PA 510 Making the Smart Grid Work in the Real World

This is the second term of our two-term course series called **Designing the Smart Grid for Sustainable Communities**.

Spring 2015 (CRN 65367)
Wednesdays, 6:40 – 9:40 PM, from April 8 through June 10
URBN 204 (Distance Learning Center Classroom) – 506 SW Mill Street

**Introduction and Background**

Making the Smart Grid Work in the Real World is the second term in the two-term course series with the overall title of **Designing the Smart Grid for Sustainable Communities**.

During the Winter Term course component called The Smart Grid and Sustainable Communities: Making the Connections, 14 graduate students and 17 professional development students from throughout the Northwest and beyond learned the foundational concepts from a first-rate, six-person multidisciplinary faculty team and well-known guest presenters. The class included lectures, panel discussions, team projects, course readings tailored to a wide range of knowledge and experience, and optional field trips. The students also fine-tuned their ability to work effectively in multidisciplinary small group teams in preparation for the Spring Term projects described below.

We explored the implications of many of the new and emerging technologies and concepts that are associated with or can be enhanced by the “Smart Grid”: smart grid edge and core grid technologies, demand response, energy efficiency, energy storage, distributed generation, energy imbalance markets and other renewable resource integration strategies, and more. We also considered conceptual frameworks to help us explore these topics, learned about the existing physical grid and how it operates, and received a whirlwind history of the grid technology, markets, planning, and regulation.

Going well beyond the latest technological innovations and current practices, the course explored the implications of:

- The growth of “disruptive” technologies and financing models, calls for new business and regulatory models, related issues associated with the anticipated “utility death spiral”, and their relationship to the Northwest’s energy profile.
- Wholesale markets and managing variable resources in a fixed obligation world.
- Demand manipulation strategies by technology and pricing.
- Stakeholder hopes and concerns with smart meters, the smart grid, distributed generation, demand response, renewables integration, and other emerging technologies and business and financing models.
- Interoperability opportunities and challenges.
- The concepts behind the vision of “community energy sustainability”.
- New strategies to encourage the successful integration of more wind, solar, and other cleaner but more intermittent and distributed forms of energy.
- Calls for transformative change and the emergence dramatically different visions of our energy future.
- Workforce challenges and job opportunities associated with the transition to a greener energy economy.
The Spring Term course, called **Making the Smart Grid Work in the Real World**, has a project-oriented focus that will explore real world applications of technology and policy development. It will also feature new presentations from our expert faculty and additional guest speakers that will explore new topics and delve more deeply into issues we have already touched on. In addition, students will work together in **small group student teams** (their formal academic title is “Small Group Learning Communities”) on projects that determine if and how the Smart Grid and related technologies and approaches can support sustainable development and a cleaner and more sustainable energy future.

We want to emphasize that professional development students are also welcome to simply attend (or stream or watch later) class sessions, listen to the presentations from faculty members and nationally known guest speakers, and not get deeply involved in one of the small group projects if this becomes a burden. Professional development students are free to choose to participate fully, partially, or not at all in the small group projects. Of course, we will encourage all students to participate in a small group team if they are able since some of the learning in this class will emerge from the group process. But we will certainly understand if some can’t make this additional commitment. We will make sure that this course meets their needs as well.

During the first Spring Term class session, students will be asked to indicate whether they would like to be involved in a student team project. Those who are interested will be asked to submit their first, second, and third choices among the candidate projects. The one group of students who are required to join a student team are the graduate students taking this course for a letter grade; this is because their grade will be based primarily on their performance on their team’s project. Professional development students who want to join a student team will also be asked to provide an assessment, on a scale of 1-10, of how much time and effort they expect to be able to commit to their project. The faculty will take this information into account as we establish the composition of each student team, and team members will have a good idea of the level of commitment they can expect from their team members. We will do our best to ensure that students with strong preferences will be assigned to a project that interests them.

### Candidate Small Group Student Team Projects

The faculty team has been consulting with several potential partners – including the Northwest Power and Conservation Council, Portland General Electric, Smart Grid Northwest, demand response visionaries, and the Living Cully Ecodistrict - on fascinating candidate projects. A faculty member and a team of expert advisors will support each student team. During our final class session of Winter Term, the faculty presented a preliminary slate of potential projects and asked the class to help us narrow down and clarify the field by offering us guidance and a “straw vote.” Later that evening, we received one more idea for a candidate project from our partners at Portland General Electric. These candidate projects have been refined since the end of Winter Term and they will be refined further as the term progresses.

