Syllabus of Record

Program: CET Taiwan
Course Code / Title: (TP/ENVR 330) Energy Policy and Conflict in Taiwan
Contact Hours: 45
Recommended Credits: 3
Primary Discipline / Suggested Cross Listings: Environmental Studies / Public Policy, Economics, Asian Studies
Language of Instruction: English
Prerequisites / Requirements: None

Description

Faced with the challenges of climate change, nearly 150 countries worldwide have committed to achieving net-zero greenhouse gas emissions. Taiwan joined this global initiative in 2020 and later solidified this commitment by introducing the Taiwan Net-Zero Emissions Policy and allocating a related budget. As a result, Taiwan is among the few countries globally that have declared a 2050 net-zero target, developed a policy pathway, allocated a budget, and legally committed to this goal. Despite emerging as a leader in the international movement towards net-zero emissions, Taiwan still faces significant challenges to energy transition, primarily due to limited land constraints, high population density, and urbanization.

This course begins with an overview of Taiwan's net-zero emissions policy and just transition planning, including policy goals, framework, strategies, and budget. It will then move on to the main focus, using solar photovoltaics (technology that converts sunlight into electricity) as an example to examine Taiwan's energy spatial planning. Through specific cases, we will explore the coexistence of solar photovoltaics with other economic activities and analyze land conflicts. Students will compare international cases and engage in policy planning based on various net-zero initiatives from Taiwan and other countries. By analyzing both international and Taiwanese case studies, students will learn about spatial conflicts between solar photovoltaics, stakeholders, and other economic activities, as well as potential win-win solutions. The course includes field visits to renewable energy sites to help students solidify their knowledge regarding Taiwan's energy infrastructure and affected communities.

Objectives

From their participation in this course, students:

- Understand the formation and context of Taiwan’s net-zero and energy policies and compare these with their own country or designated countries through class discussions and assignments.
- Comprehend the potential impact of policies on stakeholders and propose solutions to mitigate these impacts.
- Learn about the land conflicts of renewable energy and potential solutions to mitigate the environmental and societal impacts.
- Gain insights into the spatial co-evolution of energy and landscape globally and locally, and practice how to facilitate co-benefits, taking aquavoltaics and agrivoltaics in Taiwan as examples.

- Understand the implementation of new economic models in energy policy and infrastructure through field classes and reflect on the underlying costs involved.

Course Requirements
Students are expected to attend each class as outlined in the CET Attendance Policy.

- **Participation**: Active participation in the classroom is essential. Students are to read all assigned materials before each class session and come prepared to participate thoughtfully in discussions. There will be around 50 pages of reading per week.

Class Participation Grading Rubric

	A – 90-100% Exemplary	B – 80-89% Proficient	C – 70-79% Developing	D – 60-69% Unacceptable	F – 0-59% Missing
Frequency of class participation	Actively contributes 2+ times per meeting	Actively contributes at least 1 time per meeting	Actively contributes at least half of the time during term	Actively contributes less than half of the time during term	Does not contribute
Quality of class participation*	Contribution is always thoughtful, accurate, and constructive, frequently interacting with peers	Contribution is mostly thoughtful, accurate, and constructive, usually interacting with peers	Contribution is somewhat thoughtful, accurate, and constructive, sometimes interacting with peers	Contribution is rarely thoughtful, accurate, and constructive, rarely interacting with peers	Does not contribute or interact with peers
Level of class preparation	Always fully prepared and on task	Mostly prepared and on task	Somewhat prepared and on task	Rarely prepared and on task	Consistently unprepared and not on task

- **Case study essay:** Each student selects a country for energy policy review and a comparative analysis with Taiwan. The essay should address the following aspects:
    - Policy and Regulation Influences: Analyze the interactions of the energy transition policy, energy mix, budget allocation, law, and regulations.
    - Market mechanisms: Understand trading systems, grid, and electricity supply, and how suppliers' and buyers' participation shape the energy market in the long term.
    - 800 words, approximately 3 pages, double-spaced, Vancouver citation style

- **Field study reflection:** This individual reflection should include, but is not limited to, the following points:
    - Understanding of the Issue: Describe the conflicts and explain their significance.

- Role of the Stakeholder: Analyze their power relations, impacts, and involvement.
- Planning Considerations: Evaluate whether the cases provide benefit and value to the community and the environment. If you believe they do not, suggest improvements or alternative approaches to enhance co-benefit or co-value.
- 500 words, approximately 2 pages, double-spaced, Vancouver citation style.

- **Final Presentation:** Students are divided into groups of 1, 2, or 3, with each group selecting one case for conflict analysis and policy recommendations. Each group delivers a 15-20 minute case study on their chosen topic, followed by a 5-minute Q&A session. Grading criteria include:
  - Content: Depth and accuracy of information, including the comparison of policies and regulations covering, but not limited to, the history, development, current status, etc.
  - Structure: Logical organization of the presentation, with clear and cohesive sections.
  - Presentation: Clarity, delivery, and the use of visual aids or other supporting materials.
  - Q&A: Ability to effectively respond to questions and engage with peers and the instructor.
  - Individual Component: Each student will also receive an internal peer review from their group members, assessing their contributions to the group's work.

