

Energy Systems Management Assessment Report  
ACADEMIC YEAR 2018 – 2019

I. LOGISTICS & PROGRAM LEARNING OUTCOMES

1. Please indicate the name and email of the program contact person to whom feedback should be sent (usually Chair, Program Director, or Faculty Assessment Coordinator).

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2. Please indicate if you are submitting report for (a) a Major, (b) a Minor, (c) an aggregate report for a Major & Minor (in which case, each should be explained in a separate paragraph as in this template), (d) a Graduate or (e) a Certificate Program

[Graduate Program](#)

3. Please note that a Curricular Map should accompany every assessment report. Has there been any revisions to the Curricular Map?

Yes, we made several changes in the curriculum this year, as reflected in the attached Curricular Map. ENGY 624, a four unit course, was split into two 2-unit courses. This has been approved by the faculty and the CCC. We replaced Electricity Markets with Renewable Energy Finance. This new course has been approved but it seems there was some miscommunication so it will need to go through the CCC again as a replacement course. We decided not to require Energy Leadership for a variety of reasons. This has been approved by the faculty and needs to be approved by the CCC. We also decided to have ENGY 690 (taken concurrently with ENGY 644) count as a final capstone course. This has been approved by the faculty and the CCC. We also developed new PLOs as reflected in the new Curricular Map.

II. MISSION STATEMENT & PROGRAM LEARNING OUTCOMES

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1. Were any changes made to the program mission statement since the last assessment cycle in October 2018? Kindly state "Yes" or "No." Please provide the current mission statement below. If you are submitting an aggregate report, please provide the current mission statements of both the major and the minor program

Mission Statement (Major/Graduate/Certificate):

[No changes – it was revised in the previous academic year.](#)

[The mission statement is:](#)

*The MS in Energy Systems Management provides students with the knowledge, skills and networks to be leaders in the transition to a clean energy future.*

2. Were any changes made to the program learning outcomes (PLOs) since the last assessment cycle in October 2017? Kindly state "Yes" or "No." Please provide the current PLOs below. If you are submitting an aggregate report, please provide the current PLOs for both the major and the minor programs.

Note: Major revisions in the program learning outcomes need to go through the College Curriculum Committee (contact: Professor Joshua Gamson, [gamson@usfca.edu](mailto:gamson@usfca.edu)). Minor editorial changes are not required to go through the College Curriculum Committee.

PLOs (Major/Graduate/Certificate):

Yes they were revised based on an iterative process with the ESM Faculty board. The changes have been approved by the CCC.

#### Previous Program Learning Outcomes

At the end of the program, students will be able to:

- Utilize critical analysis to understand the forces that shape the current electricity system and how to move toward a clean energy future;
- Articulate how the electricity system is related to ecological and social systems;
- Evaluate how electricity policy and market environments impact energy consumption and production;
- Formulate strategies to manage change, and engage with stakeholders and customers.

#### Revised Program Learning Outcomes

At the end of the program, students will be able to:

1. Analyze complex energy challenges from technological, environmental, economic, and societal perspectives, with appreciation for their historical and institutional contexts.
2. Demonstrate a problem-solving mindset and correctly apply an interdisciplinary toolkit including relevant methods of science, engineering, business, and policy.
3. Communicate effectively, verbally and in writing, on a wide range of energy topics.
4. Formulate effective strategies to lead the transition toward a more just, sustainable, and climate-friendly energy system.

3. State the particular Program Learning Outcome(s) you assessed for the academic year 2018-2019.

PLO(s) being assessed (Major/Graduate/Certificate):

PLO#1 Analyze complex energy challenges from technological, environmental, economic, and societal perspectives, with appreciation for their historical and institutional contexts.

### III. METHODOLOGY

**Describe the methodology that you used to assess the PLO(s).**

**Methodology used (Major/Graduate/Certificate):**

We assessed this through the exit survey and through the evaluation of the final paper from the Energy Strategy course.

The questions for the survey include direct reference to the attainment of each PLO (see below).

The assessment of the PLO from the paper was conducted based on a rubric the faculty developed. The evaluation of each paper in light of the rubric was done by the Program Director.