As the Spring Term begins there are five candidate projects for the class to consider. Each project proposal is discussed in some detail in the course website called **Candidate Projects for Student Teams**; just click on the topic to be taken to additional information. As a result, we will only offer a very brief summary here. Three of the project proposals emerged from discussions with the Northwest Power and Conservation Council’s Director of Power Planning. Each deals with a different aspect of the overall topic of how the smart grid, demand response, energy storage, and related technologies and strategies can be incorporated into the Council’s Seventh Northwest Power Plan, the guiding plan for the entire region over the next five years. To the best of our knowledge, never before has the Council allowed university students to participate in the development of key aspects of this important plan. It is very likely that senior Council staff and at least some Council members...
will attend our Public Form during the last week of class to receive the small group team’s reports and listen to their presentations. The other two projects are equally exciting. One involves working with the Living Cully Ecodistrict to explore the development of a community power project in the Cully neighborhood. The other involves working with Portland General Electric to explore the role that microgrids could play as a grid resilience strategy in preparation for a major earthquake or other natural disaster.

Depending on the number of students who enroll and the assessment of time and effort provided by the professional development students, we should be able to support at least three and possibly four projects.

**Faculty and Staff** (detailed faculty bios available at [http://www.pdx.edu/cps/faculty-for-smart-grid-courses](http://www.pdx.edu/cps/faculty-for-smart-grid-courses))

### Core Faculty:
- **Jeff Hammarlund**, Lead Faculty, Adjunct Professor and Senior Research Fellow, Mark Hatfield School of Government, PSU, and President, Northwest Energy and Environmental Strategies, hammarj@pdx.edu, 503-249-0240;
- **Ken Dragoon**, Principal, Flink Energy Consulting, LLC, k.dragoon@flinkenergy.com, 503-545-8172
- **Mark Osborn**, Senior Vice President, Five Stars International; mark.osborn@fivestarsintl.com, 503-709-9373

### Contributing Faculty:
- **Dr. Robert Bass**, Associate Professor, Department of Electrical and Computer Engineering, and Director, Power Engineering Laboratory, PSU, rbass2@pdx.edu; 503-867-4018
- **Michael Jung**, Policy Director, Silver Spring Networks, mjung@silverspringnet.com, 503-360-3881
- **James Mater**, Co-founder and General Manager of Smart Grid Business Unit, QualityLogic; Chair, Board of Directors, Smart Grid Northwest, jmater@qualitylogic.com, 503-780-9796
- **Pamela Morgan**, President and Principal Consultant Graceful Systems, Pamela@gracefulsystems.com; 503-701-2875

### Graduate Student Assistant: Lauren Patton, Masters of Urban & Regional Planning Candidate, lapatton@pdx.edu; 503-726-6034

### Course Readings

Many of the course readings for Spring Term will be posted and available on the course's password protected online learning platform (D2L) or can be accessed with links from the course syllabus.

In addition, we will be using Eugene Bardach’s gem, *A Practical Guide for Policy Analysis: The Eightfold Path to More Effective Problem Solving*, during the second week of class. The 4th edition is the most recent one. We have requested that the PSU Bookstore order 15 copies of this edition. You might be able to find cheaper used copies or copies of earlier editions from other booksellers.

We used three books during the Winter Term. They are:
- **Peter Fox-Penner**, *Smart Power: Climate Change, the Smart Grid and the Future of Electric Utilities*, 2014 (best to get the new, 2014 "anniversary edition")
- **Tony Seba**, *Clean Disruption of Energy and Transportation*, 2014; and
- **Fereidoon P. Sioshansi** (editor), *Smart Grid: Integrating Renewable, Distributed & Efficient Energy*, 2012 (this book is more expensive; consider cheaper options such as renting,
We may not assign specific chapters from these books during the Spring Term, but they do offer valuable background that should be helpful for those students who are joining us for the first time during Spring Term. We particularly recommend newcomers get ahold of copies of Peter Fox-Penner’s *Smart Power* and Tony Seba’s *Clean Disruption*. We have asked the PSU Bookstore to order 5-7 copies of these two books. Sioshansi’s *Smart Grid* book would also be useful, but it will not be as important for the Spring Term course. Plus, it is more expensive. If you are a newcomer and want access to this book, you might want to consider renting it or purchasing it through Kindle or other options. We have not placed a new order for this book through the PSU Bookstore.

We also encourage you to sign up for three free electronic news services related to this class, at least during Spring Term. They are:

- [Greentechmedia](#)
- [Smart Grid News](#)
- [Utility Dive](#)

In addition, we have received permission to post on D2L the weekly issue of *Clearing Up*, covering Northwest energy news, for our use while you are in this class.