Grading

The final grade is determined as follows:

Class preparation and discussion 20%

Case study essay 30%
- 10% Policy review
- 10% Policy comparison
- 10% Insights and policy suggestions

Field study reflection 15%

Final presentation 35%
- 10% Oral presentation
- 15% Insight and innovation
- 10% Peer assessment

Readings

Academia Sinica. "Taiwan Net Zero Technology R&D Policy Suggestions." 2024. https://sec.sinica.edu.tw/archives/e4240dc6ac12d3d4.

Akita, N., et al. "Managing Conflicts with Local Communities over the Introduction of Renewable Energy: The Solar-Rush Experience in Japan." Land 9, no. 9 (2020): 290.

https://doi.org/10.3390/land9090290.

Goldberg, Z.A. "Solar Energy Development on Farmland: Three Prevalent Perspectives of Conflict, Synergy and Compromise in the United States." Energy Research & Societal Science 101 (2023): 103-145. https://www.sciencedirect.com/science/article/abs/pii/S2214629623002050.

Haggett, C. "'Planning and Persuasion': Public Engagement in Renewable Energy Decision-making." In Renewable Energy and the Public, 13, 2010. https://www.researchgate.net/publication/284059688_'Planning_and_persuasion'_public_engagement_in_renewable_energy_decision-making.

Hall, P.K., W. Morgan, and J. Richardson. "Land Use Conflicts Between Wind and Solar Renewable Energy and Agriculture Uses." WVU College of Law Research Paper No. 2022-004, 2022. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4042235.

International Energy Agency. "Clean Energy Transitions Programme 2023." 2024. https://www.iea.org/reports/clean-energy-transitions-programme-2023.

International Energy Agency. "Developing Capacity for Long-Term Energy Policy Planning: A Roadmap." 2024. https://www.iea.org/reports/strategies-for-affordable-and-fair-clean-energy-transitions.

International Energy Agency. "Energy Technology Perspectives 2023." 2022. https://www.iea.org/reports/energy-technology-perspectives-2023.

International Energy Agency. "Net Zero by 2050: A Roadmap for the Global Energy Sector." 2021. https://www.iea.org/reports/net-zero-by-2050.

International Energy Agency. "Net Zero Roadmap: A Global Pathway to Keep the 1.5 °C Goal in Reach." 2023. https://www.iea.org/reports/net-zero-roadmap-a-global-pathway-to-keep-the-15-0c-goal-in-reach.

International Energy Agency. "Strategies for Affordable and Fair Clean Energy Transitions." 2024. https://www.iea.org/reports/strategies-for-affordable-and-fair-clean-energy-transitions.

International Labour Organization. “Achieving a just transition towards environmentally sustainable economies and societies for all”. 2023. https://www.ilo.org/resource/conference-paper/ilc/111/achieving-just-transition-towards-environmentally-sustainable-economies-and

International Labour Organization. “The role of active labour market policies for a just transition”. 2023. https://www.ilo.org/publications/role-active-labour-market-policies-just-transition

International Labour Organization.“Greening macroeconomic policies Current trends and policy options”. 2022.https://www.ilo.org/publications/greening-macroeconomic-policies-current-trends-and-policy-options

International Labour Organization.“Sectoral Policies for a Just Transition towards Environmentally Sustainable Economies and Societies for All” 2022. https://www.ilo.org/publications/sectoral-

policies-just-transition-towards-environmentally-sustainable

International Renewable Energy Agency. "Finding Common Ground for a Just Energy Transition Labour and Employer Perspectives." 2023. https://www.irena.org/Publications/2023/Aug/Finding-common-ground-for-a-just-energy-transition-Labour-and-employer-perspectives.

International Renewable Energy Agency. "Renewable Energy and Jobs Annual Review." 2023. https://www.irena.org/Publications/2023/Sep/Renewable-energy-and-jobs-Annual-review-2023.

International Renewable Energy Agency. "World Energy Transitions Outlook 2023: 1.5°C Pathway." 2023. https://www.irena.org/Publications/2023/Jun/World-Energy-Transitions-Outlook-2023.

Ketzer, D. "Land Use Conflicts between Agriculture and Energy Production Systems Approaches to Allocate Potentials for Bioenergy and Agrophotovoltaics." PhD diss., Physical Geography, 2020. https://doi.org/10.13140/RG.2.2.11926.78408.

Knapp, R. "The Shaping of Taiwan's Landscapes." In Taiwan, 3-26, 2020. https://www.researchgate.net/publication/343004190_The_Shaping_of_Taiwan's_Landscapes

Lee, Y.C., J. Ahern, and C.T. Yeh. "Ecosystem Services in Pen-Urban Landscapes: The Effects of Agricultural Landscape Change on Ecosystem Services in Taiwan's Western Coastal Plain." Landscape and Urban Planning 139 (2015): 137-148. https://doi.org/10.1016/j.landurbplan.2015.02.023.

