A QUICK REFRESHER

Mission: The Sustainable Finance Initiative (SFI) works to scale up and accelerate the flow of capital toward the decarbonization of global systems by developing and deploying innovative policies and financial mechanisms, educating leaders, and engaging with the global policy and finance community.

Focus areas: We approach our work across five focus areas: (1) catalyzing private investment, (2) energy business innovation, (3) risk metrics and management, (4) stranded assets and just transitions, and (5) systems transformation and integration.

Model: SFI engages faculty, fellows, and students in projects within our five focus areas, though some projects cut across multiple themes. Every project is grounded by a question or problem sourced from the real world. SFI faculty and fellows work directly with key stakeholders where problems are located, and together we drive toward an implementation pathway so that our work has a measurable impact.

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CATALYZING PRIVATE INVESTMENT

Net Zero

As drivers of climate action enter the fourth decade of what has become a multi-stage race, Net Zero has emerged as the dominant organizing principle. Hundreds of corporations and investors worldwide, together responsible for assets well over $100 trillion dollars, are joining the race to zero greenhouse gas (GHG) emissions by 2050.

The Stanford Sustainable Finance Initiative (SFI) investigates and advances the practice of Net Zero finance. In the fall of 2021, SFI faculty and fellows published *Settling Climate Accounts: Navigating the Road to Net Zero*, elucidating both the state of play and a set of directions that help form judgments about whether Net Zero is going to carry climate action far enough. This first volume of work identified the pressing challenges at the leading edge of Net Zero in practice.

**Recent publications:**

**Events:** Tom Heller and Alicia Seiger presented the book at multiple events, including the Stanford Energy Seminar in October 2021, a GSB alumni talk in December 2021 and the Korea ASFF2022. Chapter authors also hosted workshops with practitioners and academics in early 2021 to gather feedback on early research that helped shape the chapters.

**Collaborators:** Lorenzo Bernasconi Kohn (Research Fellow, Steyer-Taylor Center for Energy Policy and Finance), Esther Choi (former Research Fellow, SFI), Soh Young In (Financial Innovation Lead, SFI), Richard L. Kauffman (Adjunct Senior Research Scholar, Columbia Global Center on Energy Policy; Chair, New York State Energy Research and Development Authority; Chair, Generate Capital; Advisory Board Member, SFI), Marc Roston (Research Fellow, Steyer-Taylor Center for Energy Policy and Finance), Gireesh Shrimali (former Precourt Energy Scholar, SFI), Kim Schumacher (Lecturer in Sustainable Finance and ESG at the Tokyo Institute of Technology), Uday Varadarajan (Precourt Energy Scholar, SFI).

**Blended finance**

In partnership with the Korea Energy Economics Institute, Esther Choi (former SFI Research Fellow) assessed the frontiers of green and blended finance by focusing on selected case studies on state-led efforts on transition finance, pension funds’ strategies for ESG investing and ending overseas coal financing in Asia, and formal institutionalization for the effective deployment of blended finance for low-carbon infrastructure. The first case explored how Japan, which had a relatively late start in the race to green finance, has embraced the concept of transition finance and instituted various institutional and policy mechanisms to ensure coherent understanding and application of the concept domestically and abroad. The study also highlights the role of Japan’s powerful Ministry of Economy, Trade, and Industry (METI) in developing, socializing, and deploying transition finance.
The second case assessed the role of institutional investors, particularly the pension fund, in ESG investing and ending overseas coal financing through the case of Japan’s Global Pension Investment Fund (GPIF). The third case explored how the UK government created its Green Investment Bank to catalyze capital for its domestic low-carbon infrastructure projects, focusing on its institutional features, characteristics, performance, and its privatization and successor.

Recent publications:

- Choi, Esther, “Mobilizing Green Finance for Energy Transition: Case Studies.” [forthcoming Summer 2022]

Events: Esther Choi presented her research from the book at several events, including the SFI Seminar in January 2021.

Collaborator: Korea Energy Economics Institute

Green finance and business strategy

Led by SFI’s Soh Young In, this research focuses on developing a framework that can help companies and investors to identify a concrete path to achieving sustainable impacts that accommodates both short-term and long-term investors alike.

