

PA 510
**Creating Oregon's Smart Grid Policy:
You be the Architect**
Spring Term 2011

Winter Term, 2011

Tuesdays 6:40-9:40 PM

Course website: <http://www.pdx.edu/eli/smartgrid>

Log in to course content at PSU's [Desire2Learn](#) (for registered course participants; enter your username and password to be provided by Ken Nichols, then click on course title)

Urban Center 204

(Distance Learning Center 204)

506 SW Mill, PSU campus

Faculty and Staff

- **Jeff Hammarlund**, Adjunct Professor and Senior Research Fellow, Mark Hatfield School of Government, PSU, and President, Northwest Energy and Environmental Strategies, hammari@pdx.edu; 503-249-0240
- **Conrad Eustis**, Adjunct Professor, PSU's Executive Leadership Institute, and Director, Retail Technology Development, Portland General Electric, evening (preferred), c.eustis@gmail.com, 503-229-0621; day 503-464-7016,
- **Michael Jung**, Policy Director, Silver Spring Networks, mjung@silverspringnet.com; 503-360-3881
- **James Mater**, Director, Co-Founder, and Smart Grid Interoperability Evangelist, QualityLogic, and Founding Board Member, Smart Grid Oregon, jmater@qualitylogic.com, 503-780-9796
- **Ken Nichols**, course alumni from last year, now Director, Ecofys US consulting firm, former Director, Risk Management, TransCanada US, kwnichols@comcast.net, 503-803-0832
- Plus fabulous guest speakers.

Course Description

This class is the latest in a series of innovative and interdisciplinary graduate level courses offered over the past three years to explore a set of emerging concepts, technologies, applications, and business models, and the complex trade-off decisions related to transforming the nation's century-old, centralized power grid into a more climate, sustainable-energy, and consumer-friendly "Smart Grid."

Visionaries believe that this emerging "internet for energy" will enable individuals and businesses alike to participate in both the quality and quantity of energy they use to live and work, generating and storing energy from multiple sources, and managing the amount and timing of their use of that energy. They contend the Smart Grid will integrate generation from both directions – home/business and central station plant – and move it as needed to meet load while incorporating solar panels, wind farms, fuel cells, plug-in hybrid electric vehicles, and other energy sources. This intelligent electric network will manage load shape and will achieve greater utilization than today. Its full value will be achieved when it is combined with an emerging participatory network model that enables consumers to actively manage their electricity consumption and sell back to the grid the surplus power they generate.

The concepts, technologies, and models addressed by this course hold the promise of a significant new paradigm for the generation, use and delivery of electric power that is more efficient, sustainable, robust, flexible, and environmentally sound, and that encourages a much higher level of consumer participation and control. Converting to the Smart Grid also opens up additional opportunities to make other infrastructures (including waste water, transportation, telecommunications, and natural gas) greener and more sustainable during the Smart Grid conversion process.

This spring term, we will take a “deep dive” into the fascinating efforts to develop an effective Smart Grid “policy roadmap” for Oregon. Ideally, a Smart Grid policy roadmap would include three key elements: an assessment of the current situation prior to the widespread introduction of the Smart Grid, a vision of a preferred situation at some point in the future (say 2030), and a pathway or strategy to move the electricity industry in particular and society more generally toward this vision.

We will go far beyond simply analyzing the key issues and debates that are swirling around the still emerging set of concepts, technologies, applications and business models that could transform the nation’s century-old, centralized power grid into a climate, renewable-energy, and consumer friendly “Smart Grid.” By proposing elements of a policy roadmap, student teams will also offer their policy recommendations to senior policy makers themselves. The teams will prepare decision memos and briefing books that present and support their recommendations to a volunteer Smart Grid Policy Review Panel comprised of policy experts associated with Smart Grid Oregon, the Oregon Public Utilities Commission (OPUC), Oregon’s and other interested utilities, and other relevant Oregon public policy-makers and stakeholders. And they will do so at a critical time, when options are still emerging and stakeholders are particularly open to new ideas and approaches.

The OPUC Commission has launched two historic investigations to establish a framework that will guide investor-owned utilities as they launch their Smart Grid planning efforts, and explore the appropriate role for utilities in the development of Oregon’s electric vehicle (EV) charging infrastructure. Meanwhile, consumer-owned utilities in Oregon and throughout the region are collaborating with the Bonneville Power Administration to consider how they can take advantage of the Smart Grid’s benefits. Many other stakeholders are engaged in these discussions, including a new trade association (Smart Grid Oregon), groups concerned about consumer protections (Citizens’ Utility Board), EV companies, state agencies, and environmental coalitions. Many are eager to share their ideas with you; they are equally interested in hearing your suggestions.