Martiskainen, M., and B.K. Sovacool. "Mixed Feelings: A Review and Research Agenda for Emotions in Sustainability Transitions." Environmental Innovation and Societal Transitions 40 (2021): 609-624. https://www.sciencedirect.com/science/article/pii/S2210422421000988.

Matulić, D., et al. "Agrivoltaics and Aquavoltaics: Potential of Solar Energy Use in Agriculture and Freshwater Aquaculture in Croatia." Agriculture 13, no. 7 (2023): 1447. https://doi.org/10.3390/agriculture13071447.

National Development Council. "Taiwan's Pathway to Net-Zero Emissions 12 Key Strategies." 2022. https://www.ndc.gov.tw/en/Content_List.aspx?n=2D918002A913582A.

National Development Council. "Taiwan's Pathway to Net-Zero Emissions in 2050." 2022. https://ws.ndc.gov.tw/Download.ashx?u=LzAwMS9hZG1pbmlzdHJhdG9yLzExL3JlbGZpbGUvMC8xNTA0NS8xMzdmMjYyMS01NmQ4LTQ0MjctODkxZS05MDQ1MjdjZmMzMzYucGRm&n=VGFpd2Fu4oCZcyBQYXRod2F5IHRvIE5ldC1aZXJvIEVtaXNzaW9ucyBpbiAyMDUwLnBkZg%3d%3d&icon=.pdf.

Oudes, D., A. van den Brink, and S. Stremke. "Towards a Typology of Solar Energy Landscapes: Mixed-production, Nature Based and Landscape Inclusive Solar Power Transitions." Energy Research & Social Science 91 (2022): 102742. https://doi.org/10.1016/j.erss.2022.102742.

Pringle, A.M., R.M. Handler, and J.M. Pearce. "Aquavoltaics: Synergies for Dual Use of Water Area for Solar Photovoltaic Electricity Generation and Aquaculture." Renewable and Sustainable Energy Reviews 80 (2017): 572-584. https://www.sciencedirect.com/science/article/abs/pii/S1364032117308304.

PwC. "2023 Taiwan Green Power Trading Progress Report." 2023. https://www.pwc.tw/en/publications/taiwan-re-market-updates/taiwan-cppa-market-report.html

Toledo, C., and A. Scognamiglio. "Agrivoltaic Systems Design and Assessment: A Critical Review, and a Descriptive Model towards a Sustainable Landscape Vision (Three-Dimensional Agrivoltaic Patterns)." Sustainability 13, no. 12 (2021): 6871. https://doi.org/10.3390/su13126871.

Trommsdorff, M., et al. "Chapter 5 – Agrivoltaics: Solar Power Generation and Food Production." In Solar Energy Advancements in Agriculture and Food Production Systems, 159-210, 2022. https://www.sciencedirect.com/science/article/pii/B9780323898669000122.

Outline of Course Content

Topic 1 - Global Net-Zero Emissions Trends and Basic Understanding of Energy
- Global commitments and targets for carbon neutrality
- Fundamentals of energy systems and transitions

Topic 2 - History of Taiwan's Energy Transition Policies
- Evolution of Taiwan's energy landscape (1945-2000)
- Recent policy developments and regulatory frameworks (2000-present)

Topic 3 - Taiwan's Net-Zero Emissions Policy
- Policy framework and 12 key strategies
- Budget allocation and implementation timeline

Topic 4 - Analysis of National Energy Policies
- Comparative analysis of international net-zero strategies
- Policy tools and implementation mechanisms

Topic 5 - How to Plan an Effective Energy Policy?
- Stakeholder mapping and engagement strategies
- Policy design and assessment frameworks

Topic 6 - Development of International Just Transition and Taiwan's Approach
- Global perspectives on just transition
- Taiwan's labor market adaptation and social protection measures

Topic 7 - Energy Landscape: A National and Global Perspective
- Geographic constraints and opportunities in Taiwan
- International case studies of energy infrastructure integration

Topic 8 - Conflicts in Renewable Energy Development I: Solar and Land
- Land-use competition and spatial planning challenges
- Stakeholder conflicts and mitigation strategies

Topic 9 - Conflicts in Renewable Energy Development II: What went wrong with off-shore wind?
- Technical and environmental challenges
- Community resistance and policy responses

Topic 10 - Field Study: Renewable Energy Land Conflict Sites
- Site visits to solar installations and affected communities
- Stakeholder interviews and impact assessment

Topic 11 - Co-location of solar and farming: Aquavoltaics and Agrivoltaics
- Technical aspects of dual-use systems
- Economic and social benefits for agricultural communities

Topic 12 - Challenges and Opportunities of Community Energy in Taiwan
- Models of community ownership and participation
- Local success stories and lessons learned

Topic 13 - Presentations and final wrap-up
- Student policy recommendations
- Synthesis of key lessons and future directions