1. **Name(s) of all program(s) and degree type(s) assessed**

   M.S. in Energy Systems Management (Graduate)

2. Names and contact information of the faculty coordinating the assessment of each program and report

   Jalel Sager (Academic Director and Assistant Professor)
   510 717 7242
   jsager3@usfca.edu

3. Your Mission Statement; note any changes since last report

   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.

   There were no changes in the Mission Statement.

4. Your PLOs; note any changes since last report

   Our major task this cycle was to refine and disaggregate our PLOs into more general objectives, supported by well-defined KPIs. The previous PLOs and their revisions, along with a new set of KPIs for each PLO, are listed below. We expect this will greatly enhance our ability to assess the extent to which we are meeting our objectives due to increased granularity in the KPIs. We are seeking feedback from our FDCD on these PLOs and KPIs before codifying and operationalizing them in our next cycle.

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

   Proposed revision

   PLO #1: Analyze complex energy challenges through a variety of analytical perspectives.

   KPI I: Students demonstrate a mastery of historical and institutional evolution of current energy systems, with a focus on the electric grid.

   KPI II: Students successfully identify environmental and social contexts for energy system choices, including constraints, opportunities, and impacts of both current and potential pathways.

   KPI III: Students illustrate clear interactions and tradeoffs between technical and economic aspects of energy systems, across scales (plant- or end-use level to national, regional, and global macro systems).

Previous PLO #2: Demonstrate a problem-solving mindset and correctly apply an interdisciplinary toolkit including methods of science, engineering, business and policy

Proposed revision

PLO #2: Demonstrate a problem-solving mindset that applies an appropriate interdisciplinary toolkit

KPI I: Students demonstrate fluency in solving mixed-methods problems, generating assumptions and frameworks that structure problems according to their unique conditions.

KPI II: Students show understanding of the positions of multiple stakeholders in common energy problems, including businesses, individuals, communities, and governments.

KPI III: Students draw appropriate systems boundaries in their problem solving, using methods of science, engineering, business, and policy as needed.

Previous PLO #3: Communicate effectively verbally and in writing on a wide range of energy topics

Proposed revision:

PLO #3: Communicate effectively verbally and in writing on a wide, integrated range of energy topics

KPI I: Students demonstrate mastery of oral presentation formats on relevant topics in energy systems.

KPI II: Students demonstrate the ability to write clear, well-referenced reports that display proper logical structure and argumentation.

KPI III: Students demonstrate capacity to formulate their own research questions in various energy domains, narrowing and structuring their investigation appropriately.

Previous PLO #4: Formulate effective strategies to lead the transition toward a more just, sustainable and climate friendly energy system.

Proposed revision

PLO #4: Formulate effective strategies for the transition to a more just and sustainable energy system.

KPI I: Students demonstrate fluency in scientific dynamics of major environmental issues such as climate change

KPI II: Students demonstrate understanding of the social and economic impacts of various types of energy systems processes, markets, and technologies.

KPI III: Students exhibit ability to balance considerations of environment and social justice with the technical, economic and political underpinnings of current energy systems.

5. Your current Curricular Map; note any changes since last report

   Changes: Curricular Map (attached, changes highlighted) updated to reflect different levels (I, D, M) for introductory courses, especially. The changes better reflect the students' progression through PLOs as presented in given courses, and less the depth and difficulty of the specific subject matter of those courses, which previously received more weight in the IDM assignment.

6. Your assessment schedule between APRs: a year by year list of PLOs assessed since your last APR and those to be assessed before your next APR (Contact your FDCD for clarification if needed)

   We assessed all previous PLOs for AY 22_23. Our current plan is to adopt the new PLOs following feedback from our FDCD in 24-25, and then prepare for our octennial assessment in the next cycle, performing a self-study and tying our new PLOs and KPIs tightly to our current course and assignment portfolio so we might then schedule our next round of year-by-year PLO assessments using a standardized rubric as proposed by our FDCD in the last assessment. It is our understanding that the next assessment report will be due in 2026.

7. Description of the assessment methodology

   As operationalized last year with our core courses, ESM assessment methodology will consist of three components described below. We expect to use these components in conjunction with a rubric that ties KPIs more closely to the type of direct and indirect assessments used below. commentary.