### IV. RESULTS & MAJOR FINDINGS

**What are the major takeaways from your assessment exercise?**

**Results (Major/Graduate/Certificate):**

This semester, group papers were assigned. A total of 5 papers were evaluated. Results from analyzing the papers: No papers were below proficient on any of the measures. Score average was 27. In retrospect, I should have written the evaluation rubric with different rows for 1. technological, 2. environmental, 3. economic, and 4. societal perspectives, and 5. historical and institutional contexts. That would have made for a superior evaluation rubric.

Results from Exit Survey: Only 10 alumni responded but, of these, only one scored their attainment of the relevant PLO as less than "To a large extent".

Overall, I feel very positive about the students' attainment of the evaluated learning outcome. The results from the survey will be shared with the External Board for their consideration. The internal faculty board will evaluate the results at the next faculty meeting.

### V. CLOSING THE LOOP

1. Based on your results, what changes/modifications are you planning in order to achieve the desired level of mastery in the assessed learning outcome? This section could also address more long-term planning that your department/program is considering and does not require that any changes need to be implemented in the next academic year itself.

While I think it was possible to assess the relevant PLO with the rubric used, I think the assessment rubric could have been better designed to see if there was a weakness in any area. Also, the artifact used is from the second semester. In the future we will use a paper from the last semester.

2. What were the most important suggestions/feedback from the FDCD on your last assessment report (for academic year 2016-2017, submitted in October 2017)? How did you incorporate or address the suggestion(s) in this report?

Suggestions (Major/Graduate/Certificate): "While your program did not have a formal assessment to present results, you did take actions based on student and instructor feedback. As this is a new program that is still in development, that plan seems reasonable to me, but I do think you need to continue with direct assessment in the 2018-2019 academic year. Please do make sure you complete the planned assessment as soon as possible."

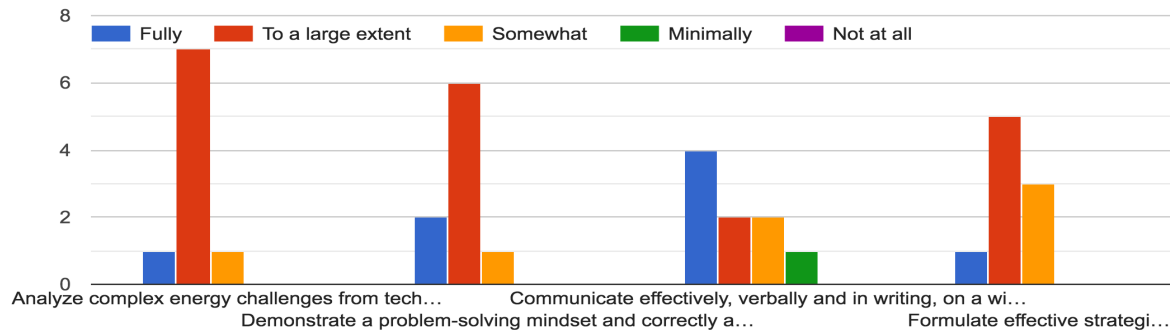
We still are making changes to the curriculum, including changing the PLOs this spring. We also added a dual degree MBA/ESM program this summer, so we have been busy with evaluation of all sorts. We completed an assessment, just not the originally planned one as the PLOs changed. The artifact we used worked well and the results were promising.

#### ADDITIONAL MATERIALS

(Any rubrics used for assessment, relevant tables, charts and figures should be included here)

Results from the exit survey:

#### 1. To what extent do you think you attained the following ESM Learning Outcomes



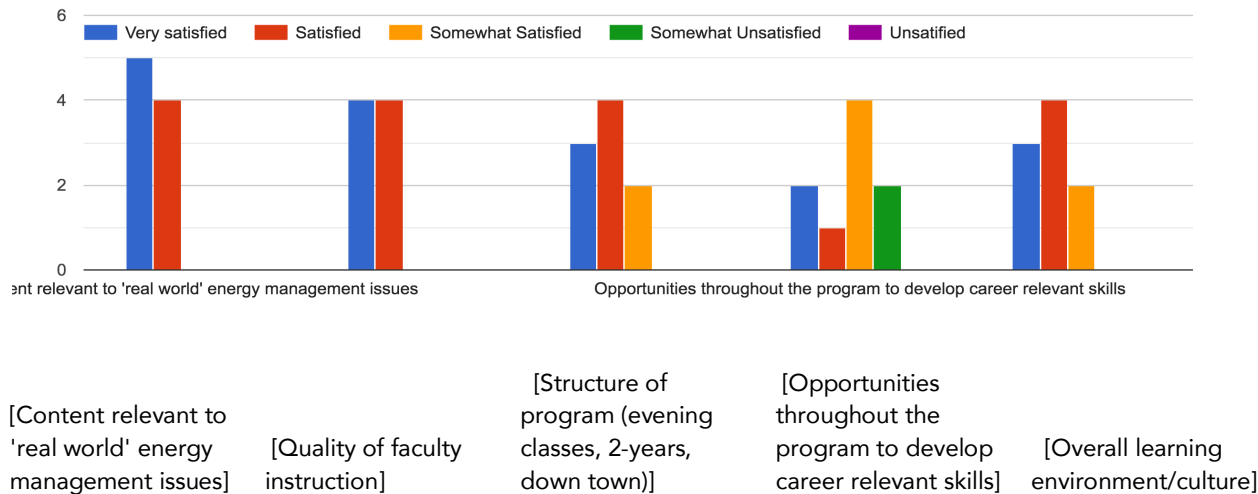
[Analyze complex energy challenges from technological, environmental, economic, and societal perspectives, with appreciation for their historical and institutional contexts.]

[Demonstrate a problem-solving mindset and correctly apply an interdisciplinary toolkit including relevant methods of science, engineering, business, and policy.]

[Communicate effectively, verbally and in writing, on a wide range of energy topics.]

[Formulate effective strategies to lead the transition toward a more just, sustainable, and climate-friendly energy system.]

## 2. How satisfied were you with each of the following aspects of the ESM program?



### 3. If unsatisfied with any of the program aspects listed above, please explain. 5 responses

- I think the leadership class is not necessary. I think there should be more quantitatively focused classes.
- I don't think there was enough focus on long-form writing. Apart from the capstone/final IRP projects there were very few assignments that I felt could be used as an appropriate writing sample for a job application.
- Career Support to connect with Industry and understanding of the relevance of stakeholders that work in this space
- I would have like to see more emphasis on energy policy regulation. The course we had was fantastic but I think this could have been expanded particularly in the Energy Law class and the Energy Markets class. For example, I've been unfamiliar with a resources NOC, ELCC or it RA flex resources.
- I would have preferred to learn Energy Modeling. Unfortunately, I did not have enough credits left.

### 4. Do you feel that the ESM program prepared you for work in your area of interest? Please explain. 6 responses

- Yes
- Yes, work in POU/CCA and am always prepared to dive into whatever topic/need comes my way.
- It did
- I do feel well prepared. My role is working on an IRP and the capstone project place me ahead of many of my peers working on this subject. I was able to support the project on day one.
- Yes. Totally.
- Yes it definitely did. Although, I felt like there was a gap between what the industry requirements are and what we did.

5. What were your top three learning experiences in the ESM Program? (For example, a particular course or assignment, a field trip, interaction with fellow students, etc.) 8 responses

Jim's classes were invaluable. Good cohort.

- The IRP course. 2. Learning where to find and download publicly available energy data. 3. The introductory Quantitative Methods course.
- Energy Modelling, Energy Economics and Finance, Electricity Markets.
- IRP, solar installation on campus, Paul's entire class.
- Industry strategy and Policy, Electricity Markets, Capstone Project
- IRP, 2. CCA written project in Paul's class & the MCE field trip, 3. Quantitative Methods problem solving skills
- Energy Economics (Monte Carlo Simulation), Energy Modelling (most of the lectures), Electricity Markets
- All of the assignments in Energy Audit, the Capstone project and Energy Industry, Strategy and Policy.

6. Were there courses/topics you wish had been offered while you were in the program? 7 responses

- Swap leadership class with coding class.
- More excel and data analysis offerings.
- Data Analytics and data science for the energy industry
- Practicum linked with an energy company. Internship through the board
- Project Finance
- Data Science in Energy Analysis
- Business Analytics or business decision analysis, data science, more on energy modeling.