Recent publications:

- In, S. Y., Peterman, A., & Monk, A. Deploying Corporate Capital as Clean Energy Catalyst.
- Spohr, J., Wikström, K., Ronikonmäki, N., Lepech, M., & In, S. Y. Are Private Investors Overcompensated in Infrastructure Projects?

Events: Soh Young led SFI’s involvement with the Asia Sustainable Finance Forum 2022: Next Steps for Climate Innovation held in March 2022. She also presented at the SFI Seminar in March 2021 on “Roles of Corporate Capital in Driving Clean Energy Impact.”

Collaborators: Kent Eriksson (Professor, KTH Royal Institute of Technology), Magnus Hellström (Associate Professor, Faculty of Science and Engineering at Åbo Akademi University), Michael Lepech (Professor of Civil and Environmental Engineering at Stanford University), Zhiye Li (Postdoctoral Fellow, Stanford), Ashby Monk (Executive Director, Stanford Research Initiative on Long-Term Investing), Andrew Peterman (Adjunct Professor of Civil and Environmental Engineering at Stanford University), Niko-Matti Ronikonmäki (Ministry of Transport and Communications, Finland), Jonas Spohr (University Lecturer, Faculty of Science and Engineering at Åbo Akademi University), Kim Wikström (Professor, Faculty of Science and Engineering at Åbo Akademi University).
Sustainability assessment and reporting

Access to high-quality sustainability data has become more crucial than ever in proving the benefits of sustainability integration. Soh Young In’s research discusses how to evaluate a firm’s carbon reduction performance more reliably and transparently and empirically investigate why and how firms manipulate such information (i.e., greenwashing, carbonwashing).

Recent publications:


**Event**: Soh Young and Kim Schumacher presented their research from the book at multiple events, including the SFI Seminar in September 2021.

**Collaborators**: Yong Jun Baek (Researcher at the Stanford Center at the Icheon Global Campus in South Korea), Lauren Nolen (BS ’21), Kim Schumacher (Lecturer in Sustainable Finance and ESG at the Tokyo Institute of Technology), Chu Tinaru (Tokyo Institute of Technology).

Financial innovation for clean energy and climate solutions

In the midst of the persistent climate investment gap, a renewed focus has emerged on blended finance to strategically use public and philanthropic capital to catalyze substantial amounts of additional private sector investment for climate projects. However, in today’s complex and fragmented climate finance landscape, investors, intermediaries, and project developers cannot find one another in an efficient and effective manner. This, in turn, incurs significant transaction, search, and opportunity costs, posing a substantial impediment to the progress that is needed to enhance the quantity and quality of climate finance. Without an effective mechanism that can mitigate the mismatch between supply of and demand for climate finance, it is unlikely that blended finance can achieve its potential to effectively mobilize private capital at scale for systemic and transformative climate actions.

In response, an array of online platforms have emerged at various governance levels and sectors to match different stakeholders and accelerate the process. Matchmaking platforms can expedite the discovery of investment opportunities and mobilize untapped resources by facilitating multi-sided interactions and reducing the transaction costs of achieving common goals. These platforms can also serve as an important tool and mechanism for a governance strategy called orchestration. By serving as meta-intermediaries, or an umbrella for public and private intermediaries, matchmaking platforms can help climate finance participants navigate through the highly fragmented landscape and direct their efforts towards accelerating the deployment of climate finance.

“The Sustainable Finance Initiative has provided incredible opportunities and resources to further my understanding of the interactions between climate, finance and engineering. This year, I participated in a SFI sponsored project studying the contrasts in climate mitigation and adaptation project financing in developing countries with a team of students from the Stanford Energy Club. Thanks to SFI, I have been able to connect with influential private actors, multilateral institutions and researchers around the globe that have taught me lessons I hope to leverage throughout my career.”

Luc Hudon, MS ’23
Framing the mismatch in climate finance as a governance problem and drawing insights from the literatures on transnational governance, polycentric governance, and collaborative governance, Esther Choi’s working paper assesses four platforms that are operating in this space: the International Renewable Energy Agency (IRENA)’s Sustainable Energy Marketplace, CDP’s Matchmaker, Convergence’s Deal Platform, and CleanTek Market.

**Recent publications:**

- Choi, Esther (February 2021), “Achieving Speed and Scale in Climate Finance: The Platforms as Meta-Intermediaries.”