   Grading data
   While the PLOs as written were conceived at the outset of the program in 2017, they have largely guided the individual assignments and testing in each of the courses.

   a. Oral presentations, both individually and in student groups
   b. Written materials in the form of papers and/or briefs
   c. Quantitative problem sets

   2nd year Individual Student Exit Interviews
   ESM faculty and staff will conduct surveys with graduating students at the end of each year to determine if, in their opinion, the PLOs were met. This was done after graduation in 2023 but will be done prior to graduation in future years to ensure adequate numbers for response.

8. Rubrics (and other instruments, if applicable)

   Currently in development.

9. Description of your results, noting any significant findings from the data or assessment process

   This year our reflections on KPIs were strongly guided by our exit interviews with last year's students (attached as appendix). This data shows that, at least from the graduate perspective, the program delivers

against its PLOs, with no disagreement noted in any category and broadly enthusiastic. We do see some areas for improvement in terms of the student understanding of various stakeholder approaches across broad energy problems. This data was extremely useful to us in reflecting on revised PLOs and KPIs, via a granular breakdown of deliverables, and how students understand the classes critical to the PLOs.

This perspective will be balanced with a rubric to be developed next cycle tying our revised PLOs and their KPIs to a set of assignments and calibrating them with various faculty.

10. Description of how the results were shared with faculty and how your department/program responded to the results. This is where you should lay out any plans for future improvement or assessment of your program indicated by the results

    Our faculty has been in intensive conversations since the assessment of last cycle on how to enhance our programmatic offering to students and ensure we are delivering everything they expect, and everything their future employers, as well as society, expect from them. The assessment process is one element of the programmatic revision, and a critical one, as it helps us measure our results.

    As a program we prioritized revision of the PLOs based on feedback we received from last year's assessment. Though we found the results of our assessment useful and interesting, we realized that, in line with comments received on last year's assessment, it was challenging to assess the whole broad sweep of our very ambitious PLOs through a set of grades or assignments. Thus the generalization and decomposition of our former PLOs into PLOs and KPIs became our priority for this cycle, to allow us to measure our results with greater resolution and fit.

    We have mainstreamed writing and research skills into more of our classes, as a major finding from last assessment was that the writing-oriented PLO was the area in which we aimed to drive the most near-term improvement. Classes such as Quantitative Methods, and Microgrids, formerly heavily quantitative, developed assignments and labs that stressed research skills and organization of material in logical and argumentative form.

    Contra to what we stated last year in the assessment, given that the next octennial assessment is approaching, and that we performed a broad assessment of all PLOs last year across core classes, and the feedback of our reviewer, we found it more important to refine our PLOs than perform another data analysis across a set we believe can be (and has been) improved.

11. Discussion of any significant feedback from your previous year's report and how your program responded to that feedback

    We found the FDCD reviewer's comments extremely constructive in building our assessment approach this year, with a focus on a revised set of PLOs and sub-KPIs which can both simplify and deepen the assessment project. We are enthusiastic about the benefits in tighter "fits" between KPIs and assignments/exams this will bring. All KPIs were written with specific student work in mind, and this will be codified in next year's cycle, preparing us for the next octennial cycle.

Learning Objective 1: Do you feel the program prepared you to utilize 1) historical principles and 2) processes of whole systems--especially to understand how energy challenges interweave technical, ecological and social systems?

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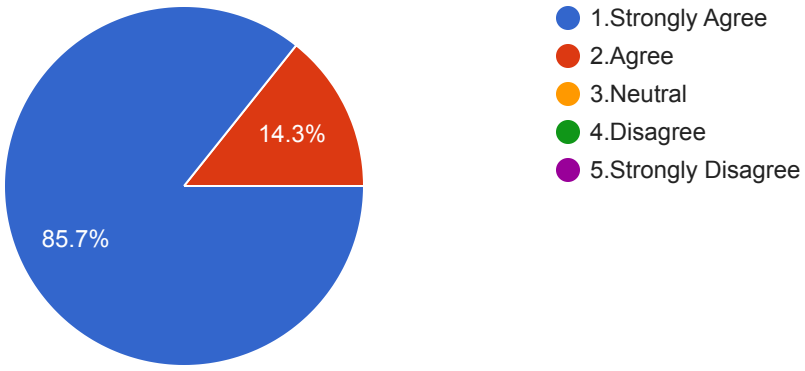
7 responses



Please share a few sentences on how MESM courses and assignments did or did not prepare you in this learning objective (#1).