### Course Sponsors

We could not offer a course with such a strong and diverse faculty team of recruit talented guest speakers without the generous financial support from companies with a strong local and regional presence that believe that the Smart Grid can make important contributions to a cleaner and more sustainable energy future. We would like to thank [Portland General Electric](#) for offering leadership and guidance, plus critical financial, faculty and technical support all five year’s we have offered this course, and [Intel Corporation](#) for offering valuable support for four years. In addition, [Smart Grid Northwest](#) and [Climate Solutions](#) have helped us inform potential students about the availability and value of this course series. Other companies with a strong Northwest presence are currently in the midst of deciding whether they will join us as course sponsors.

### Preliminary Course Schedule

Given the project-oriented focus of our Spring Term course, we won’t know which candidate projects will be selected until April 15. Our recruitment of guest presenters and the members of the advisory team for each of the small group teams sessions and advisory council members will depend largely on which student team projects that the class selects during the first two weeks of the term. As a result, it is not yet possible to provide a complete syllabus. However, we can offer a preliminary course plan. This will be converted into a full course syllabus as additional information become available.

#### Week 1: April 8

**Class Objectives:**
1. Develop a basic understanding of all candidate student team projects various student teams will be working on during Spring Term, how the project selection and team member selection process will work, and how student work will be evaluated.
2. Understand the roles and responsibilities of members in Small Group Learning Communities (Student project Teams)
3. Revisit (or for newcomers visit for the first time) an the Territory Map introduced during Week 1 of Winter Term, updated to reflect the student team projects.

**Agenda**
Module 1: Presentation of candidate student team projects (all core faculty)

- How the selection process works/distribute Individual Assignment 1 (Jeff)
- Role of Small Group Learning Communities /student teams (Jeff)
- Assignments and grading (Jeff)

Assignments for Week 1
Individual Assignment 1 will be presented in class and is due by 5 pm on April 11.

Reading Assignment for Week 1 (most of this will be review readings for winter term students)
Priority Reading:
Course texts:
- Fox-Penner, Smart Power: Climate Change, the Smart Grid, and the Future of Electric Utilities, chapters 1-3
- Sioshansi, Smart Grid: Integrating Renewable, Distributed & Efficient Energy, Introduction and Chapter 1

Posted on Desire to Learn (D2L):
- Friedman, The Energy Internet: Where IT Meets ET
- GTM Research, Grid Edge – Utility Modernization in the Age of Distributed Generation

Web links:
- Litos Strategic Communications for US DOE, The Smart Grid: An Introduction

Additional Recommended Reading:
Web links:
- Litos Strategic Communications for US DOE, Smart Grid Primers (targeted toward different stakeholder groups)

Week 2: April 15

Class Objectives:
1. Learn what policy analysis is, the basic orientations of policy analysis, and the various roles that policy analysts perform
2. Become aware of a set of practical, best practice tools that have proven to be useful in policy analysis.
3. Learn how these tools have been helpful in the realm of energy policy analysis, and how they might be useful in the work that the student project teams will engage in this term.

Agenda:
6:40 Announcements
6:50 Module 2: A “Tool Kit” to help Student Teams analyze, organize, and prepare their project reports and recommendations: Jeff Hammarlund
Assignments for Week 2
Small Groups meet and receive Student Team Assignment 1: Preliminary Problem Statement, Work Plan, and Group Communication Strategy, due by April 22 at 5 pm. Each student team should place their response in D2L Dropbox. Faculty will try to provide feedback by Noon on April 25.

Reading for Week 2
Course Text:

Week 3: April 22

Class Objectives for Module 3
(To be completed; awaiting guidance from our speakers)

Class Objectives for Module 4
(To be completed; awaiting guidance from our speakers)

Agenda:
6:40 Announcements

6:50 Module 3: The Roles, Challenges, and Opportunities of Solar Energy and their Relationship with the Smart Grid, Part 1: Ryan Edge, Research Analyst, Solar Electric Power Association (and an alum of this course)
- US solar market, growth trends, distributed generation versus utility-scale
- New utility programs such as community solar, key account offerings, and utility-ownership of rooftop solar
- Smart grid, advanced inverters, locational deployment

7:40 Module 4: Overview of Community Power Movements: Pamela Morgan and Jaime Valdez, Policy Director, Northwest Sustainable Energy for Economic Development (Northwest SEED)
- Solar gardens
- Community choice aggregation
- Community shared solar
- Planning/coordination with the utility (Minneapolis)
- Municipalization (Boulder)

8:10 Break
8:20 Module 4 continued
9:15 Student project teams meet (time permitting)
9:40 Adjourn
Assignments for Week 3
Student Team Assignment 1 due by 6:40 pm; faculty will try to provide feedback by Noon on April 26 or within four days after it is received.

