End-Use Energy Efficiency

Fridays 9 am – 12 pm, Map Room

Professor: Mark James

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Course Description: The course describes the reasons for, techniques of, results from, energy efficiency measures in leading programs around the United States. In exploring how leaders maximize energy efficiency results from home and business to the grid, the course will explore the systems, policies, and legal bases that legitimize energy efficiency as an energy resource and ensure societal trust in the outcomes.

What Success Looks Like: Understanding of the content of each class and the ability to think critically about each aspect of end-use energy efficiency is a good outcome of this course. The ability to develop connections across classes, combined with demonstrated critical thinking, analysis, and presentation of ideas is an excellent outcome.

Guest Speakers and Field Trip: The course will present an array of guest speakers working in different energy efficiency fields and from different regions of the country. All guest speakers are tentatively booked; the schedule may change to accommodate their availability. Professor James will inform you of any changes. There is a field trip to Vermont Energy Investment Corporation’s headquarters in Burlington planned for July. The field trip will provide an intensive half-day session on energy efficiency program design, implementation, and evaluation.

Requirements:
1. You must attend class;
2. Complete the required readings and be ready to participate in discussions;
3. Prepare a short list of questions from the readings that you would like answered;
4. Draft a 2-page letter to the legislature; and
5. Complete a take-home exam.
Class 1: Friday June 8, 2018

Introduction to Energy Efficiency

Introduction: In the first class, we will explore how energy efficiency initiatives reshaped the United States’ relationship with energy. We will study and discuss the relationship between energy efficiency, Gross Domestic Product, and decarbonization.

To prepare for the class, students should bring a list to class of existing or potential on-campus energy efficiency initiatives. Spend some time looking around the campus at what VLS is doing and could be doing to improve its energy efficiency.

Readings

   http://energypolicy.columbia.edu/energy-efficiency-us-lot-done-more-possible
   (Transcript is also available on the website)

Activities

1) Campus Energy Efficiency Tour
2) Energy Efficiency in Illinois Case Study (materials posted on TWEN)

Class 2: Friday June 15, 2018

Part 1 - State Actions and Utility Regulation – How Did We Get Where We Are?

Class #2 will introduce the role that state governments play in energy efficiency. The class will look back at the history of state action on energy efficiency and it will start to look forward at what regulatory options are available. Students will read and discuss energy efficiency resource
standards, utility versus third-party program administrators, utility regulation, program funding sources, and more.

Readings
6) Vermont Public Service Board Orders

Guest Speaker
Michael Dworkin, Professor of Law, Vermont Law School

Class 3: Friday June 22, 2018
Part 2 - State Actions and Utility Regulation - Developing Programs for the Future
This class will pick up on the lessons learned in Class #2 and continue to explore how energy efficiency regulation is evolving to address new challenges and seize new opportunities. The class will focus on regulatory options for incenting energy efficiency and the evolving relationship between state regulators, utilities, and third-party program administrators.

The class will hear from a variety of different guest speakers who will provide insights into the current state of state energy efficiency initiatives, how the rural-urban energy efficiency split is addressed, and working with investor-owned utilities, municipal-owned utilities, and cooperatives.

Readings
1) CNEE, Podcast, Summer Series Paper 2 Energy Efficiency, Episode 28 (October 17, 2016).

Guest Speakers
1) Tennessee Valley Authority
2) Dave Westman, Vermont Energy Investment Corporation

Class 4: Friday June 29, 2018
Federal Energy Efficiency Actions/Appliance Standards

This lecture will begin with an overview of federal programs before focusing on the process for developing and enforcing appliance energy efficiency standards. Roughly 80% of a building’s energy consumption happens via appliances that are subject to federal energy efficiency standards.

The federal government plays a specific role in energy efficiency. Often it serves as the funder for state and local programs, but a major program that it does oversee is the development and enforcement of appliance energy efficiency standards.

Readings

Review
Letter to Legislature Assignment will be handed out at the end of class. Assignment is due on July 13, 2018 at the beginning of class. Materials will be posted on TWEN.

Class 5: Friday July 13, 2018

Part 1- Low-Income Energy Efficiency and Buildings
Low-income households suffer from disproportionately high energy costs. Less disposable income combined with less efficient heating and cooling systems along with lower quality homes imposes an energy burden on the poorest members of our society. The first half of the class will explore the problem of low-income energy efficiency, federal and state low-income energy program, and the special programming and marketing needs for low-income energy efficiency initiatives.

Readings
2) Institute for Energy and the Environment Report to the Vermont Legislature, Costs and Burdens in Vermont: Burdensome for Whom
3) Department of Energy – Weatherization Assistance Program https://www.energy.gov/eere/wipo/weatherization-assistance-program
4) ACF – LIHEAP Fact Sheet (2017).

Demonstration
Powering Energy Efficiency Impacts Framework – North Carolina Test Pilot Project

Part 2 - Tapping into Residential and Commercial Building Energy Efficiency Services
Residential and commercial buildings are one of the biggest energy users in our economy. Our building stock does not have the same turnover as appliances, light bulbs, and other energy consuming devices. This lecture and guest lecture will address how building energy efficiency programs are designed for new construction and retrofits and the different regulatory and market-based options for increasing energy efficiency.

Readings
Class 6: Friday July 20, 2018

Part 1 - Measuring Energy Efficiency Effectiveness
If you can't measure it, you can't count it. This is the mantra guiding energy efficiency program administrators (PAs). Tasked with delivering cost-effective energy efficiency, PAs must be able to demonstrate that investments in energy efficiency are producing projected gains. In the first half of the class, we will examine strategies and techniques for quantifying energy efficiency gains. We will also explore how non-energy efficiency benefits are incorporated into the benefit calculation.

Readings
1) RAP, Energy Efficiency Cost-Effectiveness Screening – How to Properly Account for Other Program Impacts and Environmental Compliance Costs (2012).

Review

Is energy efficiency a resource? How does it fit into utility and grid operator planning processes? In the second half of the class, we will look at how energy efficiency is changing distribution and transmission planning processes and the regional integration of energy efficiency into wholesale electricity and carbon markets.

Readings
2) ISO-NE, 2017 Regional System Plan. (Professor James will identify sections to read.)
Class 7: Friday July 27, 2018
VEIC Field Trip: Putting Together a Program and Portfolio

This class will cover how energy efficiency measures are selected, energy efficiency programs are designed, and how energy efficiency portfolios are constructed.

Readings


Class 8: Friday August 3, 2018
Energy Efficiency Technologies and Wrap-Up

The final class of the course will explore different energy efficiency technologies and technology programs and their contributions to achieving deep energy efficiency gains. Topics covered will include smart meters, energy efficiency and renewable energy, and conservation voltage. The final half of the class will be dedicated to a course review and exam preparation.

Readings


