- Minutes -
Engineering College Council Meeting
October 27, 2017
Cornell Tech Campus

Members Present: John Balen, Najib Canaan, Lance Collins, Frank DeCosta, Mike Even, Greg Galvin, Rana Glasgal, Kent Goklen, Andrea Ippolito, Kevin Johnson, Michele Kaliski, Bill LaFontaine, Marcus Loo, Jonathan Ludwig, Ivan Lustig, Jim McCormick, Avi Mehrotra, Howard Morgan, David Perez, Susie Riley, Tony Satterthwaite, Dan Simpkins, Elissa Sterry, John Swanson, Joe Thanhauser, Molly Tschang, Andy Verhalen, Lisa Walker, Craig Wheeler, Eric Young.

Emeriti Present: Jim Becker, Mei-Wei Cheng, Sarah Fischell, Virginia Giddings, Jim Hauslein, Gretchen Knoell, Brian Kushner, Bob Shaw, Bill Shreve, Robert Smith, Duane Stiller.

The meeting presentations and materials can be found at:
https://confluence.cornell.edu/display/ECC/2017+Fall+ECC+Meeting

Welcome and Introductions

Greg Galvin, ECC Chair, welcomed the Council to the Fall '17 ECC Meeting. Lance Collins, Dean of Engineering, announced that the focus of the meeting would the new proposed structure for the Engineering College Council. He also welcomed five new members to the Council: John Balen (Cornell B.S. '82 EE, MBA '86) Canaan Partners; Bill LaFontaine (Cornell M.S. '88, Ph.D. '90 MSE) International Business Machines; Avi Mehrotra (Cornell B.S. '91 EE) Goldman Sachs; David Perez (Cornell M.Eng. '91) Palladium Equity Partners; Tony Satterthwaite (Cornell B.S. '82 CEE) Cummins, Inc. Lance also welcomed Robert Smith (Cornell B.S. '86 ChE) Vista Equity Partners LLC.

The Evolution of ECC: A New Approach to Engagement

***Lance Collins**, Joseph Silbert Dean of Engineering*
***Greg Galvin**, ECC Chair*
***Elissa Sterry**, ECC Vice Chair*

Lance Collins discussed how valuable the Engineering College Council (ECC) is to him as it provides counsel to the dean, strategic input, networking opportunities, time, and talent. Collins indicated that in an effort to have a more engaged council, he has decided to try something new and introduced the new proposed structure for the ECC. The council has been very useful to him so far. However, he would like the council to become more engaged with the College. The ECC Chair, Greg Galvin, and vice chair, Elissa Sterry provided their feedback on this new approach. From Galvin's perspective, the devotion of the members to Cornell is very strong. He emphasized that the council needs to be useful to the dean for the council to be effective. Elissa Sterry added that participation in the task forces will be voluntary. Collins indicated that they will be deadline driven and won't involve any standing committees, and that we'll reassess the task

forces at the Spring ’18 ECC Meeting. The meeting is to help him determine deliverables to meet these objectives. The task forces will be meeting over the coming year to define how they can be effective to the dean. He added that the goal of today’s meeting is to define the key needs of the College and how to make them happen.

Collins pointed out that the task force structure will provide an opportunity for ECC members to engage deeply in the strategic areas of focus for the College and provide input and recommendations to the dean. He noted that the College needs to continue to evolve and look for new approaches to further improve and transform our traditional, long-standing educational methodologies. This is vital to our long-term success if we want to continue to be a leader in higher education. He would also like clear metrics of success to determine the effectiveness of these task forces.

Lance Collins outlined the charges of the following four new task forces:

New Education Paradigm
Charge: Provide strategic counsel to enhance, transform, and disrupt traditional approaches to educating undergraduate and graduate students.

Lance Collins pointed out that ultimately we want our students to be leaders. He would like this task force to give him feedback on how the college can accomplish this, as well as indicate the attributes and credentials that the council seeks when hiring students. He also stressed the importance of increasing our global reach. We’re behind in this area because it’s difficult for our students to study abroad due to our rigid curriculum. However, he pointed out that there are other global opportunities, such as summer internships abroad (there are large number of alumni in China. A China Cornell Center in Beijing is being established as a global initiative).

Energy and the Environment
Charge: Provide strategic counsel on research and education related to existing and emerging energy technologies, carbon sequestration, energy management, and the use of the campus as a “living laboratory”.

