

SEI U.S. Center 2016 Annual Report

1 Introduction and general center information

2016 has been another strong year for the U.S. Center. We continue to engage in a wide array of exciting projects across the world, from on-the-ground primary research (cookstove adoption in India) to policy engagement (U.S.-China government cooperation on the water-energy nexus) and capacity-building (support to countries in using LEAP to develop their Nationally Determined Contributions). True to SEI's mission statement, we are bridging science and policy on multiple levels, from supporting decision-making (e.g. treaty negotiations between Lesotho and South Africa on water transfers) to providing integrative knowledge (e.g. to support the Civil Society Equity Review). Timely research and effective communication have placed SEI-US colleagues in key support roles with policy-makers, ranging from U.S. Congressional staff to the (effective) deputy Prime Minister in Lesotho.

We added six new staff and are on the verge of reaching 30 staff for the first time. Our programs in Water, Energy Modelling, Climate Policy, and Climate Equity, Sustainable Bioenergy and Development, and Sustainable Consumption and Production continued to deepen engagement and influence in policy circles, to build and develop capacity for sustainable energy and water planning across the globe, and to publish high-profile, widely read, and influential research. Section 2 describes highlights of this work in 2016.

Recent political developments in the U.S. could not only create stiff headwinds for the work we are doing, but also threaten a key element of our funding base. As can be seen in Section 1.3, government funding accounted for nearly half of 2016 funding for our research and capacity building activities, and U.S. government support is a significant part of that. We were also actively engaged in national energy and climate policy venues with foundation and NGO support. Recognizing that these funding sources and venues may be in peril in the coming years, we will be increasing our efforts in 2017 to secure new funding sources and focusing on a different set of policy venues.

1.1 Organization

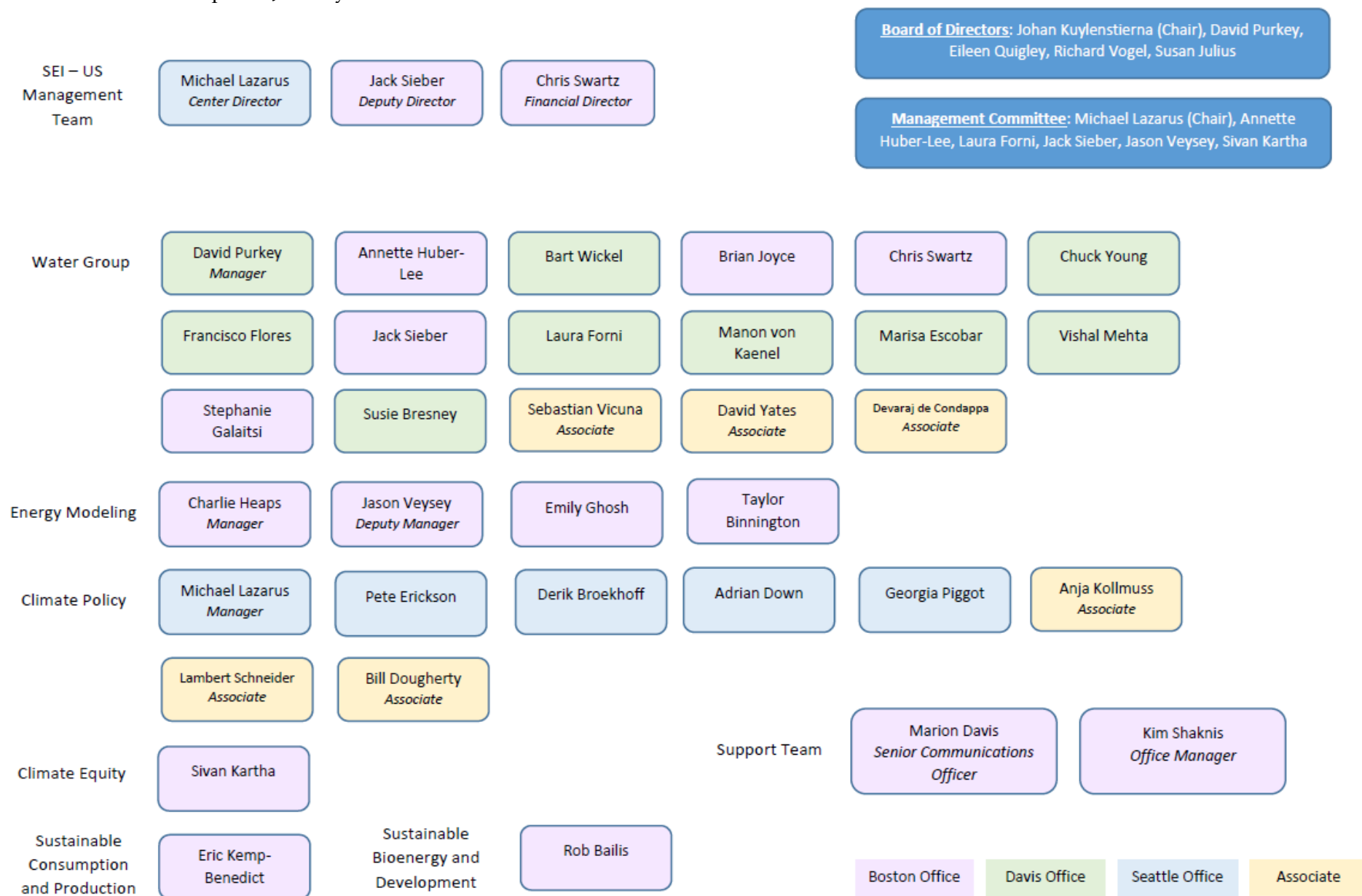
SEI-US is established as Massachusetts not-for-profit corporation formed under Chapter 180 of the Massachusetts General Laws. SEI-US is exempt from federal corporate income taxes, under section 501(c)(3) of the Internal Revenue Service code. SEI's U.S. Center is an independent research affiliate of Tufts University in Massachusetts and also has offices in Davis, California, and Seattle, Washington.

