Energy Transitions 14 – Data Analysis for Energy Research in R

Course Description

Energy Transitions 14 offers a new and timely perspective to the Energy Transitions seminar series by immersing students in the empirical dimension of energy justice and participation. This edition focuses on quantitative analysis using the FinSESCo database, which captures energy behavior, prosumer participation, and socioeconomic dynamics among German households. As Europe shifts toward decarbonization and decentralized energy systems, understanding who participates, who benefits, and who is left out becomes a key challenge. The success of its strategies hinges not only on technological advancement and regulatory reform but also on social acceptance, behavioral change, and inclusive ownership models. Quantitative research provides a powerful lens to uncover inequalities, behavioral patterns, and the real-world effects of renewable energy policy. Using the FinSESCo dataset, which offers rare access to behavioral, motivational, and socioeconomic data from over 2,500 households in Germany, students will learn basic data analysis and econometric methods using R and try to answer pressing questions: How does energy ownership influence individual behavior? How do socioeconomic factors and housing situations limit participation? What governance models help reduce inequality in the distribution of clean energy benefits? Through hands-on sessions, students will explore the social, economic, and motivational variables of the FinSESCo database and translate abstract questions into testable hypotheses. Each session connects a topic from the energy transition debate with practical coding and data exploration in R.

Teacher

Renan Magalhães and Prof. Dr. Jens Lowitzsch will be responsible for the course this semester.
Contact: `kelso-professorship@europa-uni.de` or `euv235861@europa-uni.de`

Requirements

No prior experience in programming or statistics is required (although desirable) — the course provides a guided entry point into data analysis for energy and climate research.

Assessment

6 ECTS:
10% Attendance
20% Weekly Assignments
70% 15-page term paper

Objectives

- Introduce students to the FinSESCo database and its applications in empirical energy transition research.
- Provide basic training in R programming and data handling.
- Familiarize students with basic econometric techniques.
- Encourage students to develop their own research questions and conduct exploratory data analysis.
- Foster interdisciplinary thinking about social, economic, and behavioral aspects of the energy transition.

Expected Learning Outcomes

- Understand the role of prosumers in Germany's energy transition.
- Perform basic data cleaning, transformation, and visualization using R.
- Apply introductory econometric methods to investigate patterns and relationships in the FinSESCo dataset.
- Connect data analysis to broader policy and justice-oriented debates discussed in previous Energy Transitions seminars.

Seminar Schedule

We will have five encounters, each running from 13:00 to 18:00:

6–7 November – Kelso Institute Europe, Berlin
20–21 November – Europa-Universität Viadrina, Frankfurt (Oder), August-Bebel-Straße building (specific room to be confirmed)
5 December – Kelso Institute Europe, Berlin

Structure Overview

Session 1:

Framing the Energy Transition and Exploring the FinSESCo Database
Thematic focus: Energy justice, citizen co-ownership, and the role of prosumers
Practical: Introduction to R, installing packages, loading and exploring the FinSESCo dataset

Session 2:

Prosumership and Social Inclusion: Who Participates?
Thematic focus: Income and gender disparities in energy participation
Practical: Data wrangling, recoding variables, and visualizing distributions (e.g., gender × prosumership)

Session 3:

Descriptive Statistics and Exploring Inequality
Thematic focus: Energy poverty, household characteristics, and behavior
Practical: Summary statistics, cross-tabulations, ggplot2 visualizations (boxplots, histograms)

Session 4:

Testing Hypotheses: ANOVA and Group Comparisons
Thematic focus: What drives energy-saving behavior? Interactions between income, gender, and support for green investments
Practical: One-way ANOVA, Chi-square tests; connecting statistical output to policy implications

Session 5:

Student Presentations and Peer Feedback
Present short exploratory studies based on FinSESCo data
Discussion: Bridging empirical evidence and energy policy challenges

Materials and Readings

All materials — including readings, slides, and video tutorials — will be available on Moodle.
Please review the reading list and videos before each class and complete the short R exercises to be discussed in class.

This seminar is particularly suited for students interested in combining social science inquiry with data analytics, and for those looking to gain practical research experience on citizen participation and justice in the energy transition.