7 responses

I think this was weaved into almost every course

Multidisciplinary courses helped me understand different viewpoints of looking at things (Corporate vs project finance). All classes mention how they connect and where they end.

History of energy systems readings

the intersectionality of the courses was crucial to the overall understanding of energy systems. i would've enjoyed to learn most of the second years skills in the first (excel, coding, research) but i understand the current structure of the program — it makes sense

I think the Industry Strategies class really illustrated how tough it was for PUCs to balance the different interests of different stakeholder groups. The policy/law class provides some historical context to these challenges, and the courses in general often referenced a lot of historical issues with energy as well as the technical issues of transitioning to a new energy economy.

Every class was infused with a sense of history and concrete assignments that allowed us to engage into the historical side of energy systems. It is a vital perspective to understand the systems we work on today. By including readings and book assignments and by dedicating a few lectures in each class to historical topics, I see it as essential to my education and what distinguishes the program from others.

Prepare the actual situation with regulations and the market for renewable energy. Understand how works every renewable energy system and the connection with regulators -PUCP- and trade of electricity like CAISO.

Learning Objective 2: Can you demonstrate an understanding of electricity policy and market environments, and their impact on energy consumption and production?

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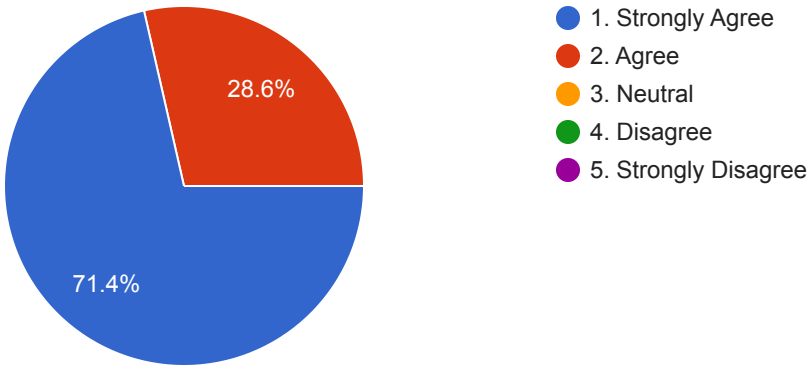

Please share a few sentences on how MESM courses and assignments did or did not prepare you in this learning objective (#2).

7 responses

Energy Economics and Energy Policy did a good job with this

understanding of market dynamics and policy impacts on markets was covered in multiple classes in various ways.

Analysis of key US and CA policies

my field! the courses on this area were fundamental to my career course selection. i liked that i kept seeing these topics in other courses, despite them not being the sole focus — showing their relevance in all spaces for energy systems.

Understanding Rate setting, and how utilities make money was a huge part of achieving this learning objective. There was also a lot of talk about how renewables are generated and how limitations of renewables affect production. I also enjoyed the classes where we talked about DSMs.

The program did a good job on this topic and it was reinforced multiple times across the various classes. It does seem like a topic that requires a significant amount of work and time to understand, and expertise may only be attainable by working in the field for years. It was good to focus on California since other areas vary so much and we were able to delve fairly deep into California/CAISO's situation.

The energy law was a great contribution to understanding the past and actual situation with the US regulation and how the government is working with private utilities.

Learning Objective 3: Can you use critical analysis to understand why the current electricity generation and distribution system evolved the way it did, and how to move them toward the 21st century grid?