To a different extent, each SEI-US office has a topic focus. The Davis office consists entirely of Water Group staff. The Seattle office focuses on climate change (mitigation) policy, from carbon markets, to the role of cities, to research on fossil fuel supply and lock-in. The Somerville office is home to the energy modeling/LEAP group, our climate equity work, our work on sustainable consumption and production and sustainable bioenergy and development, and some Water Group staff, as well as communications and administrative staff.

Despite geographical distances, we work well together as teams across offices. We are heavy users of Skype and GoToMeeting, and have invested in high-quality teleconferencing equipment. We also occasionally travel to and work from other offices. In many projects, we work seamlessly across the American continent and up and down the West Coast. The SEI Initiatives are good examples of such activities, as they span the energy-water resource continuum (nexus) and connect energy modeling and capacity-building with climate policy research (fossil fuels).

A key feature of SEI-US life is the monthly all-staff meeting, held the first Monday of each month (lunchtime on the West Coast, 3pm in Boston). It provides an opportunity to update all staff on Center and SEI-wide developments, and a venue for building team spirit and camaraderie. All-staff meetings this year covered, among other topics:

- work-life balance;
- nurturing a culture of good ethical practice;
- external communications guidance related to equity, diversity and inclusion;
- developing leadership skills;
- revisiting the tools acquired at the 2015 staff retreat;
- a deep dive on professional development;
- review of the Staff Survey;
- and reflections and feedback on Science Forum 2016.



1.2 Staffing

SEI US currently comprises 29 staff — 27 researchers (18 senior scientists, 9 scientists and analysts, inclusive of communications), and two financial and administrative staff (10 women, 19 men) – an increase from 24 in 2015 and 2014. Additions included:

- **Manon von Kaenel:** Manon joined the Water group in Davis as research analyst, after a stint as intern. Manon recently completed a double B.S./B.A. in environmental science and geography from the University of California – Berkeley, with minors in Spanish and geographical information systems.
- **Adrian Down:** Adrian joined the Seattle office as research scientist working on energy and climate on our cities and fossil fuel initiative-related projects. Adrian has a PhD in ecology, a B.A. in physics and math, and experience as an energy analyst (U.S. Dept. of Energy), software programmer, and permaculture farmer.
- **Emily Ghosh:** Emily joined the Energy Modeling group in Somerville as research scientist to provide support on LEAP and COMMEND and work on studies related to climate change mitigation in the energy sector. Emily has an M.S. in environmental technology, specializing in global environmental change and policy, from the Centre of Environmental Policy at Imperial College London, and a B.S. in chemical and environmental engineering from the University of Toronto.
- **Eric Kemp-Benedict:** Eric returned to SEI-US in late March as a senior scientist in Somerville, after passing the baton to Niall as Asia Centre Director. He will be advancing his research program on economic analysis for sustainable consumption and production.
- **Susie Bresney:** Susie joined the Davis office as part of the Water Group. Susie just received her M.S. in environmental and water resources engineering from Tufts University, and earlier this year worked as an intern in our Somerville office. She also speaks Spanish.
- **Georgia Piggot** joined the Seattle office in November. Georgia is the final stages of completing her PhD in Sociology at University of British Columbia, where she has been studying organizational responses to the “Carbon Neutral Public Sector” initiative in British Columbia, and has taught courses in “Social Research Methods” and the “Sociology of Natural Resources”.
- **Aubrey Cohen:** Aubrey joined the Seattle office in April as a half-time communications officer. His experience includes eight and a half years at the Seattle Post-Intelligencer and seattlepi.com, where he covered real estate, aerospace and tech. He departed in August, given the opportunity for a full-time position.

After 10 years at SEI-US, **Carrie Lee**, a staff scientist in Seattle who had worked on cities, bioenergy, and a range of climate change mitigation issues, left for an exciting position as Sustainability Manager at King County Metro (the Seattle region’s main transportation agency).

After more than three years at SEI-US, in November, Nicolas Depsky, a staff scientist in Davis who had worked on various river basin management and decision support projects, left in order to continue his graduate studies.

1.3 Finances

In 2016, SEI-US revenue grew by approximately 10% compared with 2015, to \$5,223,000, in part due to the proportional increase in staffing at the Center. Net assets increased by almost \$380,000, as a result of several factors, including expanded staffing, high staff billability, 2016 charge rates structured for additional senior and administrative hiring that was subsequently delayed until 2017, and lower than anticipated leave taken among staff. Of the total revenue accrued, \$1.1 million (about 20%) was obtained from efforts contributing to projects administered by SEI-International. The ratio of cash reserves to monthly expenses was just over 6:1 by year-end, indicating continued stable cash flow from operations.

A breakdown of revenue (excluding that obtained through SEI International)) by source of funding and geographic regions is provided in Figures 2 and 3 below. Contract and grant awards from government funding mechanisms continued to be major source of funding for SEI-US researchers (55%), with U.S. federal and state sources comprising almost \$2.0 million and \$0.3 million derived from other governments. Foundations and research institutions/private entities each contributed between 15% to 20% of revenue, with multilateral organizations (UN agencies) and development banks (e.g., World Bank) contributing less than 10% each. U.S.-focused projects continued to provide the largest fraction of revenue (35%), while Latin America- and Africa-focused projects each accounted for about 14%, and Asia-focused projects, for about 11%.