In addition to getting a “ring-side seat” to observe and perhaps even influence the shaping of public policy associated with Smart Grid policy in Oregon, students will also receive extensive guidance on how to actually do public policy analysis. With the help of two of the most respected practical guides to effective policy analysis, and the support of faculty who bring to the class many years of “real-world” experience as professional energy policy analysts, students will be in an excellent position to apply their new policy analysis skills to the emerging Smart Grid policy arena. These analytical skills will be just as valuable when applied to other public policy issues. While this class will focus on issues related to Smart Grid policy in particular and energy policy more generally, the analytic skills you develop in this class can transfer to other public policy domains as well.

Depending on the number of course participants, students will form 1-3 policy teams (we call them small group leaning communities) and select a current Smart Grid-related policy topic from a range of options recommended by the faculty and the Smart Grid Policy Review Panel. The topic could be as broad as the general outline of a Smart Grid Policy Roadmap to support and accelerate smart grid implementation in Oregon. Or it could focus more precisely on one of a series of components that could be addressed in a more comprehensive roadmap.

Candidate roadmap components include:

- The role of electric utility rate structures to achieve smart grid goals;
- Strategies to ensure that low-income customers are supported by the Smart Grid;
- The criteria regulators and other policy makers should use to assess the value of specific elements of smart grid plans proposed by utilities and other stakeholders;
- The role of third party providers in wholesale markets to support the development and integration of renewable energy and demand response (e.g. “virtual power plants”);
- Strategies to address the political feasibility of Smart Grid policy alternatives;
- An assessment of the maturity of Smart Grid technologies and interoperability standards and their implications for the Smart Grid policy roadmap.

We anticipate that these candidate components will be refined further and additional components will emerge early in the term.

Students will develop and present their Smart Grid Policy Roadmap recommendations to the Oregon Smart Grid Policy Review Panel with the help of a team of policy experts from Oregon and other states who will join us as guest speakers.

The course faculty is currently recruiting members of the Policy Review Panel. Candidate members include:

- A senior representative of **Governor Kitzhaber's office** (possibly Curtis Robinhold, Governor Kitzhaber's Chief of Staff and Chief Executive Officer (on leave), EnergyRM, or his yet to be appointed energy advisor);
- **Senator Lee Beyer**, former Chair, Oregon Public Utilities Commission;
- **Tom Foley**, Smart Grid Oregon Board Member; former board chair, Energy Trust of Oregon; and senior staff, Northwest Power and Conservation Council;
- **Steve Hawke**, Senior Vice President, Portland General Electric
- **Roy Hemmingway**, Energy Consultant, Smart Grid Oregon Board Member, and former Chair, Oregon Public Utilities Commission;
- **Bob Jenks**, Executive Director, Citizen's Utility Board of Oregon;
- **Preston Michie**, former General Counsel and current consultant, Bonneville Power Administration;
- **Robert Procter**, Senior Economist, Electric Rates & Planning, Oregon Public Utilities Commission and Lead Staff on UM 1460;
- **Kevin Watkins**, PNGE Power Vice President of Engineering, or another senior public power representative;

The Policy Review Panel will receive a Decision Memo from the student teams on May 17. On June 7, they will meet with the student teams to receive each team's Policy Roadmap Briefing Book and accompanying oral briefing. The Review Panel will ask questions of and offer feedback to each student team.

Other policy experts from Oregon and other states will offer presentations and provide guidance to the student teams throughout the term. Candidate¹ policy experts include:

- **Commissioner Paul Centoella**, Member, Public Utilities Commission of Ohio, and the National Association of Regulatory Utilities Commission's representative to the National Institute for Standards and Technology's (NIST's) Smart Grid Interoperability Panel;
- **John Cooper**, President, Ecomergence, formerly technical lead for smart grid with Austin Energy, then Vice President for Utility Solutions, GridNet;
- **Selwyn Dias**, Regulatory Affairs Director, American Electric Power;
- **Steve Hawke**, Senior Vice President, Customer Service, Transmission and Distribution, Portland General Electric;
- **Scott Hempling**, Executive Director, National Regulatory Research Institute;
- **Bruce Lovelin**, Chief Engineer/Systems Engineering Manager, Central Lincoln PUD;
- **Hillary McBride**, Community Relations Officer Emerald People's Utility District;
- **Lauren Navarro**, Lead Attorney on Smart Grid Regulatory Efforts for the Environmental Defense Fund;
- **Chris Thomas**, Policy Director, Citizens Utility Board of Illinois;
- **Kevin Watkins**, Vice President of Engineering, PNGE Power;

