustainable Energy Engineering program
Senior Lecturer, School of Mechatronic Systems Engineering
Simon Fraser University

Terms of Reference

Sustainable Energy Engineering Research Advisory Board (SEE-RAB)

The Research Advisory Board provides the SEE Program Director and the Dean of the Faculty of Applied Science with informed perspectives and independent advice on strategies to ensure relevance of research, and to achieve the SEE program vision for partnerships, internationalization and indigenization.

The scope of the SEE-RAB includes the following.

Research Strategy

- The program's long term objectives, challenges, prioritization and implementation.
- Research strategy taking into account: trends and developments in energy and related sectors, at the regional, national and global levels; funding opportunities; industry and societal needs.
- Research collaboration, partnerships and strategic linkages with governmental organizations, industry, professional associations, NGO's etc.

Graduate Programs

- Alignment of graduate programs objectives with research orientations and needs of industry, business and society.
- Industry and public sector engagement in enriching graduate training through guest speakers, field visits, internship/coop and identification of career opportunities.

Communication and Outreach

- Promotion of research capabilities and accomplishments nationally and internationally to key stakeholders (funders, government, employers, alumni etc).

Operation and Time Commitment

- Advisory Board members will be appointed for a two-year term (renewable).
- Meetings will be held three times per year.
- An agenda including all required background information will be distributed at least one week prior to each meeting.

- October 31, 2018

Appendix 3

Sustainable Energy Engineering

Steering Committee Members and Terms of Reference

- **Dr. Ivan Bajić**
Professor
School of Engineering Science
Faculty of Applied Sciences
Simon Fraser University
- **Dr. Majid Bahrami**
Professor and Canada Research Chair in Alternative Energy Conversion Systems
School of Mechatronic Systems Engineering
Faculty of Applied Sciences
Simon Fraser University
- **Dr. Kevin Oldknow (Chair)**
Associate Dean, Faculty of Applied Sciences
Director, Sustainable Energy Engineering program
Senior Lecturer, School of Mechatronic Systems Engineering
Simon Fraser University
- **Dr. Patrick Palmer**
Professor
School of Mechatronic Systems Engineering
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Terms of Reference for the Sustainable Energy Engineering Steering Committee

Provided by Eugene Fiume
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A blue ink signature of Eugene Fiume, written in a cursive style.

Preamble:

During the summer of 2017, the Full Program Proposal for an undergraduate (B.A.Sc.) degree in Sustainable Energy Engineering was approved by SFU's Senate and Board of Governors, and submitted to the British Columbia Provincial Government's Ministry of Advanced Education, Skills and Training for Degree Quality Assessment Board approval. Since then, the Ministry has announced funding for 320 FTE undergraduate seats and 120 FTE graduate seats in Sustainable Energy Engineering at SFU. Notices of Intent and Full Program Proposals for MASC and PhD programs in SEE have also been submitted to SFU's Senate approvals process. The formation of a research centre will take place in the coming months, and it is anticipated that subsequent development of additional undergraduate (e.g. joint major) and graduate (e.g. professional master's) programs in SEE may follow.

The Sustainable Energy Engineering Program¹ serves as the administrative body for Sustainable Energy Engineering at SFU. Its governance rests in the Director and Steering Committee, as described in this document.

I - Membership

1. The Director of the SEE Program will initially be appointed by the Dean of Applied Sciences for a term of 5 years and subsequently recommended by the SEE Steering Committee to the Dean for appointment on the basis of election by the Steering Committee. Although the SEE program is not formally a school or department, the selection process of its academic leader will follow a process analogous to that of a school/department.
2. The Chair of the Steering Committee will normally be the Director.
3. In addition to the Chair, five faculty members will initially be appointed to the Steering Committee by the Dean of Applied Sciences upon the advice of the Director of the Program and other interested parties, and with due regard to the mix of disciplinary perspectives needed to maintain and develop the program. During the first three years of Program operation this will increase to a total of seven faculty members in addition to the Chair. Once the Steering Committee has reached its full complement of eight faculty members (including the Chair), the distribution of these members will be as follows:
 - a. At least two research faculty members (Assistant Professor, Associate Professor or Professor)
 - b. At least two teaching faculty members (Lecturer, Senior Lecturer or University Lecturer)
 - c. At least one female faculty member

¹ The "SEE Program" collectively refers to both undergraduate and graduate programs.

4. When possible, Steering Committee meetings will include one undergraduate student representative to be named by the SEE Undergraduate Student Society. They must be registered as a SEE undergraduate student, and must have completed at least 60 credit hours of study. Student participation will be excluded from matters involving other students where confidentiality issues may arise, as well as matters relating to salary reviews, tenure and promotion.
5. When possible, Steering Committee meetings will include one graduate student representative to be named by the SEE Graduate Student Society. They must be registered as a SEE graduate student. Student participation will be excluded from matters involving other students where confidentiality issues may arise as well as matters relating to salary reviews, tenure and promotion.
6. All members of the Steering Committee are voting members (including student representatives), with the exception of the Chair who will vote only if needed to break a tie.

II – Terms of Office

1. The term of office of the Director will normally be five years, renewable up to a limit of ten years.
2. The terms of office for the remaining Steering Committee members will normally be two years.