Figure 1. SEI-US sources of revenue in 2016 (not including projects administered by SEI-International)

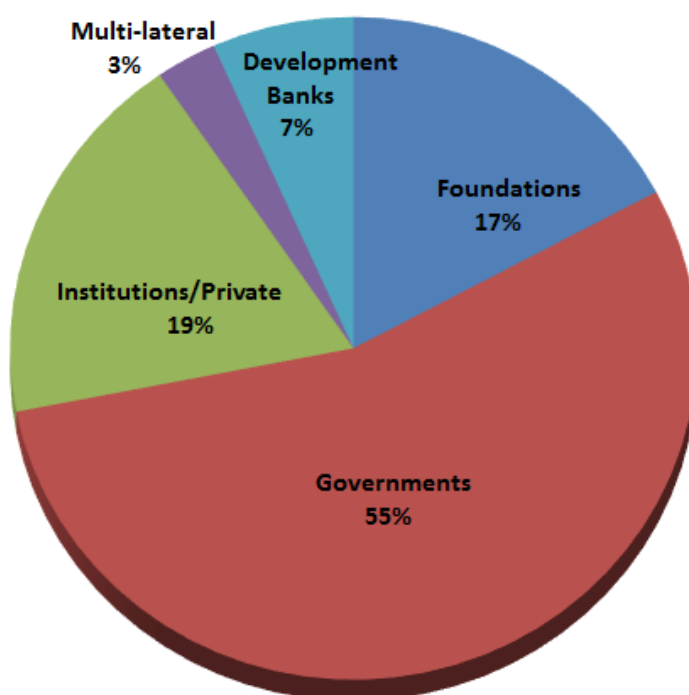
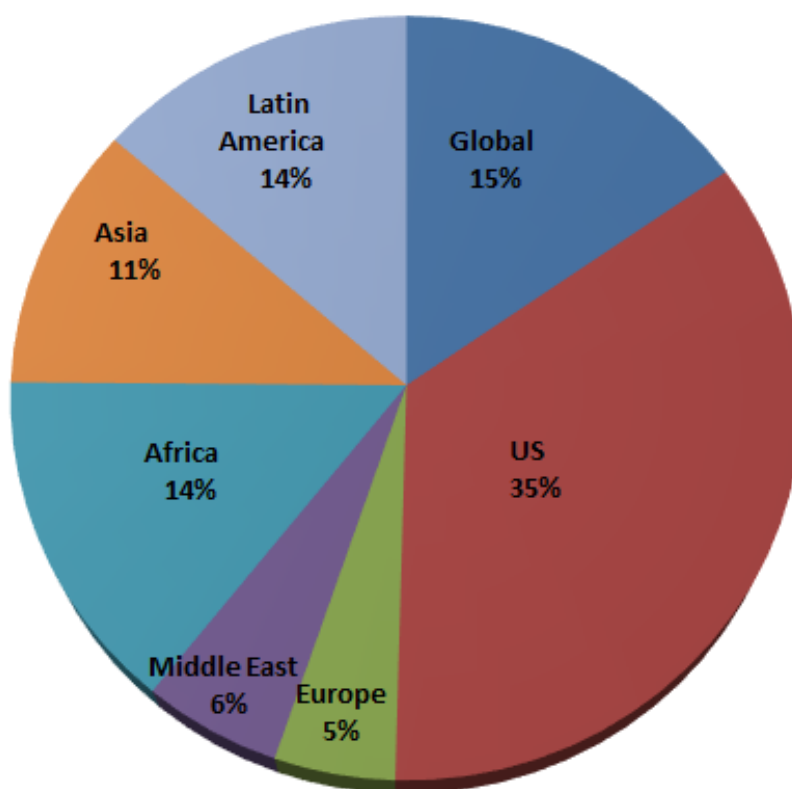


Figure 2. Geographic focus of SEI-US work in 2016 (by amount billed)



2 Project work

At SEI-US, we have a decentralized organizational structure in which each program designs, develops, and funds its own work. Below we review the highlights of 2015 project work by SEI-US program.

2.1 Water Group

Two themes dominated the Water Group's activity in 2015: consolidation of recent work focused on decision support within the water management arena, and the expansion of this approach into new geographic regions. The consolidation efforts have been supported by a New Idea grant from the U.S. Center which allowed for the development of training materials, an SEI discussion brief, and a peer-reviewed journal article. Within the broad focus on decision support, we have worked directly in thematic areas related to river basin planning, the water-energy-food nexus, and city-scale resources management. Finally, we have begun to build a cluster of spatial analysis capability within a group that has been traditionally dominated by systems analysis.

With 13 researchers, the Water Group is the largest research program within the U.S. Center, and the only research program with members working out of more than one office, with nine members in Davis and four in Somerville. Since the creation of SEI-US in 2006, the Water Group has continuously maintained some level of project activity in California, managed principally by staff working in Davis, with the relative proportion of California water work

varying from year to year. 2016 was a year of comparatively significant and high-profile engagement in the Golden State, complemented by exciting activity in other parts of the world.



Figure 3. Brian Joyce and Annette Huber-Lee (not shown) work with colleagues in Lesotho on the issue of water transfers to South Africa.

For more than two decades, the State of California has relied on a simulation model called CALSIM to support various planning and decision-making processes. CALSIM was developed by the California Department of Water Resources and is supported by a small ecosystem of users in allied agencies and consulting firms. As the challenges facing water managers have deepened, the CALSIM platform and ecosystem has proved less and less adaptable to changing conditions, leading one important agency, the California State Water Resources Control Board, to move all of its modeling work to a new application of SEI's WEAP software developed in partnership with colleagues in the Water Group. The model will be used to overhaul the water rights structures in the state, in order to achieve a better balance between consumptive uses and aquatic ecosystems. This very high-profile engagement is raising the profile of the entire group across California.



Figure 4. David Purkey presents to the PARA-Agua workshop participants in Chiclayo, Peru.

Other California projects also contributed. A partnership with the Santa Clara Valley Water District is defining new reservoir operating rules that will allow for the restoration of anadromous fish habitat while maintaining sufficient levels of service in this economically vital portion of the state. A partnership with the Yolo County Flood Control and Water Conservation District is allowing for the development of groundwater management rules that protect food production levels within the district's service area.

Internationally, the Water Group continued to promote improves river basin planning and decision-making in Latin America, Africa and Asia. The use of WEAP within the Robust Decision Support approach lead to the identification of the innovative actions that were broadly acceptable to a wide group of stakeholders in the Quilca-Chili basin in Peru, the Orange River Basin in southern Africa, and the Prek Thnot basin in Cambodia.

As is typically that case for the Water Group, wherever our work is concentrated, in 2016 we: (i) advanced our long-standing reputation for the development of innovative analytical tools; (ii) applied these tools within new formal decision-making constructs; and (iii) discovered the next set of challenges awaiting those who seek to manage water sustainably.