We will explore case studies of what is and is not working in a variety of states that have pursued different models and approaches to defining, implementing and funding the smart grid. Our list of candidate states for case study review includes Maryland, Ohio, Illinois, Pennsylvania, Florida, Texas, and California. Of course, this review will involve the readings of selected documents from these states. But we will also hear directly from

¹ Actual guest lecturers from policy experts will depend on the size of class (and consequent funding to defray travel expenses) and schedules of the candidate experts.

some of the most respected public utilities commissioners, industry members, environmental and consumer advocates, and utility executives who have been on working these issues in their states.

Like our Winter Term class, the Spring Term course is designed to serve two key audiences:

- Graduate students in engineering, information technology, public administration and policy, urban planning, business, economics, and related fields from PSU and other local universities; and
- Current and emerging leaders from utility, information technology, public administration, urban, transportation and water resource planning, architecture and design, business, and other fields.

Winter term participants are encouraged to continue the journey with us, but new participants are also most welcome to join in. We will make a special effort to help bring newcomers up to speed; they can start by reading the course blog: <http://www.smartgridoregon.org/Default.aspx?pagelid=769594>.

Course Readings:

We will continue to use Peter Fox-Penner. *Smart Power: Climate Change, the Smart Grid, and the Future of Electric Utilities*, Island Press, 2010. Winter term participants already have this book but we have ordered additional copies for new course participants who will join us Spring Term.

In addition, the PSU Bookstore has ordered two key books on how to do public policy analysis. They are:

- Eugene Bardach. *A Practical Guide for Policy Analysis: The Eightfold Path to More Effective Problem Solving*, Third Edition, 2008, CQ Press.
- David Weimer and Aidan Vining, *Policy Analysis: Concepts and Practice*, Fifth Edition, 2011, Longman Pearson Prentice Hall.

Other key readings that are publicly available include:

- Ashley Brown and Raya Satler, *Smart Grid Issues in State Law and Regulation*, Galvin Electricity Initiative, 2010, <http://www.galvinpower.org/smart-grid-issues-state-law-regulation-white-paper>.
 - *Smart Grid Roadmap and Architecture*, California ISO, December, 2010, <http://www.caiso.com/green/greensmartgrid.html>
- California Public Utilities Commission, *Report to the Governor & the Legislature on Smart Grid Plans and Recommendations*, http://www.cpuc.ca.gov/NR/rdonlyres/A3D6019B-3620-44B5-95D5-5ADFDAD714C7/0/2010_Smart_Grid_Annual_Reportzafmjd_v5.pdf and related documents.
- Illinois Smart Grid Collaborative, *Collaborative Report*, 2011, <http://www.icc.illinois.gov/reports/>.
- Oregon Public Utilities Commission, *Docket 1460, Development of Smart Grid Objectives and Action Items*, 2011, <http://apps.puc.state.or.us/edockets/docket.asp?DocketID=15928>.
- Tom Stanton, *Smart Grid Strategy: How Can State Commission Procedures Produce the Necessary Utility Performance?* National Regulatory Research Institute, 2011, http://www.nrri2.org/index.php?option=com_content&task=view&id=314&Itemid=48.

Additional course materials, readings, and assignments will be posted electronically to PSU's online course tool (Desire2Learn or D2L). They are available to registered students and participants. Log onto [Desire2Learn](#) to access these materials. In general, they will be posted on D2L one or two weeks before they are needed or due. On-line tutorials on how to use D2L can be found at <http://www.pdx.edu/psuonline/node/36>.

Draft Syllabus Spring Term

Week 1 (March 29) Introduction to the Topic and Class Participants

Class Objectives:

1. Introduce students and faculty to each other.
2. Introduce new students to and remind continuing students of the basic concepts related to the Smart Grid and how the Smart Grid relates to other features of the current electric power system.
3. Develop a basic understanding of the Spring term course plan and logistics.

