# Education materials

| Title | Language | Year | Contact person |
|---|---|---|---|
| Energy, Planning and the Built Environment | English | 2016 | Carissa Slotterback, Humphrey School of Public Affairs, University of Minnesota |
| Energy, Transportation & Land Use | English | 2015 | |
| Urban Energy & Infrastructure Systems | English | 2015 | |
| Climate Action Planning | English | 2015 | |
| Energy Planning | English | 2015 | |
| Community, energy and planning | English | 2014 | |
| Adapting the Physical City: Innovations in Energy, Transportation, and Water | English | 2014 | |
| Planning resilient and low-carbon cities | English | 2013 | |
| Energy for sustainability | English | 2008 | |
| Urban Energy Planning – Compact Seminar | English | 2017 | Andreas Koch, EIfER |
| Transition to energy neutral cities | English | 2015 | Jacques Kimman, Zuyd University |
| Energy and urban Planning: Possibilities, instruments, potentials | German | 2017 | Helmut Strasser, Salzburg Institute for Regional Planning and Housing |
| Smart neighborhood development in small and medium-sized tows: Ideas and impulses | German | 2017 | |

Course Syllabus [Spring 2016]

# UP466: Energy, Planning and the Built Environment

**Time:** Tuesday, 5-7:30 PM
**Room:** 223 Temple Buell Hall (TBH)
**Instructors:** Haozhi Pan (hpan8@illinois.edu)
Brian Deal (deal@uiuc.edu)
**Credits:** 4 Hours
**Prerequisite:** Junior standing, Senior Standing or Graduate Standing
**Office hours:** Thursday, 2-3:00 PM at 228 Temple Buell Hall, or by appointment.

## COURSE MOTIVATION

Our building stock in the state of Illinois represents approximately 40% of our total GHG emissions while demanding about 75% of our electrical production. At the University of Illinois, they play an even bigger part – buildings here represent over 80% of our GHG footprint. From another perspective, the cultural memory of this campus and more broadly of our civilization, is embedded in our buildings and physical environment. We seek to create a class on the built campus environment, especially related to sustainability and planning for carbon neutrality. We intend to use campus buildings as a learning laboratory, where students can truly engage with the material they learn on the ways we use our buildings and the ways we can improve upon them.

Clearly, any path toward carbon neutrality will need to address strategies for buildings that include vast improvements in efficiencies and approaches toward self support through renewable energy systems. Technologies for both these strategies already exist, although we have been slow to engage students in their discovery, analysis and implementation.

In this class we will learn about carbon footprinting and climate action planning with an emphasis on building energy analysis.

## OBJECTIVE

The main objective of the course is to teach students about how to think about carbon from a different - energy and sustainability centric, perspective. Students in this course will learn about and subsequently apply knowledge to the study of buildings, their histories and designs, their past and present uses and place in our campus, and most prominently how they contribute to a carbon neutral future.

## DELIVERY METHODS

The course is a lecture / lab type class delivered as a hybrid of face to face and online. It has been divided into 5 substantive sections:

| | |
|---|---|
| SECTION 1 | CLIMATE FRAMEWORK |
| SECTION 2 | ENERGY BASICS |
| SECTION 3 | UNDERSTANDING BUILDING ENERGY SYSTEMS |
| SECTION 4 | BUILDING ENERGY CONSERVATION |
| SECTION 5 | PLANNING IMPLICATIONS |

**Lectures**

Each section is composed of weekly lectures and a follow up clarification lab and assignment. Lectures will be delivered on Tuesday evenings.

**Labs**

Labs will be delivered online with office hours on Thursday for help and assistance. Weekly assignments are a part of each lab sections. All assignments will be due Monday at noon of the week following the assigned lab. **All submittals will be made as pdf documents to:** UP466Energy@gmail.com.

**Course Web Portal: http://www.faa.leam.illinois.edu/up466/**

**Major Projects**

- 1. Campus building simulation and analysis using eQuest
- 2. Small Area Climate Action Plan

During the 'building energy systems' section , students will each focus on a campus building, as the focal point for applying the relevant theory examined. Students will apply energy modeling and analysis techniques learned in class to their assigned buildings, as well as: the basic elements of an energy audit, examine the building's energy consumption in detail, correlating it with how people use the spaces. Students will also discuss the planning implications of energy efficiency and the role of planners in addressing this issue. Finally, students will use their individual building evaluations to develop a small area climate action plan as part of team assignment.

## OUTCOMES

This course offers a significant opportunity for students to engage urban carbon footprints. Simultaneously, it will give an important and highly marketable skill set in building energy systems modeling and analysis.

## LEARNING PHILOSOPHY

The course involves lectures, reading, classroom learning, laboratory sessions, and outside applications. Some of the required reading and discussions will be led by students. Participatory learning is essential and stressed.

## GRADING

- Class Participation and Attendance: 10%
- HW assignments: 25%
- Building Analysis Project: 30%
- Small Area Climate Plan Final Project: 35%

Late homework will be accepted with a reduction of 10% per day late up to 50% or, if applicable, 50% off after the answers have been distributed or discussed.

## ATTENDENCE

Attendance is mandatory and an attendance sheet will be passed around in every class. Only students attending all the lectures will receive all 10 of the attendance grade. After 2 allowed excused leaves, 1 further grade point will be taken away from class attendance grade for each absence. 6 or more absence (excused or non-excused) will result in an INCOMPLETE grade for the final grade.

## COURSE MATERIAL

All of the course reading materials will be available online and can be downloaded from the class web-site (http://www.leam.faa.illinois.edu/up466/). In addition to the readings, energy modeling software (eQuest) will be used for the course – this is available via free download and made available to all students. Please contact us if you have any trouble findings readings or using the software.

- Students teams will be provided with architectural and mechanical plans, energy use data, etc for their building evaluation project, and will be responsible for arranging site visits, etc.
- The class will have out of class arranged tours of some campus facilities in late part of the semester. Participation of campus facility visits is not compulsory, but participation can count towards bonus credits for students' final grades.

## EQUIPMENT AND SOFTWARE

The course uses eQuest, a free building energy simulation tool, for building energy simulation studies. The software is downloadable at http://www.doe2.com/equest/. Please note that currently **eQuest only have versions that run on Windows platform.** It is students' own responsibilities to make sure that they have access to computing resources with Windows operating system and can be installed with eQuest.

## SPECIAL CIRCUMSTANCES

Please communicate any expected or unexpected absences with the instructor as early as possible. Every effort will be made to work with students with unusual or unexpected obligations outside the course (family emergencies, health issues, participation in University sanctioned activities, etc.). Students with disabilities or special needs who require any accommodations to facilitate full participation and completion of the course should contact the instructor as soon as possible.

## STUDENT CONDUCT

From the University Student Code, Article 1, Part 3: Students enrolling in the University assume an obligation to conduct themselves in a manner compatible with the University's function as an educational institution and suitable to members of the academic community. Students are responsible for knowing their rights and responsibilities as found in the student code at http://www.admin.uiuc.edu/policy/code/index.html

**COURSE SCHEDULE**

| Date | Topic |
|---|---|
| **SECTION 1** | **CLIMATE FRAMEWORK** |
| 19 Jan | Lect 1: Course Intro / Energy Intro |
| Online | Lab 1: Climate Change and Expected Impacts |
| 26 Jan | Lect 2: Climate Stabilization and Planning |
| Online | Lab 2: Carbon Inventory |
| **SECTION 2** | **ENERGY BASICS** |
| 2 Feb | Lect 3: Energy Basics |
| Online | Lab 3: Energy Fundamentals |
| 9 Feb | Lect 4: Energy Generation; Grids and Renewables |
| Online | Lab 4: Renewable Energy Calculations |
| **SECTION 3** | **UNDERSTANDING BUILDING ENERGY SYSTEMS** |
| 16 Feb | Lect 5: Introduction to Building Energy Simulation |
| Online | Lab 5: eQuest Sandbox and Building Ethnography |
| 23 Feb | Lect 6: Building Basics and Benchmarking |
| Online | Lab 6: Utility Bill Analysis and Parametric Runs 1 |
| 1 Mar | Lect 7: Building Envelopes |
| Online | Lab 7: Building Schedules / Uses and Parametric Runs 2 |
| 8 Mar | Lect 8: HVAC Systems |
| Online | Lab 8: eQuest Tutorial and Parametric Runs 3 |
| 15 Mar | Lect 9: Lighting and Plug Loads |
| Online | Lab 9: EEM Tutorial and Parametric Runs 4 |
| 22 Mar | Spring Break |
| **SECTION 4** | **BUILDING ENERGY CONSERVATION** |
| 29 Mar | Lect 10: Energy Conservation: Existing Buildings |
| Online | Lab 10: LEED for Existing Buildings |
| 5 Apr | Lect 11: Net-Zero Buildings and Whole Systems Design |
| Online | Lab 11: Net Zero Buildings |
| 12 Apr | Lect 12: Other Building Types and Building Codes |
| | Building Project Due by Midnight Monday Apr 18 |
| **SECTION 5** | **POLICY AND PLANNING IMPLICATIONS** |
| 19 Apr | Lect 13: Climate Action Planning and Resources |
| 26 Apr | Group Works and Q&A |
| 3 May | CAP Presentations and comments |
| 19 Apr | Small Area Climate Action Plan |
| 13 May | |
| In Group | |
| 13 May | Final Project due by 11:59pm Friday May 13 |

**PLAN 547 - Energy, Transportation & Land Use** **Fall 2015**

Syllabus & Schedule

Location: 209 Stone
Instructor: Nikhil Kaza
email: nkaza [at] unc [dot] edu
Office hours: Tue 10 AM -11 AM NE 315

Time: MW 11:15 AM – 12:30PM
TA: Joseph Seymour
frankjoe [at]live[dot]unc.edu
Thu 1 PM-2 PM NE Reading Room

## Objective

Recent interest in climate change, in general, as well as large projects like Keystone XL. in particular, has focussed the attention of urban planners on the impacts of land use and transportation planning on energy use. This course seeks to explore the reciprocal connections between all aspects of energy (production/conversion, distribution and use), land use, environment and transportation. Evaluation of Federal, state and local policies on energy conservation, alternative energy sources are emphasised. At the end of the course, the students are expected to have learnt the skills to critically analyse impacts, interdependencies and uncertainties of various energy conservation measures and production technologies on different sectors, organisations and communities

## Student Responsibilities

This class is meant for upper class undergraduates and beginning graduate students interested in issues of energy planning. There are no prerequisites for the class, however, you are required to be familiar with basic principles of energy, economics and public policy.

The course moves quickly and cover a lot of ground and techniques. It is your responsibility to keep up, learn the material and expertise. I expect that, on average, you will be working 10 hours/week for this class (including class time).

The main course website is https://sakai.unc.edu/portal/site/plan547-fall15. The course materials and assignments, announcements are all posted there. You should be familiar with using Sakai including submitting assignments and editing Wiki. If in doubt, please ask for help.

The librarian, Philip McDaniel has kindly created a library website for the course at http://guides.lib.unc.edu/plan547. This is a very useful resource that will list information of various data sources. It also has information on how to cite various resources.

You are responsible for reading the assigned readings **before** the class. The lectures proceed quickly and cover only the main topics and therefore are not exhaustive. Please be prepared to take notes as I do not usually provide powerpoint slides. It is your responsibility to keep up and/or request additional clarification on particular topics and techniques.

The problem sets and assignments are meant to supplement lectures and discussion and build skills. You are expected to do research, make assumptions, find data, to figure out the problem sets. In other words, the problem sets as well as papers require problem framing, research and analysis.

My calendar is available at http://meetme.so/nikhilkaza. You can directly setup an appointment for a time that is mutually convenient. I will automatically get an email when you set the

meeting up, so please add a title as to the purpose of the meeting so that I can know it is you. Office hours and meetings are typically held in my office at Rm 315 New East.

Joseph, the TA, can be reached via email and you can seek his help outside his office hours by appointment. He holds his office hours in the New East reading room.

Email to the class, TA and instructor is through Sakai to enable archival and automatic filtering. If you use a different mode (such as Outlook etc.), your email subject should include "PLAN547" in the subject line for easy filtering.

Course calendar is at http://tinyurl.com/plan547-fall15. You can subscribe to it using any calendar program such as Microsoft Outlook, Apple iCal, Mozilla Sunbird etc. I will keep this calendar up to date with dates for seminars on campus, guest lectures in class and field visits. I strongly urge you to subscribe to it and keep an eye on it. This calendar is also visible through Sakai. The dates mentioned in the attached schedule are tentative. The calendar, rather than the schedule below, is the most up-to-date calendar and should be viewed as definitive for due dates, topics, field trips and guest lectures.

You are accountable to the integrity of the work you submit. You are allowed and encouraged to consult with your peers and use the resources in the library and on the web for many of your assignments. However, all help (including your peers'), all verbatim text and images that are not your own, should be explicitly acknowledged and cited. Non-attribution carries severe penalties.

I am in the process of setting up various field visits as well as guest lectures by eminent experts and practitioners. Since these depend on others' schedules, the class schedule will adapt. Logistical details about the field visits will be provided later.

In addition, you are required to attend any three of the four Energy and Environment lunches sponsored by Institute for the Environment. The first one is Sep 9 by Prof. Ashlynn Stillwell at Noon on Wednesday Sep 9, on 'Energy & Water'. The others are about 'Financing Waste to Value Projects', 'A Reporters View on National Energy Issues' & 'Data Analytics in the Energy Industry'. More details will follow and will be posted on the Calendar. If you are unable to attend these lunches (free food!), please find acceptable substitute events on campus and share them with class via email and in class.

## Grading and Assignments

The course grade is based on four problem sets, quizzes, blog posts and three group projects.

On random days, a total of six, short quizzes are administered in the class. The top five count towards the grade. In total, these account for 10% of the grade. Absolutely, no make up quizzes.

The problem sets provide practise for analytical techniques described in the class and in the textbook. You are expected to use spreadsheet and other statistical software for completing the problem sets. It is expected that you are familiar with these software, or would avail yourself of the resources on the web and at the university to troubleshoot. If you do not have access to a computer with required software, please let me or Udo (reisinge (at) unc (dot) edu) know. In addition, I will arrange of licenses for Tableau software that you will use to visualise some datasets.

Each of the problem sets accounts for 10% of the grade. A submission to a problem set is a single document (pdf). Emphasis is placed on the readability of your argument and solution. Points will be deducted, if the information is scattered in multiple places and files. I strongly suggest that you get familiar with writing math equations in electronic documents. All equations, data, tables, research and help should be cited. Follow a consistent citation style. I recommend UNC

citation builder http://library.unc.edu/citationbuilder/. Also see http://writingcenter.unc.edu/handouts/why-we-cite/.

For the three projects, the students work in groups of two and each student should be part of three distinct groups. In general, graduate students pair up with other graduate students and undergraduates pair up with other undergraduates. Each of these papers are preceded by presentations, where your work will be critiqued by the rest of the class. Each of the term papers account for 15% of the grade. Both presentations and reports are evaluated.

The remaining 5% of the grade is based on participation in the class, including attendance and engagement, and will be evaluated throughout the semester. Part of this participation grade is based on blog postings on Sakai. Each student is expected to post at least 5 blog posts during the semester (approximately once every two weeks). These blogs are short responses ($\sim$ 400 words) to a talk you attended, a newspaper article you read, a point you want to elaborate on or a critique you want to express. I expect that these posts are spread relatively evenly throughout the semester. The quality of each blog post is more important than the number of posts. These blogs serve as a out-of-class online interaction and are viewable by everyone in the class.

If you are a graduate student taking this class, you are expected to explore the issues in-depth and demonstrate your understanding of key issues in the field of energy planning. The papers and presentations will be graded differently than your undergraduate peers. H (High Pass) for graduate students is equivalent to A for undergraduate students.

Appropriate planning and time management significantly reduces stress at the end of the semester. Participation in class and timely completion of problem sets and other assignments is imperative.

## Textbooks and Readings

The following textbooks are required for this class:

- John Randolph and Gilbert M. Masters. *Energy for Sustainability: Technology, Planning, Policy*. Island Press, Washington, D.C., 1 edition, June 2008 (henceforth RM)

The textbook is available at the University Bookstore and is on reserve at the Undergraduate library. The textbook contains a lot of information on the technology aspects of various types of energy production and distribution. Proficiency of these materials is not the goal of this course, however, they should be understood to a sufficient depth that would allow for better land use, transportation and environmental planning and policies.