Figure 5. Jordanian WEAP Training participants with Stephanie Galaitsi in Stockholm

2.2 Energy Modeling (LEAP)

The energy modeling program expanded the scope of its work in 2016 with the addition of a fourth member, Emily Ghosh, who joins Charlie, Jason and Taylor. Our work continues to focus on three main areas: (1) developing LEAP and related software systems, (2) conducting our own studies primarily using LEAP, and (3) supporting LEAP users all around the world with a program of support and capacity-building.

Software/web development

In terms of our development efforts, highlights of 2016 included a major effort to redevelop the COMMEND website. This has now been renamed as simply the LEAP website, and has been redesigned from the ground up to be more engaging, secure and responsive. It now works with any device including PCs, tablets and even phones, and it has over 32,000 registered members from 190 countries. The redesigned site includes an excellent new set of training videos developed by Emily Ghosh. We plan to expand on these in 2017, as they are most informative for our partners.

A second highlight has been the development of a new module for LEAP known as IBC: The Integrated Benefits Calculator. This new module is designed to allow LEAP's capabilities to be extended beyond pollution emissions to now include an analysis of the human health (deaths) and ecosystem impacts (crop losses) caused by emissions of short-lived climate

pollutants (SLCPs). 2016 also saw the release of a major new version of LEAP (LEAP2017) that includes major new results visualization capabilities that help energy and climate modelers to more readily explain their analyses to policy-makers and other stakeholders. Finally, in 2016 we also started the process of developing a major new cloud-based open technology database, which we expect to complete in 2017. This new database is expected to greatly improve the quality of data used in LEAP studies worldwide.

Energy studies

The energy modeling program has also been involved in a number of major studies in 2016, including continued work on the USAID-sponsored B-LEADERS program, which is helping develop capacity in the Philippines for the development of low-carbon climate and development policies. In 2016 our team built upon its earlier work to develop a comprehensive LEAP model for the country that was the basis for the country's Intended Nationally Determined Contribution (INDC) under the Paris Agreement. This year we have been looking into detailed energy-water nexus issues in the Mindanao region as well as conducting further capacity-building efforts at the regional scale.

The energy modeling program has also been the lead modeling team in a major project to assist the State of Rhode Island to update its climate planning efforts. This project, in large part lead by Taylor Binnington, will result in a comprehensive new climate plan that targets 80% GHG emissions reductions by 2050.

A third major focus of our energy modeling studies has been an effort to develop an energy model for Morocco within LEAP in collaboration with the Moroccan Ministry of Energy, Mines, Water, and Environment. This work, which was conducted by Jason Veysey included a workshop in our Somerville office in October, at which SEI and MEMW staff explored advanced optimization modeling of renewable integration, including storage. The work was later showcased in a presentation Jason gave at the UNFCCC Conference of Parties (COP) in Marrakech in late 2016.

Finally, an additional study worth highlighting is the Collaborative Programme for the Euphrates and Tigris (CPET). CPET is a five-year program (2013–2018) that aims to assist the countries in the Euphrates and Tigris region to make progress towards improving water and energy management through dialogue, trust-building, information exchange, analysis and regional investment prioritization. CPET is funded by Sida, and is implemented in partnership by ICBA, SIWI, SEI, SMHI, ICARDA, and the American University of Beirut (AUB) as well as partners from countries in the basin region. Charlie and Emily have been working with Andreas Lindström from the Stockholm Centre to develop a regional energy model using LEAP as an input to the program. The model examines energy demand and supply and hydropower production and development in the region. After further development, it is hoped that the model will be adopted by the partner countries to help set energy sector investment priorities in the region, as it starts the process of recovering from recent political and humanitarian crises.

Aside from our own studies, it is worth noting that 2016 has seen a bumper crop of new energy and climate studies published that are built upon the use of LEAP. Notable studies include *80 Gigawatts of Change: Egypt's Future Electricity Pathways*, a major new publication of the Egyptian Center for Economic and Social Rights (ECESR) in partnership with the

Heinrich Böll Foundation, which examines visions for Egypt to develop sustainably. They also include *Reinventing Fire: China - A Roadmap for China's Revolution in Energy Consumption and Production to 2050*, a major new study developed by the Rocky Mountain Institute (RMI), the Chinese Energy Research Institute (ERI) and the Lawrence Berkeley National Laboratory (LBNL). This study provides an innovative energy roadmap to 2050 in which China meets its energy needs and improves its energy security and environmental quality using the maximum feasible share of cost-effective energy efficiency and renewable energy supply. 2016 also saw the publication of a series of papers that resulted from an innovative new study of the long-range impacts of climate change on hydropower in the Zambezi basin. The work was led by Randall Spalding-Fecher and supported by Charlie Heaps and Brian Joyce. It involved the development of an innovative multi-regional LEAP energy model for southern Africa, coupled to a detailed WEAP model of the Zambezi basin.

Capacity-building

During 2016, the energy modeling program continued its extensive training and capacity-building efforts. Highlights of the year included our continued engagement with ECRAN, the EU's Environment and Climate Regional Accession Network, which is building capacity for energy and climate policy modeling in the Balkan region of Europe. Charlie conducted a series of workshops in 2016 for ECRAN in Albania and Montenegro. Charlie has also been working closely with WRI's Electricity Governance program to build capacity among state energy planners in the Indian states of Jaipur and Tamil Nadu. The work is intended to help planners conduct long-range electric sector planning that better takes into account long-term trends such as the rapid growth of renewables, and important social issues such as providing access to electricity for poor and rural households.

The energy modeling program has also been working closely with staff from SEI-York as part of the SNAP program (Supporting National Action Planning) of the Climate and Clean Air Coalition (CCAC). Through the SNAP program, we have delivered trainings in Bangladesh, Ghana, Nepal, Peru and Colombia, with more trainings planned in 2017. The trainings teach the use of LEAP and the new IBC module for the assessment of efforts to mitigate short-lived climate pollutants (SLCPs). Other capacity-building efforts in 2016 included workshops conducted in Albania, Jordan and Morocco.