Agenda:

6:40 pm Welcome
 6:50 pm Student introductions
 7:10 pm Initial faculty introductions
 7:25 pm Class Logistics (Jeff Hammarlund and Ken Nichols)
 7:40 pm Break
 7:50 pm An introduction to the Smart Grid (Jeff Hammarlund)
 8:25 pm The Smart Grid – A remake after the first 120 years (Conrad Eustis)
 9:00 pm Summary of winter course and spring course introduction (Jeff Hammarlund)
 9:20 pm Receive individual assignment 1: Personal bio and interest summary; assignment due by Friday, April 1, 5 pm to help faculty refine syllabus and establish small group learning communities.
 9:40 pm Adjourn

Reading Assignment for Week 1:

Priority Reading:

Web link:

- Subscribe to free on-line *Smart Grid Newsletter* at <http://www.smartgridnews.com/artman/publish/index.html> and review updates throughout course.
- US DOE, *Enhancing the Smart Grid: Integrating Clean Distributed and Renewable Generation* http://www.oe.energy.gov/DocumentsandMedia/RDSI_fact_sheet-090209.pdf

Posted on D2L:

- US DOE, *Smart Grid Vision Statement (A Vision for the Smart Grid and What Is the Smart Grid?)*
- US DOE, *Enhancing the Smart Grid: Integrating Clean Distributed and Renewable Generation*
- Friedman-*The Energy Internet: Where IT Meets ET*

Week 2 (April 5) Smart Grid Policy Roadmaps: Smart Grid Oregon's Ambition and Challenge/Smart Grid Oregon's Comments on UM 1460 Smart Grid Planning Docket/Key Concepts, Tools and Methods of Policy Analysis, Part 1

Class Objectives:

1. Gain an appreciation for the challenges of developing a State-level Smart Grid Policy Roadmap.
2. Become familiar with some examples of State-level Smart Grid Roadmaps.
3. Understand a process for developing such a Roadmap and the key considerations that could be included.
4. Gain an appreciation for the OPUC UM 1460 and Smart Grid Oregon Comments on the Docket.
5. Develop a basic understanding of key concepts, tools, and methods of public policy analysis.

Agenda:

- 6:40 pm Class announcements
- 6:50 pm Initial tutorial on D2L (Ken Nichols)
- 7:00 pm Smart Grid Roadmaps: The Smart Grid Oregon ambition and challenge (James Mater)
- 8:00 pm Break
- 8:10 pm Smart Grid Oregon's UM 1460 Comments (James Mater)
- 8:40 pm Key concepts, tools and methods of policy analysis, Part 1 (Jeff Hammarlund)
- 9:40 pm Adjourn

Description

Developing a Policy Roadmap is a daunting task. The objectives of this session are to look at some example Roadmap efforts and the process for developing a Roadmap. We will look at work by the State of Illinois and CAISO, as well as a survey of State-level policies and lessons conducted by Harvard. Finally, we'll look at a process used by EnerNex, one of the leaders in facilitating Smart Grid Collaborative efforts at the State level.

The OPUC has embarked on an historic effort to mandate development of Smart Grid plans by the regulated utilities in the State. We'll briefly review the UM-1460 Docket and comments by SGO on the Docket. These are instructive as they probably represent the first time a Smart Grid Association has specifically commented on such a docket.

James Mater has been deeply involved in Smart Grid interoperability standardization since early 2008. He was one of the Founders of Smart Grid Oregon in 2010 and remains an active Board member. James organized the Fall 2010 First Smart Grid Oregon Public Policy Conference. He has been recognized by GWAC and SGIP for his contributions in developing the Smart Grid Interoperability Maturity Model and leading the SGIP Test and Certification efforts to develop standards for standard's certification programs. James is also QualityLogic's representative to the PNW Regional Smart Grid Demonstration Project Review Board and is co-leading the work group in standards for the Project.

Jeff Hammarlund will begin a two-part presentation on key concepts, tools, and methods of public policy analysis. It is based on a more extensive course he has taught for BPA. Jeff's lectures will assume you have read the assigned chapters from the two of the best textbooks on this subject: Bardach and Weimer & Vining.

Reading Assignment for Week 2:

Priority Reading:

- Eugene Bardach, *A Practical Guide for Policy Analysis*, part I
- David Weimer & Adian Vining, *Policy Analysis*, Edition No. 5, chapters 11-12
- Ashley Brown and Raya Satler, *Smart Grid Issues in State Law and Regulation*, Galvin Electricity Initiative, 2010, <http://www.galvinpower.org/smart-grid-issues-state-law-regulation-white-paper>.
- California Public Utilities Commission, *Report to the Governor & the Legislature on Smart Grid Plans and Recommendations*, http://www.cpuc.ca.gov/NR/rdoonlyres/A3D6019B-3620-44B5-95D5-5ADFDAD714C7/0/2010_Smart_Grid_Annual_Reportzafmjd_v5.pdf and related documents.
- Illinois Smart Grid Collaborative, *Collaborative Report*, 2011, <http://www.icc.illinois.gov/reports/>.
- Oregon Public Utilities Commission, *Docket 1460, Development of Smart Grid Objectives and Action Items*, 2011, <http://apps.puc.state.or.us/edockets/docket.asp?DocketID=15928>.
- *Smart Grid Roadmap and Architecture*, California ISO, December, 2010, <http://www.caiso.com/green/greensmartgrid.html>

Week 3 (April 12) Key Concepts, Tools and Methods for Policy Analysis, Part 2 /Small Group Learning Community Assignment 1

Class Objectives

1. Develop a basic understanding of key concepts, tools, and methods of public policy analysis.
2. Meet, exchange contact information, discuss group norms, and begin working with your Small Group Learning Community.