Other books that are recommended (not required) for purchase are:

- Daniel Sperling and Deborah Gordon. *Two Billion Cars: Driving Toward Sustainability*. Oxford University Press, USA, January 2009
- Ferdinand E Banks. *Energy economics: a modern introduction*. Kluwer Academic, Boston, 2000

Most of the other readings are derived from journal articles and book chapters. These readings are posted on the Sakai. Usual copyright notices apply.

# Very Tentative Schedule

### Introduction & Administrative Details (Aug 19)

- RM Chapter 1

# Production and Distribution of Energy

### Patterns of Energy Use & Fundamentals of Energy Science (Aug 24)

- RM Chapter 2 & 4
- Vaclav Smil. *Energy in world history*. Westview Press, Boulder, 1994(Chapter 6)
- Monthly Energy Review (July 2015) (Sections 1 & 2)
- Executive Summary of the Annual Energy Outlook 2015

### Economic Analysis of Energy (Aug 26)

- RM Chapter 5

### Conventional Energy Production (Aug 31)

- RM Chapter 9 & 10

### Field trip to Cogeneration Plant (Sep 2)

### Shale Gas & Hydraulic Fracturing (Sep 9)

- R. D. Vidic, S. L. Brantley, J. M. Vandenbossche, D. Yoxtheimer, and J. D. Abad. Impact of Shale Gas Development on Regional Water Quality. *Science*, 340(6134), May 2013. PMID: 23687049
- Vikram Rao. *Shale gas: the promise and the peril*. RTI Press, Research Triangle Park, NC, 2012 (Chapter 1 & 5)

### Photovoltaics & Other Solar Power (Sep 14)

- RM Chapter 11 & §12.8
- S. F Stromberg. Has the Sun Set on Solar Rights? Examining the Practicality of the Solar Rights Acts. *Natural Resources Journal*, 50:211–539, 2010

### Biofuels and Alternatives (Sep 16) - Guest Lecture (David Dayton, RTI)

- RM Chapter 14

### Wind Energy (Sep 21)

- RM Chapter 12 & §10.7
- Gijs Kuik, Bart Ummels, and Ralph Hendriks. Perspectives on wind energy. In K. Hanjali'c, K. Van de Krol, and A. Leki'c, editors, *Sustainable Energy Technologies*, pages 75–97. Springer Netherlands, Dordrecht, Netherlands, 2008
- Patrick DevineWright. Beyond NIMBYism: towards an integrated framework for understanding public perceptions of wind energy. *Wind Energy*, 8(2):125–139, April 2005

## Federal, State and Local Frameworks

### Land and Water Interactions with Energy (Sep 23)

- N. Kaza and M. Patane. The land use energy connection. *Journal of Planning Literature*, 29(4):355–369, 2014
- Gordon Walker. Renewable energy and the public. *Land Use Policy*, 12(1):49–59, January 1995
- david pimentel, megan herz, michele glickstein, mathew zimmerman, richard allen, katrina becker, jeff evans, benita hussain, ryan sarsfeld, anat grosfeld, and thomas seidel. Renewable Energy: Current and Potential Issues. *BioScience*, 52(12):1111–1120, December 2002
- US Department of Energy. Energy demands on water resources: Report to the congress on interdependency of energy and water. Technical report, Sandia National Laboratories, 2006

### Energy Politics (Sep 28)

- Timothy Mitchell. *Carbon democracy: political power in the age of oil.* Verso, London; New York, 2011 (Chapter 1 & 2)
- Robert Millward. The political economy of urban utilities. In Martin Daunton, editor, *The Cambridge Urban History of Britain*, chapter 11, pages 315–350. Cambridge University Press, Cambridge, 2001
- Jim Rossi. Trojan Horse of Electric Power Transmission Line Siting Authority, The. *Environmental Law*, 39:1015, 2009

### Group presentations (Oct 5 and 7)

Each group will present for about 10-15 min. Five groups will present in each class. The presentation schedule will be posted on the Sakai later.

## Energy Consumption

### Residential Energy Consumption (Oct 19) (Guest Lecture: Aaron Lubeck, Trinity Design Build)

- RM Chapter 6

### Simulating Building Energy Consumption - eQuest Tutorial (Oct 21)

- James Hirsch & Associates, *eQuest Tutorial*(reference only)

### Transportation Energy use (Oct 26)

- RM Chapter 13

### Alternative Transportation Technologies (Oct 28)

- Daniel Sperling and Deborah Gordon. *Two Billion Cars: Driving Toward Sustainability*. Oxford University Press, USA, January 2009 (Chapter 4, 5 & 9)

### Group presentations (Nov 2 and 4)

Each group will present for about 10-15 min. Five groups will present in each class. The presentation schedule will be posted on the Sakai later.

### Emerging issues in Energy & Transporation (Nov 9)

TBD

### Energy in Freight (Nov 11)

- D. McCollum, G. Gould, and D. Greene. Greenhouse gas emissions from aviation and marine transportation: Mitigation potential and policies. Technical report, Pew Center on Global Climate Change, 2009
- Fatumata Kamakaté and Lee Schipper. Trends in truck freight energy use and carbon emissions in selected OECD countries from 1973 to 2005. *Energy Policy*, 37(10):3743–3751, October 2009
- Rommert Dekker, Jacqueline Bloemhof, and Ioannis Mallidis. Operations research for green logistics – an overview of aspects, issues, contributions and challenges. *European Journal of Operational Research*, 219(3):671–679, June 2012

### Operational Sustainability (Nov 16) (Jeff Dunbar, Sustainability Director, Verdani Partners)

### Interactions of Land Use and Transportation (Nov 17)

- TRB and BEES. Driving and the built environment: Effects of compact development on motorized travel, energy use, and co2 emissions. Special Report 298, National Research Council of the National Academies, Washington, D.C., 2009 (Chapters 5 & 6)

### Energy Based Economic Development (Nov 23) (Sara Lawerence, RTI)

- Carley, S. and Lawerence, S. *Energy-Based Economic Development - How Clean Energy can Drive Development and Stimulate Economic*. Springer, New York, 2014(Chapters 1 & 7)

### Group Presentations (Nov 30 and Dec 2)

Each group will present for about 15 min. The presentation schedule will be posted on Sakai later.

# Urban Energy & Infrastructure Systems
# 11-477 / Fall 2015

Last updated: September 29, 2015

## Key information

| | |
|---|---|
| Instructor: | Assistant Professor David Hsu, office 9-334, ydh@mit.edu |
| Administrator: | Takeo Kuwabara, 9-332, takeok@mit.edu |
| Time & Place: | Tuesdays and Thursdays, 11 am - 12:30 pm, room 9-450A |
| Contact: | The best way to reach me is by e-mail.<br>You can expect a reply in 1-2 business days.<br>For anonymous feedback, use anonymouse.org/anonemail.html. |
| Office Hours: | By appointment: (1) go to www.meetme.so/davidhsu, or (2) by e-mail. |
| Website: | Check Stellar settings for notifications of discussions and assignments. |

## Learning Objectives

1. Learn how cities use and are served by energy systems, infrastructure, and technology
2. Develop ability to do simple back-of-the-envelope calculations for new cities, systems
3. Identify key points or issues for future management, intervention, or revolution
4. Develop a highly-detailed understanding for a group of cities as a class, together.

## Introduction

The availability of energy, and the means to harness it, is a critical shaper of human civilization and therefore cities. Modern cities are composed of many overlapping systems of energy infrastructure that have all developed at different times. This course is designed for any students interested in learning how to intervene in these complex existing systems using policy, technology, economics, and planning, and how to prepare them for the future.

It is an exciting time to be involved in this area. Responding to climate change will remain a multi-generational challenge but requires immediate action. Physical and digital technologies have many profound and still unforeseen implications for the built environment, and in particular for transportation. While the developing world has often been traditionally been characterized by a lack of existing infrastructure, some countries have rapidly moved forward with advanced new technologies and infrastructure, while many developed countries now face issues of legacy infrastructure or the need to replace one-hundred year-old systems. Finally, this is an area in which planners have unique skills to contribute to a variety of new industries and sectors that few students have previously considered, and there are many opportunities for employment in this area and to shape how we use energy in the future.

## Prerequisites:

- high-school chemistry OR physics
- high-school algebra
- university-level microeconomics

## Class structure

You can think of this class as composed of three segments: in the first segment (September 10 to 24) we will develop key "global" concepts regarding energy use and management in all cities; in the second segment (September 29 to October 27), we will develop our understanding of key technical aspects of energy systems; and in the third segment (October 27 to December 10), we will examine how key issues and strategies differ in particular cities, with selected cases presented by both the professor and students.

You can also think of the class as a sliding spectrum, where the semester begins with me lecturing each day with a short discussion at the end of class, and by the end of the semester I will just give shorter introductory remarks, because the second half of class will be dominated by discussions where we work together to decide how to analyze and communicate key findings about particular cities. In lecture, I or we will demonstrate one calculation or analysis method in class, and then the job of all of us together and individually is to go apply this finding to each city for which each of us is responsible.

The exact balance of class activities, topics, and specific cases will depend on the number of students enrolled and their interests.

## Readings

The following required books can be obtained either online, on Amazon (all in print, some in Kindle or can be rented), or at your local bookseller:

- MacKay, D.J., 2009. *Sustainable Energy - Without the Hot Air,* 1st ed., UIT Cambridge Ltd. Can be read or downloaded (legally) as a pdf from www.withouthotair.com.
- Smil, V., 2003. *Energy at the Crossroads: Global Perspectives and Uncertainties*, MIT Press.
- Randolph, J. & Masters, G.M., 2008. *Energy for Sustainability: Technology, Planning, Policy*, Island Press.
- (optional): Prentiss, M., 2015. *Energy Revolution: The Physics and the Promise of Efficient Technology*, Harvard University Press.

All other readings will be made available on Stellar. I may occasionally modify the weekly readings and will notify you by e-mail in advance.

## Agenda & topics

SP indicates student presentations, which we will sign up for on Doodle once the class enrollment and groups have stabilized. To prepare for class, you should read the suggested readings and the class announcements on Stellar.

| Date | No. | SP | Topic | Readings |
|---|---|---|---|---|
| 10-Sep | 1 | | Course overview & organization | Review syllabus |
| 15-Sep | 2 | | Key metrics and tools | Smil 1, Mackay 1, 2 |
| 17-Sep | 3 | | Economics: pricing, regulation, mgmt. | Train 1, Gomez-Ibanez 2 |
| 22-Sep | 4 | | Exercise in regulation; selection of cities | Gomez-Ibanez 7, Jacobson 3 |
| 24-Sep | 5 | | Institutions, distribution, poverty | Smil 2, Bazilian et al, Sovacool et al, Krueger |
| 29-Sep | 6 | | MIT librarian; Uses: buildings | Mackay 7, app. E, 9, 21, 22 |
| 1-Oct | 7 | 1 | Uses: transportation | Mackay 3, 5, 20, Banister et al, Sperling |
| 6-Oct | 8 | 2 | Uses: gadgets, food, stuff, & services | Mackay 11, 13, 15, 17 |
| 8-Oct | 9 | 3 | Sources: fossil fuels, present & future | Smil 4, Mackay 18, 19, 25 |
| 13-Oct | | | HOLIDAY | |
| 15-Oct | 10 | 4 | Sources: renewables 1 | Mackay 4, 6, 8, 10, 12, 14, 16, Mackay 2013 papers |
| 20-Oct | 11 | 5 | Sources: renewables 2 | Smil 5, Mackay 18, 19, 25 |
| 22-Oct | | | ACSP – find make-up date | |
| TBD | 12 | 6 | System: transmission, storage, district | Mackay 26, 27, 31, Keirstead, Keirstead (TBD) |
| 27-Oct | 13 | 7 | Sources: energy efficiency; student | Smil 6, Mackay 22, Blumstein et al |
| 29-Oct | 14 | 8 | Case 1: forecasting in California; | CEC forecast |
| 2-Nov | | | PAPER #1 due | |
| 3-Nov | 15 | 1,2 | Focus on student cases | TBD by students |
| 5-Nov | 16 | | Case 2: GHG strategy in Boston | Greenovate Boston, Kirshen |
| 10-Nov | 17 | 3,4 | Focus on student cases | TBD by students |
| 12-Nov | 18 | | Case 3: energy poverty in Rio de Janeiro | World Bank Cajú report |
| 17-Nov | 19 | 5,6 | Focus on student cases | TBD by students |
| 19-Nov | 20 | | Case 4: energy efficiency in NYC | NYC GGBP case study |
| 24-Nov | 21 | 7,8 | Focus on student cases | TBD by students |
| 26-Nov | | | HOLIDAY | |
| 1-Dec | 22 | | Case 5: transportation in LA | Sperling and Salon, CARB |
| 3-Dec | 23 | 1-4 | Focus on student cases | TBD by students |
| 8-Dec | 24 | | Case 6: renewables in Honolulu | Trabish, Coffman, Timilsina |
| 10-Dec | 25 | 5-8 | Focus on student cases | TBD by students |
| 14-Dec | | | PAPER #2 due | |

## Grading

### Learning expectations / norms

- Prepare by doing reading before class
- Focus on class discussion and lecture
- Use technology effectively and only as needed
- Contribute to everyone's learning in and out of class

### Assignments and due dates

By the second or third week of class, we will collectively develop a portfolio of cities for us to research, discuss, and talk about throughout the semester, so all of us can learn from what each other is doing. For the first assignment, the cities will them be randomly assigned to each student, so people view the material with fresh eyes. I [the professor] will help research your cities by using occasionally using them as examples. For the second assignment, since people have particular interests that they want to follow as well, you can pick the city that you want to write about, although it may be easiest (and is allowed) to write about your first (randomly-assigned) city. The paper assignments and due dates are as follows:

- Presentations: schedule TBD by third week of class, depending on the size of class.
- Paper #1: City energy system description paper, 8-12 pages long, due **November 2**. This will describe the energy context of your city, including its existing systems, sources and uses of energy; the current state of technological, social, and economic development; and most importantly, the future energy challenges that this city will face. It may help to use some of the basic metrics and research that we have developed in class, as well as a comparison to your classmates' cities (please cite if you rely upon their research and material). You should also turn in a book of calculations (not included in the paper page limit), which shows how you derived the key calculations that are the foundation of your paper analysis. Finally, although this is a description or context paper, organizing this paper still requires a strong thesis or narrative about why you see the issues and challenges that you discuss are more important than other ones.
- Paper #2: Strategic plan paper, 10-15 pages long, due **December 14**. This will describe a strategic plan to meet the energy challenge for a chosen city. This paper will include a description of your plan and/or intervention, with an assessment of its prospects for success (strengths, weaknesses, other contributing factors necessary), an assessment of the capability of proposed or existing institutions to carry out the plan, and an analysis of its likely environmental, economic, and social effects. You should also turn in a book of calculations (not included in the paper page limit), which shows how you derived the key calculations that are the foundation of your paper analysis.

### Grading breakdown

The details marked TBD (to be determined) will depend on the number of students in the class and number of topics that we want to cover.

| | |
|---|---|
| Discussion and feedback to classmates | 10% |
| Presentations to class (number and length TBD) | 20% |
| Paper #1, city energy system description | 30% |
| Paper #2, city strategy paper | 40% |
| | 100% |

**Presentation criteria**

These will be short presentations in which you summarize a particular aspect of your city (in the first half of the course), or explore a particular strategy that you want to implement (in the second half of the course). Students will assgn readings of no more than 10 pages, and create a summary handout of no more than one page for your classmates and me, so we can understand the overall gist of your argument, or any particularly complex issues that you want us to focus on and discuss. Presentations will be graded on how well they succinctly introduce the topic or question and how well they provide material that sparks discussion and debate.

**Discussion criteria**

Discussion works only if everyone is prepared, participates and is fully involved, and works towards being constructive. While this does not entirely substitute for your active participation and presence in the classroom, another way to participate is to give constructive criticism to your classmates' work and to post this on the Stellar site. To stimulate discussion, please post any interesting news items that you find to the class blog on Stellar or else bring to class.

Please make an effort to be on time for class, and please let me know in advance if you will miss class. Missing more than two classes will affect your discussion grade.

**Paper criteria**

In general, papers will be evaluated based on the degree to which they present a clear and coherent argument, introduce appropriate supporting evidence, and develop the argument to a logical conclusion. You should develop your writing and thoughts through multiple written drafts. Other considerations:

- Format: Avoid overly fancy graphic layouts for your paper. Please use black text, white paper, 1.5 or double-spacing, a font with serifs, minimum font size 11.
- Bibliographies: You should include a full bibliography in a common citation format (for example, University of Chicago). This will not count towards the total pages of the paper.
- Tables & graphics: You are encouraged to use any tools that you need to communicate, such as maps, figures, or tables, but these exhibits may not exceed 20% of the pages. Captions and references help to integrate graphics and text. These exhibits will also be graded for clarity, cogency, and the degree to which they support, inform, or extend the argument presented in the text.