Reading for Week 3, Module 3
Course texts: None

Posted on Desire to Learn (D2L):
- Taylor et al (SEPA and NREL), Value of Solar-Program Design and Implementation Considerations, March 2015 (read at least the executive summary)
- Edge et al, (SEPA and EPRI), Locational Deployment of Distributed Solar (read at least the executive summary)
- Campbell et al (SEPA), Expanding Solar Access through Utility Led Community Solar

Web Links:
- Edge (SEPA), Utility’s Solar Record 2014 Q4: More Projects, More Diversity
- Edge (SEPA), Utility-Scale Solar in 2014: Unpredictable, Diverse, and Counting Down to Sunset

Reading for Week 3, Module 4
Priority Reading:
Course texts:
- Seba, read or reread sections of Chapter 2 involving participatory finance.

Posted on Desire to Learn (D2L):
- Mackres and Zazerooni (ACEEE), Local Energy Planning in Practice: A Review of Recent Experiences
- Farrell (Institute for Local Self-Reliance), Advantage Local – Why Local Energy Ownership Matters
- Coughlin et al (Northwest SEED for USDOE), A Guide to Community Shared Solar
- Morgan (Graceful Systems), A Blueprint for Electricity-Energy Services in Fertile Ground submission to Solar Electric Power Association’s The 51st State project
- City of Minneapolis Memorandum of Understanding Clean Energy Partnership with Xcel
- City of Minneapolis Memorandum of Understanding Clean Energy Partnership with CenterPoint Energy
- Smart Grid Insights (Zpryme), Fact or Fiction: The Municipal Utility Revolution, 2014

Web Links:
- Solar Gardens Community Power, A Brief History of Solar Gardens
- Creyts and Mauer (greentechmedia), Microgrids and Municipalization: Can You “Micro-Municipalize” a Utility?
- Bhave (RenewableEnergyWorld.com), Microgrids Create Municipalization Benefits
- St. John (greentechsolar), Community Solar Developers Take Baby Steps into Potentially Huge Market
Websites for Relevant Resources:
- Northwest Sustainable Energy for Economic Development (SEED) Website
- Clean Energy Collective Website
- Community Power Network Website
- Institute for Local Self Reliance Energy Website
- DC Sun (DC Solar United Networks) Website
- Center for Social Inclusion Energy Democracy for All Website

Additional Recommended Reading
D2L:
- Bourgoie et al (PACE Energy and Climate Center), Community Microgrids: Smarter, Cleaner, Greener
- Giancaterino et al (Center for Social Inclusion), Community-Scale Energy-Models. Strategies and Racial Equity

Week 4: April 29

Class Objectives:
(To be completed; awaiting guidance from our speakers)

Agenda:
6:40 Announcements
6:50 Module 5: The Roles, Challenges, and Opportunities of Solar Energy and their Relationship with the Smart Grid, Part 2: Mark Osborn and Tom Starrs, Vice President, Market Strategy and Policy, SunPower Corporation;
- Solar and solar integration technologies
- US solar market, growth trends, distributed solar, and utility-scale solar
- New development such as the rise of the “prosumer”, combining solar and storage in rooftop and utility scale solar, community solar, key account offerings, and utility-ownership of rooftop solar
- Smart grid, advanced inverters, locational deployment
- Load defection, value of solar, net metering, rate design and other solar policy issues
- Hawaii as a case study
8:10 Break
8:20 Module 5 continued
8:55 Module 6: An Introduction to Microgrids: Mark Osborn
9:40 Adjourn

Assignment for Week 4
Student Team Assignment 2: Revised Problem Statement, Work Plan, and Group Communication Strategy, due by Monday, May 4 at 5 pm. Each student team should place their response in D2L Dropbox.) Faculty will try to provide feedback by Noon on May 8 or four days after it is received.

Readings for Module 5
Priority Reading:
Course Texts:
- Seba, read or reread chapters 1 and 2
• Fox-Penner, read or reread chapter 8 sections on solar
• Sioshanssi, read or reread chapters 5 and 7

**D2L:**
• Kennerly and Proudlove (NE Clean Energy Technology Center for US DOE), *Going Solar in America: Ranking Solar’s Value to Customers*, 2015
• Bronski et al (Rocky Mountain Institute), *The Economics of Load Defection*, Executive Summary, April, 2015
• Smart Inverter Working Group (for the California Energy Commission and the California Public Utilities Commission), *Recommendations for Utility Communications with DER Systems with Smart Inverters* (read at least sections 1 and 2)

**Web Links:** (Note: most of these articles are short and can be read very quickly; they often suggest further readings if you want to go further with the topic.)