In 2016, the SEI-US energy modeling team also devoted considerable energy to building internal capacity in other SEI Centres. We have worked closely with SEI-Tallinn staff to build their LEAP modeling skills, as part of the EU-funded HERON project that is examining energy efficiency scenarios for the EU. We have also been working closely with the atmospheric modeling team in SEI-York as part of the CCAC SNAP program and the wider SEI LED-P initiative. We have been supporting staff in SEI Stockholm and SEI Africa to use LEAP in various projects.

Finally, aside from our own workshops, SEI also supported a growing number of workshops led by regional centers of expertise in Latin America and Southeast Asia. These included the 15th annual Latin American workshop on using LEAP for energy policy analysis in Bariloche, Argentina, conducted by Fundación Bariloche, as well as a series of LEAP trainings for Regional Energy Planning in Indonesia. Following the finalization of Indonesia's National Energy Planning, there is a mandate that all 34 provinces of Indonesia

should have their Regional Energy Planning completed within one year. The Ministry of Energy and Mineral Resources of Indonesia (MEMR) initiated a series of LEAP trainings to support this process. It is very encouraging to see how LEAP use is spreading and is no longer entirely dependent on the limited resources of SEI-US's own staff to train new LEAP users.



Figure 6. Taylor Binnington and Emily Ghosh at the B-LEADERS team lunch, as part of LEAP training to the Philippines Department of Energy (DOE).



Figure 7. Workshop in Lima, Peru run by SEI-US and SEI-York on using LEAP-IBC for assessment of policy options to address health and ecosystem impacts and reduce emissions of short-lived climate pollutants (SLCPs).

2.3 Climate Policy (Seattle group)

In 2016, the Climate Policy (Seattle) group continued to focus on three areas of current interest and promise: the role of cities in achieving GHG emissions abatement at scale; our long-standing work on carbon markets and climate action planning; and supply-side climate policy as part of the SEI Initiative on Fossil Fuels and Climate Change.

Cities and climate change

The U.S. Center's work on city-scale GHG abatement continued in 2016 with support from Bloomberg Philanthropies and other funders, and we began an effort to look at how national-level policy levers could help promote climate-smart urban development and (in so doing) help realize many of the urban-scale GHG abatement opportunities identified in our prior work. This work has continued to lay a foundation for further research exploring policy approaches for achieving urban-scale GHG reductions and informing city-level policy-making and advocacy efforts.

Highlights include:

- **Continued exploration of an SEI initiative focused on urbanization**, in coordination with staff from other centres, especially Bangkok, Nairobi, and York. We facilitated a session on this opportunity at the Science Forum in Stockholm in 2016, and hope that the initiative may come to fruition in 2017, pending final proposal development and review by the Research Directorate.
- **Regular engagement in “on the ground” city-scale efforts focused on GHG abatement both domestically and internationally.** These have included beginning a new partnership with Climate Solutions' New Energy Cities effort, which has led us to assist a number of smaller cities in the Puget Sound region of Washington state with climate action planning. In 2016 we completed Seattle's GHG inventory again, and published an opinion piece, co-written with City of Seattle's climate program manager, in the journal *Carbon Management* focused on methods for city-scale GHG accounting. And, in Brazil, we have contributed to an evaluation of urban mobility projects funded by CIFF that may lead to a new publication with the funder.
- **Preparation of a major new research paper outlining the potential for national policy-makers to support low-carbon transitions in urban areas**, conducted as one of the central research products of the New Climate Economy effort and which we expect to publish with their support in 2017. (Our work on this has been funded by Bloomberg Philanthropies).

Carbon pricing, carbon markets, and climate action planning

In 2016, we have continued to play an important advisory role with policy-makers focused on carbon pricing and markets, including with the Washington Governor's office and Seattle-based NGOs exploring carbon pricing options for Washington state. The past year also saw an assessment of offset availability for international aviation (in conjunction with Rob Bailis' group) and ongoing engagement with a project with the World Bank's Partnership for

Market Readiness providing guidance related to “scaled-up” crediting mechanisms under the Paris Agreement. We have also contributed to small and larger-scale projects for the Swedish Energy Agency and German Environment Ministry exploring environmental integrity and the possible development of trading systems under Article 6 of the Paris Agreement.

Highlights include:

- **Ongoing support to the Washington Governor’s office as well as Seattle-based NGOs on carbon pricing.** In 2016, the Washington State Department of Ecology enacted an executive order from the Governor and adopted a new regulatory rule regulating state GHG emissions. The new “Clean Air Rule” (CAR) establishes a cap on emissions and allows for certain types of emissions trading. SEI staff contributed analysis on the rule throughout the year, and were instrumental in effecting changes to the CAR’s final design. 2016 also saw the defeat of a ballot initiative in the state that would have imposed a carbon tax but failed to draw a wide support of environmental groups due to perceptions that it did not adequately address revenue and equity impacts. SEI is now engaged in an effort to craft the bill’s replacement, working both directly with the Governor’s office as well as with civil society groups to create a workable solution that maintains Washington’s climate leadership and provides a better template for other states to follow.
- **Support to the World Bank Partnership for Market Readiness (PMR) and other international bodies on the design of new market-based mechanisms.** SEI is leading work for the World Bank related to developing baselines for “scaled-up” crediting mechanisms (i.e., mechanisms that would issue tradable emissions credits for reductions achieved across whole economic sectors, or large groups of GHG sources, rather than for individual projects). The work, begun in 2016, is focusing in particular on how to approach baseline development in light of evolving international standards under the Paris Agreement, including requirements to avoid “double counting” of emission reductions. In addition, SEI contributed to separate reports and analyses for, among others, the Swedish Energy Agency and German Environment Agency, examining a range of issues related to ensuring the environmental integrity of new international market mechanisms.