### Extensions

You are allowed four total days of extensions on the two paper assignments, which you can allocate as you choose; I will assume that you used your extension days if you hand in the assignments late according to the time of posting on Stellar. Assignments that are otherwise handed in after you have used your extensions up will be penalized. If there are extreme physical or emotional circumstances, any further extensions should be requested from the Office of the Dean of Graduate Education (http://odge.mit.edu); if they decide that an extension is warranted, they will then send me a generic note, which preserves your privacy.

### ADA accommodations

Any student who, because of a disability, may require special arrangements in order to meet course requirements should contact me as soon as possible to make necessary arrangements with MIT's Student Disabilities Services: http://web.mit.edu/uaap/sds/index.html.

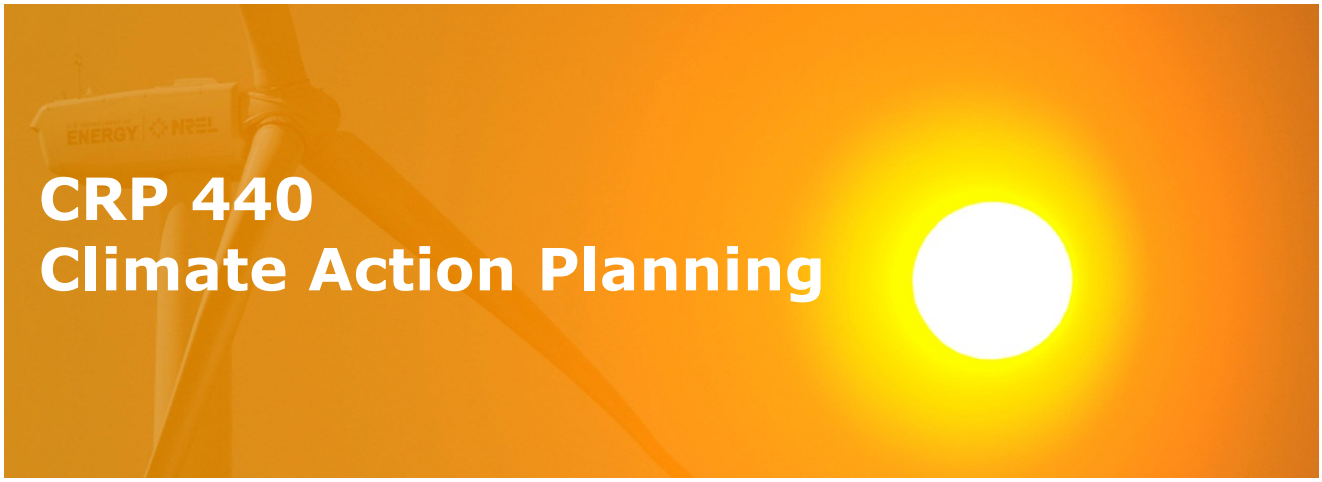
### Academic integrity

Plagiarism, unauthorized collaboration, cheating, and facilitating academic dishonesty are academic crimes. It is your responsibility as students and scholars to understand the definition of any such activities, and to avoid and discourage them. Engaging in these activities either knowingly or unknowingly may result in severe academic sanctions, and you are therefore expected to familiarize yourself with MIT's policies: https://integrity.mit.edu.

### Issues TBD on first day

1. Your names, backgrounds
2. Particular topics, issues of interest
3. Portfolio of cities
4.
5.

Last updated: September 29, 2015




# CRP 440
# Climate Action Planning

Fall 2015
Tuesday & Thursday, 6:10 – 8:00 PM


| | |
|---|---|
| Instructor: | Adrienne Greve, Ph.D. |
| Telephone: | 756-1474 |
| E-mail: | agreve@calpoly.edu |
| Office: | 21-116c |
| Office Hours: | Mon 10-11:30 AM, Thurs 3:30 - 5 |


## Course Description

Provides an introduction to the role of planning in reducing greenhouse gas emissions and adapting to climate change. Includes basic climate science, greenhouse gas emissions inventories, the politics of climate change, vulnerability assessment and climate adaptation, and federal and state policy. The focus is on the development and implementation of local climate action plans. Prerequisite: Basic knowledge of city planning, environmental management, and/or public policy.

## Course Objectives

In this course we will examine:

- The science of climate change including forecasting/modeling.
- Anticipated impacts of climate change on global to local systems.
- Potential actions for reducing greenhouse gas emissions.
- Potential actions for adapting to climate change impacts.
- Methods for greenhouse gas emissions inventorying, accounting, and forecasting.
- Methods for vulnerability assessment and prioritizing adaptation needs.
- The process of preparing a local climate action plan including public participation.
- The politics of climate change.
- Federal and state law and policy on climate change.
- Implementation of climate action plans.
- The implications of climate action planning for general plans and CEQA.

## Learning Outcomes

Students who excel in this course will be able to:

- Define the science and impacts of climate change.
- Conduct a basic local greenhouse gas emissions inventory.
- Conduct a basic climate vulnerability assessment.
- Outline a public participation program for climate action planning.
- Identify, assess, and implement actions for reducing greenhouse gas emissions.
- Identify, assess, and implement actions for adapting to climate change impacts.
- Prepare a local climate action plan.

## Grading

Assignments and exams will generally be graded on a 10-point scale, with standard 10% intervals for letter grades. Late assignments will be penalized 10% per day. Make-ups can be arranged for excused absences. There are no extra credit assignments. The graded items and respective weights are as follows:

| **Undergraduates** | |
|---|---|
| Assignments (3 × 20%) | 60% |
| Mid-term Exam #1 | 20% |
| Final Exam #2 | 20% |

There are three assignments that will require you to apply knowledge learned in the class to address a particular aspect of climate action planning. There are two take-home, essay exams focusing on lectures and readings.

## Attendance & Participation

Attendance is expected. Due to the emphasis on in-class discussion and activities, materials and information from missed classes is difficult to replicate. Instructor notification of absence should be received prior to class when possible, and in cases of extended or emergency absences (i.e. family emergency or illness), please contact the instructor so that arrangements can be made. Students are expected to actively participate in class discussions.

## Special Requirements

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and the Disability Resource Center, Building 124, Room 119, at (805) 756-1395, as early as possible in the term.

## Style Manual & Plagiarism

The CRP Department requires that all assignments follow the APA style for manuscript preparation, editing, and citation. The APA style is documented in (available in El Corral Bookstore):

American Psychological Association. (2010). *Publication manual of the American Psychological Association* (6th ed.). Washington, D.C.: Author.

Examples:

**Article:** Alberti, M. (1996). Measuring urban sustainability. *Environmental Impact Assessment Review*, 16: 381-424

**Book:** Bocking, S. (2004). *Nature's expert*. New Brunswick, NJ: Rutgers University Press.

**Report:** Cassin, J., Fuerstenberg, R., et al. (2005). *Development of hydrological and biological indicators of flow alteration in Puget Sound lowland streams*. Seattle: King County Water and Land Resources Division, 114 p.

**Government Document:** City of San Luis Obispo. (2008, June 12). *Zoning regulations*. San Luis Obispo, CA: Author.

**Website:** Weier, J. (2002). Global warming. *NASA Earth Observatory*. Retrieved September 19, 2006 from http://earthobservatory.nasa.gov/Library/GlobalWarming/printall.php

**Newspaper**: Holden, S. (1998, May 16). Frank Sinatra dies at 82: Matchless stylist of pop. *The New York Times*, pp. A1, A22-A23.

## Academic Dishonesty

Cases of academic dishonesty (cheating and plagiarism) will be dealt with using university procedures: http://www.osrr.calpoly.edu/academicdishonesty/

*From the Campus Administrative Manual (§684.3):*
Plagiarism is defined as the act of using the ideas or work of another person or persons as if they were one's own without giving proper credit to the source. Such an act is not plagiarism if it is ascertained that the ideas were arrived at through independent reasoning or logic or where the thought or idea is common knowledge. Acknowledgment of an original author or source must me made through appropriate references; i.e., quotation marks, footnotes, or commentary. Examples of plagiarism include, but are not limited to, the following: the submission of a work, either in part or in whole, completed by another; failure to give credit for ideas, statements, facts or conclusions which rightfully belong to another; failure to use quotation marks when directly quoting from another, whether it be a paragraph, a sentence, or even part thereof; close and lengthy paraphrasing of another's writing without credit or originality; use of another's project or programs without or part thereof without giving credit.

## Course Textbooks

- [required] Boswell, M., Greve, A., and Seale, T. (2012). *Local climate action planning*. Washington, DC: Island Press. [on reserve at the library]
- [recommended] Henson, R. (2014). *The Thinking Person's Guide to Climate Change*. Boston: American Meteorological Society, 516 p. [on reserve at the library]
- Additional readings to be assigned and available on PolyLearn.

**Schedule (subject to change)**

CRP 470 CAP Updated: Sept. 21

| | Date | Session | Assignments |
|---|---|---|---|
| **The Climate Action Planning Process** | | | |
| 1 | Tues., 9/22 | **Welcome & Overview**<br>**Introduction to Climate Action Planning**<br>***Guest Speaker:*** Dr. Michael Boswell<br>**Readings:** The AAAS Climate Science Panel 2014 | |
| | Thurs., 9/24 | **The Science of Climate Change**<br>***Guest Speaker*:** Dr. Charles Camp<br>**Readings:** Henson 2014, Part 3 | |
| 2 | Tues., 9/29 | **Climate Policy and Law**<br>**Readings:** LCAP, ch.1; Friedman 2008, ch. 9; California Air Resources Board 2014, Executive Summary; The U.S. Conference of Mayors 2005 | |
| | Thurs., 10/1 | **The Impacts of Climate Change**<br>**Reading:** Henson 2014, Part 1 | |
| 3 | Tues., 10/6 | **Getting Started**<br>**Readings:** LCAP, ch. 2; Parzen 2009, pp. 3-13; TBA | |
| | Thurs., 10/8 | **Public Participation**<br>**Readings:** LCAP, ch. 3; Center for Research on Environmental Decisions 2014; Somerville & Hassol 2011; Leiserowitz, et al. 2013, Executive Summary & pp.5-6 | **DUE:** CAP Review and Analysis |
| **Greenhouse Gas Emission Accounting and Reduction** | | | |
| 4 | Tues., 10/13 | **GHG Emissions Inventories, Forecasts, and Targets, p1**<br>**Readings:** LCAP, ch. 4; City of South San Francisco 2011, pp. i – 5-2 | |
| | Thurs., 10/15 | **GHG Emissions Inventories, Forecasts, and Targets, p2**<br>**Readings:** ICLEI 2013 | |
| 5 | Tues., 10/20 | **Energy Efficiency**<br>**Readings:** LCAP, ch. 5; Gerdes 2012; | |
| | Thurs., 10/22 | **Cap and Trade**<br>***Guest Speaker:*** Dr. Michael Boswell<br>**Readings:** TBA | **OUT:** Mid-Term Exam |
| 6 | Tues., 10/27 | **Energy and Cal Poly**<br>***Guest Speaker*:** Stacey White, LEED AP BD+C<br>**Readings:** Sustainability Report, Draft CP Inventory | **DUE:** Mid-Term Exam |
| | Thurs., 10/29 | **Renewable Energy**<br>**Readings:** California ISO n.d. [skim]; Berkeley Lab 2011; California Council on Science and Technology 2011, pp. 1-5; EPA 2014 | |
| 7 | Tues., 11/3 | **Transportation & Land Use**<br>***Guest Speaker:*** Dr. Billy Riggs<br>**Readings:** LCAP, ch. 5 ; Cambridge Systematics, Inc. 2009, pp. 1-9; Ewing, et al. 2008, pp. 1-16; Badger 2011; TBA | |
| | Thurs., 11/5 | **Climate Adaptation – Intro & Vulnerability Assessment**<br>**Readings:** LCAP, ch. 6; Henson 2014, Part 2; Cal EMA 2012 (Adaptive Communities) | |

| | | | |
|---|---|---|---|
| **Climate Change Adaptation** | | | |
| 8 | Tues., 11/10 | **Climate Adaptation – SLR & Infrastructure** | |
| | Thurs., 11/12 | **Climate Adaptation**<br>***Guest Speaker:*** Leeanne Singleton, Raimi +Associates<br>**Readings:** Cal EMA , 2012 (Impacts, pp. 25-35); IPCC 2012, pp. 3-12; SPUR 2014; Gillis 2015 | **DUE:** GHG Technical Analysis |
| 9 | Tues., 11/17 | **Climate Adaptation – Health/Food/Water/Ecosystems**<br>**Readings:** Halverson 2015; TBA | |
| | Thrus., 11/19 | **Climate Adaptation – Case Studies**<br>**Readings:** City of Laguna Woods 2014; City of Chula Vista 2011; City of Santa Cruz 2011; TBA | |
| **Conclusion** | | | |
| | Tues., 11/24 | Self directed Cal Poly CAP activity | |
| | Thurs., 11/26 | **THANKSGIVING** | |
| 10 | Tues., 12/1 | **Policy Development and Implementation**<br>**Readings:** LCAP chs. 7 & 8; Henson 2014, Part 5 | |
| | Thurs., 12/3 | **Wrap-up** | **DUE:** Climate Change Vulnerability Analysis<br>**OUT:** Final Exam |
| | Wed, 6/11 | **Finals Week** | **DUE @ 1pm:** Final Exam |

## Reading List


The AAAS Climate Science Panel. (2014). *What we know: The reality, risks and response to climate change.* Author. Retrieved April 1, 2014 from: http://whatweknow.aaas.org/get-the-facts/

Badger, E. (2011, December 7). The missing link of climate change: Single-family suburban homes. The Atlantic Cities. Retrieved April 9, 2012 from: http://www.theatlanticcities.com/housing/2011/12/missing-link-climate-change-single-family-suburban-homes/650/

Berkeley Lab (2011, November 24*). A how-to guide to slashing California's greenhouse gas emissions by 2050.* News release. Berkeley, CA: Author. Retreived April 9, 2012 from: http://newscenter.lbl.gov/news-releases/2011/11/24/ca-emissions-2050/

California Air Resources Board. (2014, February). *Proposed first update to the climate change scoping plan: Building on the framework*. Author. Retrieved April 1, 2014 from: http://www.arb.ca.gov/cc/scopingplan/document/updatedscopingplan2013.htm

California Council on Science and Technology. (2011, May). *California's energy future: The View to 2050: Summary Report*. Sacramento, CA: Author. Retrieved April 9, 2012 from: http://ccst.us/publications/2011/2011energy.pdf

California ISO. (n.d.). *Progress*. Retrieved April 4, 2012 from: http://www.cacleanenergyfuture.org/progress.html

California Department of Public Health. (2008). *Public Health Climate Change Adaptation Strategy for California*. Sacramento, CA: author. Retrieved April 2, 2013 from: http://www.cdph.ca.gov/programs/CCDPHP/Documents/CA_Public_Health_Adaptation_Strategies_final.pdf

California Emergency Management Agency. (2012). *Adaptation Planning Guide*. Sacramento, CA: Author. Retrieved April 2, 2013 from: http://resources.ca.gov/climate_adaptation/local_government/adaptation_planning_guide.html

California Natural Resources Agency (2009). *2009 California climate adaptation strategy: A report to the Governor of the State of California in response to Executive Order S-13-2008*. Sacramento, CA: Author.

Cambridge Systematics, Inc. (2009). *Moving cooler: An analysis of transportation strategies for reducing greenhouse gas emissions*. Washington, D.C.: Urban Land Institute.