- Caldwell (New York Times), *Sun Power Battles Puts Hawaii at Forefront of Worldwide Changes*, April 18, 2015 (Make sure to watch the short video too)
- Trabish (Utility Dive), *Why Utilities Could Soon Face Massive Load Defection, and How they Can Prevent It*
- Lacey (greentechsolar), *Rise of the Prosumer: Will Homeowners Ever Be More Important than Power Plants?*
- Lacey (greentechsolar), *Rise of the Prosumer: Will Homeowners Ever Be More Important than Power Plants?*
- Lacey (greentechmedia), *Storage Is the New Solar: Will Batteries and PV Create an Unstoppable Hybrid Force?*
- Pyper (greentechsolar), *Report: Solar is Cheaper than the Grid in 42 of the 50 Largest US Cities*
- Walton (Utility Dive), *Inside the Utility Industry’s 2015 Playbook*
- Trabish, (Utility Dive), *The Fight Over Solar Moves from Net Metering to Rate Design*
- Trabish, (Utility Dive), *What the Solar Market Looks Like Now, and Where it’s Headed*
- Wesoff (greentechsolar), *Solar Summit Slide Show: The Evolution of Solar*
- Trabish (Utility Dive), *New Polls: Americans Love Solar More than Any Other Type of Energy*

Short web link articles that focus on Hawaii, the bellwether state that is addressing key issues now that many other states are expected to address, in some variation, down the road:

- Caldwell (New York Times), *Sun Power Battles Puts Hawaii at Forefront of Worldwide Changes*, April 18, 2015 (Make sure to watch the short video too)
- Walton (Utility Dive), *Hawaii Can Get to 100% Renewables, 70% in Short Term*
- St. John (greentechsolar), *How HECO is Using Enphase’s Data to Open its Grid to More Solar*
- St. John (greentechmedia), *Can Microinverters Stabilize Hawaii’s Shaky Grid?*
- St. John (greentechsolar), *Charting Hawaii’s Spectacular Solar Growth*
- Wesoff (greentechgrid), *NextEra’s Bid to Acquire Hawaii’s Grid Might Have Unintended Consequences*
- Travish (Utility Dive), *Hawaii Lawmakers Consider Bill to Check NextEra-HECO Merger*
- Wesoff (greentechsolar), *Friction at the Grid Edge: Hawaii’s PUC Orders HECO to Approve Solar Rooftops*
Walton (Utility Dive), *Maui Mayor Floats Splitting with Hawaiian Electric, Creating Public Utility*
Walton (Utility Dive), *What Will NextEra’s Acquisition of HECLO Mean for Solar Energy?*
Mangelsdorf (greentechsolar), *PV in Hawaii 2014: The Roller Coaster Ride*
Walton (Utility Dive), *Regulators: HECO Must Continue to Interconnect Rooftop Solar Systems*
Wesoff (greentechsolar), *Hawaii’s Utility Is Approving a Backlog of More Than 3,000 Solar Installations*
St. John (greentechsolar), *Hawaii’s Biggest Utility Wants to Ditch Solar Net Metering*
*NRG Energy Exec Questions Why Solar Is the Bad Boy, While Efficiency Is Good*
Sevenije (Utility Dive), *Hawaii’s Overhaul of the Utility Business Model*

**Additional Recommended Readings**

**Web Links:**
- Tabish (Utility Dive), *CPUC Head: California Grid Can Soon Handle 100% Renewables*
- Trabish, (Utility Dive), *Where the Energy Storage Expansion Will Happen First and Why*
- Weshoff (greentechgrid), *These States Are the Early Leaders in the US Energy Storage Market*
- Trabish (greentechsolar), *Is Utility-Scale Solar Really Cheaper than Rooftop Solar?*

**Web links focusing on SunPower Corporation and a few of its competitors:**
- Tweed (greentechgrid), *EnerNOC and SunPower Partner to Blend Commercial Solar With Energy Market Intelligence*
- Tweed (greentechgrid), *Sunpower Invests $20M in Tendril to Link Solar with Home Energy Management*
- Wesoff (greentechsolar), *SunPower Is Tripling Solar Capacity, Boosting Cell Efficiency, Adding Energy Management and Storage*
- Fitspatrick (RenewEconomy), *Sunpower to Add Storage to Solar in New Homes*
- Tweed, (greentechsolar), *SunEdison’s Next Market: Solar Minigrids and Micropower Stations for the Energy Poor*
- Trabish, (Utility Dive), *SolarCity Partners with Google’s Nest to Integrate Smart Thermostats with Rooftop Solar*