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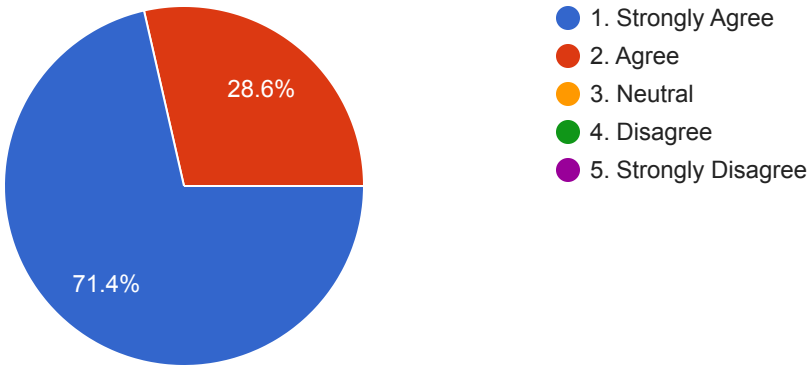

Please share a few sentences on how MESM courses and assignments did or did not prepare you in this learning objective (#3).

7 responses

In Energy Technologies, Electricity Systems and Energy Economics we studied this extensively

almost all classes start with a foundation chapter to build a strong conceptual understanding. In electricity classes this helped me understand system evolution

Economics of energy systems

the historical part of the instruction was deep enough so that i could understand the evolution of the grid until now and try to assess the best way moving forward.

I don't think anyone can predict how to move it into the future as there is no single answer. I think the program has done a good job of exploring the possibilities and the costs, but there are so many pathways and deeper understandings needed of policies and technological feasibility. In that vein I wish energy policy was a longer course to provide more time to explore how policy is made and to truly craft good policy recommendations that make sense in relation to real world limitations.

Since this topic was covered in practically every class I feel quite comfortable with this topic. Again, there was good emphasis on the historical dimension of the energy system in the program.

Understanding the new status is driving the transition to green energy and enforcing to reduce the emission of greenhouse gas emissions and combat global warming.

Learning Objective 4: Can you demonstrate understanding of the human dimension of electricity systems, including managing for change, stakeholder engagement, and customer engagement?

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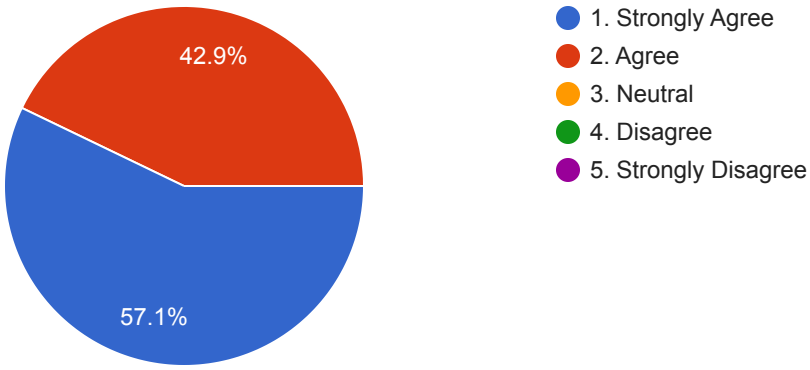

Please share a few sentences on how the courses and assignments supported or did not prepare you for the learning objective (#4).

7 responses

I learned a lot about this in the Microgrids course.

energy policy class and multiple classes bring in stakeholder viewpoints helping students understand impact of market on energy.

Analysis of CPUC proceedings and NEM policies

courses like industry strategy show the importance of human participation in formal processes in the system. the decisions today shape the energy system of the future.

Similar to #3, the program exposes us to examples that are done/can be done as well as existing evaluation methods. However, it doesn't go into enough detail about the effectiveness of each method. How can we measure stakeholder/customer engagement? How do we get other people to care, how might different DSM programs work effectively? I feel like there could be an entire elective on DSMs and how each implementation was effective (or ineffective).

The Energy Industry Strategy, although maybe a bit ad hoc, was very effective and engaging in its structure. My peer group greatly enjoyed the experience and I think we got a lot out of following a specific CPUC proceeding and reading fairly deeply into it. Also, there were many opportunities to practice our presentation skills.

The renewable energy economics course introduced me to ecological economics, which is the foundation of the sustainable plan with companies and being more conscience the environment and sociality.

Learning Objective 5: Do you feel you can communicate skillfully through written reports and oral presentations in styles relevant to the energy field?

