

Energy: Science, Society, and Communication

Spring 2016

Pitt: HONORS 1020 (2 credits) / CMU: 99-245 (9 units)

Course Meeting Time: 5:30-8:00pm Thursdays, Lawrence Hall 233 (Pitt campus)

Instructors: Dr. William Alba (CMU), Dr. Gordon Mitchell (Pitt), Dr. Götz Vesper (Pitt),

Contact Info & Office Hours:

Dr. Alba: alba@cmu.edu, 412-268-7333 (office). Doherty Hall 2201, generally Mon-Fri 9:30am-4:30pm

Dr. Mitchell: gordonm@pitt.edu, 412-624-6880 (office). Cathedral of Learning 3609. Thu 1-3pm

Dr. Vesper: gveser@pitt.edu, 412-624-1042 (office). Benedum Hall 806.

Overview

Energy pervades our lives, influencing our actions in transportation, industry, agriculture, building use, and more. Enormous challenges such as climate change, national security, resource depletion, air and water quality, and biodiversity loss are converging to create an urgent need for new technological and social approaches related to energy, including broader public understanding and engagement.

Responding to this situation, the National Academy of Sciences (NAS) and National Academy of Engineering (NAE) recently chose Pittsburgh as the pilot city for its Science and Engineering Ambassadors program (<http://scienceambassadors.org/>). This program selects, prepares, and supports a team of local experts to engage with community members, helping to add the perspective of science and engineering as people make important decisions about energy in their personal and professional lives.

This course links together Pitt and CMU students and faculty, NAS/NAE Ambassadors and staff, opinion leaders, and citizens for a series of deliberative forums on energy topics from January to April 2016. Students will read background literature on the overall energy landscape, study scholarship addressing energy issues of local concern, and collaborate with partners to develop innovative deliberative designs for three events in the National Academies Energy Issues Forum. Through their work, students will increase their own understanding of and ability to engage publicly with energy issues, as well as contribute to the mission of the National Academies and the welfare of our local community.

Discussions of technical issues are oriented to enable students without advanced backgrounds in the engineering and the natural sciences to participate fully. Students from the social sciences and humanities fields are especially welcome to join this interdisciplinary course.

Objectives:

- Be able to describe primary components and technological options of the technical energy system, including production, transmission/distribution, and use.

- Assess benefits and liabilities of different technologies with respect to economic, environmental, or social criteria.
- Develop and apply skills for communicating science and technical information to a variety of audiences.
- Learn multiple possible formats for deliberative events and gain practical experience in designing, executing, and assessing such events.
- Contribute to the National Academies' Science and Engineering Ambassadors program by developing and circulating innovative models for science-based community engagement.

Course Enrollment:

There are no prerequisites. Student enrollment will be limited and by permission of the instructors, based on an application process.

Readings, Assignments, and Grading:

The assigned textbook is *Energy for Future Presidents*, Richard A. Muller, ISBN: 978-0-393-34510-0. Other readings will be available for download via <https://pitt.box.com/energycourse>. Assignments will include a series of writing exercises linked to the semester-long project to design and co-produce a series of National Academies Energy Issues Forum Events (see details below). Assignments, unless otherwise specified, are due on Thursdays by 5:30pm, in electronic formats, emailed to energyassignments@gmail.com. Deductions due to late assignments of 10% per day may be applied at the discretion of the instructors.

Assignment Name	Group or Individual	Percent of Total Grade	Due Date
Kickoff Event Observer Report	Individual	15%	Jan 21
Draft Forum Event Format Proposal	Group	10%	Feb 4
Final Forum Event Format Brief	Group	10%	Feb 25
Forum Event Observer Reports	Individual	30%	Apr 21
Forum Event Final Case Study Report	Group	15%	Apr 28
Attendance and Participation	Individual	20%	

- *National Academies Energy Issues Forum Kickoff Event Observer Report* (15% of total grade, due January 21). NAS/NAE Ambassadors, program leaders, and course instructors will co-produce a “Kickoff” Forum Event on January 14, 2016. After attending the event, students will write a 3-5 page paper that summarizes their reflections as observers. Observer Reports should include commentary on the content of issues discussed during the event: What were the most important energy concepts raised? What was overlooked? What was the quality of deliberation? What were the most surprising or novel outcomes to emerge from the conversation? In addition, observer reports should advance a general assessment of the extent to

which the Kickoff event furthered the overall mission (listed below) of the NAS/NAE Ambassadors program:

The Science and Engineering Ambassador program will address the need for scientific perspectives in public discourse by facilitating scientific dialog with public audiences. The program's mission is twofold:

- For the community and its leaders to think critically about complex issues in science, engineering, and medicine, engage with these issues, and make informed decisions in their lives. For the Pittsburgh pilot phase, the focus is energy.
- For the scientific and engineering community to understand how the larger social, political, and cultural context is connected to their work and to incorporate that understanding into their public communication.