Center for Research on Environmental Decisions. (2009). *The psychology of climate change communication: A guide for scientists, journalists, educators, political aides, and the interested public*. New York: Author.
City of Chula Vista. (2011). *City of Chula Vista Climate Adaptation Strategies Implementation Plans*. Chula Vista, CA: Author. Retrieved April 2, 2013 from: http://www.chulavistaca.gov/clean/conservation/Climate/documents/ClimateAdaptationStrategiesPlans_FINAL_000.pdf
City of South San Francisco. (2011, January). *2005 Community-wide greenhouse gas emissions inventory*. South San Francisco, CA: Author. Retrieved March 26, 2012 from: http://ssf.net/DocumentCenter/Home/View/2472
Environmental Protection Agency. (2014). *Green power procurement: A guide to developing and implementing greenhouse gas reduction programs*. Washington, DC: Author. Retrieved April 1, 2014 from: http://www.epa.gov/statelocalclimate/documents/pdf/greenpowerprocurement508final.pdf
Ewing, R., Bartholomew, K., Winkelman, S., Walters, J., & Chen, D. (2008). *Growing cooler: The evidence on urban development and climate change*. Washington, D.C.: Urban Land Institute.
Friedman, T. L. (2008). *Hot, flat, and crowded: Why we need a green revolution--and how it can renew America* (1st ed.). New York: Farrar, Straus and Giroux.
Fuller, M. C., Kunkel, C., and Kammen, D. M. (2009, September). *Guide to energy efficiency & renewable energy financing districts for local governments*. Berkeley, CA: City of Berkeley. Retrieved April 9, 2012 from: http://www.ci.berkeley.ca.us/uploadedFiles/Planning_and_Development/Level_3_-_Energy_and_Sustainable_Development/Guide%20to%20Renewable%20Energy%20Financing%20Districts2009.pdf
Gerdes, J. (2012, February 28) Net-zero energy buildings are coming - What about the buildings already standing? *Forbes*. Retrieved from http://www.forbes.com/sites/justingerdes/2012/02/28/net-zero-energy-buildings-are-coming-what-about-the-buildings-already-standing/
ICLEI–Local Governments for Sustainability. (2013). *U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, Version 1.1*.
IPCC. (2012). Summary for Policymakers. In: *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation* (SREX) [Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds.)]. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK, and New York, NY, USA, pp. 3-21.
Leiserowitz, A., Maibach, E., Roser-Renouf, C., Feinberg, G. & Howe, P. (2013) *Global warming's six Americas, September 2012*. Yale University and George Mason University. New Haven, CT: Yale Project on Climate Change Communication. http://environment.yale.edu/climate/publications/Six-Americas-September- 2012
Local Government Commission. (2006). *Community choice aggregation*. Sacramento, CA: Author. Retrieved April 9, 2012 from: http://www.lgc.org/cca/docs/cca_energy_factsheet.pdf
Moser, S.C. & Dilling, L. (2007). Toward the social tipping point: Creating a climate for change. In Moser, S. C., & Dilling, L. (Eds.). *Creating a climate for change: Communicating climate change and facilitating social change*. Cambridge: Cambridge University Press.
Moser, S., Franco, G., Pittiglio, S., Chou, W. & Cayan, D. (2009). *The future is now: An update on climate change science impacts and response options for California*. CEC-500-2008-071. Sacramento, CA: California Energy Commission, Public Interest Energy Research Program.
Parzen, J. (2009, July). *Lessons learned: Creating the Chicago Climate Action Plan*. Chicago. IL: City of Chicago.
Roberts, D. (2009, November 30). Making buildings more efficient: It helps to understand human behavior. *Grist*. Retrieved March 29, 2010 from: http://www.grist.org/article/2009-11-30-making-buildings-efficient-it-helps-to-understand-human-behavior/
Somerville, R.C.J. & Hassol, S.J. (2011, October). Communicating the science of climate change. *Physics Today*.
SPUR. (2012). *Ocean Beach Master Plan*. San Francisco, CA: author. Retrieved April 2, 2013 from: http://www.spur.org/files/Ocean_Beach_Master_Plan052012.pdf
U.S. Conference of Mayors. (2005). *The U.S. Mayors climate protection agreement* (As endorsed by the 73rd Annual U.S. Conference of Mayors meeting, Chicago, 2005). Chicago, IL: Author. Retrieved September 13, 2015 from: http://www.usmayors.org/climateprotection/documents/mcpAgreement.pdf

# CRPLAN 5500: Energy Planning

**Instructor name:** Kimberly Burton
**Year and term:** Fall Semester 2015
**Meeting time:** W / F, 2:20-3:40pm
**Meeting location:** Bolz 128

**Telephone/E-mail:** (614) 292-1027 /burton.90@osu.edu
**Office location:** 229 Knowlton Hall
**Office hours:** M, 5:15-6:00pm / W, 5:00-6:00pm
**Teaching assistants:** N/A
**Teaching assistant email:** N/A

## COURSE INFORMATION

### DESCRIPTION

This course is designed as an introduction to the role of energy as a factor and constraint at various levels of city and regional planning and policy with a focus on transportation-related energy issues. The resource, technological, environmental, economic, and institutional dimensions of these issues are analyzed. The emphasis is set on basic facts finding, definition of the problems, search for possible solutions, and evaluation of their associated costs and benefits.

After an overview of the course, worldwide and US energy production and consumption patterns will be presented. The following specific subjects will be discussed: Energy sources, definitions & components; basic terminology; transportation & energy – the externalities; new energy technologies; land use, urban form & transportation demand; alternative fuels & alternative vehicles; energy efficiency, policies & measures; closed-loop systems; life cycle analysis of transportation related energy; future of transportation & energy demand.

This course is non-quantitative, and no prior knowledge about energy is required. The course is structured as a seminar with independent readings, a mid-term exam and class debates. Detailed information on class debates are presented in a separate document.

### GOALS & OBJECTIVES

Upon completion of the course, a student should be able to:

1. Understand the existing patterns of energy supplies, and their associated economic costs and environmental impacts;
2. Understand the links between transportation, land use and energy;
3. Understand transportation-related energy consumption patterns and their determinants, costs and environmental impacts;
4. Discuss the critical issues confronting the development of regional, state and local transportation energy plans and policies;
5. Understand the new and emerging technologies related to renewable energy and alternative fuels and vehicles.
6. Understand the role planners can play in energy planning and the tools available to them.

### FORMAT

This course includes lectures, guest speakers, student presentation, in-class discussions, and tours.

### COURSE MATERIALS

The students will be required to read a variety of articles for this course. The reading materials will be online or in the Architecture Library's Reserve section.

The below texts are available for download:

- Daniel Sperling & James S. Cannon (2009), *"Reducing Climate Impacts in the Transportation Sector",* Springer.

- Brown, Lester (2009), *Plan B 4.0.* Earth Policy Institute

The below text will be available for the students in the Closed Reserve Section of the Architecture Library:

- Randolph, J. and Masters, G.M. (2008) *Energy for Sustainability*. Island Press.

## ASSIGNMENTS

The assignments, exams, and other graded items for the course are as follows:

| | |
|---|---|
| Attendance | 10 % |
| Class Participation | 10 % |
| Assignments | 15 % |
| Midterm Exam | 30 % |
| Final Group Project | 35 % |

The mid-term exam will be a short (1 hour) examination covering the basic concepts discussed in class. Class participation accounts for 10% of the class. The students are expected to read the class materials before class and participate in the class discussions. Additional information on assignments are available in Carmen.

## CRITERIA FOR EVALUATION OR GRADING

Letter grades are assigned based on a standard scheme:

| | | | |
|---|---|---|---|
| A | 93-100 | C+ | 77-79.9 |
| A- | 90-92.9 | C | 73-76.9 |
| B+ | 87-89.9 | C- | 70-72.9 |
| B | 83-86.9 | D+ | 67-69.9 |
| B- | 80-82.9 | D | 60-66.9 |
| | | E | <60 |

## PLANNING ACCREDITATION CRITERIA MET

The Planning Accreditation Board has a series of standards by which accredited planning programs are measured. Both Virginia Tech and Ohio State University have accredited planning programs. Below is a list of accreditation criteria that are covered in this course.

- Purpose and Meaning of Planning: appreciation of why planning is undertaken by communities, cities, regions, and nations, and the impact planning is expected to have.
- Planning Law: appreciation of the legal and institutional contexts within which planning occurs.
- The Future: understanding of the relationships between past, present, and future in planning domains, as well as the potential for methods of design, analysis, and intervention to influence the future.
- Global Dimensions of Planning: appreciation of interactions, flows of people and materials, cultures, and differing approaches to planning across world regions.
- Research: tools for assembling and analyzing ideas and information from prior practice and scholarship, and from primary and secondary sources.
- Written, Oral and Graphic Communication: ability to prepare clear, accurate and compelling text, graphics and maps for use in documents and presentations.
- Quantitative and Qualitative Methods: data collection, analysis and modeling tools for forecasting, policy analysis, and design of projects and plans.
- Leadership: tools for attention, formation, strategic decision-making, team building, and organizational/community motivation.
- Governance and Participation: appreciation of the roles of officials, stakeholders, and community members in planned change.
- Sustainability and Environmental Quality: appreciation of natural resource and pollution control factors in planning, and understanding of how to create sustainable futures.
- Growth and Development: appreciation of economic, social, and cultural factors in urban and regional growth and change.
- Social Justice: appreciation of equity concerns in planning.

**SCHEDULE**

| WEEK | DATE | TOPIC |
|---|---|---|
| 1 | 8/26 | Lecture - Class Introduction |
| 1 | 8/28 | Lecture - Today's Energy-Related Problems |
| 2 | 9/2 | In-Class Discussion - Energy-Related Problems |
| 2 | 9/4 | Lecture - Energy Usage Patterns; Sources Of Energy |
| 3 | 9/9 | Lecture - Nonrenewable Energy Sources |
| 3 | 9/11 | No Class - Online Lecture - Energy Fundamentals |
| 4 | 9/16 | Lecture - Solar (Active & Passive) & Wind Energy |
| 4 | 9/18 | Lecture - Geothermal, Water & Biomass Energy |
| 6 | 9/23 | In-Class Discussion - Renewable Energy Technologies |
| 5 | 9/25 | No Class - APA-OH State Conference |
| 7 | 9/30 | Lecture - Energy Storage; Energy Efficiency |
| 6 | 10/2 | Guest Speaker - Renewable Energy & Sustainability At OSU |
| 5 | 10/7 | Guest Speaker - Renewable Energy Technologies |
| 7 | 10/9 | Class Presentations - Renewable Energy Houses; Midterm Review |
| 8 | 10/14 | Midterm |
| 8 | 10/16 | No Class - Autumn Break (10/15-10/16) |
| 9 | 10/21 | Lecture - Transportation Energy Use; VMT Reduction |
| 9 | 10/23 | Computer Lab Time - Complete Streets Projects |
| 10 | 10/28 | Tour - OSU LEED Building |
| 10 | 10/30 | Class Presentations - Complete Streets Projects |
| 11 | 11/4 | Lecture - Vehicle Efficiency; Low-Carbon Fuels |
| 11 | 11/6 | Lecture - Life-Cycle Methods; Well-To-Wheel Studies (Assgmnt Only) |
| 12 | 11/11 | No Class - Veterans Day (11/11) |
| 12 | 11/13 | Tour - New Vehicle Technologies |
| 13 | 11/18 | Lecture - Planners & Energy; Localized Energy |
| 13 | 11/20 | Lecture - Closed-Loop Systems; Ecological Clustering |
| 14 | 11/25 | No Class - Thanksgiving Break (11/25-11/27) |
| 14 | 11/27 | No Class - Thanksgiving Break (11/25-11/27) |
| 15 | 12/2 | Class Presentations - Final Group Project Presentations |
| 15 | 12/4 | Class Presentations - Final Group Project Presentations |
| 16 | 12/9 | Tour - OSU's enCORE Solar House - 1:45pm - 2:45pm |
| 16 | 12/11 | No Final |

## COURSE POLICIES

### ATTENDANCE

Students are expected to attend all scheduled class meeting times and related events as outlined in the course syllabus. There are five situations which constitute an "excused absence". They are:

**Personal illness**: Students who are too ill or injured to participate in class must provide written documentation from a physician stating that the student cannot participate in class.

**Death of a member of the student's immediate family**: Students who have missed class due to a death in the family must provide documentation of the death (death certificate, obituary, etc.).

**Military or government duty**: Please notify the instructor prior to service.

**University/Knowlton School sanctioned events:** Students who will be participating in University/Knowlton School sanctioned events must provide the instructor with a copy of the scheduled events and those classes of which will be missed.

**Major religious holiday:** Students who will be observing a religious holiday must provide date/event written notification to the instructor within the first two weeks of the semester.

A student's grade will drop one letter grade after the second and third unexcused absences; and a student with four unexcused absences can be dropped from the course and given an "E".

### DEADLINES

Students who miss deadlines due to valid and documented extenuating circumstances may submit the required work at a date agreed upon with the instructor.

Unexcused work will not be accepted, incomplete projects will be evaluated in relation to their degree of completion, and a student is present only if he or she displays sufficient preparation for the course to the instructor.

### COMMUNICATION

Students must check their university email daily.

## GENERAL POLICIES AND PROCEDURES

### ACADEMIC MISCONDUCT

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the University's Code of Student Conduct, and that all students will complete all academic and scholarly assignments with fairness and honesty. Students must recognize that failure to follow the rules and guidelines established in the University's Code of Student Conduct and this syllabus may constitute "Academic Misconduct."

OSU's Code of Student Conduct (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the University, or subvert the educational process." Examples include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the University's Code of Student Conduct is never considered an "excuse" for academic misconduct, so it is recommended that you review the Code of Student Conduct.

If a faculty member suspects that a student has committed academic misconduct in a course, they are obligated by University Rules to report suspicions to the Committee on Academic Misconduct. It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. If COAM determines that a student has violated the University's Code of Student Conduct, the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the University.

**Resources you can refer to include:**
The Committee on Academic Misconduct web page: oaa.osu.edu/coam.html
Ten Suggestions for Preserving Academic Integrity: oaa.osu.edu/coamtensuggestions.html

### SEXUAL HARRASSMENT

Any forms of sexual harassment or intimidation will not be tolerated. OSU's Sexual Harassment policy, which applies to all faculty, staff, and students, includes lewd remarks and inappropriate comments made in the studio environment, classroom, and computer labs as well as the "display of inappropriate sexually oriented materials in a location where others can see it." Sexual harassment includes inappropriate behavior among two or more students; between students and faculty; and among faculty. The actions can take place in physical, verbal, or written forms. Refer to University's Code of Student Conduct 3335-23-04 (C) for additional information and for procedures on filing a complaint.

### KNOWLTON SCHOOL CONDITIONS FOR PROBATION BY SPECIAL ACTION

All undergraduate students must meet standards of academic progress. Students who do not meet these standards are subject to probation and dismissal. Dismissed students have an opportunity to apply for reinstatement. As described in University Rules, the responsibility for administering these rules is split between the university and the student's school or program. Refer to the Undergraduate Advising Handbook section D for details on how these provisions are implemented: knowlton.osu.edu/students/current-students.

### SAFETY

To provide the best education, the Knowlton School must act as a community. As such, its members (faculty, students, and staff) must respect and watch out for each other. The studio is available for students 24/7. The University escort service provides safe transportation to and from Knowlton Hall 7:30AM-3:00AM. Call 292-3322.

### STUDENTS WITH DISABILITIES

If you have a documented disability, please register with Student Life Disability Services. After registration, make arrangements to meet with instructors as soon as possible to discuss your accommodations, so they may be implemented in a timely fashion. If you have any questions about this process, please contact Disability Services at 614-292-3307.

### PROFESSIONAL CONDUCT

Students are expected to conduct themselves in a professional manner and to abide by the provisions in the Code of Student Conduct. Students should appreciate diversity, and they should conduct themselves professionally with members of the same or opposite gender and/or from different ethnicities and cultures.

Students should represent themselves in a professional manner in forums that have public access. This includes information posted on social networking sites such as Facebook and Twitter. Information on these pages is often screened by potential employers, and unprofessional material can have a negative impact on job or graduate school prospects.

### PROHIBITED ITEMS AND ACTIONS

The following items are prohibited: Non-Knowlton School furniture, alcohol, cigarettes, weapons, bicycles, skateboards,

rollerblades, pets, spray paints, foam cutter wands, welding devices, heat guns and any flame or gaseous liquid device.

The following safety compliances must be observed: electrical power cords cannot be connected in a series or extend over traffic areas; fire extinguishers must remain accessible and in full view; access to stairwells, corridors, and aisles must maintain a 44" clear width and handrails must be unobstructed.

Building surfaces cannot be marked, anchored to, or penetrated.

Installations may not occur in any part of the building except by permission of the Knowlton School Building Coordinator.

Power tools are restricted to the shop except when permission is granted by the Knowlton School Building Coordinator.

Loud noise is forbidden.

Graffiti and vandalism are grounds for disciplinary action.