**Climate of Infrastructure**

Jeffrey Ball, scholar-in-residence at the Steyer-Taylor Center and a lecturer at Stanford Law School, leads this wide-ranging initiative to understand and explain why key players are investing in high- or low-carbon infrastructure.

The project examines which players are funding what infrastructure where, about why they’re making those investment decisions, and about how, by shifting to financing lower-carbon infrastructure, they could create infrastructure-project deals that would increase rather than reduce their profits.

The initial phase of the project has examined electricity-generation projects in seven emerging economies: Bangladesh, Egypt, Indonesia, Kazakhstan, Kenya, Malaysia, and Pakistan.

In 2020, cooperation with the World Bank enabled the researchers to access to the institution’s highly comprehensive global infrastructure investment data. Access to that data allowed the project to begin tracking and mapping global infrastructure investment across several key emerging economies. Two early and related insights from the new data and analysis are particularly relevant for decision-making on climate policy: the growing agency that countries receiving foreign funding wield in shaping the carbon intensity of the infrastructure built within their borders, and the range of powerful players in those countries whose fortunes will rise or fall depending on those decisions.

Approximately 20 Stanford graduate students have been engaged in the Stanford Climate of Infrastructure Project since it launched.

**Recent publication:**

**Event:** Jeffrey presented this research at the SFI Seminar in January 2021 and will give a talk to an annual conference of the U.S. Agency for International Development (USAID) in June 2022 on “Hot money: Illuminating the financing of high-carbon infrastructure in the developing world.”

**Recent collaborators:** The World Bank, Benedict Bingham (formerly International Monetary Fund), Hubert Jenny (Global Climate Fund), Seong Ho Hong (formerly World Bank), Darwin Marcelo (formerly World Bank), Emily Dickey (BS ‘23), David Liou (JD/MBA Candidate), Angela Ortega Pastor (MIP ‘21).

**Nature-based solutions**

STC Research Fellow Marc Roston worked with Olamide Oladeji (PhD student in Environmental Engineering) and advised Stella Liu (MBA ‘23) to analyze permanence and additionality in nature-based offsets.

Lorenzo Bernasconi, Research Fellow at STC, researched the emerging reliance on nature-based offsets to balance Net Zero accounts, pointing out the interdependence of private market and state solutions that add up to effective carbon management.

**Recent publications:**


**Event:** Marc and Lorenzo each presented their research from the book at various events, including the SFI Seminars in February and October 2021, respectively.

**Collaborators:** Stella Liu (MBA ‘23), Olamide Oladeji (PhD student in Environmental Engineering).

**Energy Business Innovations (EBI)**

EBI looks at how the transition to a decarbonized energy future can be accelerated and accepted in the marketplace. Projects supported by the initiative focus on the interplay of business fundamentals, technological innovations, organizations and public policy. EBI is funded by the Steyer-Taylor Center through an allocation that has, since STC’s early days, been allocated to the business school. Because EBI also receives funding from Precourt, EBI operates as a focus area of SFI. The following are a selection of EBI projects.

**The truth about corporate net-zero pledges**

Is net zero an adequate tool to address climate change? EBI Faculty Research Director Stefan Reichelstein and EBI lead Steve Comello examine and summarize the carbon reduction plans put forth by seven global firms in a broad range of industries.
The economics of low-carbon energy

A transition to secure, reliable, low-carbon and low-cost energy resources at scale requires advancements in technology, policy, and methods for economic evaluation. The Cost Competitiveness of Low-Carbon Energy Technology project encompasses research initiatives that build tools to evaluate the economic sway of low-carbon energy technologies.

More information on EBI’s research, publications and events can be found here.

RISK METRICS AND MANAGEMENT

Assessing climate-related risk exposure of energy assets

Led by Soh Young In, this research assesses the financial impacts of managing climate risk (physical and transition) on different levels of the economy: macroeconomic factors and financial stability, investment portfolios, and infrastructure assets. In response to financial and stakeholder pressure, investors are reviewing the mix of energy assets in their portfolios. Yet investors lack a transparent tool to accurately assesses the climate-related risk exposure of their energy investments. To fill this gap, Soh Young is leading work to propose a novel climate-related risk assessment framework to guide the determination of financial risks (and opportunities) of energy projects at an asset level.

