

# End-Use Energy Efficiency

*Fridays 9 am – 12 pm, Map Room*

**Professor:** Mark James

**Office:** Eaton House 103

**Office Hours:** By appointment

**Email:** [markjames@vermontlaw.edu](mailto:markjames@vermontlaw.edu)

**Phone:** (802) 831-1060 (W), (802) 356-6275 (C)

**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.

**Grading:**

Class Participation:	20%
Letter to Legislature:	25%
Final Exam:	55%

## **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

- 1) Columbia Center on Global Energy Policy, Columbia Energy Exchange Podcast, Energy Efficiency in the US: A Lot Done, More Possible (April 9, 2018).  
<http://energypolicy.columbia.edu/energy-efficiency-us-lot-done-more-possible>  
(Transcript is also available on the website)
- 2) ACEEE, The Greatest Energy Story You Haven't Heard: How Investing in Energy Efficiency Changed the US Power Sector and Gave Us a Tool to Tackle Climate Change (2016). Read pages 1 – 20.

#### 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

- 1) CNEE, Podcast, Summer Series Paper 1 Energy Efficiency, Episode 27, (August 27, 2016) <https://soundcloud.com/energypolicypodcast/summer-series-paper-1-energ>.
- 2) CNEE, Part 1 – Driving Energy Efficiency Markets: The Conventional Approach (2016).
- 3) CNEE, Clean Energy Policy Guide for State Legislatures, <http://aceee.org/sites/default/files/publications/researchreports/u1604.pdf>. (Read Chapter 1)
- 4) ACEEE – The 2017 State Energy Efficiency Scorecard (2017). Read Chapters 2 and 6.
- 5) ACEEE – State Energy Scorecard website, <http://aceee.org/state-policy/scorecard> (find and read up on your state).
- 6) Vermont Public Service Board Orders
  - a. Vermont PSB - Approval Settlement for Creation of EEU (1999). Pages 7-20.
  - b. Vermont PSB – Order of Appointment for Vermont Energy Investment Corporation (2016).

### 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).
- 2) CNEE, Part 2 – State Policies to Expand Market Certainty for Energy Efficiency without an Energy Efficiency Resource Standard (2016).

- 3) CNEE, Clean Energy Policy Guide for State Legislatures, <http://aceee.org/sites/default/files/publications/researchreports/u1604.pdf>. (Read Chapter 1).
- 4) NREL – Decoupling Policies: Options to Encourage Energy Efficiency Policies for Utilities (2009).

#### 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

- 1) ACEEE, The Impact of Federal Energy Efficiency Programs (2018), <http://aceee.org/sites/default/files/pdf/fact-sheet/impact-federal-ee-programs.pdf>.  
Read pages 1 – 14.
- 2) House Energy and Commerce Committee – Energy and Power Subcommittee, Home Appliance Energy Efficiency Standards Under the Department of Energy – Stakeholder Perspectives (June 10, 2016) (Listen from the 1 h 00 minute mark to the 1 h 35 minute mark) <https://energycommerce.house.gov/hearings/home-appliance-energy-efficiency-standards-under-department-energy/>
- 3) ACEEE, “Next Generation Standards: How the National Energy Efficiency Standards Program Can Continue to Drive Energy, Economic, and Environmental Benefits” (2016)  
Read pages 1 – 36.
- 4) NRDC v. Perry – Complaint (2017). Read pages 1-12, 28-31.
- 5) NRDC v. Perry – Summary Judgement (2018).

#### Review

- 1) Energy Star website, <https://www.energystar.gov/>.

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

- 1) Institute for Energy and the Environment Report to the Vermont Legislature- Energy Costs and Burdens in Vermont: Burdensome for Whom? Summary
- 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).
- 5) EDF – Low-Income Energy Efficiency (2018).

#### 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

- 1) NEEP, Model Progressive Building Energy Codes Policy 2012 Update (2012).
- 2) NEEP, Attributing Building Energy Code Savings to Energy Efficiency Programs – Final Report (2013). (Only required to read Executive Summary)

### Guest Speaker

Carolyn Sarno – Northeast Energy Efficiency Partnership, Inc., Director of Buildings & Community Solutions | Energy Efficient Buildings, Senior Management Team

## **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).
- 2) Dunsky et al, Screening DSM: When the TRC Blocks Energy Efficiency, What's Next? (2012).
- 3) National Standard Practice Manual for Assessing Energy Efficiency Resources – Executive Summary (2017).

#### Review

- 1) National Standard Practice Manual for Assessing Energy Efficiency Resources – Final Report (2017).

### **Part 2 – Energy Efficiency Resource Planning**

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

- 1) ACEEE – Role of Energy Efficiency in a Distributed Energy Future (2018) Read pages iv to 50.
- 2) ISO-NE, 2017 Regional System Plan. (Professor James will identify sections to read.)
- 3) Read RGGI Proceeds Report 2015. Pages 1-8.

## **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

- 1) Podcast, CNEE – The Energy Policy Podcast, Behavioral Reporting for Energy Efficiency (May 1, 2013) <https://soundcloud.com/energypolicypodcast/2013-epp05-behavioral-reporting-for-energy-efficiency>.
- 2) Dunsy et al, Screening DSM: When the TRC Blocks Energy Efficiency, What's Next? (2012).
- 3) Malmgren and Skumatz, Lessons from the Field: Practical Applications for Incorporating Non-Energy Benefits into Cost-Effectiveness Screening (2014).
- 4) National Standard Practice Manual for Assessing Energy Efficiency Resources – Executive Summary (2017).

## **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

- 1) Edison Electric Institute – Electric Company Smart Meter Deployments: Foundation for A Smart Grid (2016).
- 2) Energy Star Program, <https://www.energystar.gov/>.
- 3) Ferreira, Conservation Voltage Reduction in Smart Microgrids (September 14, 2016) <https://microgridknowledge.com/conservation-voltage-reduction-in-smart-microgrids/>.
- 4) Warner and Willoughby, Voltage Management: A Hidden Energy Efficiency Resource (May 7, 2013) <https://www.greentechmedia.com/articles/read/voltage-management-a-hidden-energy-efficiency-resource#gs.SXko9Rk>.
- 5) Video, Dan Reicher Keynote at 2017 VJEL Symposium, [https://youtu.be/5H\\_H9DR5PeY?t=16m39s](https://youtu.be/5H_H9DR5PeY?t=16m39s).