Agenda:

6:40 pm Class announcements

6:50 pm Key concepts, tools and methods for policy analysis. Part 2 (Jeff Hammarlund)

8:00 pm Break

8:10 pm Key concepts, tools and methods for policy analysis. Part 2 continued

9:15 pm Students meet in Small Group Learning communities to exchange contact information, discuss group norms, and begin Group Assignment 1.

Reading Assignment for Week 3:

Priority Reading:

- Weimer & Vining, chapters 14-16
- Bardach, parts II and III

Additional Recommended Reading:

- Other sections of Bardach and Weimer & Vining that interest you.

Week 4 (April 19) The Roles and Responsibilities of State Public Utility Commissions in Developing State Level Smart Grid Policy, and How State Commission Procedures Can Influence Utility Activities in the Smart grid Space

Scott Hempling, Executive Director, National Regulatory Research Institute

Week 5 (April 26) How Do Investor-owned Utilities Recover Their Costs?/An Oregon Investor-Owned Utility's Smart Grid Strategy: The Case of Portland General Electric

An Oregon investor owned utility's smart grid strategy: The Case of Portland General Electric (Steve Hawke and Conrad Eustis)

Cost Recovery for IOU's (Conrad will focus on Oregon; Michael will focus on selected other states)

Week 6 (May 3) Smart Grid Strategies of Local Consumer-Owned Utilities

Smart Grid strategies of Local Consumer Owned Utilities (*Kevin Watkins, Vice President, Pacific Northwest Generating Cooperative; Hillary McBride, Community Relations Officer Emerald People's Utility District; and/or Bruce Lovelin, Chief Engineer/Systems Engineering Manager, Central Lincoln PUD*)

Week 7 (May 10) Lessons for Oregon from Other States, Part 1: Maryland and Texas

Maryland case study (Michael)

Texas case study (John Cooper, president, Ecomergence, formerly technical lead for smart grid with Austin Energy, then Vice President for Utility Solutions, GridNet)

Week 8 (May 17) Lessons for Oregon from Other States, Part 2: California and Pennsylvania/Decision Memos to Oregon Smart Grid Policy Review Panel Due

California and Pennsylvania case studies (Michael)

Decision memos from small groups due to Smart Grid Review Panel

Week 9 (May 24) Lessons for Oregon from Other States, Part 3: Ohio and Illinois

Paul Centoella, Ohio PUC Commissioner and NARUC representative to NIST's Smart Grid Interoperability Panel

Chris Thomas, Policy Director, Citizens Utility Board of Illinois

Week 10 (May 31) Lessons for Oregon from Other States, Part 4: California and Florida

Lauren Navarro, Lead Attorney on Smart Grid Regulatory Efforts for the Environmental Defense Fund
Selwyn Dias, Regulatory Affairs Director, American Electric Power

Week 11 (June 7) Presentations from Student Teams to Oregon Smart Grid Policy Review Panel

Proposed and invited members, Smart Grid Policy Review Panel:

- A senior representative of Governor Kitzhaber's office (possibly Curtis Robinhold, Governor Kitzhaber's Chief of staff and former Chief Executive Officer, EnergyRM, or his yet to be appointed energy advisor);
- Senator Lee Beyer, former Oregon Public Utilities Commission chair;
- Tom Foley, Smart Grid Oregon Board Member; former board chair, Energy Trust of Oregon; and senior staff, Northwest Power and Conservation Council;
- Steve Hawke, Senior Vice President, Portland General Electric
- Roy Hemmingway, Energy Consultant, Smart Grid Oregon Board Member, and former Chair, Oregon Public Utilities Commission;
- Bob Jenks, Executive Director, Citizen's Utility Board of Oregon;
- Preston Michie, former General Counsel and current consultant, Bonneville Power Administration
- Robert Procter, Senior Economist, Electric Rates & Planning, Oregon Public Utilities Commission and Lead Staff on UM 1460
- Kevin Watkins, Vice President of Engineering, PNGE Power, or another senior public power representative