Papers will be evaluated based on the degree to which they: 1) Exhibit strong and polished prose; 2) Feature insightful reflections stemming from careful listening and creative thought; 3) Assess the extent to which the Kickoff event's deliberative design furthers the NAS/NAE Ambassadors programmatic goals listed above.

• *Draft National Academies Energy Issues Forum Event Proposal* (10% of total grade, due February 4). Student groups ("Group A," "Group B," and "Group C") will be formed based on individual interests and skill sets, with each group tasked with co-producing a forum event associated with one of three broad energy themes isolated by the NAS/NAE Ambassadors. The first step of group work will be collaboratively read and discuss a set of readings provided by a small group of NAS/NAE Ambassadors matched to the theme. During this collaborative reading exercise, students will work together to isolate a specific topic focus and develop a preliminary proposal for *two* possible formats that could be used to execute a National Academies Energy Issues Forum Event. Papers will be evaluated based on the degree to which they: 1) Clearly and effectively communicate key elements of the format, including participant roles, sequence and timing of events, and design of deliberative structure; 2) Show evidence of engagement with the scholarly literature on deliberative design and readings provided by Ambassadors for the specific energy topic area; 3) Explain formats with promise to advance the NAS/NAE Ambassadors programmatic goals listed above. This is a group assignment, so individual students will share the grade assigned to each format proposal.

• *National Academies Energy Issues Forum Event Format Brief* (10% of total grade, due February 25). After receiving feedback and consulting with their partner Ambassadors, each group will select a final seminar format that may be a revision of one of the two formats proposed in the earlier draft exercise. The brief should also include a plan for assessing the effectiveness of the forum event (e.g. wording of survey questions, procedure for gathering data). Briefs conveying final formats will be evaluated based on the degree to which they: 1) Clearly and effectively communicate key elements of the format, including participant roles, sequence and timing of events,

and design of deliberative structure; 2) Show evidence of engagement with the scholarly literature on deliberative design and readings provided by Ambassadors for the specific energy topic area; 3) Explain a format with promise to advance the above listed NAS/NAE Ambassadors programmatic goals; 4) Detail a sound and appropriate strategy for assessing effectiveness of the symposium; and 5) Reflect growth in response to constructive feedback. This is a group assignment, so individual students will share the grade assigned to each format proposal.

- *National Academies Energy Issues Forum Event Observer Reports* (15% for each of two papers, 30% of total grade, due April 21). Following Spring Break, group members will focus on implementing the respective forum events they co-produce with NAS/NAE staff and the select Ambassadors matched to their group. But they will also attend the other two student groups' forum events and write 3-5 page Observer Reports that summarize their reflections. Observer reports should include commentary on the content of issues discussed during the event: What were the most important energy concepts raised? What was overlooked? What was the quality of deliberation? What were the most surprising or novel outcomes to emerge from the conversation? In addition, Observer Reports should advance a general assessment of the extent to which the group events further the overall mission of the NAS/NAE Ambassadors program (see above description of goals). Observer Reports will be evaluated based on the degree to which they: Papers will be evaluated based on the degree to which they: 1) Exhibit strong and polished prose; 2) Feature insightful reflections stemming from careful listening and creative thought; 3) Assess the extent to which the forum event's deliberative design furthers the NAS/NAE Ambassadors programmatic goals listed above.

- *National Academies Energy Issues Forum Event Final Case Study Report* (15% of total grade, due April 28). Working together, each student group will collaborate to write and submit a case report on their forum event to *Participedia* (<http://www.participedia.net/en/browse/cases>). Reports will be evaluated based on the degree to which they: 1) Exhibit strong and polished prose; 2) Provide accurate and comprehensive content for each of the areas of the Participedia case report; 3) Incorporate effectively data (e.g. from survey data, Observer Reports) into the final report narrative; 4) Connect theoretical issues raised in the course of the report with relevant scholarly literature, including citations. This is a group assignment, so individual students will share the grade assigned to each format proposal.