Recent publications:


Event: Soh Young presented this work at various events, including the SFI Seminar: “Is Being Green Rewarded in the Market?” in November 2021.

Collaborators: Berk Manav (MS ‘21), Ki Young Park (Professor of Economics at Yonsei University), Luis Enrique Cruz Rodriguez (MS ‘21), Clothilde Venereau (MS ‘20), John Weyant (Professor of Management Science and Engineering at Stanford University).

Climate risk in the financial system

Called to serve by Governor Newsom as a follow-up to Executive Order N-19-19, the California Climate Risk Disclosure Advisory Group, Co-Chaired by Alicia Seiger, was comprised of 20 global leaders with deep expertise in state and local government, infrastructure, economics, finance, accounting, banking, business, insurance, and investment portfolio management.
The report offers over 45 recommendations to help the state better account for climate risks and opportunities impacting its $262 general operating budget and the combined $1 trillion in AUM across the state’s biggest pensions. It serves as a roadmap for other states and asset owners in the face of climate-related physical and transition risks, and is groundbreaking in its reach, specificity and ambition.

Related but distinct from the project above, which considers how climate risk impacts macroprudential regulators and state actors, this work focuses on how climate risk impacts large pools of assets, such as those held by state pension funds, university and foundation endowments, and sovereign wealth funds.

Julien Maire is a recent addition to SFI’s team. His current work focuses primarily on gaining a deeper understanding of wildfire modeling and hurricane model development. Our goal is to help transfer market knowledge and experience from Florida’s catastrophe prone insurance markets to California and other wildfire exposed areas.

Recent publications:

- Golden, M. (October 2021), “Q&A: Advisors to the state of California on climate risk disclosure explain their recommendations.”

Events: Alicia, Tom and other Advisory Group members presented the CA report to multiple Federal, State and municipal policymakers, and spoke at multiple conferences.

Collaborators: Full list of Advisory Group Members, and 20 California State steering committee members representing agencies and offices across the whole of state government.

STRANDED ASSETS AND JUST TRANSITION

Transition finance

Led by Uday Varadarajan, this work focuses on developing financial and rate impact models to help regulated utilities in states across the US figure out how to profitably transition to clean energy while saving ratepayers money and providing transition assistance to affected communities—primarily through the use of ratepayer-backed bond securitization with capital recycling.

Over the last year, a significant and singular focus of Uday’s work at SFI, in collaboration with a team he leads at RMI through the Utility Transition Hub, has been around utilizing publicly available data and tools to engage in public debate around potential policy options to enable a just and equitable transition from fossil assets to clean energy in the US and globally.

In the US, this began with work last June focused on identifying key barriers associated with current clean energy tax law that misalign the incentives of regulated utility investors and customers in shifting to clean energy. Based on this initial work, the team suggested several tweaks to federal tax and financing policies that could mitigate
these challenges. The team focused on one particularly promising solution that could leverage a relatively small federal appropriation to have an outsized impact on mitigating the cost of fossil transition on customers and promoting reinvestment in fossil communities. This lending program was subsequently introduced and passed the US House and has been introduced in the Senate as a new authority for the DOE Loan Program with authorities to provide up to $250 billion in financing for these purposes at a cost of $5 billion to the US Treasury.

Further, the team developed a model to assess at a granular level the potential cost and emissions impacts of specific clean energy tax and financing provisions under consideration by US policymakers. In particular, they quantified the potential benefits of a key provision (tax normalization of the storage and transmission ITC) that, if addressed, could reduce emissions by 50 MtCO₂ and save customers $1bn annually.

The team also began the process of generalizing these insights around the using of novel public financing tools to facilitate just and equitable fossil transition internationally, building on the insights and work developed in the US. They also began to use novel modeling tools developed in the Utility Transition Hub to help truth-test utility commitments around decarbonization.

**Recent publications:**

- **Castillo, M., Rea, J. & Varadarajan, U.** (October 2021), *Build Back Better Act would reduce the burden of household energy costs.*
- **Calhoun, K., et al,** (November 2021), *Financing the Coal Transition.*
- **Varadarajan, U.** *Cleaner, Cheaper Energy: Climate Investments to Help Families and Businesses.* Congressional Testimony prepared for the House Select Committee on the Climate Crisis, December 2021.