**D2L:**
- Read full reports of other Priority Reading items

**Readings for Week 4, Module 6**

**Priority Reading:**

**Course texts:**
- Sioshansi, read or reread Chapter 8 (What Role for Microgrids)

**Web Links:**
Note the first three links are especially for students who will benefit from introductory readings on microgrids. Feel free to skip these and move to the last if they are too basic.
- USDOE, *The Role of Microgrids in Helping to Advance the Nation’s Energy System, How Microgrids Work*, and *Microgrid Activities*
- Gilpan (TechRepublic), *Microgrids: 5 Things to Know*
• Berkley Lab, *About Microgrids, Microgrid Definitions, Types of Microgrids, and Examples of Microgrids*
• Bass (energybiz), *Microgrids and Distributed Generation Will Change Our Energy Futures*
• Backhaus et al (Los Alamos National Laboratory), *DC Microgrids Scoping Study—Estimate of Technical and Economic Benefits*, 2015, (read at least the executive summary)
• Bower et al (Sandia National Laboratories), *The Advanced Microgrid: Integration and Interoperability* (read at least the executive summary)
• Creyts and Mauer (greenTechMedia), *Microgrids and Municipalization: Can You 'Micro-Municipalize' a Utility?*
• Bhave (RenewableEnergyWorld.com), *Microgrids Create Municipalization Benefits*

Additional Recommended Readings
• Read full reports of other Priority Reading items

Week 5: May 6

**Module 7: Consultation Session between Members of the Living Cully Community Power Project Student Team and their Advisory Team.** All other class participants observe and are welcome ask questions toward the end of the session.

**Client for this project:** [Living Cully Ecodistrict](#). The primary point of contact is Tony DeFalco, **Living Cully Coordinator**, who is based at Verde. Tony has also agreed to serve as a member of the Advisory Team for this project. The four Cully-based community development organizations that collaborate on Living Cully are:

- **Verde**, a unique social venture organization that builds environmental wealth through social enterprise, outreach, and advocacy.
- **Hacienda Community Development Corporation**, dedicated to providing affordable housing and economic development to immigrants and their families.
- The **Native American Youth and Family Center**, a holistic, wraparound services organization for Native Americans that is youth centered, family driven, and elder guided.
- **Habitat for Humanity Portland/Metro East**, which has decided to focus its Neighborhood Revitalization efforts in the Cully community.

**Invited Team Cully Advisory Team members.** (Note: a few advisory team members will not be able to attend this session due to schedule conflicts. They have offered to help recruit someone else from their organization or with a similar skill mix. As an alternative, they will attempt to address the student team’s questions by email, phone, or a separate meeting.)

- **Rob Bennett**, CEO of [Ecodistricts](#), or another staff member of advisor Rob and recommends and recruits.
- **Shanna Brownstein**, Manager Governmental & Community Affairs, NW Natural, and founder of [Women in Sustainability and Environment (WISE)](#). Shanna is interested and will seek to recruit an appropriate person from NW Natural to participate.
- **Tony DeFalco, Living Cully Coordinator**, Verde
- **Jackie Dingfelder**, Senior Policy Director, Portland Mayor Charlie Hales, City of Portland. Jackie is also a PhD student in Public Policy at PSU’s Hatfield School of Government. (Jackie has advised she has another commitment on May 6 but is attempting to recruit another appropriate representative of the City of Portland.
- **Sheila Holden**, Regional Community Manager, Pacific Power (Sheila has advised she cannot join us on May 6 but will attempt to find an appropriate representative from PacifiCorp who can.)
- **Dwayne Johnson**, Co-founder and Partner at ScaleUp Partners LLC and self-described “Social Alchemist”.
• **John Sorenson**, former Executive Director, N2e, which John describes as “community empowerment, energy efficiency, sustainability all rolled into a neat package called district or neighborhood energy. Neighborhood scale heating and cooling that is far more energy and finance efficient and adaptable than our individual/separate building model.”

• **Jaimes Valdez**, Policy Manager, *Northwest Sustainable Energy for Economic Development* (Northwest SEED). Until recently, Jaimes was an Energy Policy Analyst and Renewable Energy Specialist with City of Portland’s Bureau of Planning and Sustainability, where he managed Solarize Portland and Solar Forward. Jaimes is also a professional development student in this class. (Invited and accepted). [Northwest SEED’s website](http://www.nwseed.org) indicates they offer a range of services, including project technical assistance, education, and research and advocacy. Jaimes should be able to help us identify if we qualify for any of these services. They have a number of free and relevant [publications](http://www.nwseed.org/publications) available on its website.

• **Ben Walsh**, Green builder currently working on two projects in the Cully neighborhood and a student in this class.