Collins is seeking advice on the role of partnerships with industry, foundations, and the state. Examples of programs and areas of focus include the: Energy Institute, Earth Source Heat, Transportation, and the Atkinson’s Center for a Sustainable Future.

Bioengineering
Charge: Provide strategic counsel about enhancement of bioengineering research, teaching and interdisciplinary engagement across the College, and the University.

Collins is seeking advice on what is the aspirational objective for bioengineering at Cornell; and how do we strengthen the connections among these different entities. Engineering has been playing an increasingly important role in biological systems research. Collins sees tremendous opportunities in this realm for the college. He would also like advice on how to strengthen the

college's partnerships with Cornell Tech, Weill Medical College, and the Cornell College of Veterinary Medicine.

Capital Infrastructure
Charge: Provide counsel, insight, and offer feedback on strategic planning and marketing for major capital infrastructure renovation for the College of Engineering. Ultimate goal is to completely transform the Engineering educational, teaching and research experience at Cornell through reinventing physical spaces.

Lance Collins is seeking advice on how to engage our constituencies on our capital project needs. A few examples include: the Facilities Master Plan, the impact of infrastructure on faculty recruitment, improvement of the undergraduate and graduate educational experience, co-location of interdisciplinary research and its impact on the graduate student experience.

Collins also discussed the proposed timeline for implementing the task forces and described the expected outcomes:

Proposed Timeline for Implementation:
Lance Collins explained that the breakout sessions at the Fall 2017 ECC meeting would be followed by group discussions to outline the implementation of task force actions. The first outcomes of the task forces will be reported at the Spring ECC Meeting on April 12-13, 2018.

Expected Outcomes:
Collins pointed out that the goal is to develop focused task forces to guide ECC conversations, and provide him with input between formal meetings. Each task force chair will facilitate monthly phone calls, interim reports to the Associate Dean for Alumni Affairs and Development, and present a formal report at the Spring 2018 Meeting. The designated task force chairs will be in touch with their task force members with next steps and links to individual blog sites where information and updates will be posted.

New Educational Paradigm
Mike Thompson, *Associate Dean for Undergraduate Programs*
Madeleine Udell, *Assistant Professor, Operations Research and Information Engineering*

Mike Thompson gave an overview of the New Educational Paradigm being implemented in the College. He noted that with the explosion of information, big data and new fields of study have been created to computationally analyze huge data sets to reveal patterns, trends, and associations that lead to better decisions and strategic moves. In addition, engineering is engaging with broader communities. He pointed out that the face of education is evolving in such a way that in addition to acquiring core technical expertise, students also need to develop professional skills, know how to work in a diverse and global environment, learn different working styles and expectations, explore career paths such as consulting, business and entrepreneurship, and participate in experiential learning.

Thompson also discussed the College of Engineering Division of Engineering Practice Wheel which represents engineering in action through: Project Teams (design, implementation, leadership, team management); McCormick Teaching Excellence Institute (pedagogy and assessment); Bovay History and Ethics Program (individual and society responsibility, unique engineering role as stewards); Leadership Program (vision, team management, communication, project management, group dynamics); Engineering Communications Program (written, oral, visual, range of formats from technical papers and presentations to elevator pitches); Kinzelberg Entrepreneurship Program and Kessler Fellows Program (innovation enterprise, networking, self-awareness); and Engineering Learning Initiatives (research involvement, collaborative learning). He added that this wheel shows combining existing programs to leverage synergies in professional development that will span broad aspects of the professional engineer's life.

Thompson also pointed out that students need to be involved in a wide range of interests in the areas of: industry and technology; academia and research; entrepreneurship; consulting and business; with the center of these areas being technical and professional expertise. He also stressed the importance of experiential education which involves learning by doing: Co-op program; Engineering Leadership Program and Entrepreneurship (business minor with the Dyson School; engineering entrepreneur minor; eLab/PopShop and eHub; innovation competition; and Kessler programs); Cornell-Tech internships and project teams.

Thompson indicated that there are over 29 project teams in the college with over 1,100 students from all 14 engineering majors and 7 undergraduate colleges/schools, with total expenditures of over $1M (funded through endowments, the college, gifts, and corporate sponsorships). He noted that project teams give students the opportunity to learn leadership skills, promote team building, conflict management, and corporate relations. He added that President Martha Pollack and Bill Nye were given tours of the new project team space in Upson Hall.