7. Is there anything else you would like to share about your experience in the ESM program? 6 responses

- Wonderful program
- The industry in general is very harsh on international students. All major companies (PG&E, CCAs) do not entertain students on OPT let alone offer sponsorships. It would be helpful if all international students are made aware of that and helped with strategising since the beginning of the program. This would help them target the right companies and properly channelise their networking efforts.
- The course was comprehensive and gave depth on the energy sector
- I really enjoyed the program but it is very expensive...
- The coursework couldn't be more relevant.
- It sparked more curiosity on the challenges ahead to decarbonize the grid.

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Rubric used to assess the papers (format changed from landscape layout):

Assessment Rubric for PLO #1: Analyze complex energy challenges from technological, environmental, economic, and societal perspectives, with appreciation for their historical and institutional contexts.

Artifact: ENGY 624 Final Policy Paper from Energy Industry Strategy and Policy

Essay Title:

Reviewer:

Total: /30

| Exceptional (10)  | Proficient (8)  | Approaching proficient (5)   | Below proficient (2)   |
|---|---|--|--|
| Both theory and applied knowledge are used to evaluate energy challenges, drawing upon multiple theories and relevant literature/information from different stakeholder groups. | Paper provides an adequate use of theory and applied knowledge and presents significant level of relevant information from various sources. | Evaluation of problem inaccurate or incomplete. Either limited evidence of theoretical understanding of problem or applied knowledge used. | No evidence of use of theory or applied knowledge for evaluating problem or recommendations. |
| Impacts on energy systems are clearly articulated and accurately reflect the issue the historical and institutional context.  | Evaluation results and research methods are explained but explanation for response is not as robust.  | Potential results from policy are not clear or do not clearly follow from explanation of problem.  | Problem evaluation weak or problematic.  |
| Policy recommendations are appropriate and complete for the topic being analyzed.   | Recommendations are less robust but still appropriate for topic. Recommendations follow from results.                                       | Few recommendations were developed from the analysis. Recommendations do not necessarily fully flow from material presented.               | Management recommendations are problematic and are not related to problem evaluated.         |

Comments:

Curricular Map:

Required

Courses

Learning Outcomes

|   | Analyze complex energy challenges from technological, environmental, economic, and societal perspectives, with appreciation for their historical and institutional contexts | Demonstrate a problem-solving mindset and correctly apply an interdisciplinary toolkit including relevant methods of science, engineering, business, and policy | Communicate effectively, verbally and in writing, on a wide range of energy topics | Formulate effective strategies to lead the transition toward a more just, sustainable, and climate-friendly energy system |
|---|---|---|--|---|
| I= Introductory<br>D= Developing<br>M = Mastery |   |   |  |   |
| ENGY 604<br>Renewable Energy Economics          | I   | I   | I  | I   |
| ENGY 610<br>Quantitative Methods                | D   | D   | I  | I   |
| ENGY 612<br>Energy Technologies                 | D   | D   | I  | I   |
| ENGY624<br>Energy Industry Strategy             | D   | D   | D  | M   |
| ENGY 625<br>Energy Policy                       | D   | D   | D  | M   |
| ENGY 627<br>Renewable Energy Finance            | D   | I   | D  |   |
| ENGY 630-01<br>Electricity Systems              | M   | M   | D  | D   |
| LAW Energy Law                                  | D   | D   | D  | D   |
| ENGY 640-01<br>Renewable Energy Practicum       | D   | D   |  |   |
| ENGY 644<br>Energy Analysis for Climate         | M   | M   | D  | D   |



|  |   |   |   |   |
|--|---|---|---|---|
| <i>Change</i>  |   |   |   |   |
| <i>ENGY 690<br/>Masters Group<br/>Project Research<br/>Seminar</i> | M | M | M | M |
| <i>ENGY 699-01<br/>Energy<br/>Capstone<br/>Project</i>             | M | M | M | M |

### Assessment plan for 2019-2020

1. This year we will assess PLO#2: Demonstrate a problem-solving mindset and correctly apply an interdisciplinary toolkit including relevant methods of science, engineering, business, and policy. The assessment will stem from the final paper for *ENGY 690 Masters Group Project Research Seminar*, a course in the final semester of the program.
2. We will also continue to conduct the exit survey to keep collecting information regarding attainment of the learning outcomes.