III – Responsibilities of the Program Director

Directors are to bring their expertise and professional experience to support the interests of the SEE program and its students. The Program shall be autonomous while respecting the interests of units in which its faculty members are housed. Specific duties of the Director include the following:

1. Drawing on input from faculty, staff and students in the SEE program, as well the Steering Committee, Research Advisory Board and other appropriate sources, to develop, articulate and guide the strategic vision for the SEE program.
2. To work with the support staff (assigned by the Dean's Office) in the deployment and day-to-day running of the Program.
3. With assistance from support staff and the SEE Steering Committee, to identify, recruit, and appoint top-quality faculty members and teaching assistants to teach the courses that fall under the Director's purview. The recruiting and hiring of faculty members will additionally consider advice provided by the SEE Research Advisory Board, with respect to areas of expertise and research priorities.
4. To develop and administer workload assignments, including both teaching and service, for faculty members associated with the SEE program.
5. With assistance from support staff, to develop and administer the annual budget for the SEE program.
6. To assist and support faculty members associated with the SEE program in maintaining an awareness of available resources across FAS and SFU, and to encourage and assist them in developing their academic careers.
7. With assistance from support staff and the SEE Steering Committee, to participate in the evaluation of faculty members associated with the SEE program with respect to salary reviews, as well as tenure and promotion cases.
8. To consider and make recommendations (either in person or via designate) to the Faculty of Applied Sciences Undergraduate Curriculum Committee (FAS UCC) on all successfully approved SEE Steering Committee recommendations and reports pertaining to the SEE undergraduate program.

9. To consider and make recommendations (either in person or via designate) to the Faculty of Applied Sciences Graduate Program Committee (FAS GPC) on all successfully approved SEE Steering Committee recommendations and reports pertaining to the SEE graduate programs.
10. To represent the Program at Faculty of Applied Sciences Executive meetings, and other Faculty level meetings where FAS units are represented.
11. In cooperation with the SEE Steering Committee, to consult with units that have related programs to ensure that those units are informed of changes to the SEE program and to ensure that the SEE program is informed about changes to related programs.
12. To work closely with support staff in advising and consulting students, and in developing the co-op and other program-related employment opportunities, including strategies for professional development and preparation for further studies.
13. To liaise and consult with the SEE student population (undergraduate and graduate, through (for example) regular meetings with the student representatives named by the corresponding student societies.
14. To work with support staff in promoting the Program to prospective students.
15. To foster existing SEE courses and promote new ones, taking into consideration fiscal realities and possible overlap with outside courses.
16. Where appropriate, to teach courses in the Program.
17. To represent the Program at internal and external meetings, and other important functions.
18. To enhance the Program in other ways as appropriate.

IV – Responsibilities of the Steering Committee Members

Members are to bring their expertise to constructive discussions aimed at improving the quality and delivery of the Program and hence to enhance the educational opportunities for the students. Their specific duties include the following:

1. To work in a collegial manner to update and upgrade the curriculum for the Program.
2. To assist the Director and support staff in identifying and recruiting top-quality instructors and teaching assistants to teach the courses that fall under the purview of the Director.
3. To assist the Director and support staff with the evaluation of faculty members associated with the SEE program with respect to salary reviews, as well as tenure and promotion cases.
4. In cooperation with the Director, to consult with units that have related programs to ensure that those units are informed of changes to the SEE Program and to ensure that the SEE Program is informed about changes to related programs.
5. To assist the Director and support staff in advising and consulting students, and in developing the co-operative education and other program-related employment opportunities, including strategies for professional development and preparation for further studies.
6. Where appropriate (for faculty members assigned to the SEE program), to teach courses in the Program.
7. To be willing to serve as alternates to the Director at internal and external meetings, and other important functions.
8. To provide advice to the Director on course substitutions within the Program, in cases where availability of a required course for a particular student is for legitimate reason a problem.
9. To assist the Director in other ways as appropriate.

Also note:

1. Disputes of a programming or curriculum nature should first be addressed to the Steering Committee. All other disputes must first be addressed to the Director.
2. Only if disputes cannot be resolved by neither the Steering Committee nor the Director should the Associate Dean and finally the Dean become involved.
3. The Dean's decisions on all matters are final.

V – Operation

1. There shall be meetings of the Steering Committee at least once per semester, and additionally as needed.
2. The time, place and agenda of any meeting shall be set by the Chair.
3. The Chair shall be obliged to call a meeting within 10 days at the request of any Steering Committee member, such request having been made in writing with the business to be discussed stated and any necessary supporting documents supplied.
4. The quorum for a regular meeting shall consist of at least 75% of the voting membership of the Steering Committee.
5. The Steering Committee is at liberty to invite guests to attend and participate in meetings when the presence of such a guest serves a reasonable purpose. Such guests are not eligible to vote on Committee recommendations and reports.
6. The FAS Curriculum Coordinator will act as a resource person providing assistance both internally to the Steering Committee and between the Steering Committee and the Curriculum Committee.
7. Recommendations and reports to the FAS UCC shall be by majority decision of the Steering Committee members if they arise out of a regular business item on the agenda of a regular meeting. The Chair shall prepare and deliver the majority report to the FAS UCC at its next meeting. If there is a dissenting minority, it may present its own report to the FAS UCC at the same meeting. The reports should be concise and give the reasons for the views of the Committee.
8. Recommendations and reports to the FAS GPC shall be by majority decision of the Steering Committee members if they arise out of a regular business item on the agenda of a regular meeting. The Chair shall prepare and deliver the majority report to the FAS GPC at its next meeting. If there is a dissenting minority, it may present its own report to the FAS GPC at the same meeting. The reports should be concise and give the reasons for the views of the Committee.
9. Changes to the terms of reference for this Committee shall require efforts to reach a full consensus of the Committee members. If a consensus is not possible after all reasonable efforts have been made, approval of changes will require consent from at least 75% of the voting membership of this Committee, or can be made at the discretion of the Dean of the Faculty of Applied Sciences.