Thompson pointed out that the structure of the classroom is evolving and becoming very high tech. Students are more visual now. Instead of attending large lectures, students are learning in small groups and learning by doing. The new technology includes fully flipped classes that are totally collaborative. Faculty are still learning to use and be comfortable with the new technology. He also noted that distance learning facilities will enable course sharing between the Ithaca, Cornell Tech and Weill Medical campuses.

Thompson added that a key partner in implementing this new educational paradigm is the McCormick Teaching Institute led by Kathy Dimiduk, Director, which is involved in the assessment and improvement of the existing engineering curriculum. This is done through various activities, such as: individual consultations, classroom observation, new faculty assistance, teaching research assistance, teaching tips and resources, workshops and seminars, as well as books and articles on college teaching. Dimiduk encourages new teaching styles, such as the movement to flipped course models.

Thompson also described the challenges of developing global innovators through semester study abroad, international projects and internships, remote collaborations between institutions in different countries, due to the rigorous engineering curriculum.

Madeleine Udell, *Assistant Professor, Operations Research and Information Engineering,* discussed the importance of data driven decision making in the modern world. She noted that this critical skill enables engineers to draw conclusions from data and helps everyone evaluate data-based reasoning. She added that managing the recent explosion of data driven information is a national challenge and that research and scholarship in the 21st century are being dramatically transformed by their interaction with data. Data science has become a fundamental skill for understanding the world and making decisions.

Udell also discussed the consequences of data being ignored or being used unjustly. She mentioned the article, *The Supreme Court is Allergic to Math*, which indicated that, "The Supreme Court does not compute. Or at least some of its members would rather not. The justices, the most powerful jurists in the land, seem to have a reluctance — even an allergy — to taking math and statistics seriously. For decades, the court has struggled with quantitative evidence of all kinds in a wide variety of cases. Sometimes justices ignore this evidence. Sometimes they misinterpret it. And sometimes they cast it aside in order to hold on to more traditional legal arguments. (And, yes, sometimes they also listen to the numbers.) Yet the world itself is becoming more computationally driven, and some of those computations will need to be adjudicated before long. Some major artificial intelligence case will likely come across the court's desk in the next decade, for example. By voicing an unwillingness to engage with data-driven empiricism, justices — and thus the court — are at risk of making decisions without fully grappling with the evidence". Udell also mentioned the book, *Weapons of Math Destruction,* whose main point is "that predictive models are never neutral but reflect the goals and ideology of those who create them. They also tend to load the dice against poor people, reinforcing inequality in society. From calculating university rankings or credit ratings and processing job applications, to deciding what advertising you see online or what stories appear in your Facebook news feed, algorithms play an increasingly important role in our lives. Even the police use big data to help them predict where crimes may occur. The problem is that these algorithms are often incapable of reflecting the real world: mathematical models should be our tools, not our masters."

Udell indicated that the course, *Foundations of Data Science,* at the University of California at Berkeley, has been an inspiration to us. This course explores teaching the core concepts of inference and computing, while working hands-on with real data including economic data, geographic data and social networks and is designed for entry-level students from any major.

Udell pointed out that she has been teaching the course *CS/ORIE I 1380: Data Science for All* to teach these skills to students from any discipline, without any prerequisites, who may go on to do important data-driven work in their own disciplines, and combines theory and practice. The course covers: data science (causality, randomization, experiments); programming (data types, tables, functions); visualization (interpreting and exploring data); randomness and sampling

(understanding random selection); prediction (making predictions from data); and inference (reasoning about populations).

Udell also discussed the differences between data science vs. artificial science. She noted that it's not always clear when the division takes place between the two. Data science strives to augment humans' capabilities, whereas, artificial intelligence is geared towards replacing humans. She pointed out that she's looking for new forms of active learning to help students absorb more information, in addition to engaging lectures, small group discussions, demos, projects and labs. In conclusion, she pointed out that currently, every engineering student takes intro programming (CS1110 or 1112) and she would like to know what the college can do to offer courses on data science for engineering students, as well as for the rest of the university.