## STUDENT RESOURCES

**Knowlton Student Services**
100 Knowlton Hall. Hours: 8 a.m. – 5 p.m. weekdays
Undergraduate Students: knowlton.osu.edu/students/undergraduate
Graduate Students: knowlton.osu.edu/students-current-students/graduate

**Student Advocacy and the Dennis Learning Center**
advocacy.osu.edu
dennislearningcenter.osu.edu

**University Counseling and Consultation Services**
ccs.ohio-state.edu

**Ohio State Police Department**
ps.ohio-state.edu
General non-emergency: (614) 292-2121

**To report an emergency, dial 9-1-1**

**York University**
**Faculty of Environmental Studies**

**COURSE OUTLINE**
**Fall 2014**

**ES/ENVS 6121 Community, energy and planning**

This course examines the relationship between sustainable communities and sustainable energy systems. In the context of climate change, environmental, ethical, and social concerns, the course will consider the flexibility and adaptability of landscape, communities and city-building processes, and integrated and multi-scalar responses and approaches to policy-making and implementation.

**Course Director:** Professor Christina Hoicka
cehoicka@yorku.ca

**Office hours:** Thursday 11AM to 12PM, drop-in, please check my blog for updates http://cehoicka.blog.yorku.ca/

**Objectives:**

The objectives of this course are fourfold:
First, for students to describe and differentiate between the drivers of change and path dependence in energy systems and resource intensive communities.
Second, students will learn theory and concepts that support an understanding of the integrated and multi-scalar responses and approaches to policy-making and implementation of community energy planning. These will consider strong sustainability goals, long-term change and sustainable communities.
Third, students will learn practical skills through guest lectures and projects that are supportive of more sustainable use of energy and of working in the interdisciplinary environment that is community energy planning. For example, students will not master engineering knowledge or principles, but they will learn concepts and practices that are important to engineers, and therefore prepare them for these discussions.
Fourth, students will improve their ability to communicate complex concepts and materials in a concise and effective manner.

**Outline:**

Course format

- The course will take place on Thursdays from 230 to 530 PM.
- The course textbook and readings have been carefully selected so that students can meet the learning objectives of the course and have a wide breadth of knowledge upon entering the community energy planning and policy field of work.
- In the first week, students will sign up to present summaries of the readings, and to lead a discussion in the seminar format during the first 90 minutes of class. The summaries and participation in discussions will constitute a large portion of evaluation of the student.
- **Summaries are due on Moodle (preferred) or in hard copy in class, the date that the reading is due.**
- During the latter 90 minutes of class, students will receive a lecture or activity based in practical knowledge, delivered either by the course instructor or a guest lecturer who is a recognized leader in the field.
- Early in the semester, students will be assigned a research paper that on a topic developed by a municipality. **This paper will be due on the last class, when presentations of the projects will take place. Late submissions will not be considered.**
- At the end of the semester, students will collaborate on a document titled “Ideal Principles of Community Energy Planning” with the intention of using it to guide conversations at York University.

**Schedule of Activities**
**Week 1. Sept 11, 2014 Course introduction**
Sign up to present readings in subsequent weeks

**Week 2. Sept 18, 2014** The role of energy in society, drivers for change
Sign up for research paper topics

**Week 3. Sept 25, 2014** Scenarios for cities

**Week 4. Oct 2 2014** Land use, space, scale, and time

**Week 5: Oct 9 2014** Exergy, optimization and monitoring
**Week 6: Oct 16 2014** Urban and rural energy landscapes, importing energy to the city

**Week 7: Oct 23 2014** Sustainability Transitions

**Oct 30 2014—no class co-curricular days**

**Week 8: Nov 6 2014** What to do part 1 transportation

**Week 9: Nov 13, 2014** What to do part 2: Theories and practice of community engagement at the community level

**Week 10: Nov 20 2014,** Current practice in Canada and ideal principles of community energy planning

**Week 11: Nov 27 2014** Financing and local economic development

**Week 12: Dec 4 2014** Presentations

**Requirements:**

**Assignment Submissions**
Students are encouraged to submit their assignments via the Moodle website in the appropriate dropbox. Assignments must be submitted in Word (.doc or .docx) format. Students with supplementary materials in an Excel spreadsheet are encouraged to submit the spreadsheet with calculations. **Assignments in PDF format will not be accepted.**

**Relation to Other Courses:**
This course is designed to promote the type of interdisciplinarity required for community energy planning. Hence, students with different disciplinary backgrounds will bring together their strong set of knowledge to integrate and problem solve as a group. Enrolment to this course is by permission only, to be received from the Course Director. Students with a strong background in (undergraduate degree or one year of courses focused in) in planning, energy, and resource/ecological economics are encouraged to seek permission directly from the course director.

**Preliminary Reading List:**
Required reading, available for purchase from the bookstore:
Newman P, Beatley T, Boyer H (2009) Resilient cities responding to peak oil and climate change. Island Press, Washington, DC

We will read select chapters from this book, which is available on the library's website for free. Please note that six students can read this simultaneously.
Sven Stremke, Andy van den Dobbelsteen (2013) Sustainable Energy Landscapes: Designing, Planning, and Development. CRC Press, Boca Raton, London, New York

Other Articles as assigned in the Student Reading List (available in Moodle)

**Communication Policy**

All email communication must follow the following guidelines to ensure prompt and accurate responses:

- Responses will be provided to emails for which the email subject heading begins with "ENVS 6121"
- Prior to sending an email, please review the syllabus carefully. Answers that are contained in the syllabus may not be responded to.
- Responses will be provided within three business days. Please plan accordingly.
- For reasons of privacy and confidentiality, please email me from the email registered to your Moodle account.
- You are responsible for checking your email a may contact you through.

- Content related questions will be discussed in class, or on online discussion forums with the entire group.

**Academic Honesty**
All York students are subject to policies regarding academic honesty as set out by the Senate of York University and by the Faculty of Environmental Studies (FES). Students are strongly encouraged to read the Senate Policy on Academic Honesty, a copy of which can be found on the York University web-site (http://www.yorku.ca/secretariat/legislation/senate/acadhone.htm). FES is committed to maintaining the highest standards of academic integrity. Please be advised that conduct that violates the ethical or legal standards of the University community may result in serious consequences. For more information, please contact the Director, Student and Academic Services and/or the FES Writing Program Coordinator.

**Research Ethics**
Students who conduct a research study using human participants must submit the following for approval prior to the conduct of research:

1. three copies of a proposal outlining the purpose of the research and the methodology to be used
2. three copies of the Faculty of Environmental Studies Human Participants Research Protocol Form, and
3. three copies of the Written Informed Consent form or a script of Verbal Informed Consent (Verbal Informed consent is permissible only in extenuating circumstances, where written communication is not feasible).

This material will be reviewed by a Sub-committee of the Research and Awards Committee. Reviews will take up to 2 weeks from the date of submission. If the research is not approved prior to the conduct of the research, then the research will not have received research ethics clearance and will be deemed unacceptable for submission as a component of this course.

Information regarding the use of human participants in research studies may be found on the Faculty of Graduate Studies webpage http://www.yorku.ca/grads/polc/ethics.htm.

Students are advised that all human participants in the research must have either signed a written consent form or have provided oral consent for their participation in the research. Students also are advised that the consent forms must be retained by the Principal Investigator for two years following the completion of the research.

**PLEASE NOTE:**
Students who feel that there are extenuating circumstances that may interfere with the successful completion of the course requirements are encouraged to discuss the matter with the Course Director as soon as possible. Students with physical, learning or other disabilities who require reasonable accommodations in teaching style or evaluation methods should discuss this with the Course Director early in the term so that appropriate arrangements can be made.

August 8, 2014

New York University, Wagner Graduate School of Public Service
URPL-GP 2612 Adapting the Physical City: Innovations in Energy, Transportation, and Water
Fall 2014, Tuesday 4:55-6:35 PM, Location: Bldg GCASL, Room 279
Professor Rae Zimmerman (rae.zimmerman@nyu.edu)
Office hours: Tues., 2-4 PM (updates http://wagner.nyu.edu/zimmerman) and by appointment

## COURSE SYLLABUS AND OUTLINE SUMMARY

**Summary and Objectives**. A revolution has been occurring in the way energy, transportation, and water services are provided and used that goes beyond the boundaries of individual buildings and communities, but connects with them. Cities have relied upon traditional infrastructure to provide energy, transportation, water, and environmental services. Now, new innovations continue to emerge that present opportunities to proactively address climate change, resource scarcity, environmental contamination, and social inequities while meeting service needs. These innovations have now become the foundation not only for popular movements but business practices also. Students will obtain knowledge and skills to evaluate the performance, resource demands and selected impacts of these innovations relative to one another and to conventional infrastructure in light of urban needs. The course also covers ways to incorporate these new technologies and adapt user behavior to plan neighborhoods, communities and regions to conserve resources, promote environmental protection, and reduce the consequences of service disruptions. Communications and information technology are often vital links for energy, water and transportation and ways to evaluate their influence on these other services are covered. Methods to balance alternative approaches to service delivery within planning and policy frameworks are also emphasized. The course covers the evolution of physical elements of cities, the environmental consequences and social adaptations to new technologies, and challenges cities continue to face in these areas. Transformations in planning standards and protocols to accommodate these new systems are part of the course. The course combines separate streams of thought in the areas of smart growth, climate change adaptation and mitigation, environmental planning and greening cities with alternatives for energy, transportation and water.

### Course Outline

I. The Context of Cities for Public Services – Framing the Issues
1. September 2 Introduction: How to Adopt New Directions, Develop Innovations and Adapt Land Use Planning
2. September 9 Social Drivers for Infrastructure Innovation: Quality of Life, Population, & Social Justice
3. September 16 Environmental Drivers for Infrastructure Innovation: Catastrophes, Climate, & Public Services
II. Energy: Economies for Light, Heat, and Motion
4. September 23 Introduction: Energy Trends, Traditions and Hazard Impacts
5. September 30 Integrating Energy Infrastructure into the Built Environment: Green Buildings
6. October 7 Energy Technologies and Alternatives: Experiences from the Field
(October 14 No Class – University Holiday)
7. October 21 Tinkering with Tradition: Alternative Fuels and Technologies (including Nuclear Power)
III. Transportation: Transforming Vehicles, Fuel, Land Use, and Behavior
8. October 28 Transportation Trends, Traditions, and Hazard Impacts
9. November 4 Transportation (transit) Initiatives
10. November 11 Transportation (road-based, non-transit) Initiatives
11. November 18 A Call for Innovation: Environment, Land Use and Equity
IV. Water: Too Little, Too Much, Too Dirty, Too Expensive?
12. November 25 Trends, Traditions and Hazard Impacts for Water and Wastewater
13. December 2 Innovations in the Provision of Water Services
V. Integration: Greening the Gray City
14. December 9 Synthesis and Brief Discussion of Student Papers

## COURSE INSTRUCTIONS

**Availability of Course Readings**

Required and optional readings are listed by lecture, NOTE choices among readings. NYU Classes site is used extensively. Be sure to activate your NYU Classes accounts. Availability:
(1) Books: Bookstore and Bobst Library Reserve (some books are also available on-line)
Required:

T. Beatley, editor (2012) *Green Cities of Europe*, Washington/Covelo/London: Island Press. Also available online at library.nyu.edu (type title in search bar)

R. D. Bullard (2007) *Growing Smarter*, Cambridge, MA: MIT Press.

A. Y. Hoekstra (2013) *The Water Footprint of Modern Consumer Society*, NY: Routledge.

National Academy of Sciences (NAS) (2010) *Electricity from Renewable Resources: Status, Prospects, and Impediments*, Washington, DC: National Academy Press. Also on-line.

Jean-Paul Rodrigue (2013) *The Geography of Transport Systems*, 3rd edition New York, NY: Routledge. 3rd edition. Available for viewing online at: http://people.hofstra.edu/geotrans/

P. L. Schiller, E. C. Bruun and J. R. Kenworthy (2010) *Introduction to Sustainable Transportation: Policy, Planning and Implementation*, Earthscan, Washington DC.

Optional: R. Zimmerman (2012) *Transport, the Environment and Security*, Cheltenham, UK and Northampton, MA: Edward Elgar Publishing, Ltd.

(2) Required readings from book chapters: Bobst Library Reserve and Unique Copy Center for purchase (Chapters are in a single packet in both locations)
(3) Journal articles: Available from Bobst Library online.
(4) Internet and/or NYU Classes – "Resources"/ "Documents" (listed by lecture number below).
(5) Power point slides will be posted on NYU Classes for the lectures each week.

**Course Assignments and Requirements**

Detailed instructions are on NYU Classes under Resources/"Assignments". Objectives are to:

- evaluate the impacts of decisions about how public services and development use environmental resources by applying "green or carbon calculators" to infrastructure;
- analyze/critique debates for a new infrastructure technology and competing alternatives;
- understand how to overcome obstacles to adopting new technologies; and
- design energy, transportation, or water needs of a city to optimize environmental quality, resource conservation, and social equity.

1. Study questions and exercises. Due: Sept. 23; Nov. 25 before class: Two graded short exercises on readings and skills will be required. Students will have some choice within each exercise. Some ungraded study questions will be distributed to guide discussion of readings.
2. Mid-Term Paper. Due: Oct. 28: Analysis of a selected case or two comparative cases on the implementation and performance of alternative technologies using environmental and socioeconomic criteria. Students choose topics or cases and are first submitted for approval. The mid-term will in part provide a foundation for the final paper.
3. Final Paper Assignment and Selected Presentations: Paper on a case or case area used for the mid-term; in-class discussion of individual papers Dec. 9 and other times. Final Due: Dec. 16.

All assignments are take-home exercises and papers to be prepared individually.

**Course Grading Criteria**: Study Questions: 30% (15% each); Mid-Term Paper: 30%; Final Paper and Class Discussion: 30%; Class Participation: 10%.

**Academic Code:** Students are required to comply with the Wagner **Academic Code** located on the course NYU Classes site and at **http://wagner.nyu.edu/students/policies/.**

## GP-URPL.2612 Fall 2014: Detailed Course Lecture Outline and Readings

**NOTE:** Lectures for the semester are listed below with required and optional readings for each lecture. NOTE CHOICES AMONG REQUIRED READINGS LISTED - NOT ALL HAVE TO BE READ. Some lectures may extend over more than one week. Several guest lectures are planned by professionals in government, academia, or the private sector in infrastructure innovations. Readings listed for those lectures will be covered in abbreviated form in other lectures. The order of some lectures may change given speaker schedules. Additional readings are added over the course of the semester as needed and where new information arises.

### I. THE CONTEXT OF CITIES FOR PUBLIC SERVICES – FRAMING THE ISSUES

The natural environment is a critical part of the infrastructure that supports human activity. Social and environmental drivers are covered for adaptation and change in energy, transportation and water, including environmental quality and quality of life considerations, global warming, resource depletion and uncertainty, and social justice issues such as inequitable costs and resource availability for public services. The first three lectures provide a framework for the specific energy, transportation and water sectors later in the semester, and include the definition of the innovation concept and its application to infrastructure.

**Lecture 1. Introduction: How to Adopt New Directions, Develop Innovations, and Adapt Land Use Planning (September 2)**

Required Readings (to be extended through Lecture 2)

- Internet: ASCE (2013) 2013 Report Card for America's Infrastructure
- Internet & NYU Classes: U.S. EPA (2013) Our Built and Natural Environments: A Technical Review of the Interactions among Land Use, Transportation, and Environmental Quality, Second edition. Washington, D.C.: EPA http://www.epa.gov/dced/pdf/b-and-n/b-and-n-EPA-231K13001.pdf, pp. 80-87
- Bookstore/Library Reserve/Library Online: selected readings from Beatley, ed. (2012)

**Lecture 2. Social Drivers for Infrastructure Innovation: Quality of Life, Population and Social Justice (September 9)**

Required Readings

*A. Development Patterns, Land Use, and Green Building* (continued from Lecture 1)

- Library Reserve; Copy Center: T. Beatley (2000) Chap. 2: "Land Use and Urban Form: Planning Compact Cities," *Green Urbanism*, Washington, DC: Island Press, pp. 29-75.

*B. Measuring Sprawl, Carbon Footprints, and Calculators*

*C. Social Justice*

- Bookstore/Library Reserve; library on-line: R. D. Bullard (2007) *Growing Smarter*, Cambridge: MIT.
- Internet: Various public opinion polls and surveys.