**Events:** In December 2021, Uday testified before the House Select Committee on the Climate Crisis at a hearing on Cleaner, Cheaper Energy: Climate Investments to Help Families and Businesses. He also presented his research from the book at various events, including the SFI Seminar: “Securitization as a Model for an Equitable Transition” in November 2021.

**Collaborators:** Rocky Mountain Institute, Sky Chen (BS ‘23, research on novel health impact related financial vehicles for fossil transition), Jeff Ball (STC), Phuthi Tsatsi (MS ‘23, research on just transition efforts in South Africa), Louise White (MBA/MS ‘23, research on coal plant repurposing in Missouri), Stanford Energy Club (project with RMI staff focused on deriving novel energy burden insights from the Utility Transition Hub).
**Systems Transformation and Integration**

**Market design and systemic energy reform: California, Hawaii and India**

Led by [Gireesh Shrimali](#) (former Precourt Energy Scholar) in consultation with supervising faculty, this project looks at technology costs in situ, market design to enable cost-effective deployment of alternative flexible service options, reformed business models and new designs for public/private financial structuring better fitted to the different risk distributions associated with lower carbon energy.

**Recent publications:**


**Collaborators:** World Bank Group’s Energy Sector Management Assistance Program (ESMAP), Abhinav Jindal (Indian Institute of Management, Indore), Aravind Retna Kumar (former SFI Innovative Finance Research Associate).

**Courses**

**Sustainable Finance Initiative (SFI) Seminar (CEE 157/257)**

*Soh Young In*

During fall quarter, students may enroll in the *Sustainable Finance and Investment Seminar*, a 1-unit course which aims to equip the Stanford community with the knowledge and networks required to undertake significant future work on sustainable finance and investment. The class explores multiple disciplines of sustainable finance, featuring talks by Stanford faculty and guest speakers.

**Assessing the Impact of China’s Global Infrastructure Spending on Climate Change (LAW 8070)**

*Jeffrey Ball*

In this policy lab, students advance research toward two sorts of deliverables: a data-analysis and data-visualization tool to map players, financing structures, and carbon emissions from Chinese-financed infrastructure projects in key host countries; and a written account of how Chinese-financed infrastructure is playing out in those countries.

**Climate: Politics, Finance and Infrastructure (LAW 2513)**

*Alicia Seiger and Kate Gordon*

For their final project, students in Climate: Politics, Finance and Infrastructure delivered a suite of compelling financial and policy interventions to achieve large-scale climate impact. Check out their great ideas by watching this video of their final presentations or by visiting SFI’s Projects page to read them.
Climate Risk Disclosures (LAW 808F)

Alicia Seiger and Thomas Heller

Working with the governor’s office of the State of California and the U.S. Securities and Exchange Commission, this policy lab helps design climate-related disclosure and reporting processes at the state and federal level.

SFI Summer Fellowship Program

Officially launched in 2021, the Sustainable Finance Initiative (SFI) program provides financial support to continuing Stanford graduate students who have secured summer internships with organizations whose missions are aligned with SFI’s focus areas. In summer 2021, SFI supported Joanna Klitzke MBA/MS ‘21 and Wes Miller MS ‘22. Joanna supported climate startup SupplyShift in building better ESG management tools for private investors, and Wes worked at ADN Capital Ventures, facilitating renewable energy and sustainable technology and infrastructure transactions. Applications for the 2022 program close on May 12, 2022.

Looking Ahead

SFI’s research and analysis helps investors, business executives and policy makers better navigate the complex questions of transitioning economic systems from high- to low-carbon and from low- to high-climate resilience. Building on the insights of Settling Climate Accounts, SFI’s 2022-23 research will focus on the following:

• Net Zero Governance
• Carbon Accounting (Scopes 2 and 3)
• Climate Risk, Insurance & Pricing
• Transition Management
• Green Finance

In addition to pursuing its research agenda, SFI is a key contributor to and point of connection with Stanford’s new school of sustainability and a growing offering of executive education programs.

“Learning about the sustainable and impact-oriented investment universe this summer, particularly through a practitioner lens, has been an invaluable experience. I am grateful to both ADN Capital Ventures and Stanford’s Sustainable Finance Initiative for this awesome opportunity.”

Wesley Miller, MS ‘22