- *Attendance and Participation* (20% of total grade). Due to the nature of this class attendance and class participation are mandatory.

Academic Integrity

All students are expected to adhere to the standards of academic honesty. Any student engaged in cheating, plagiarism, or other acts of academic dishonesty would be subject to disciplinary action. Any student suspected of violating this obligation for any reason during the semester will

be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity <http://www.provost.pitt.edu/info/ai1.html> (for Pitt students) or the University Policy on Academic Integrity <http://www.cmu.edu/academic-integrity/> (for CMU students). The penalty for an academic integrity violation in this course will be worse than receiving a zero on the corresponding assignment, potentially including failure in the course.

Disability Services

If you have a disability, contact both your instructor and university disability resources office as early as possible in the term. For Pitt students, contact the Office of Disability Resources and Services (DRS), 216 William Pitt Union, 412-648-7890/412-383-7355 (TTD). DRS will verify your disability and determine reasonable accommodations for this course. For CMU students, contact Larry Powell, Manager of Disability Resources, 143 North Craig Street, 412-268-2013 or access@andrew.cmu.edu.

Statement on Classroom Recording

To address the issue of students recording a lecture or class session, the University's Senate Educational Policy Committee issued the recommended statement on May 4, 2010. "To ensure the free and open discussion of ideas, students may not record classroom lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student's own private use." This statement also applies to Carnegie Mellon students enrolled in 99-245.

SCHEDULE OF MEETINGS, THEMES, ASSIGNED READINGS AND KEY MILESTONES

WEEK 1 – JANUARY 7

Introduction to Course

Course Milestones	NAS/NAE Milestones
<ul style="list-style-type: none"> • CMU students return early • Student introductions • Energy background • Course preview 	<ul style="list-style-type: none"> • (Nov/Dec 2015): Three themes and Ambassador groups formed; Ambassadors provide targeted reading lists.

WEEK 2 – JANUARY 14

The Energy Landscape

Reading Richard Muller’s big picture overview of “The Energy Landscape” will prepare students to observe the National Academies Energy Issues Forum Kickoff Event. This event will cover a broad range of topics and provide one model for how to design formats for deliberative stakeholder engagement events.

- Richard Muller, *Energy for Future Presidents* (Part II, “The Energy Landscape”): 77-138.

Course Milestones	NAS/NAE Milestones
<ul style="list-style-type: none"> • Kickoff Forum Event 	<ul style="list-style-type: none"> • Kickoff Forum Event

WEEK 3 – JANUARY 21

Powering the Planet and Moving Beyond the ‘Deficit Model’ of Science Communication

Following the previous week’s broad sweep of energy themes, this week students will form into groups and begin focusing on more specific topics, working in partnership with the Science Ambassadors to custom design a Forum Event. Lewis (2007) provides a life-cycle perspective on energy decision-making under conditions of uncertainty that will be useful for navigating this transition from the macro-to-micro level. A Spring/Summer 2015 “Spotlight” article in the National Academies’ *InFocus* publication notes that effectiveness of the student groups’ work hinges in part on a communication challenge: “Communicating effectively also means engaging local leaders in the right way.” Quoting external reviewer external evaluator Jessica Sickler, the article goes on to suggest that in addressing this challenge, “the ‘deficit’ model of science communication -- ‘You lack something that we will provide’ -- doesn’t work.” Ahteensuu (2012) unpacks this statement by spelling out four key assumptions that undergird “the deficit model type of thinking,” drawing from illustrative examples in the debate on genetic engineering in agriculture to ground the discussion. Button & Ryfe (2005) outline how a focus on “deliberation” as a key term guiding community engagement efforts provides an alternative to the deficit model, and Carcasson (2012) extends this line of thinking to suggest how the tradition of

scientific inquiry can interface synergistically with models of community engagement grounded in “deliberative inquiry.” Questions to guide reading and discussion: What is the “deficit model” of science communication, and how does the model counsel caution when addressing the challenge of community engagement around science and technology issues? Are there some instances where it may be appropriate to embrace the “deficit model”? If so, what are they and how might the model work effectively? How does the “deliberative democracy movement” stand as a possible alternative to the “deficit model” of science communication? What are the four key products of deliberative inquiry, and how well might they dovetail with overall objectives of the Ambassadors program?