Fossil fuels, supply-side climate policy, and carbon lock-in

This year has been an exciting year for the SEI Initiative on Fossil Fuels and Climate Change, which involves staff at multiple centres, and is housed here at the U.S. Center (co-led by Michael Lazarus and Harro van Asselt at SEI Oxford). The Initiative fully came to life in 2016, including the following developments:

- **SEI co-organized (especially Michael and Harro, with special contributions from Marion Davis, plus a few others) the first International Conference on Fossil Fuel Supply and Climate Change Policy** at The Queen’s College, Oxford, in late September 2016. Judging by the enthusiastic response of our 110 participants it was a big hit – several remarked that it was one of the best conferences they had ever

attended. Videos from the conference, including full-day streams and individual sessions, have collectively been viewed more than 1,700 times on YouTube.

- **The Obama administration took dramatic steps to limit the expansion of fossil fuel supply, building on SEI analysis.** President Obama permanently withdrew the U.S. Arctic from further oil and gas drilling, and he and Canadian Prime Minister Trudeau used a logic also advanced by a new SEI analysis just weeks prior: that new Arctic oil is not consistent with the low-carbon transition called for in the Paris Agreement. Further, the U.S. Department of Interior committed to analyze a phase-out of leases for coal production, citing SEI's work as an example.
- **Lastly, SEI-Seattle's major new analysis of removing fossil fuel producer subsidies, funded by the KR Foundation, was completed in 2016 and published the first week of January 2017.** Completed in partnership with longtime subsidies experts Earth Track and with outreach planned by Oil Change International, the study helps deepen the case for fossil fuel subsidy reform both in the U.S. and internationally, and has become a focal point in a line of questioning of nominated incoming U.S. Secretary of State Rex Tillerson, former CEO of ExxonMobil.

Other developments of note for the fossil fuel initiative include a partnership with the equity program, which produced a paper on the equity implications of supplying the fossil fuels for a diminishing carbon budget, and a number of blogs and opinion articles, including in Carbon Brief, Climate Home, Energy Collective, and in the *Seattle Times*.



Figure 8. Michael Lazarus presenting at SEI's COP22 side event on the need for UNFCCC Parties to recognize and track actions to reduce fossil fuel supply.



Figure 7. OCI researcher (and SEI collaborator) Greg Muttitt presents at SEI's COP22 side event, while Pete Erickson waits to present on SEI's analysis of a managed decline of U.S. coal supply.

2.4 Climate Equity

The Climate Equity program's primary objective for 2016 was to provide analytical and intellectual input to a broad range of activities among Parties and civil society organizations focused on the negotiations following approval of the Paris Agreement.

Most specifically, the program's achievements included:

- **Contributing to a second annual process and report providing an effective science- and equity-based review of the national mitigation pledges.** Nearly all UNFCCC Parties tabled pledges for 2020 as part of the Copenhagen/Cancun negotiations, and a broad coalition of civil society organizations have collaborated to undertake a careful science- and equity-based assessment of them, with SEI serving a core role in convening the group, providing the analysis, and preparing the report on behalf of the coalition. The strategy underlying this objective has been that – with the largely bottom-up regime now in place – any effective process to ratchet up national-level ambition will require some means of reviewing the pledges, comparing them with the demands of a 2°C (and 1.5°C) pathway, based on current climate science, and with each other, based on notions of equity. With the Marrakech COP focused on high-level and technical dialogues on enhancing pre-2020 ambition, the civil society coalition analysis help put the spotlight on the importance of rapidly increasing action. The coalition involved in this effort comprised more than 170 global civil society organizations, including a large number of major groups such as Friends of the Earth, ActionAid, Act Alliance, 350.org, and others.
- **Further developing the Climate Equity Reference Calculator** – our flexible and powerful analytical tool that serves as an impartial common platform for the analytically rigorous assessment of the national efforts. Considerable work was done this year to update and enhance the usefulness of the tool.



Figure 8. Sivan Kartha presents the Civil Society Equity Review at its COP22 release event.

An important part of this overall effort has been public presentations, ranging from academic venues (Tufts University, Columbia University, and the University of California Berkeley), to several well-attended presentations on panels with delegates in Marrakech.

A related effort was the publication of an analysis of the role negative emissions in the context of ambitious global pathways, such as 1.5°C or 2°C, along with a corresponding policy brief. (See *The risks of relying on tomorrow's "negative emissions" to guide today's mitigation ambition*, by Sivan Kartha and Kate Dooley)

The Climate Equity program also published a discussion brief as part of the SEI Initiative on Fossil Fuels and Climate Change, *Fossil fuel production in a 2°C world: The equity implications of a diminishing carbon budget*. Providing an overview of the scientific and political context of fossil supply issues, it presents two broad contrasting equity perspectives on fossil fuel

extraction: “extraction as pollution” versus “extraction as development”. It provides quantitative insights into the financial implications (expressed in terms of rents) of historical fossil fuel extraction, and the anticipated financial consequences of constraining extraction. Relatedly, this theme was the basis of a panel at fossil fuel initiative’s Oxford conference in September, and of a side event at the Marrakech COP.



Figure 9. A side event on equity and fossil fuels production in the Green Zone at COP22, co-organized by Sivan Kartha and Greg Muttitt (far left), of Oil Change International.

As an input to discussions in Australia about curbing fossil fuel production, the Climate Equity program published *Implications for Australia of a 1.5°C future*, which put Australia’s emissions and fossil fuel production in the context of the tightly limited carbon budget implied by a 1.5°C future.

2.5 Sustainable Bioenergy and Development

This program devoted much 2016 to establishing links with existing SEI programs in other centers, while continuing to deliver on existing research grants and enhancing the policy impact of the program’s research. By the close of 2016, the program was active in six projects, two of which are short-term activities that will be completed within the first quarter of 2017, and four of which are long-term projects that will continue through 2018 and beyond (listed below). These projects build on the program’s core mission to seek sustainable outcomes linked to development of biomass energy.