*D. Population: Numbers, density, location, and equity*

- Internet & NYU Classes: S. G.Wilson and T.R. Fischetti (May 2010) Coastal population trends in the US: 1960–2008. U.S. Bureau of the Census. http://www.census.gov/prod/2010pubs/p25-1139.pdf.
- Internet & NYU Classes (Lecture 1): EPA Built & Natural Environments, pp. 6-14;31-33

Supplements (Available for Class) – equity (also covered for each type of infrastructure)

- Internet: Z. S. Naphtali, C. E. Restrepo & R. Zimmerman (2007) "Using GIS to Examine Environmental Injustice in the South Bronx. The Case of Waste Transfer Stations," *Connect*, pp. 23-28. http://www.nyu.edu/its/pubs/connect/spring07/pdfs/naphtali_gis.pdf
- C.E. Restrepo and R. Zimmerman (2008) "Environmental Justice," *Encyclopedia of Quantitative Risk Analysis and Assessment*, E. L. Melnick and B. S. Everitt, eds. Chichester, UK: John Wiley & Sons, Ltd, Vol. 2, pp. 808-817.

**Lecture 3. Environmental Drivers for Infrastructure Innovation: Catastrophes, Global Climate Change and Public Services and Adaptation Innovations (September 16)**

Required Readings. Readings are organized by sources and impacts of infrastructure disruptions and adaptations to reduce the consequences of extreme events.

*A. Sources and Impacts of Infrastructure Disruptions*

*Climate Change and Natural Hazards:*

Internet & NYU Classes (Lecture 1): EPA Built & Natural Environments, pp.65-70
Choice of readings from IPCC, U.S. Global Change Research Program and NOAA.
Optional: Readings from *Science* and *PNAS*

*Human-Initiated Hazards:*

- National Transportation Safety Board reports, online
- Case studies of factors leading to infrastructure failures attributed to design, construction, operation and maintenance

*B. Innovations for Mitigation and Adaptation to Reduce Risks to Infrastructure and Its Users*

- Internet & NYU Classes: U.S. Department of State *U.S. Climate Action Plan*
- Bookstore/Library Reserve, library on-line: R. D. Bullard, ed. (2007) *Growing Smarter*, selected readings

Optional

- Readings from *Science*; NYC *plaNYC*
- Internet & NYU Classes: R. Zimmerman and C. Faris (2010) "Infrastructure Impacts and Adaptation Challenges," Chap. 4 in *New York City Panel on Climate Change 2010 Report*, C. Rosenzweig and W. Solecki, Eds. *Annals NY Academy of Sciences*, Vol. 1187. New York, NY, NY Academy of Sciences, pp. 63-85. Available for class. http://onlinelibrary.wiley.com/doi/10.1111/j.1749-6632.2009.05318.x/pdf

## II. ENERGY: ECONOMIES FOR LIGHT, HEAT, AND MOTION

Traditional and innovative ways are discussed for approaching production, distribution, consumption of energy and byproduct utilization; trends in reliability and resiliency; options and alternatives for the provision of energy residences and industry.

**Lecture 4. Energy Trends, Traditions, and Hazard Impacts (September 23)**

***Exercise 1 Due by September 23 prior to class***

Required Readings

*A. Characteristics of and Trends in Energy Production and Consumption* CHOOSE 1 of 3

- 2014 reports and databases from the U.S. Energy Information Administration; U.S. EPA; International Energy Agency; and the World Bank

*B. Introduction to Renewable Energy*

- Internet & Bookstore: National Academy of Sciences (2010) Electricity from Renewable Resources: Status, Prospects, and Impediments. Washington, DC: National Academy. https://download.nap.edu/catalog.php?record_id=12619 (Click download free pdf on left)

CHOOSE 1 of the 2 readings on wind energy:

- Library Reserve; Copy Center: J. A. Layzer (2012) Chap. 11, "Cape Wind. If Not Here, Where? If Not Now, When?" in *The Environmental Case. Translating Values into Policy*, Washington, DC: CQ Press, pp. 308-347.
- Library online: A. Davis, J. Rogers and P. Frumhoff (October 2008) "Putting Wind to Work. The challenges of balancing conservation, climate change, and local siting issues," *Planning*, pp. 36-41.

Optional

- Library online: J.S. Simonoff, C.E. Restrepo, and R. Zimmerman (2007) "Risk Management and Risk Analysis-Based Decision Tools for Attacks on Electric Power," *Risk Analysis*, Vol. 27, No. 3, pp. 547-570. Available for class.
- Library online: Hines, P, Apt J and Talukdar S (2009) Trends in the history of large blackouts in the United States. *Energy Policy*, 37: 5249–5259.

**Lecture 5. Integrating Energy Infrastructure into the Built Environment: Green Buildings (September 30) Guest Lecturer: LEED certified speaker, consulting firm (TBA)**

Required Readings

- Internet & NYU Classes (Lecture 1): EPA Built & Natural Environments, pp. 14-16
- Internet: U.S. EPA (October 2008) *Reducing Urban Heat Islands: Compendium of Strategies*. http://www.epa.gov/heatisld/resources/compendium.htm
- Internet & NYU Classes: Fiona Cousins (February 2007) "Down to Zero," *ARUP Journal*. http://www.arup.com/_assets/_download/88C68E29-19BB-316E-4055A7DFC5EF7ECB.pdf

*Cases for reference:* From City of NY plaNYC 2030 (2011), green buildings plan (2012) and NYC Green Codes Task Force (2010).

**Lecture 6. Energy Technologies and Alternatives: Experiences from the Field (October 7) Guest Lecturer: Electric Power Utilities speaker (TBA)**

Required Readings

- Lecturer's slide presentations will be available after class.

**October 14. No Class – University Holiday.**

**Lecture 7. Tinkering with Tradition: Alternative Fuels and Technologies (including Nuclear Energy) (October 21)**

*A. Renewable Forms of Alternative Energy*

Required Readings

- Internet: U.S. Department of Energy, Energy Information Administration (EIA) incentives database
- Internet & Bookstore: National Academy of Sciences (2010) *Electricity from Renewable Resources: Status, Prospects, and Impediments*. Washington, DC: National Academy.

https://download.nap.edu/catalog.php?record_id=12619 (Click download free pdf on left), pp. 258-265 (section on "Renewable Electricity Integration").

- Bookstore, Reserve, Online: Selections from Beatley, ed. (2012).

*B. Nuclear Power*

Required Readings: CHOOSE 1 of 3 readings below:

*Cases on nuclear power to be covered in lecture: Nuclear Waste Repository at Yucca; Fukushima and the World's Reaction to Nuclear Power* optional readings to be provided.

## III. TRANSPORTATION: TRANSFORMING VEHICLES, FUEL, LAND USE, AND BEHAVIOR

Traditional transportation methods and their social, economic and environmental implications; options for green transportation including travel mode, travel technology, and amount of travel.

### Lecture 8. Transportation Trends, Traditions, and Hazard Impacts (October 28)

***Midterm Due October 28***

Required Readings

*A. Transportation Characteristics, Patterns and Trends: Highways, Transit*

- Internet & NYU Classes: readings on transit access and jobs
- Bookstore and Online (http://people.hofstra.edu/geotrans/): Jean-Paul Rodrigue (2013) *The Geography of Transport Systems*, New York, NY: Routledge. Selected sections.
- Bookstore: P.L. Schiller, E.C. Bruun and J.R. Kenworthy, *An Introduction to Sustainable Transportation*, Washington, DC: Earthscan, pp. 1-21

Optional: American Public Transportation Association (APTA) (current)

*B. Hazards Affecting Transportation:* CHOOSE 2 of the 5 readings below

*Extreme Weather, Global Climate Change and Energy Resource Scarcity*:

- Internet: TRB, NCHRP reports
- Internet & NYU Classes: Victoria Transport Policy Institute readings on transportation and land use
- Internet & NYU Classes: Davis, S.C., S.W. Diegel and R.G. Boundy (2014) *Transportation Energy Data Book: Edition 33*, Oak Ridge, TN: ORNL. Skim. http://cta.ornl.gov/data/tedb33/Edition33_Full_Doc.pdf
- Internet & NYU Classes: U.S. DOT, FHWA (2009). "The Carbon Footprint of Travel," 3 pp. http://nhts.ornl.gov/briefs/Carbon%20Footprint%20of%20Travel.pdf

Optional

- Library/Bookstore: R. Zimmerman, *Transport, the Environment, and Security*, Chaps. 2 (patterns and trends), 3 (global climate change), 6 (natural hazards), and 7 (security).

### Lecture 9. Transportation (road-based, non-transit) Initiatives (November 4)

**Guest Lecturer: NYC DOT (TBA)**

Required Readings

*A. Alternative Modes of Travel*

- Bookstore & Online (http://people.hofstra.edu/geotrans/): Jean-Paul Rodrigue (2013) *The Geography of Transport Systems*, New York, NY: Routledge. Selected sections.

*B. Alternative Vehicular design, fuel type, and fuel usage – recent advances*

- Bookstore/Library Reserve: P.L. Schiller, E.C. Bruun and J.R. Kenworthy (2010) An Introduction to Sustainable Transportation, Washington, DC: Earthscan, pp. 25-46; 52-53; 63-73; 87-96; 100-111; 236-244.
- Internet: Renewables – General References and Databases from U.S. Department of Energy (EIA)

Hydrogen

- Internet & NYU Classes: U.S. Congressional Research Service, "A Hydrogen Economy and Fuel Cell: An Overview," January 14, 2004. http://www.policyarchive.org/handle/10207/bitstreams/1915.pdf

Hybrid/Electric Vehicles

- Internet: Union of Concerned Scientists (June 2012) State of Charge: Electric Vehicles' Global Warming Emissions and Fuel-Cost Savings across the United States http://www.ucsusa.org/assets/documents/clean_vehicles/electric-car-global-warming-emissions-report.pdf

**Lecture 10. Transportation (rail-based transit) Initiatives (November 11)**
**Guest Lecturer: MTA (TBA)**

Required Readings

- Bookstore, Library Reserve, and Online (http://people.hofstra.edu/geotrans/): Jean-Paul Rodrigue (2013) *The Geography of Transport Systems*, New York, NY: Routledge.
- Bookstore/Library Reserve: P.L. Schiller, E.C. Bruun and J.R. Kenworthy, *An Introduction to Sustainable Transportation*, Washington, DC: Earthscan, pp. 96-100

CHOOSE 1 of the 2 readings below:

- Internet & NYU Classes: MTA (2009) Greening Mass Transit & Metro Areas. Final Report of the Blue Ribbon Commission on Sustainability and the MTA. New York, NY: The MTA. http://web.mta.info/sustainability/pdf/SustRptFinal.pdf
- Library Reserve; Copy Center: T. Beatley (2000) Ch. 4: "Transit Cities: Public Transport Innovations & Priorities," *Green Urbanism*, Washington, DC: Island Press, pp. 109-136.

*Cases (primarily covered in Lecture 9)*:

- Bookstore: P.L. Schiller, E.C. Bruun and J.R. Kenworthy (2010) *An Introduction to Sustainable Transportation*, Washington, DC: Earthscan, pp. 198; 203; 259-295.
- Internet & NYU Classes: New York City (April 2011) *plaNYC. A Greener, Greater, NY*. http://nytelecom.vo.llnwd.net/o15/agencies/planyc2030/pdf/planyc_2011_planyc_full_report.pdf Transportation, pp. 86-99.
- Library Reserve/Library on-line: Readings from Beatley, ed. (2012).

**Lecture 11. A Call for Innovation: Environment, Land Use and Equity (November 18)**

Required Reading (unless indicated otherwise)

- Bookstore and Online (http://people.hofstra.edu/geotrans/): Jean-Paul Rodrigue (2013) *The Geography of Transport Systems*, New York, NY: Routledge. Selected sections.

*A. Reducing Transportation Impacts on the Environment*

- Internet & NYU Classes: Victoria Transport Policy Institute studies on land use and travel behavior
- Internet & NYU Classes: EPA Built and Natural Environments (sections on transportation). http://www.epa.gov/dced/pdf/b-and-n/b-and-n-EPA-231K13001.pdf

*B. Equity*

- Bookstore/Library Reserve: R. D. Bullard, ed. (2007) *Growing Smarter*. Cambridge, MA: MIT Press. Section III: Transportation Equity, pp. 215-320. Skim.

*C. Alternative Modes (in addition to rail transit): Biking, Walking, Bus Transit, Street Redesign*

(1)Biking and Walking:

- Internet & NYU Classes: Alliance for Biking and Walking (2014) Bicycling and Walking in the United States 2014 Benchmarking Report. https://www.bikewalkalliance.org/storage/documents/reports/2014BenchmarkingReport.pdf. Skim.

(2) Bus Transit; Bus Rapid Transit

- Internet and NYU Classes: Bus Rapid Transit (North America) John Niles and Lisa Callaghan (June 2010) From Buses to BRT: Case Studies of Incremental BRT Projects in North America, San Jose, CA: Mineta Transportation Institute, San Jose State University. http://www.reconnectingamerica.org/assets/Uploads/2010_bus2brt.pdf

(3) Street Redesign

*Case Examples*: Roadway design: Smart Streets; Complete Streets; Ecological Corridors

- Optional: Library Reserve/Bookstore: R. Zimmerman, *Transport, the Environment, and Security*, Chap. 4 (pp. 147-151 streets); Chap. 5 (pp. 166-174 ecological corridors)

## IV. WATER: TOO LITTLE, TOO MUCH, TOO DIRTY, TOO EXPENSIVE?

Issues and alternatives associated with the supply and quality of drinking water, wastewater management, and flood control.

### Lecture 12. Trends, Traditions and Hazard Impacts for Water and Wastewater (Nov. 25)

***Exercise 2 Due: November 25 prior to class***

Required Readings

- Bookstore, Library Reserve: A.Y. Hoekstra (2013) *The Water Footprint of Modern Consumer Society*, New York, NY: Routledge. Selected sections to be assigned.

CHOOSE 3 of the 6 readings below:

- Internet & NYU Classes: Readings on global sanitation and water supply will be provided from the World Health Organization, the UN, the World Bank, and other sources.
- Internet & NYU Classes (Lec. 1): EPA Built & Natural Environments, pp.16-19;46-56
- Library Reserve; Copy Center: M. Palaniappan, E. Lee, A. Samulon (2006) "Environmental Justice and Water," P.H. Gleick, ed. *The World's Water 2006-2007*, Washington, DC: Island Press, pp. 117-135.
- Internet & NYU Classes: City of New York (April 2011) *plaNYC. A Greener, Greater, NY*. Water supply pp. 74-85; waterways (water quality) pp. 58-73. http://nytelecom.vo.llnwd.net/o15/agencies/planyc2030/pdf/planyc_2011_planyc_full_report.pdf
- Internet & NYU Classes: U.S. Congress, Congressional Budget Office (August 2007) "Trends in Public Spending on Transportation and Water Infrastructure, 1956-2004." http://www.cbo.gov/sites/default/files/cbofiles/ftpdocs/85xx/doc8517/08-08-infrastructure.pdf

- Internet & NYU Classes: C. Copeland and M. Tiemann (2010) Water Infrastructure Needs and Investment: Review and Analysis of Key Issues, Washington, DC: Congressional Budget Office. http://fas.org/sgp/crs/homesec/RL31116.pdf

Cases to be discussed in class:

- Bookstore/Library Reserve: P.H. Gleick (2009) "Three Gorges Dam Project, Yangtze River, China," In: P.H. Gleick *The World's Water, 2008-2009*, Washington, DC: Island Press, pp. 139-150.
- Internet & NYU Classes: U.S. EPA (August 2010) *Green Infrastructure Case Studies: Municipal Policies for Managing Stormwater with Green Infrastructure*. Washington, DC: U.S. EPA. http://www.epa.gov/owow/NPS/lid/gi_case_studies_2010.pdf
- NYU Classes: R. Zimmerman and N. Gilbertson (December 1999) "The North River Wastewater Treatment Plant, NYC," New York, NY: NYU-Wagner, ICIS.

Optional

- Library: W.M. Fedien and E.S. Winkler (November 2006) "Planning Issues for On-site and Decentralized Wastewater Treatment," Planning Advisory 542. Theory of Treatment pp. 11-12; Conventional Decentralized Wastewater Treatment Systems (Septics), pp. 13-15.
- Bookstore/Library Reserve: H. Cooley (2009) "Water management in a Changing Climate," in P.H. Gleick *The World's Water, 2008-2009*, Washington, DC: Island Press, pp. 39-56.
- Bookstore/Library Reserve: M. Palaniappan and P.H. Gleick (2009) "Peak Water," In: P.H. Gleick, *The World's Water, 2008-2009*, Washington, DC: Island Press, pp. 1-16.