Impact of Capital Infrastructure Renovation
Mark Campbell, *John A. Mellowes '60 Professor of Mechanical Engineering and S.C. Thomas Sze '05 Director of Sibley School of Mechanical & Aerospace Engineering*

Mark Campbell gave a presentation on the impact of capital infrastructure renovations on the College. He noted that the Sibley School of Mechanical and Aerospace Engineering started in 1865 when Cornell was founded. He added that the architect for the new renovation project incorporated some of Sibley's history into the renovations. Campbell pointed out that several renovations to the Sibley School's facilities have taken place since 2012 (Upson, Rhodes, Grumman, Kimball, Thurston and Ward Halls). He explained that in 2012 the top facilities challenges were the need for new types of space, the high cost of changing and updating the facilities, and having facilities that would enable modern teaching, learning and research. He indicated that the Kimball Hall renovation project that took place from 2012-14 created open layout space to facilitate collaborations between MAE and BME, as well as for sharing equipment, creating swing space, and providing wet lab space.

Campbell also discussed the Upson Hall Renovation project which took place (2015-2017) due to several factors including the CS Department's move to Gates Hall, MAE's facilities challenges and the decision to renovate rather than build a new building. The renovation totaled $75M and covered 168K sq. ft. He added that today's renovation costs have increased dramatically and funding is difficult to obtain. Consequently, the College needed to leverage an endowment to fundraise in parallel with the renovations.

Campbell added that the new Upson 2017 renovation project provides student project teams with meeting spaces, build spaces, a rapid prototyping lab, and the Emerson Shop. It also has very few walls which allows the teams to grow, shrink and to start up new project teams. In addition, it also enables state of the art instruction (flipped classroom, computer lab, teaching labs); collaborative research and learning (bump out spaces, small, medium and large conference rooms); life sciences research (Erickson's lab: mobile/global health); and interdisciplinary robotics (human-robot collaboration, carbon 3D printer, rehabilitation robotics, indoor robotics testing). The renovation also provided a space to exhibit the historic Reuleaux Collection.

Campbell summarized by indicating that state-of-the-art facilities ease and lower costs in adapting and changing spaces, facilitate project teams, enable new teaching methodologies, create collaborative research space and attract new faculty and students.

Bioengineering

Marjolein van der Meulen, *James M. and Marsha McCormick Director of Biomedical Engineering, Swanson Professor of Biomedical Engineering, Nancy E. and Peter C. Meinig School of Biomedical Engineering*

Marjolein van der Meulen gave an overview on bioengineering. This field of bioengineering refers to the application of engineering principles to biology. Van der Meulen pointed out that bioengineering involves a wide range of faculty, covering most of the departments in the college, including: CBE (biomolecular), BME (biomedical), MSE (biomaterials), MAE (biomechanics), AEP (bio-imaging), Facilities (CNF Synchrotron, CCMR, MRI), BEE (biological), ECE (neuro-systems). She indicated that biomedical engineering sits in the overlap between engineering, medicine and the life sciences. Bioengineering is biology combined with engineering broadly. Bioengineering also has strategic synergies with Weill Cornell Medicine, the Jacobs Institute/Cornell Tech (high priority), and Life Sciences and Veterinary Medicine.

Van der Meulen indicated that the BME major was approved by New York State in June 2015 and that the first class of BME seniors will be graduating in Spring 2018 (74% female and 11% URM. The Class of 2019 is 82% female and 7% URM). She added that BME was ranked number 20 by the *US News and World Report* in 2017. Van der Meulen also pointed out that students acquire experiential learning through participation in project teams, such as iGEM (International Genetically Engineered Machine), Engineering World Health, and Engineers for a Sustainable World. Other experiential learning involves being undergraduate research assistants, undergraduate teaching assistants, and educational outreach activities. She pointed out that the Council is our customer and that we're producing biomedical engineers and other engineers for them to hire. She added that we need to instruct our students so that they are prepared for future industry needs.

Van der Meulen also discussed faculty and research opportunities through entrepreneurship (IP from research laboratories, faculty start-up companies) and research partnerships (broad strength in biomaterials; industry relies on academic research; federal support for research is declining). In summary, she indicated that are strengths in bioengineering are in the areas of biomaterials and drug delivery, optical imaging, and tissue engineering. She added that there are great opportunities in bioengineering as a result of the new undergraduate BME major, new interdisciplinary areas, global health, our entrepreneurial faculty, and research partnerships.