Project	Location	Funder	Closing
Energy Access Multitier Framework Survey	Kenya	World Bank	Mar 2017
Woodfuel Mapping	Haiti	GACC	Mar 2017
Household Energy Intervention	India	US EPA	Aug 2018
Adoption and Use of Advanced Woodstoves	Kenya	CCAC	Aug 2018
Improved woodstove program evaluation	Honduras	Overlook Foundation	Dec 2018

In addition to several successful proposals, the program's output included five peer-reviewed journal articles, including several in high-impact journals such as *Nature Energy*, *Environmental Science & Technology*, and *Environmental Modeling and Software*, as well as one SEI Working Paper, a blog post (with slide show), and an online Q&A.

During 2016, Rob Bailis participated in several international conferences and workshops, including a pair of workshops that he co-organized. The first was a two-day "Scoping Dialogue on Sustainable Woody Biomass for Energy" convened by The Forest Dialogue. This event focused on industrial and artisanal or subsistence uses of wood energy and will lead to an extended dialogue between stakeholders from industry, research, and advocacy organizations in order to find common ground on some of the more contentious issues affecting wood energy such as carbon accounting, land use planning, and governance, particularly in developing country settings.



Figure 10. Rob Bailis discusses bioenergy carbon accounting with The Forest Dialogue.

The second workshop was convened in conjunction with the 53rd annual conference for the Association for Tropical Biology and Conservation (ATBC). This focused on the "Nexus Approach to Understand Tradeoffs and Synergies between Charcoal, Food and Water Production in Tropical Forests". Sessions included presentations from eight scholars and practitioners working primarily in Africa, including SEI's own Louise Karlberg. The papers presented will be published in a special open-access edition of *Frontiers Journal* in 2017.

Looking ahead to 2017, the program has three main objectives: deliver high-quality research output from its existing projects; continue to strengthen ties within SEI-US and with other SEI centers; and enhance the impact of its research output by engaging more in outreach, policy engagement, and capacity-building.

2.6 Sustainable Consumption and Production

The Sustainable Consumption and Production program at the U.S. Center is new in 2016. It is led by Eric Kemp-Benedict, who is bringing existing work with him. The program will take a systems approach to better understand the impacts of policies and actions on sustainable consumption and production, including employment, investment, and economic growth.

One project that came to an end in 2016 is Global to Local Climate Change Adaptation and Mitigation Scenarios (GoLoCarSce). SEI supported partners in the Caribbean to develop qualitative scenarios, and also led the work on macroeconomic modelling. The result is a model calibrated to three Caribbean islands that was used to generate longer-term trends as inputs into the scenarios. The model is documented in an SEI working paper, which is currently under review. Other major projects included Mistra Financial Systems (MFS) and the Producer to Consumer Sustainability (P2CS) Initiative. Both projects directly supported work on sustainable consumption and production, which has resulted in one submitted journal article, a working paper in review, and other papers in preparation.

As the program is starting up, Eric put funds and time into building up his professional network. This included external collaborations in the MFS project with economists at Kingston University in the UK and Vienna University of Economics and Business, as well as presentations at professional conferences. In two conferences Eric was invited to submit a paper by a session organizer (the International Society for Ecological Economics, ISEE, and the European Association for Evolutionary Political Economy, EAEPE). The papers from the ISEE conference are posted on the Tufts GDAE site, while the papers for the EAEPE session are being submitted to *Ecological Economics* for a special issue.

3 Delivering Results

3.1 Scientific research

3.1.1 How the centre has contributed to increase the quality and impact of SEI's scientific publications

As noted across Section 2, U.S. Center staff continue to publish widely, both in the peer-reviewed literature, and through SEI's and others' publication series. In 2016, SEI-US staff authored or co-authored more than 30 publications in 2015, including 13 articles in peer-reviewed journals, four SEI working papers, 12 SEI-branded briefs, and reports published with the World Bank and USAID.

3.1.2 How the centre has contributed to SEI's ambition to become a global knowledge leader through the SEI Initiatives

The U.S. Center continues to house the SEI Initiative on Fossil Fuels and Climate Change, providing initiative leadership and financial management. Charlie Heaps co-leads the Low Emission Development Pathways (LED-P). Sivan Kartha co-leads the Gender and Social Equity Programme. Derik Broekhoff, with support from Pete Erickson, continues to coordinate cross-center efforts to develop a new Urbanization initiative. Various staff also contribute to other initiatives, and Marion Davis leads communications for the Fossil Fuels, Climate Finance and Climate Services initiatives and the Gender and Social Equity Programme, and provides support to several other initiatives.

3.1.3 How the centre developed and deepened partnership agreements with universities and research centres.

We continue our close relationships with nearby universities (University of California–Davis, University of Washington, and Tufts University). Our closest connection remains with Tufts, which provides us with our office space in Somerville, as well as a number of other key services (e.g. library access). We actively engage with all three universities in a regular fashion. Annette Huber-Lee, Charlie Heaps, Sivan Kartha and other Somerville staff frequently lecture at Tufts. Michael Lazarus is adjunct faculty at the Evans School of Public Administration at the University of Washington, and taught Energy and Climate Policy in spring 2016. Davis staff also occasionally lecture at UC Davis.

In 2016, we also strengthened our connections with the Tufts Institute for the Environment (TIE), and initiate efforts to organize an SEI-TIE joint symposium in April 2017. The event will also honor SEI-US's 10 years as an US legal entity and close partner with Tufts University. We also ramped up the number of Tufts interns and are in process of exploring a joint fellowship program with TIE.

3.2 Policy engagement

3.2.1 How the centre has contributed to the development of SEI's approaches to policy engagement and influence

In 2016, the Center contributed to policy engagement and impact through a range of conduits:

- Across various projects, as highlighted in Section 2, we engaged directly with policy-makers, from advising the Governor's staff on the design and features of Washington's draft State Clean Air Rule, and now, proposed carbon tax legislation.
- We actively participated in a variety of policy forums from the UNFCCC/COP process (see links to SEI events above), local and regional planning processes (e.g. California water planning), the Partnership for Market Readiness, the International Carbon Action Partnership, the Climate and Clean Air Coalition, Low Emissions Development Strategies meetings, the Global Alliance for Clean Cookstoves, and civil society initiatives (such as the Civil Society Equity Review). Descriptions and links can be found throughout Section 2 above.
- In particular, we also had notable successes in: influencing Obama Administration policies, procedures, and approaches with respect to the leasing of U.S. federal lands for fossil fuel production; supporting, through the use of SEI-developed software within a highly visible process, changes in the fundamental approach used in determining in-stream flows in California and the world; and, enabling civil society organizations around the world to engage effectively on the issue of climate equity. These "impact stories" can be found on the pages that follow.