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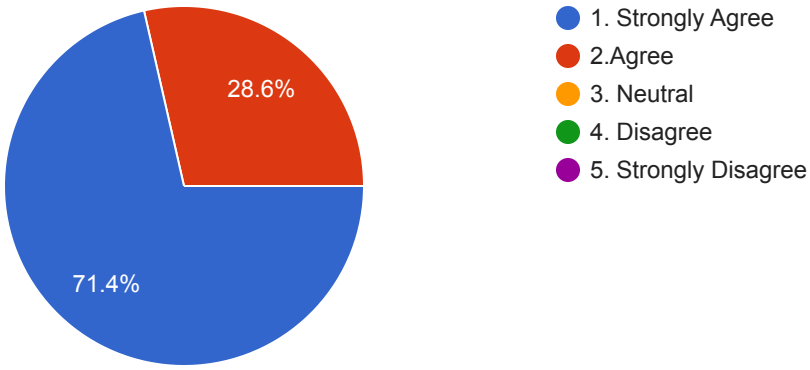

Please share a few sentences on how the courses and assignments supported or did not prepare you for the learning objective (#5), including any specific reports or papers you prepared.

7 responses

There were a lot of written reports, and particularly the Energy Policy and the IRP provided a lot of opportunities to hone in on presentation skills.

Industry strategy class really helped me understand how to present and what information to give since we had to print multiple times on the same project at different phases. Energy Econ allowed me to explore essay writing and extraction of important information from the readings. Finally, ESG Strategies really helped me get comfortable with presenting and discussing in public and with peers.

Lots of practice with public presentations

the IRP writing and presenting process was meaningful. it helped me identify the perfect balance to tell a story AND report data on a project.

I think Energy Modeling + Capstone does a really good job of teaching us presentation skills + written reports. I also felt energy news was a good exercise on taking a lot of information and condensing it down to a bite size summary.

The program had ample opportunities to work on presentation skills - I think classes like Energy Policy and Energy Industry strategy, where the structure heavily relied on student presentations, were key to the course mix with other more traditional classes. Delivering the energy news and leading book discussions were also great opportunities. I wouldn't have minded another book discussion in a different class although I do understand it s tough to include so many things in a single course.

I learned more technical English, which gave me more support in my writing and expression

Which skills are you most confident in upon graduation? Select all that apply.

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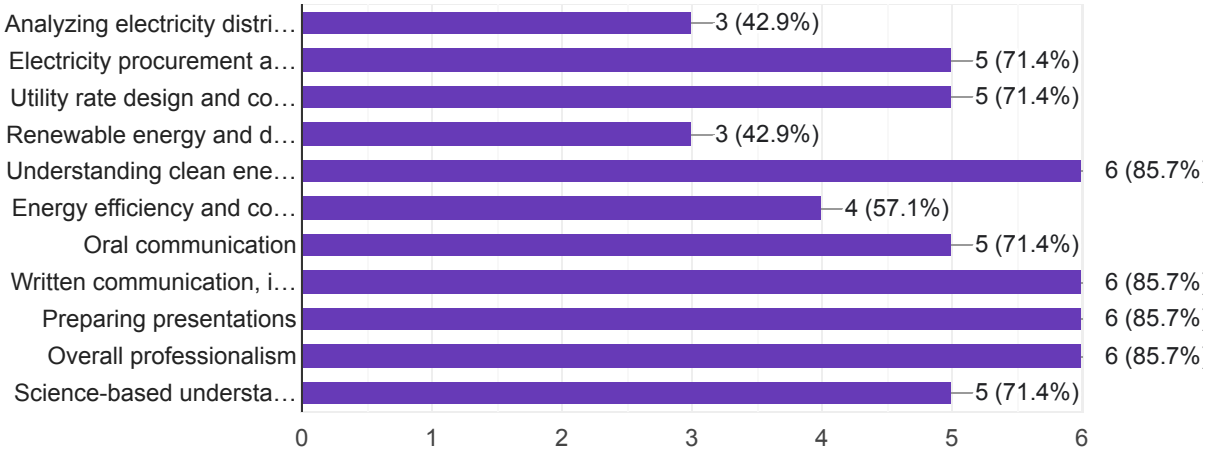

Which communications platform do you recommend for the program to use to effectively outreach to students and/or alumni for day to day communication and events?

7 responses

LinkedIn or email. I think a private LinkedIn group for Alumni would be would the best

Instagram

Email

linkedin and canvas

Email or Linkedin

Email works great for me. I am not very present on social media.

WhatsApp