**Lecture 13. Innovations in the Provision of Water Services (December 2)**

Required Readings

- Bookstore, Library Reserve: Arjen Y. Hoekstra (2013) *The Water Footprint of Modern Consumer Society*. London, UK and New York, NY: Earthscan/Routledge

CHOOSE two of the readings below:

- Library online: J. Parrott (November 2007) "The Ins and Outs of Stormwater Management," *Planning*, pp. 26-31.
- Internet & NYU Classes: U.S. EPA green infrastructure cases and methods
- Internet & NYU Classes: NYC Green Infrastructure Plan – A Sustainable Strategy for Clean Waters, Executive Summary (c2010), New York, NY: NYC, 16 pp. http://www.nyc.gov/html/dep/pdf/green_infrastructure/NYCGreenInfrastructurePlan_ExecutiveSummary.pdf
- Library Reserve & Library online: Selections from Beatley, ed. (2012).

*Success Stories*:

- Internet: U.S. EPA (2002) Section 319 Success Stories Volume III: The Successful Implementation of the Clean Water Act's Section 319 Nonpoint Source Pollution Program. http://water.epa.gov/polwaste/nps/success319/Section319III_intro.cfm
- NYU Classes: NYC (December 2008) Sustainable Stormwater Management, Main report; appendices. New York, NY: City of NY. NYC DEP (2011) Staten Island Bluebelt

## V. INTEGRATION: GREENING THE GRAY CITY

Integrating greener infrastructure into the life of cities – concepts and cases; interdependencies among physical components of energy, transportation, and water in cities; the role of communications and information technologies in the viability of alternative infrastructure technologies. What have we left out? Have we made a difference? Has investment changed the course of infrastructure needs and the development of renewables? Basic course themes and questions will be revisited. Students will contribute insights from their own papers.

**Lecture 14. Synthesis and Brief Discussion of Student Papers**
**(December 9)**

Required Reading

- Bookstore/Library online: (Synopsis for green infrastructure) T. Beatley "Conclusion: Green Cities of Europe as Compelling Models," in T. Beatley, ed., *Green Cities of Europe*, pp. 215-224.

Optional: (Synopsis for infrastructure financing) R. Zimmerman (2014) "Strategies and Considerations for Investing in Sustainable City Infrastructure," Chapter 7 in *The Elgar Companion to Sustainable Cities: Strategies, Methods and Outlook*, edited by D. A. Mazmanian and H. Blanco, Cheltenham, UK: Edward Elgar pp. 133-153. Available for class.

**No in-class exam. Final papers due (via email: December 16).**

# Course 6221
# Planning resilient and low-carbon cities
## Professor Anthony G. Bigio

# SYLLABUS

**Key course readings**

Organization for Economic Cooperation and Development (OECD)
**Cities and Climate change, 2010**
http://www.oecd-ilibrary.org/governance/cities-and-climate-change_9789264091375-en

United Nations HABITAT (UNHABITAT)
**Cities and Climate Change, 2011**
http://www.unhabitat.org/pmss/listitemDetails.aspx?publicationID=3086

Urban Climate Change Research Network (UCCRN)
**Climate Change and Cities 2011**
http://uccrn.org/publications/

**January 13 Class 1 – General introduction to the course**
*Class contents:* Self-introduction by the professor and course participants, and their expectations. General presentation of the course objectives and contents. Introduction to the three key course reading assignments and their contents. Discussion of the modalities for the interaction between professor and students. Discussion of future assignments and of course grading criteria. Links with other SUP courses. Open conversation.

**January 20 NO CLASS – Martin Luther King Day**

**January 27 Class 2 – Climate change, science and uncertainties**
*Class contents:* General presentation of climate change causes and manifestations. Overview of climate change modeling and forecasting from IPCC's 4th Assessment Report to the present IPCC 5th Assessment report: current Representative Concentration Pathways and Socio-Economic Scenarios. Likely global and regional manifestations expected by mid-century. Discussion of the inherent uncertainties that accompany climate change science.

***Additional Class Readings***: Intergovernmental Panel on Climate Change (IPCC), Climate Change 2013, The Physical Science Basis, Summary for Policymakers
http://www.climatechange2013.org/images/uploads/WGI_AR5_SPM_brochure.pdf
Annex 1: Atlas of Global and Regional Climate Projections
http://www.climatechange2013.org/images/uploads/WGIAR5_WGI-12Doc2b_FinalDraft_AnnexI.pdf

**February 3 Class 3 – Urbanization, processes and projections**
*Class contents:* Magnitude of urbanization and worldwide progression from 1950 to 2000, projections to 2050. Demographic trends, links with economic and social development, global variations of urbanization. Varying definitions of urban boundaries. Systems of cities and types of urban fabrics in Europe, North America, emerging economies and less developed countries. Sustainable urban development priorities in the world contexts.

***Additional Class Readings***: United Nations Department of Economic and Social Affairs 'Towards Sustainable Cities' in World Economic and Social Survey 2013, pp. 53-84
http://www.un.org/en/development/desa/policy/wess/wess_current/wess2013/WESS2013.pdf

**February 10 Class 4 – Urban greenhouse gas emissions**
*Class contents:* Urban sources: urban mobility and transportation systems, residential and commercial buildings, production and distribution of goods. Energy sources and urban GHG emissions. Aggregate emissions and forecasts. Emissions intensity, links to varying levels of economic activities across space and time. Urban density, urban form and GHG emissions, intra-urban and inter-urban differentials. GHG emissions and urban lifestyles.

***Additional Class Readings***: Christopher Kennedy, Jared Vande Weghe, A spatial analysis of residential GHG emissions in the Toronto Census Metropolitan Area, in Journal of Industrial Ecology 03,2007, pp. 133-144
http://onlinelibrary.wiley.com.proxygw.wrlc.org/doi/10.1162/jie.2007.1220/pdf
Lorraine Sugar, Christopher Kennedy, A low carbon infrastructure plan for Toronto, Canada, in Canadian Journal of Civil Engineering, 2012
http://www.nrcresearchpress.com/doi/pdf/10.1139/cjce-2011-0523

**February 17 NO CLASS – President's Day**

**February 24 Class 5 – Urban vulnerability and climate change impacts**
*Class contents:* Rapid-onset hazards and slow-onset changes threatening urban territories. Links between natural disasters and climate change impacts. Relevance of geographic location and main manifestations of climate change in cities. Increasing exposure and vulnerability of urban assets and populations, links to socio-economic welfare. Intra-urban differentials in various regional contexts. Aggregate magnitude of climate change impacts.

***Additional Class Readings***: Intergovernmental Panel on Climate Change (IPCC) Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation, 2012, a) Summary for Policymakers and b) Chapter 4, pp. 291-325
http://ipcc-wg2.gov/SREX/images/uploads/SREX-All_FINAL.pdf

**March 3 Class 6 – Stakeholders and agents of urban climate change**
*Class contents:* Roles of scientists, communities, media and NGOs in establishing climate change knowledge and advocating for policy changes. National and local governments, municipal associations and their networks. Roles of fossil fuel groups, lobbying groups and renewable energy companies. International organizations and their respective roles: OECD, EU, WMO, IEA, UNEP, UNFCCC, WB and IPCC. Envisioned socio-technical transformations.

***Additional Class Readings***: a) Harriet Bulkeley et al., The role of institutions, governance and urban planning for mitigation and adaptation; b) Toby Warden, Viral Governance and Mixed Motivations: How and Why US Cities engaged on the Climate Change issue, in World Bank, Cities and Climate Change, Responding to an Urgent Agenda, 2011, http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2011/06/20/000333038_20110620002238/Rendered/PDF/626960PUB0Citi000public00BOX361489B.pdf

**March 10 NO CLASS – Spring break**

**March 17 *Submit mid-term paper on a topic of choice from classes 4, 5 or 6 drawing from the key readings and additional course readings***

**March 17 Class 7 – Urban risk assessment methods**
*Class contents:* Digital Elevation Models, LIDAR, Earth Observation. Future climate downscaling methods. Probabilistic assessments of geological risks. Hydro-meteorological data and flood modeling. Sea-level rise, marine inundation, land subsidence and coastal erosion forecasting. Ambient air quality, heat island effect and heat wave monitoring. Urban vulnerabilities. Community risk assessments. Generating urban risk GIS maps.

***Additional Class Reading***: UCCRN, Framework for City Climate Risk Assessment, 2009 http://uccrn.org/documents/Framework_for_City_Risk_Assessment-June17.pdf
The World Bank, Urban Risk Assessment – Understanding Disaster and Climate Risks in Cities, 2012
http://ecapra.org/sites/default/files/documents/Urban%20Risk%20Assessments.pdf

**March 24 Class 8 – Urban green-house-gas inventories and methods**
*Class contents:* Protocols for measuring GHG emissions by sector. Carbon footprints. National GHG inventories and communications to the UNFCCC. Local measurements of urban emissions from "scopes" 1, 2 and 3. Urban and community emissions protocols and third-party certifications. Carbon financing mechanisms under Joint Implementation. International carbon markets. GHG emissions trading schemes.

***Additional Class Reading***: C. Kennedy et al., Greenhouse Gas Emission Baselines for Global Cities and Metropolitan Regions in World Bank, Cities and Climate Change, Responding to an Urgent Agenda, 2011, pp.15-54
http://siteresources.worldbank.org/INTURBANDEVELOPMENT/Resources/336387-1342044185050/8756911-1342044620209/V1Chap2.pdf

**March 31 Class 9 – Economic valuation methods and tools**
*Class contents:* Ex-post valuations of damages and losses from natural disasters. Costs of climate adaptation. Economic valuations of urban risk assessments: life loss, disabilities, public infrastructure, private properties, economic activities. Direct and indirect impacts of disaster and climate events. Valuation of adaptation responses. Adaptation and mitigation cost-curves. Benefit-cost analysis in climate change decision-making.

***Additional class reading***: Stéphane Hallegatte et al., a) The economics of climate change, impacts and policy benefits at city scale: a conceptual framework; b) Assessing climate change impacts, sea level rise and storm surge risk in port cities: a case study on Copenhagen, in Climatic Change vol. 104, issue 1, January 2011
http://link.springer.com.proxygw.wrlc.org/journal/10584/104/1/page/1

**April 7 Class 10 – Adaptation planning for resilient cities**
*Class contents:* Linkages between urban resilience and adaptation. Institutional response systems and civil preparedness. Resilient infrastructure planning, building and retrofitting. Adapting existing urban areas to climate change. Ecosystem services for adaptation. Planning future urban expansion away from risk. Urban adaptation action plans. Linkages between adaptation and sustainable urban development in the various global contexts.

***Additional Class Reading***: European Environment Agency, Urban Adaptation to climate change in Europe, EEA report n.2, 2012
http://www.eea.europa.eu/publications/urban-adaptation-to-climate-change

**April 14 Class 11 – Mitigation planning for low-carbon cities**
*Class contents:* Urban planning for GHG mitigation: land-use, densities and urban form. Smart grid and smart cities. Energy efficiency. Designing and constructing the built environment. Transit oriented development. Walkable cities, non-motorized transportation. Mixed-use urban development. Water usage and waste management. Ecosystem services for GHG mitigation. Linkages with sustainable urban development.

***Additional Class Reading***: Peter Calthorpe, Urbanism in the Age of Climate Change, 2011
http://www.amazon.com/Urbanism-Climate-Change-Peter-Calthorpe/dp/159726721X/ref=reader_auth_dp#reader_159726721X

**April 21** **Class 12 – Policy frameworks and climate politics**
*Class contents:* Climate change and other major challenges of sustainable development. Policy scenarios: limits to growth, green growth, prosperity without growth. UNFCCC and climate negotiations since the Rio 1992 summit. Cap and trade vs. carbon taxes. The EU's 20-20-20 policy and its implementation. California's AB 32 and its implementation. Energy policies and energy politics. Climate tipping points and public action. A low-carbon future.

***Additional class reading***: Peter Newman, Anne Matan, Green Urbanism in Asia, 213
http://www.amazon.com/Green-Urbanism-Asia-Emerging-Tigers/dp/9814425478

**April 28** **Class 13 – Planning resilient, low-carbon cities**
*Class contents:* Bringing it all together: course contents covered and lessons learned. Successful examples of urban innovations across cities worldwide. The role of urban planners in making resilient, low-carbon cities. EPA's and HUD's programs and emerging US urban innovations. Major international initiatives: C40, ICLEI, UNISDR, Rockefeller Foundation, WB and IDB. Market demand for urban climate change professionals.

***Additional class reading***: Timothy Beatley, Green Cities of Europe, 2012
http://www.amazon.com/Green-Cities-Europe-Lessons-Urbanism/dp/1597269751

**April 30** ***Submit final paper on a topic of choice from classes 7,8,9,10 or 11 drawing from the key readings and additional course readings***

**April 30** **Class 14 – Student feed-back on the course**
*Class contents:* Final group session, with suggestions from the students for improvements to the course design and contents. Last opportunity to contribute to the course's body of knowledge via literature references, videos, case studies, media articles etc. Discussion of likely follow-up engagement by students on cities and climate change. Anonymous course evaluation forms to be completed and handed over to the professor at the end of the class.

**Grading**

- 25% mid-term paper
- 40% final paper
- 25% class participation
- 10% contribution to course's body of knowledge

Professor Anthony G. Bigio's e-mail: agbigio@gwu.edu

**Office hours**: Mondays 4:00 to 6:00 PM upon prior request by email

# Sample Syllabus-- Semester Course Using Entire Book

## I. Course Description:

Energy is figuratively and literally the fuel that drives our society, our economy, and our impact on the environment. During the past thirty years, most of major global recessions have been triggered by energy price increases. The Gulf War in 1991 and the Iraq War make clear the political and geologic realities of our dependence on non-renewable petroleum. Now 2/3 of the U.S. oil consumption is imported, and that proportion continues to increase. Recent crude oil and petroleum-product price increases, the California electricity crisis in 2001, and the east coast blackout of 2003 illustrate our continuing energy problems. Environmental concerns about energy production and consumption, especially the effects of fossil-fuel combustion on air quality and climate change, have further clarified the non-sustainable nature of our current patterns of energy use. Despite global economic recession, rolling blackouts, $100/barrel oil, war, and the threat of major climate change, we have done little to alter our patterns of energy production and consumption in the past 30 years.

We need to establish efficient and environmentally acceptable patterns of energy production and use that are sustainable in a future of limited petroleum and climate change. Conventional sources of energy (coal, oil, natural gas, nuclear power) will be part of our energy mix for decades to come. However, due to geologic, economic, political, and environmental constraints associated with these sources, improving the efficiency of energy use and increasing our reliance on renewable energy systems (solar, biofuels, wind, hydro) provide the best opportunities for sustainable energy.

### This course has three basic objectives for students:

1. to learn about the energy situation and relevant economic and environmental issues;
2. to understand the technical nature of energy and apply fundamental design concepts for efficient and renewable systems at both a community and site scale; and
3. to understand and apply some of the basic tools for energy and economic analysis involved in energy system design, planning, evaluation, and policy analysis.

## II. Course Design and Requirements:

The course is divided into five sections: (1) Energy Patterns and Fundamentals; (2) Green Buildings; (3) Sustainable Electricity; (4) Sustainable Transportation and Land Use; and (5) Energy Planning and Policy for Renewables and Efficiency. Emphasis will be on the quantitative aspects of energy design and analysis. These will be explored in six homework assignments. There will also be a midterm and a final exam. In addition, students are given the opportunity to explore a term project either individually or in small groups.

### Project:

Students will develop a project during the last half of the semester. Options include a large project that the entire class works on, such as an energy and greenhouse gas inventory for the campus or the community (using ICLEI software), or individual or small group projects, such as an home energy audit (using a blower door), a site wind energy assessment, a critique of local or state energy policy, the design and construction of a solar water heater, etc.