In conclusion, Van der Meulen noted that biological applications of engineering are a focus across the entire College of Engineering and bioengineering will be a factor that sets Cornell apart from its peers. In the future, there will be increasing collaboration between biomedical engineers and researchers in other fields and Cornell is in an excellent position to lead the field

since collaboration is one of our key strengths.

Energy, Environment, and Sustainability

Todd Cowen, *The Kathy Dwyer Marble & Curt Marble Faculty Director for Energy, Atkinson Center for a Sustainable Future (ASCF), Professor, School of Civil and Environmental Engineering, Director, DeFrees Hydraulics Laboratory*

Todd Cowen gave a presentation on energy, the environment, and sustainable engineering. He indicated that he has been working on energy and the environment since he began his career at Cornell. He discussed several energy initiatives including the Climate Action Plan, led by the Senior Leaders Climate Action Group (SLCAG) which is striving to make Cornell carbon neutral by 2035. He explained that the campus is a living laboratory where sustainability solutions are being developed, studied, implemented and evaluated through action-oriented partnerships between faculty, students, staff, and off-campus partners. In an effort to enhance faculty hiring the university has launched a series of initiatives. They target and elevate strategic, "radically collaborative" discipline areas that point the way toward the discoveries and solutions of tomorrow: data science, genome biology, humanities and arts, infection biology, nanoscale science and molecular engineering (NEXT Nano); the social sciences and sustainability. He pointed out that each area will have a dedicated task force led by faculty members.

Cowen discussed the recommendation of the sustainability task force which included: focus interdisciplinary research on the UN sustainable goals for 2030; fill critical intellectual gaps and enhance community with coordinated hires of 8 senior faculty; educate the next generation of sustainability professionals – a Ph.D. program; and create structures to support large, long-term, co-created interdisciplinary research programs. He also discussed the David R. Atkinson Center for a Sustainable Future's 2017 Academic Venture Fund Awards with faculty to stimulate innovative, impactful interdisciplinary research in sustainability at Cornell -- several engineering faculty were the recipients of these awards. He mentioned a few examples, such as the: Energy Smart Community (a 12,400 advanced metering infrastructure test bed) – leveraging virtual storage to turn advanced metering infrastructure into a smart service system; electric vehicle charging services (emerging infrastructure of solar and electric vehicle garage/charging facilities); Hi-Light Solution: artificial photosynthesis reactor (making solar fuels viable through efficient utilization and even distribution of sunlight in scalable reactor forms with novel functionalized catalysts); solar fuels (customer problems with solar fuel production, sub-optimal light delivery and poor energy balance).

Cowen also gave an overview of the Center for Transportation, Environment and Community Health(CTECH). Their vision is to pursue research and innovation to support sustainable mobility of people and goods while preserving the environment and improving community health. He highlighted the six research thrusts areas of CTECH: 1. Behavior, Active Transportation, and Community Health; 2. New Transportation Technologies and Business Models; 3. Green Multimodal Transportation Systems; 4. Freight Transportation and Community Health; 5. Data-Driven Transportation-Health Informatics; and 6. Energy, Technology and Policy Pathways. These multi-level, multidisciplinary and institutional collaboration will enable CTECH to advance transportation sustainability.

Cowen highlighted the areas of active research of the Cornell Energy Institute (CEI) which include: subsurface science and engineering; earth energy systems focused on geothermal energy and unconventional fossil; wind and water power -- aerodynamic and hydrokinetic energy; solar energy capture and conversion; advanced materials for energy storage; bioenergy, biofuels, and bio-products; multiscale computational modeling - molecular to process to LCA /TEA; energy systems for sustainable communities; energy systems management and integration -- Verizon data centers and cell tower cooling projects. He outlined the CEI's role in energy education which has a Sustainable Energy Systems minor for undergraduate and graduate students, 20 Energy models, three Energy program core courses (Analysis of Sustainable Energy Systems; Earth Energy Systems Behavior and Resources; Earth Energy Science and Engineering), and a weekly Energy seminar program with invited speakers. He added the AguaClara project team is an example of sustainability. AguaClara is a multi-disciplinary program at Cornell that designs sustainable water treatment systems committed to long-term environmental, social, and economic sustainability. He explained that this project team is currently assisting in the recovery effort in Puerto Rico by working on a prototype for a water treatment plant where no electricity is required.

Cowen concluded by indicating that the Atkinson Center and CornellTech are seeding cross-disciplinary teams with an external partner on a pathway to impact in the energy area. He believes that this is a tremendous opportunity for the College and that the ECC members can serve as connectors between the College and industry.