**Agenda:**

6:40 Announcements
6:50 **Consultation Session between Members of the Living Cully Community Power Project Student Team and their Advisory Team** (Note: The approach and consultation questions will be determined in advance by the student team)
8:00 Break
8:10 Consultation Session continued. Questions from class members who are not members of this student team are accepted during the last 15 minutes of this session
9:00 Consultation session concludes and advisory team members are thanked
9:05 Student teams meet
9:40 Adjourn

**Readings for Module 7**

Note: While class readings for this session are particularly important for the student team members of the Cully Community Energy Project, we encourage other class participants to read them as well. Many of the readings listed for Module 4 above are also relevant for this module. In addition, we offer readings that are particularly appropriate for this module and consultation session.

**Priority Reading:**

**Course texts:**

• None

**D2L Articles about Cully Neighborhood and Living Cully:**

• Enlow and Hesselgrave (Ecotrust), *Verde and Living Cully-A Venture in Place Making*
• DeFalco, *Living Cully Ecodistrict-Sustainability as an Anti-Poverty Strategy*
• Energy Democracy for All, *Living Cully*
• Enlow (Ecotrust), *Building Cully Park-Social Equity in America’s Greenest City*

**D2L Articles about Options to Consider for Cully:**

• Farrell (Institute for Local Self-Reliance), *Advantage Local – Why Local Energy Ownership Matters*
• Campbell et al (SEPA), *Expanding Solar Access through Utility Led Community Solar*
• Farrell (New Rules Project), *Community Solar Power-Obstacles and Opportunities*
• Farrell (Institute for Local Self Reliance), *Beyond Utility 2.0 to Energy Democracy*
• Campbell et al (SEPA), *Expanding Solar Access through Utility Led Community Solar*
• Giancatarino et al (Center for Social Inclusion), *Community-Scale Energy-Models, Strategies and Racial Equity*
• Berry et al (Compass and Portland Sustainability Institute), *Neighborhood Infrastructure-Doing More with Less (District Energy and Microgrids)*
• McConnell et al (Interstate Renewable Energy Council), *Easing the Transition to a More Distributed Electricity System*

**Web Links about Cully Neighborhood and Living Cully:**
• [Living Cully Vision Statement](#)
• [Living Cully Facebook Page](#)
• Banuelos et al (Portland State University Master of Urban Planning Workshop), *Not in Cully: Anti-displacement Strategies for the Cully Neighborhood* (Note: Additional background documents are also available)
• DeFalco (Climate Solutions), *How a Strip Club Becomes a Climate Justice Solution*
• Hipolito (IndoGoGo), *Let Us Buy the Sugar Shack!*
• Bernard (Emerald Cities Collaborative), *Bridging the Green Divide in Portland*
• Bingham (the Oregonian), *Cully Residents Tell PSU Students Worries about Northeast Portland Gentrification*
• Portland Parks and Recreation, *Portland Parks & Recreation, Verde Secure Major Federal Grant for Thomas Cully Park*

**Web Links about Options to Consider In Cully:**
• Trabish (Utility Dive), *Why Utilities Across the Nation Are Embracing Community Solar*
• Creyts and Mauer (greentechmedia), *Microgrids and Municipalization: Can You ’Micro-Municipalize” a Utility?*
• Bhave (RenewableEnergyWorld.com), *Microgrids Create Municipalization Benefits*
• Capage (greentechsolar), *Community Solar: Key Considerations in Designing a Successful Program*
• Capage (greentechsolar), *Designing Community Solar Programs to Manage Risk*

**Additional Recommended Reading:**
**Web Links:**
• Ecodistricts, *Resources (Portland Pilot Projects and District Utilities and Case Studies)*

**Week 6: May 13**

**Module 8: Consultation Session between Members of the Northwest Smart Grid Technology Assessment Student Team and their Advisory Team.** All other class participants observe and are welcome to ask questions toward the end of the session.

Advisory Team members: In process.
Module 9: Consultation Session between Members of the Microgrids as a Grid Resilience Strategy Student Team and their Advisory Team. All other class participants observe and are welcome to ask questions toward the end of the session.

Advisory Team members: In process.

Assignment for Week 6
Student Team Assignment 3: Detailed Report Outline for the Living Cully Community Power Project Team due by 6:40 pm.

Readings for Module 8 and 9
To be determined.

Week 7: May 20

Module 10: Consultation Session between Members of the Development of a Regional Demand Management Strategy Student Team and their Advisory Team. All other class participants observe and are welcome to ask questions toward the end of the session.

