Course Syllabus

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Introduction

Urbanization has been associated with increasing energy use and related GHG emissions and climate vulnerabilities. Yet, in the USA and other parts of the world, urban energy systems have almost been a taken-for-granted infrastructure system, outside the realm of urban planning. Due to climate change as well as threats of "peak energy use" however, these systems are coming under increasingly intense scrutiny. Understanding and planning for urban energy may be one of the most important tasks for planners in the future. This class explores urban energy systems, their components, development pathways, transitions and related planning issues.

Course description and learning objectives

This class introduces students to concepts and issues related to planning for urban energy systems. Initial lectures explore the global energy system. We later use this framework for analytical purposes to examine urban and metropolitan energy systems. The course will cover an introduction to the trends and current state of urban energy systems in developed and developing cities, transitions in energy systems, vulnerabilities and adaptation and mitigation theories and practices. We end with a discussion of plausible urban energy futures

The learning objectives for the course include student ability to:

- Identify and describe general components of urban energy systems (both hard and soft infrastructure)
- Explain shifts in urban energy system infrastructure and energy use through the use of the concept of energy transitions
- Evaluate contemporary local energy planning and policy related to climate change vulnerability and mitigation
- Synthesize current urban energy system trends and states as the basis for projecting future challenges

Tentative subject titles

1. Introduction
    1. What the class is about
    2. Energy transitions and climate change
    3. Adaptation and mitigation

2. The global energy system background
    1. Energy Resources
    2. Current global primary energy use
    3. Current global energy end use
    4. Social side of energy systems
        1. Energy use (energy poverty and health, access inequities, externalities, use/efficiency differences, subsidies, fairness and responsibility with climate change) future generations and long-lived (nuclear) waste, resource depletion,
        2. Energy extraction (dangerous energy related jobs, severely demeaned communities, corruption, etc.)
        3. Energy system development (unfair negotiations, involuntary resettlements, Improper licensing and deception, community marginalization, intellectual property)
    5. Energy and climate change
    6. Role of cities

3. Urban energy system state 1
    1. Energy components
        1. Extraction (geography)
        2. Transmission to urban areas (truck, pipeline, boat, plane, other)
        3. Generation for and within urban areas
        4. Distribution within urban areas
    2. Urban prime movers and energy infrastructure

4. Urban energy system state 2
    1. Urban energy end use sectors components
    2. Case studies for urban prime movers and energy infrastructure
        1. Industrial, buildings (residential, commercial), transport in the developed world
        2. Industrial, buildings (residential, commercial), transport in the developing world

5. Energy system transitions theories
    1. Energy transitions theory review
    2. Urban environmental/infrastructure transition theory
    3. Urban energy transitions

6. Urban energy system trends in the developed world
    1. Recent transitions in energy fuels
    2. Energy use trends over the past decades
    3. Energy externalities

7. Urban energy system trends in the developing world
    1. Trends in the developed world cities
    2. Trends in the developing world cities
    3. Potential futures for both developed and developing world cities

8. Urban energy system vulnerabilities
    1. Theory of vulnerability
    2. Climate change potential impacts on energy systems
    3. Energy security and vulnerability (and resource limitations)

9. Urban energy system adaptation
    1. Theory of adaptation
    2. Types of adaptation
    3. Urban energy system adaptation

10. Urban energy system adaptation (case studies)
    1. Adaptation of energy systems in the developed and developing worlds
        1. Adaptation to sea level rise

2. Adaptation to warmer temperatures
3. Adaptation to changes in precipitation
4. Other
5.

2. Urban energy system mitigation
    1. Climate change mitigation theory
    2. Urban energy system mitigation to climate change
    3. Co-benefits of mitigation

12. Urban energy system mitigation (case studies)
    1. Climate mitigation in urban energy systems
        1. Mitigation in the developed world cities
            1. Transport, buildings
        2. Mitigation in the developing world cities
            1. Transport, buildings, industry
        3. Climate mitigation and adaptation conflicts and synergies

Course Summary:

Date	Details	Due
Thu Feb 17, 2022	1st Policy Brief	due by 11:59pm
Thu Mar 3, 2022	1st Low-Impact Proposal Assignment	due by 11:59pm
Thu Mar 10, 2022	2nd Policy Brief	due by 11:59pm
Thu Mar 24, 2022	2nd Low-Impact Assignment	due by 11:59pm
Thu Apr 7, 2022	3rd Low-Impact Assignment	due by 11:59pm
Thu Apr 21, 2022	4th Low-Impact Assignment	due by 11:59pm
Thu Apr 28, 2022	Final Presentations	due by 11:59pm
Thu May 5, 2022	Final paper (proposal) due	due by 11:59pm