- Nathan S. Lewis, “Powering the Planet,” *Engineering & Science* 2 (2007): 12-23.
- Ahteensuu, M. (2012). Assumptions of the deficit model type of thinking: Ignorance, attitudes, and science communication. *Journal of Agricultural and Environmental Ethics*, 25, 295–313. <http://doi.org/10.1007/s10806-011-9311-9>
- Button, M., & Ryfe, D. M. (2005). What can we learn from the practice of deliberative democracy? In J. Gastil & P. Levine (Eds.), *The Deliberative Democracy Handbook: Strategies for Effective Civic Engagement in the Twenty-First Century* (pp. 20–33). New York: Jossey-Bass.
- Carcasson, M. (2012). The cycle of deliberative inquiry: Re-conceptualizing the work of public deliberation. In J. Goodwin (Ed.), *Between Scientists & Citizens: Proceedings of a Conference at Iowa State University, June 1-2, 2012* (pp. 85–97). Ames, IA: Great Plains Society for the Study of Argumentation.

Course Milestones	NAS/NAE Milestones
<ul style="list-style-type: none"> • National Academies Energy Symposium kickoff event Observer Reports due • Student groups formed 	

WEEK 4 – JANUARY 28

The Deliberative Design Tool-Kit

Just as energy systems are engineered by assembling selected materials according to a design blueprint, community engagement projects can be fashioned using specific deliberative tools, such as the “deliberative opinion poll” (Fishkin & Farrar, 2005), the “National Citizens’ Technology Forum” (Guston, 2014), “National Issues Forums” (Melville, Willingham & Dedrick, 2005), “science cafes” (Navid & Einsiedel, 2012), “deliberative theater,” Fred Friendly Seminars, and hundreds of other formats archived online at Participeda. Questions to guide reading and discussion: 1) What are the key design features, strengths and weaknesses of the four deliberative tools discussed in this cluster of readings? 2) Which design tools show the most promise for the specific communicative challenges introduced by the Ambassadors program symposia being considered this term?

- Fishkin, J., & Farrar, C. (2005). Deliberative polling: From experiment to community resource. In J. Gastil & P. Levine (Eds.), *The Deliberative Democracy Handbook: Strategies for Effective Civic Engagement in the Twenty-First Century* (pp. 68–79). New York.

- Guston, D. H. (2014). Building the capacity for public engagement with science in the United States. *Public Understanding of Science*, 23(1), 53–59. <http://doi.org/10.1177/0963662513476403>
- Melville, K., Willingham, T. L., & Dedrick, J. R. (2005). National Issues Forums: A network of communities promoting public deliberation. In J. Gastil & P. Levine (Eds.), *The Deliberative Democracy Handbook: Strategies for Effective Civic Engagement in the Twenty-First Century* (pp. 37–58). New York: Jossey-Bass.
- Navid, E. L., & Einsiedel, E. F. (2012). Synthetic biology in the science cafe: What have we learned about public engagement? *Journal of Science Communication*, 11(4).
- Deliberative theater (see <http://www.wqed.org/tv/managingmarcellus/> <http://www.popcitymedia.com/features/shaleevent062211.aspx>)
- Fred Friendly Seminars (see <http://www.fredfriendly.org/>)
- Hundreds of other deliberative formats archived at <http://www.participedia.net>

Course Milestones	NAS/NAE Milestones
<ul style="list-style-type: none"> • Ambassador class visits 	<ul style="list-style-type: none"> • Ambassador class visits

WEEK 5 – FEBRUARY 4

Community Engagement as a Design Challenge

Aakhus and Bzdak (2015) propose to open up the “black box” of stakeholder engagement projects by recasting them as products of “communicative design.” Pidgeon and colleagues (2014) elucidate explicit design decisions that went into their execution of a citizen dialogue initiative in the UK that focused on energy. Questions to guide reading and discussion: Compare and contrast how the concept of “design” informs understanding of work in the respective contexts of engineering and stakeholder engagement.

- Aakhus, M., & Bzdak, M. (2015). Stakeholder engagement as communication design practice. *Journal of Public Affairs*, 15(2), 188–200. <http://doi.org/10.1002/pa>
- Pidgeon, N., Demski, C., Butler, C., Parkhill, K., & Spence, A. (2014). Creating a national citizen engagement process for energy policy. *Proceedings of the National Academy of Sciences*, 111(Supplement_4), 13606–13613. <http://doi.org/10.1073/pnas.1317512111>

Course Milestones	NAS/NAE Milestones
<ul style="list-style-type: none"> • Draft National Academies Energy Issues Forum Event format proposals due 	

WEEK 6 – FEBRUARY 11

Energy Topic

Overview and discussion prompts TBA.