Assignment for Week 7
Student Team Assignment 3: Detailed Report Outline, due May 20 by 6:40 pm for the Northwest Technology Assessment Team and the Microgrids as a Grid Resilience Strategy Team. For the members of the Development of a Regional Demand Management Strategy Student Team, the Detailed Report Outline is due by May 23 by 6:40 pm.

Readings for Module 10
To be determined.

Week 8: May 27

Module 9: An Evening with a Smart Grid Dream Team
Invited Speakers:
- Ron Ambrosio, IBM Distinguished Engineer & CTO, Smarter Energy Research, Thomas J. Watson Research Center, New York
- Edward Cazalet, CEO and founder of TeMix Inc., a transactive energy services company, and author of Transactive Energy: A Sustainable Business and Regulatory Model for Electricity; named by Public Utilities Fortnightly as “innovator of the year”
- Paul De Martini, Managing Director, Newport Consulting Group
- Erich Gunther, Chairman, CTO and Co Founder, EnerNex

Assignment for Week 8
Student Team Assignment 4: First Draft of Report due for all Student Teams on May 27 by 6:40 pm.

Readings for Module 9
To be determined.

Week 9: June 3

Syllabus: PA 510 Making the Smart Grid Work in the Real World
Spring Term, 2015

Mark O. Hatfield School of Government
Portland State University
Student Teams give dry run presentations with critiques from faculty and students.

**Assignments for Week 9**
Student Team Assignment 5: Draft Presentation and Slides due in class.

**No new readings.**

**Week 10: June 10**

**Smart Grid Public Forum: Powering the Future**
Presentations by student project teams to a select audience of senior energy professionals, community leaders, and potential employers.

**Assignments for Week 10**
Final Draft of Presentations due on June 10 at the Public Forum.
Final Draft of Reports due on June 14 at 5 pm.

**No new readings.**

**Other Course Information**

**Optional Field Trip:**
There will be an optional class field trip related to our case study projects. More information will become available as it develops.

**Evaluation of student work:**
Course evaluations and grades will be based on student performance in four areas. The six small group Student Team assignments will focus on the various steps that will lead to the final group report and final group presentation will count for 30% of the grade. Each assignment will be worth 5 points for a total of 30 points. They are:

- Student Team Assignment 1: Preliminary Problem Statement, Work Plan and Group Communication Strategy
- Student Team Assignment 2: Revised Problem Statement and Work Plan
- Student Team Assignment 3: Detailed Report Outline
- Student Team Assignment 4: First Draft of Report
- Student Team Assignment 5: Draft Presentation and Slides
- Student Team Assignment 6: Near-Final Draft of Report

The Final Report (Green Paper) itself will count for 35% of the grade (and 35 points) and the Final Group Presentation given at the June 10 Public Forum will count for 25% (25 points). Class participation, observance of due dates, and attendance will count for the remaining 10% (10 points).

The faculty will ask all students to complete an evaluation of the small group learning community process as a whole, a self-assessment of the student’s participation in this process, and an anonymous assessment of the level of participation and performance of fellow group members. This information will play a significant role in the final evaluation of each student’s performance in the course.

Students taking the course for professional development are encouraged to participate actively in their small group learning communities if possible. This is where a significant amount of your
learning will take place. Some organizational sponsors may require an evaluation of performance as a condition for reimbursing course payment. The faculty will follow their direction and/or we will establish an understanding with the organizational sponsor.

Grades will be determined as follows:

- **A** = 93%
- **A-** = 90%
- **B+** = 87%
- **B** = 83%
- **B-** = 80%
- **C+** = 77%
- **C** = 73%
- **C-** = 70%
- **D+** = 67%
- **D** = 63%
- **D-** = 60%
- **F** = below 60%

### Late Assignment and Report Submission Policy

Unless arrangements have been made with us well in advance, late assignments will be assessed a late penalty of one grade increment for every day late. Please plan your schedule accordingly.

### Desire2Learn (D2L)

We have activated a D2L site for this course. If this is the first time you are using the D2L, please go to the following site for instructions.


To log in, go to the following site: [https://d2l.pdx.edu](https://d2l.pdx.edu).

### Attendance and Etiquette

Please email Jeff Hammarlund and Lauren Patton in advance if you are normally attending the class live and will need to miss a class session. You will be able to view the session as early as the next morning by going to the appropriate week on D2L. Please come to class on time and turn all cell phones off.

### Faculty Office Hours

This becomes difficult since all members of the faculty team have other full time jobs. However, it is possible to email or phone faculty members. In addition, Jeff Hammarlund will hold semi-regular office hours on Thursday mornings between 10 am-12 Noon. If you make prior arrangements, you can meet him in person at his home office or speak with him by phone. The other three core faculty members are available by appointment.