### Evaluation Criteria:

| | |
|---|---|
| Assignments | 50% |
| Midterm | 15% |
| Final | 15% |
| Term Project & Presentation | 15% |
| Class Participation | 5% |
| | 100% |

## Course Outline: e.g., twice-a-week 75-minute classes

| Date | Topic | Read | Assignment |
|---|---|---|---|
| | **Energy Patterns and Fundamentals** | | |
| 1/15 | Introduction | | |
| 1/17 | Energy Situation: about oil & war & nuclear & global warming | E4S 1,2 | |
| 1/22 | Energy Futures | E4S 3 | |
| 1/24 | Energy Situation: Student Group Presentations | | 1 |
| 1/29 | Fundamentals of Energy Science | E4S 4 | |
| 1/31 | Energy and Economic Analysis | E4S 5 | |
| | **Green Buildings and Solar Energy Fundamentals** | | |
| 2/5 | Buildings and Energy; Building Envelope -- Heat Loss | E4S 6 | 1 Due |
| 2/7 | Blacksburg and Virginia Tech Energy & GHG Inventory | | 2 |
| 2/12 | Building Energy Systems: HVAC | E4S 7 | |
| 2/14 | Solar Fundamentals: Sun Angles and Insolation | | 2 Due |
| 2/19 | Solar Collection and Domestic Water Heating | | 3 |
| 2/21 | Active Space Heating; Passive Solar | | Project Topic |
| 2/26 | Passive Solar Heating Heating & Cooling | | 3 Due |
| 2/28 | MIDTERM | | |
| | | | |
| 3/11 | Green Buildings; Embodied Energy; Review | E4S 8 | |
| | **Electricity** | | |
| 3/13 | Electricity Fundamentals & Centralized Systems | E4S 9 | Project Update, 4 |
| 3/18 | Electricity: Decentralized Generation | E4S 10 | |
| 3/20 | Photovoltaics | E4S 11 | 4 Due |

| | | | |
|---|---|---|---|
| 3/25 | Photovoltaics and Net-Zero-Energy Buildings | | 5 |
| 3/27 | Wind Energy | E4S 12 | |
| 4/1 | Wind Energy | | |
| | **Transportation Energy** | | |
| 4/3 | Transportation: Vehicle Efficiency | E4S 13 | 5 Due |
| 4/8 | Biofuels | E4S 14 | |
| 4/10 | Energy, Land Use, and Community Design | E4S 15 | 6 |
| | **Energy Planning & Policies for Renewables & Efficiency** | | |
| 4/15 | Government Policies for Renewables & Efficiency | E4S 16 | |
| 4/17 | Federal, State, & Utility Programs for Renewables & Efficiency | E4S 17, 18 | 6 Due |
| 4/22 | Local Energy Planning: Creating Sustainable Communities | E4S 18 | |
| 4/24 | Presentation of Student Project | | |
| 4/29 | Presentation of Student Project | | |
| 4/31 | | | Project Due |
| 5/6 | FINAL EXAM | | |

## Readings:

Main text:
Randolph, J., and G.M. Masters. 2008. *Energy for Sustainability: Technology, Planning, Policy.* Island Press

Other references:
California Energy Commission. 2007 Integrated Energy Policy Report. November.

Leckie, J., G.M. Masters, H. Whitehouse, and L. Young. 1981. *More Other Homes and Garbage*. Sierra Club Books. Selections (book is out of print)

Lovins, A. B., et al. *Winning the Oil Endgame: Innovation for Profits, Jobs, and Security*. Snowmass, CO: Rocky Mountain Institute. 2004. download from http://www.oilendgame.com/

Masters, G. M., 2004. *Renewable and Efficient Electric Power Systems*. Wiley-Interscience

## Additional references:


Aiken, D., Transitioning to a Renewable Energy Future, White Paper prepared for the ISES, 2003.

Intergovernmental Panel on Climate Change. 2007. Fourth Assessment Report (AR4).

Pacala, S. and R. Socolow. "Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies." Science, v. 305. 13 August 2004, p. 968-971.

Science, Special Issue: Toward a Hydrogen Economy. v.305, 13 August 2004, p. 957:http://www.sciencemag.org/search.dtl (enter vol & 1st page)

U.S. DOE, Efficiency and Renewable Energy Network (EREN):
Renewable sources primer: surf the site on sources: http://www.eren.doe.gov/
Distributed Energy Basics: http://www.eren.doe.gov/der/basics.html
Buildings: http://www.eren.doe.gov/EE/buildings.html
Photovoltaics: http://www.eren.doe.gov/RE/solar_photovoltaics.html
Transportation: http://www.eren.doe.gov/EE/transportation.html
Biomass: http://www.eren.doe.gov/RE/bio_resources.html http://www.eren.doe.gov/RE/bio_biopower.html http://www.eren.doe.gov/RE/bio_fuels.html
Hydrogen: http://www.eren.doe.gov/RE/hydrogen.html

Million Solar Roofs WebSite: http://www.millionsolarroofs.com/

U.S. Energy Information Administration (USEIA),
Annual Energy Review 2006, http://www.eia.doe.gov/emeu/aer/contents.html
Energy Perspectives: Trends and
Milestones. http://www.eia.doe.gov/emeu/aer/pdf/perspectives.pdf
Energy in the United States: 1635-2000. http://www.eia.doe.gov/emeu/aer/eh/frame.html.
Annual Energy Outlook 2007. http://www.eia.doe.gov/oiaf/aeo/index.html
International Energy Annual, 2005. http://www.eia.doe.gov/emeu/iea/contents.html

U.S. National Renewable Energy Laboratory, "Clean Energy
Basics" http://www.nrel.gov/clean_energy/

U.S. National Renewable Energy Laboratory, "Renewable Energy
Data" http://rredc.nrel.gov/


## "We're in Trouble" Books:


James Gustave Speth, *Red Sky at Morning: America and the Crisis of the Global Environment*, 2005

Matthew R. Simmons, *Twilight in the Desert: The Coming Saudi Oil Shock and the World Economy*, 2005

Kenneth S. Deffeyes, *Beyond Oil : The View from Hubbert's Peak*, 2005

James Howard Kunstler, *The Long Emergency: Surviving the End of the Oil Age, Climate Change, and Other Converging Catastrophes of the Twenty-first Century*, 2004

Richard Heinberg, *The Party's Over : Oil, War and the Fate of Industrial Societies*, 2004

Paul Roberts, *The End of Oil : On the Edge of a Perilous New World*, 2004

Colin Campbell, *The Coming Oil Crisis*, 2004

John Houghton, *Global Warming : The Complete Briefing*, 2004

**"We have no Problem" Books:**

Peter W. Huber, *The Bottomless Well: The Twilight of Fuel, the Virtue of Waste, and Why We Will Never Run Out of Energy*, 2005

Patrick J. Michaels, *Meltdown: The Predictable Distortion of Global Warming by Scientists, Politicians, and the Media*, 2004

Christopher Essex, *Taken By Storm: The Troubled Science, Policy and Politics of Global Warming*, 2003

Bjorn Lomborg, *Cool It - The Skeptical Environmentalist's Guide to Global Warming*, 2007

# Urban Energy Planning – Compact Seminar

## Objectives of the course

Students understand the fundamental drivers of the current debate on sustainable urban development. They understand the fundamental indicators, and are able to identify the right application cases for them. They can analyse existing designs and identify main challenges and selected solutions with regard to the energy concept. The students are able to evaluate opportunities and barriers in a specific context.

## Prerequisites

Basic understanding of current debates on climate change and societal challenges.

## Method

The module “Urban Energy Planning” is proposed in the format of a dialogue based compact seminar of two times 16 hours presence and additional 32 hours of work on the energy concept in small groups. Short input lectures will provide the necessary input and orientation. In the course of the group work additional solutions or references will be provided on a case by case basis. The latter allows students to work on common analytical tasks/projects with intermediate presentations. The studio format similar to planning disciplines is proposed to deepen the exchange among students and foster the understanding of the provided inputs. Studios can be supported by visiting practitioners to relate the topics to real planning tasks.

## Means, Instruments

Student work is supported by selected case studies and where applicable can be supported by open source computer based decision support tools such as District Energy Concept Advisor, RETScreen, GEMIS, LEAP.

## Literature

acatech-Deutsche Akademie der Technikwissenschaften (2011). "Handlungsfelder." Smart Cities: Deutsche Hochtechnologie für Die Stadt Der Zukunft: 13-18.

Bader, N. and R. Bleischwitz (2009). Comparative Analysis of Local GHG Inventory Tools. Brugge, Natolin, College of Europe, Institut Veolia Environnement.

DIN, et al. (2014). Die Deutsche Normungs-Roadmap Smart City. Frankfurt, VDE Verband der Elektrotechnik Elektronik Informationstechnik e. V.

Fischedick, M. (2012). Smart City–Schritte auf dem Weg zu einer CO2-armen Stadt. Smart Energy, Springer: 395-414.

Jank, R. Ed. (2013). Case Studies and Guidelines for Energy Efficient Communities - A Guidebook on Successful Urban Energy Planning. Stuttgart, Fraunhofer IRB Verlag

Öko-Institut (2008). Globales Emissions-Modell Integrierter Systeme: Datenbank mit Bilanzierungs- und Analysenmöglichkeiten für Lebenszyklen von Energie-, Transport- und Stoffprozessen.

Natural Resources Canada (2005). Clean Energy Project Analysis Third Edition RETScreen® Engineering & Cases Textbook. Ottawa.

Webster, J., Baier, C., Jank, R., Koch, A., Shimoda, Y. (2013). Community Energy and Emissions Inventory and Modelling Tools to Support Local Energy Planning (LEP). Case Studies and Guidelines for Energy Efficient Communities - A Guidebook on Successful Urban Energy Planning. pro:21 GmbH and Projektträger Jülich. Stuttgart, Fraunhofer IRB Verlag.

| First Semester | | | | |
|---|---|---|---|---|
| **Day** | **Contents** | **Learning Objectives** | **Course hours** | **Add. work** |
| 1 | Introduction<br>– Global drivers<br>– Course concept<br>– Expectations of students<br>– Explanation of project work | Students should:<br>– Understand the general objectives of the course<br>– Express their expectation and questions | 1 | |
| 1 | Topic 1: Urbanisation & Demographic Change<br>– UN World Urbanization Prospects<br>– Demographic Change | Students should:<br>– Know key references<br>– Understand drivers and outlooks in different world regions | 1 | Student portfolio work |
| 1 | Project presentation<br>– Presentation of design projects | Students should:<br>– Identify relevant aspects of their own work with regard to the discussed topics<br>– Agree on working groups<br>– Select one project per group | 4 | Project poster presentation |
| 1 | Topic 2: Energy & Local Climate Change Policy<br>– Adaptation and mitigation<br>– GHG emission targets<br>– Global targets example: UNEP Green Economy Report<br>– From global to local target definition<br>– Scope of GHG inventories | Students should:<br>– Know the main milestones in the international climate debate<br>– Know European, German and local targets<br>– Understand the concept of urban carbon metric | 2 | |
| 1 | Feedback round<br>– Short feedback on the first day<br>– Discussion on project specific aspects of urban energy planning | Students should:<br>– Define key-questions and main axis of the proposed work | 2 | |
| 2 | Topic 3: Urban Energy Strategy<br>– Supply and demand in energy planning<br>– Energy in buildings<br>– Overview renewable energy carriers | Students should:<br>– Understand the need to develop site specific solutions<br>– Understand the structure and basic elements of the IT based planning tool District Energy Concept Advisor | 2 | Disctric Energy Concept Advisor |

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|---|---|---|---|---|
| 2 | Project work<br>– Discussion of work plan to develop local energy concept within individual groups | Students should:<br>– Develop their work plan in close dialogue with professor<br>– Identify specific challenges in the selected designs | 4 | Define work plan |
| 2 | Feedback round<br>– Short feedback on the first session and the developed work plan | Students should:<br>– Judge the quality of the inputs<br>– Formulate open issues that must be clarified before/in the beginning of the working phase | 2 | Present work plan |
| | Working period 6 – 8 weeks | | | |
| 3 | Introduction (optional)<br>– Presentation of a local energy concept | Students should:<br>– Critically assess the project presentation<br>– Evaluate in how far context-specific solutions were applied<br>– Identify elements that can be transferred | 2 | |
| 3 | Project work<br>– Discussion of work plan to develop local energy concept within individual groups | Students should:<br>– Develop their work plan in close dialogue with professor<br>– Identify specific challenges in the selected designs | 6 – 8 | Work on open issues, refine strategy |
| | Working period 4 weeks | | | |
| 4 | Presentation of Projects & Feedback<br>– Guiding Questions<br>– Discussion | Students should:<br>– Present their analysis in project teams<br>– Understand the different approaches of each team | 6 – 8 | Student portfolio work |
| 4 | Feedback round<br>– Short feedback on the first course | Students should:<br>– Judge the quality of the inputs<br>– Express future needs | 2 | |
| | End of the module | | | |

# Energie & räumliche Planung –

## Möglichkeiten, Instrumente, Potenziale

### Referenten

**DI Manfred Koblmüller**
**Oskar Mair am Tinkhof, MSc .**
**Mag. Alexander Rehbogen, MBA**
alle SIR

### Seminarinhalt

Die räumliche Dimension ist für den effizienten Einsatz von Energie und die Nutzung erneuerbarer Energieträger hochrelevant. Wärmenetze, Standorte für Stromerzeugung oder Nachverdichtung mit gemeinschaftlichen Energielösungen sind wesentliche Themen in den Planungsprozessen der Gemeinden. In der Raumordnung und bei der Siedlungsplanung sind energierelevante Kriterien stärker zu berücksichtigen. Mit der jüngsten Novellierung des Salzburger Raumordnungsgesetzes wurde dazu ein weiterer Schritt gesetzt. Das Seminar steckt die aktuellen rechtlichen Rahmenbedingungen in Salzburg ab, liefert einen Überblick über brauchbare Datengrundlagen und demonstriert innovative Beispiele aus aktuellen Projekten.

### Zielgruppen

Mitarbeiter von Gemeinden (Baubehörde, Stadtplanung), Raum- und Ortsplaner, Architekt, Planungsbüros, Bauträger, Energieberater und sonstige Interessierte.

### Veranstaltungsort

Seminarraum des SIR (Erreichbarkeit siehe vorletzte Seite)

## Mo, 20.11.17

## 9:00 –13:00 Uhr

- Überblick zum Thema: Energie im Raumbezug
- Datengrundlagen für Energieraumplanung
- Aktuelle rechtliche Rahmenbedingungen in Salzburg und Österreich
- Energie im REK
- Planungsprozesse und Instrumente
- Praxisbeispiele und Ergebnisse aus aktuellen Projekten

**Smarte Quartiersentwicklung in Klein- und Mittelstädten: Ideen und Impulse**
**Programm und Inhalte:**

| Ablauf | | Themen | Inhaltsverantwortlich / Vortragende |
|---|---|---|---|
| **Tag 1 14. Nov. 2017** | Beginn 10.00<br><br>10.00 – 11.45: Impulsvorträge und Diskussion | Nachhaltige Agglomerations- und Stadtentwicklung, Fokus Innenentwicklung.<br>Beispiele aus Österreich und Europa | Begrüßung: Vizerektor Heck<br>Intro: **Aglaée Degros, Ernst Rainer** (TU Graz)<br>Forschung: **Sibylla Zech/ Petra Hirschler/ Rudi Scheuvens** (TU Wien)<br>Verwaltung: **Michael Ermann** (Region Stockholm), (Fokus: Regionsentwicklung)<br>**Melanie Lienhard,** Hochschule Luzern (Innenstadtentwicklung Kanton Luzern) |
| | 11.45 – 13.00: Workshop | Besprechen von Problemfeldern und Projektideen der TeilnehmerInnen | |
| | 13.00 – 14.00: Mittagspause | | |
| | 14.00 – 16.00: Impulsvorträge und Diskussion | Räumliche Energieplanung im Stadtquartier | Praxis: **Helmut Strasser** (SIR)<br>Verwaltung: **Stefan Geier** (MA 20 Energieraumplanung)<br>Forschung: **Hartmut Dumke** (TU Wien)<br>**Maren Kornmann,** (2000 Watt Arealentwicklung Schweiz) |
| | 16.00 – 17.30: Workshop | Besprechen von Problemfeldern und Projektideen der TeilnehmerInnen | |
| | 19.30: Gemeinsames Abendessen | | |

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|---|---|---|---|
| **Tag 2 15. Nov. 2017** | 09.00 – 10.30: Impulsvorträge und Diskussion | Urbane Mobilitätsformen im Fokus der Fuß- und Radwegfreundlichen Stadt und Region | Praxis: **Stefan Bendiks** (Artgineering Brüssel)<br>Forschung : **Martin Berger** (TU Wien)<br>Verwaltung/Forschung: **Birgit Kohla** (GEA Graz) |
| | 10.30 – 12.00: Workshop | Besprechen von Problemfeldern und Projektideen der TeilnehmerInnen | |
| | 12.00 – 13.00: Mittagspause | | |
| | 13.00 – 17.00 Exkursion | Exkursion: Smart City Zielgebiet West, Besichtigung vor Ort, Akteure treffen | In Kooperation mit Stadtbaudirektion Graz & StadtLabor Graz<br>**Bertram Werle** (Stadtbaudirektor Stadt Graz)**,**<br>**Kai-Uwe Hoffer** (Smart City Koordinator, Stadtbaudirektion Graz) |
| | 17.00 – 18.00: Vortrag **Wulf Daseking** (Stadt Freiburg) | | |
| | Ende 18.00 Abschiedsumtrunk | | |