- Readings TBA

Course Milestones	NAS/NAE Milestones
• Ambassador class visits	• Ambassador class visits

WEEK 7 – FEBRUARY 18

Energy Topic

Overview and discussion questions TBA

- Readings TBA

Course Milestones	NAS/NAE Milestones
• Ambassadors class visit	• Ambassadors class visit

WEEK 8 – FEBRUARY 25

Evaluation and Assessment

It is one thing to design a promising event that would connect the NAS/NAE Science Ambassadors to the general public. Another challenge is to evaluate whether the event was effective or not. Longstaff and Secko (2014) apply validated NRC criteria to evaluate the effectiveness of an engagement event in Canada that focused on biofuels. Hall, Wilson and Newman (2011) evaluate the impact of a deliberative opinion poll. Haywood and Besley (2014) and O’Doherty (2013) propose other models for evaluation and assessment of deliberative community engagement projects. Question to guide reading and discussion: What are the best metrics for evaluating and assessing deliberative engagement projects, and how might they be deployed effectively in the Ambassadors program?

- Longstaff, H., & Secko, D. M. (2014). Assessing the quality of a deliberative democracy mini-public event about advanced biofuel production and development in Canada. *Public Understanding of Science*, August, 1–10. <http://doi.org/10.1177/0963662514545014>
- Hall, T. E., Wilson, P., & Newman, J. (2011). Evaluating the short- and long-term effects of a modified deliberative poll on Idahoans’ attitudes and civic engagement related to energy options. *Journal of Public Deliberation*, 7(1). Retrieved from <http://www.publicdeliberation.net/jpd>
- Haywood, B. K., & Besley, J. C. (2014). Education, outreach, and inclusive engagement: Towards integrated indicators of successful program outcomes in participatory science. *Public Understanding of Science*, 23(1), 92–106. <http://doi.org/10.1177/0963662513494560>

- O’Doherty, K. C. O. (2013). Synthesising the outputs of deliberation: Extracting meaningful results from a public forum. *Journal of Public Deliberation*, 9(1). Retrieved from <http://www.publicdeliberation.net/jpd/vol9/iss1/art8>

Course Milestones	NAS/NAE Milestones
<ul style="list-style-type: none"> • Final National Academies Energy Issues Forum Event formats due 	

WEEK 9 – MARCH 17

Final forum prep. Checklist. Rehearsal.

WEEK 10 – MARCH 24

Course Milestones	NAS/NAE Milestones
<ul style="list-style-type: none"> • Group “A” Forum Event 	<ul style="list-style-type: none"> • Group “A” Forum Event

WEEK 11 – MARCH 31

Course Milestones	NAS/NAE Milestones
<ul style="list-style-type: none"> • Group “B” Forum Event 	<ul style="list-style-type: none"> • Group “B” Forum Event

WEEK 12 – APRIL 7

Course Milestones	NAS/NAE Milestones
<ul style="list-style-type: none"> • Group “C” Forum Event 	<ul style="list-style-type: none"> • Group “C” Forum Event

WEEK 13 – APRIL 21

Scientific Information and Motivated Reasoning

Sinatra, Kienhues and Hofer (2014) point out that any attempt to engage the public in communication about science will necessarily entail challenges associated with motivated reasoning and other cognitive quirks, especially if such interventions are geared toward attitude change. Gudowsky and Bechtold (2013) explore this challenge in the context of a specific community engagement effort organized around the issue of global warming. Discussion question: At the design phase, one can’t assume that members of the public will reason perfectly; then the question becomes, how do you integrate insight on these limitations into design decisions?

- Sinatra, G. M., Kienhues, D., & Hofer, B. K. (2014). Addressing challenges to public understanding of science: Epistemic cognition, motivated reasoning, and conceptual change. *Educational Psychologist*, 49(2), 123–138.
<http://doi.org/10.1080/00461520.2014.916216>
- Gudowsky, N., & Bechtold, U. (2013). The role of information in public participation. *Journal of Public Deliberation*, 9(1).

Course Milestones	NAS/NAE Milestones
<ul style="list-style-type: none">• Forum Event Observer Reports due	

▪

WEEK 14 – APRIL 28

Porch

Final meeting

Course Milestones	NAS/NAE Milestones
<ul style="list-style-type: none">• Final Forum Event case study report for Participedia due	