Breakout Sessions – October 27, 2017

During the afternoon session, the following questions were addressed:
1. Provide feedback and suggestions for ECC Task Force structure.
2. Propose opportunities and challenges each Task Force might tackle.
3. Determine the focus of each Task Force during this academic year.

Breakout Session Notes

New Educational Paradigm

Facilitator: Dan Simpkins

- Charge: Provide strategic counsel to enhance, transform, and disrupt traditional approaches to educating undergrad and graduate students.
- Recommended Text: *Designing the New American University*, by Crow and Dabars 2015
- Objective: Raise the bar for Cornell Engineering.
- Lower bars such as cost, and obstacles to succeeding at a university.
- Categories of Education
    - Processes
    - Programs
    - Metrics/Outcomes

- Define an educational experience that matches the students' needs to their professional interests.
- Experiential Learning: a central theme to providing a great education. How do we get everyone to gain this experience? Need to match students to the right experiential opportunities.
- Educational methods – changing role of Professor
- Mission of the College of Engineering – how can it educate maximum number of interested students without constraint to achieve the broader mission of Cornell University?
- Culture of change – how?
- What do students think about change?
- What is the mission of the Cornell Eng. College?
- What is impacting our ability to grow?
- What methods are used for what courses?
- How do we spread experiential learning?
- Portfolio based education: We want to know that our students have developed a portfolio (to communicate that they have relevant skills).
- Strategy that applies to undergraduates.
- Ability to meet demand across school/dept.
- Need programs that cover a wide range of students, backgrounds and interests.
- Role of interdisciplinary education
- Different roles for faculty: research/teaching
- Teaching excellence
- Role of distance learning

Capital Infrastructure

Facilitator: Lisa Walker

- Current situation- 4 phases
    - Gates
    - Upson
    - Hollister & Olin
    - Philips, Thurston & Bard
- Importance of Capital Campaign
    - Deferred Maintenance
    - Attract Faculty & Students
    - Lab Constraints today
    - Support current Standing of structures
- Constraints
    - Faculty (Labs, Start-up costs, Dual Career)
    - Students
    - Trustees-Need to raise sights-educate why needed

    - City
    - Integration w/University -Cornell Tech-Ithaca Campus
- Goal-$300M total
    - 50 million per year to fund $150M -Phase 3
    - Provide support for Development Team
    - Open New Doors
    - Work to Educate Alumni and be an ambassador
    - Pre-Silent Campaign
    - Feasibility/Naming Opportunities
- Sources of Funding
    - Alumni
    - Corporate
    - Private
- 2017-2018
    - Phase 3 underway
    - Secure support President Pollack and Provost Michael Kotlikoff
    - Presentation to BOT-approval
    - Feasibility study underway
    - Creative IDEAS to find and discover potential ways to make this happen.

Bioengineering

Facilitator: Craig Wheeler

- Bring the world into Bio Engineering at Cornell.
- Bring Cornell Bio Engineering into the world…Ithaca is isolated, how can they help faculty research move into industry.
- How do we measure success, are there other indicators of success other than US News and World Report rankings?
- Who do we want to be, world class or niche area research?
- *Cornell wants to be the best in everything, we need to decide what we want to be in BME.*
- Understand who is doing what, and the cost to be what we want to be.
- Understand current strengths.
- Who are the 25 companies we want to align with? How can ECC help with contacts?
- Junior level faculty, what are the incentives for junior faculty to engage with industry, why they came to Cornell, what promises were made, what does future look like.
- Atkinson Center model as energy and sustainability umbrella, should bioengineering be like that?
- If we interview faculty the sample size needs to be large.
- Spoke of having Bob Langer involved.

- Incentivize faculty to partner with Industry.

Energy, Environment, and Sustainability

Facilitator: John Swanson

- How do make Cornell attractive for energy conscious students?
- Cornell is a smart and net zero community.
- Help with Earth Source Heat financing.
- Private definition of problems/funding (seed list of partners)
- Battery Recycling (Tesla, etc.)
- Micro Grids (Ithaca/NYC, cost/obstructions)
- How can we help raise the energy profile of Cornell to potential students and partners?
- Adaptation and resilience (how do we save NYC?)
- Wind project (with PV, Tours, Education)