

Nils Angliviél de La Beaumelle

Advisor: Ines Azevedo



Renewable Potentials and Floating Offshore Wind Integration in California

May 30, 2025 at 9:30am Pacific Time
Shriram 262

Zoom link:

<https://stanford.zoom.us/j/98363622526?pwd=hSE1qn2sME0T4LDQE7XMfQ6eoKMcoT.1>

Meeting ID: 98363622526

Passcode: 956563

Abstract:

Climate change demands an unprecedented transformation of electricity systems, one that not only decarbonizes power generation but also ensures reliable, affordable energy in the face of rising demand and technological uncertainty. While renewable resources like solar and wind are central to this transition, deep questions remain about their true potential, their integration into complex energy systems, and the role of emerging technologies such as floating offshore wind.

This dissertation investigates where and how renewable electricity can be deployed at scale, and what infrastructure and policy frameworks are needed to support it. Chapter 1 synthesizes global estimates of renewable energy potential, revealing wide variation across technologies and highlighting the importance of clear definitions and feasible deployment assumptions. Chapters 2 and 3 turn to the U.S. West Coast, using expert elicitation and techno-economic modeling to assess the costs, risks, and transmission requirements of floating offshore wind in California. Chapter 4 expands the analysis to the system level, using a high-resolution model of the Western U.S. grid to evaluate how infrastructure investments, emerging technologies, and policy mandates shape decarbonization outcomes. Across these studies, the dissertation highlights the tension between technical potential and system feasibility, and the critical need for coordinated planning to unlock a reliable and deeply decarbonized electricity future.