IMPACT STORY: SEI RESEARCH INFORMS U.S. PRESIDENT OBAMA’S DECISION TO PERMANENTLY BAN ARCTIC OIL AND GAS DRILLING

Throughout 2016, SEI researchers analyzed how decisions by the U.S. Department of Interior to make the country’s vast public lands available for oil, gas, and coal extraction would affect global CO₂ emissions. SEI engaged on the topic with funding from Friends of the Earth (U.S.) and NextGen Climate America, as part of SEI’s Fossil Fuels and Climate Initiative.

SEI produced three pieces of research in 2016, each of which substantially advanced the conversation about the role of public lands in global CO₂ emissions and related efforts to meet the Paris Agreement’s target of limiting global warming to “well below” 2°C above pre-industrial levels. The first, a [working paper](#), addressed whether future leasing of areas for coal, oil, and gas extraction would be consistent with 2°C goals. The second, [a website article](#), identified how the Department of Interior was overlooking the largest CO₂ impact of offshore oil drilling. The final, [a discussion brief, made the case](#) for why future leasing of public U.S. offshore areas for oil exploration was inconsistent with climate goals. These products led to, in rapid succession, a briefing at the U.S. House of Representatives, private meetings with U.S. Senate staff, a briefing for a dozen Department of Interior staff on how they could improve their analytical methods and, ultimately, engagement with the White House.

These three work products informed U.S. government research and policy-making in two highly visible ways. First, our methodology for assessing the CO₂ impacts of expanded offshore oil drilling [was applied](#) by the Department of Interior, and showed a [much greater CO₂ emissions impact](#) than they had found previously. Second, and most notably, on December 20, President Obama and Canadian Prime Minister Trudeau [permanently withdrew](#) nearly all Arctic oil and gas resources (and much of the U.S. Atlantic) from future oil and gas drilling. In enacting this ban, they used the same climate argument SEI had articulated in our December 1 discussion brief: that oil and gas activities should only be pursued if they are “[consistent with national and global climate and environmental goals](#).” Obama and Trudeau concluded, as SEI had just weeks earlier, that new Arctic oil and gas drilling [would not be consistent](#) with the global call to limit warming to 2°C.

It is too early to say how Obama and Trudeau’s decision to reject major new fossil fuel development based on climate concerns will affect similar decisions by other world and U.S. leaders. Early signs, however, are encouraging, at least at sub-national levels in the U.S. (e.g. [California Governor Jerry Brown](#) and the [Washington Department of Natural Resources](#)), where leaders are gearing up for a new President who is expected to take a different approach. Through the Fossil Fuels Initiative, SEI will continue to engage on critical policy questions related to fossil fuel supply throughout the world, using innovative research and methods and in partnership with government policy-makers and civil society.

IMPACT STORY: WATER RESOURCES PLANNING IN CALIFORNIA

At the heart of California water management is the challenge of balancing the needs of an internationally important agricultural industry, a growing population, and changing societal values related to the environment. In no place is the challenge of this balance more acute than in the Sacramento – San Joaquin Delta. The management of water in the Delta impacts millions of acres of highly productive farm land, the water supply for over 10 million people, and many endangered species of fish. The state agency responsible for conducting this high wire balancing act is the California State Water Resources Control Board (Board). Since 2009 the Board has been developing a new water management plan to assess and rebalance the distribution of water among these competing users with the goal of improving ecological conditions in the Delta while protecting other beneficial uses. The stakes are incredibly high.

For the past three years, researchers in the SEI-US Water Group have led the development of a WEAP model that represents the mountainous watersheds that supply water to this region, the major water diverters, the Delta, and the myriad rules and regulations that control water distribution for a large portion of the State. This work has been funded by and conducted in close collaboration with the Board. This effort represents two paradigm shifts in California water management. The first is the introduction of a new, more flexible model that fosters rapid analysis of various scenarios. Previously existing models of this complex system were very complicated a difficult to manipulate. The second, and more important shift, is the introduction of in-stream flow requirements based on some portion of “unimpaired flow” or the flow that would exist if dams and diversions did not exist. The idea behind this approach is to maintain more of the natural variability in stream flows that structures such as dams dampen out. Previously, in-stream flow requirements in California, and indeed in most of the world, were static flow rates that did not allow for the ecological benefits that are derived from a varied flow regime. SEI has provided the Board with a tool to rigorously study the implications of changing to an “unimpaired flow” approach while also improving model transparency and user friendliness.

Moving forward, SEI will work with Board staff to use this model in the formal regulatory process to understand the implications of a new flow regime for water availability throughout this critical watershed. Ultimately, information derived from the model will be used to alter the underlying water rights structure that determine water use in the state, ideally in a manner that achieve the balance between water use and ecosystem health. Since the release of this model, multiple stakeholders have installed WEAP in order to explore these implications in terms of their particular interests, setting the stage for ambitious negotiations around more sustainable patterns of water management in California. California water management is a thorny and contentious environmental governance challenge that often involves formal legal proceedings, within which SEI may be called to defend its work. Nonetheless, the opportunity to use SEI-developed software to test innovative water management approaches within a highly visible process, changing the fundamental approach used in determining in-stream flows in California and the world, is another strong example of how SEI bridges science and policy.

IMPACT STORY: CLIMATE EQUITY AND ENABLING THE CIVIL SOCIETY EQUITY REVIEW COALITION

SEI continues to be a key actor enabling civil society organizations around the world to engage effectively on the issue of climate equity. As its flagship effort within this work, SEI has helped create the [Civil Society Organization Equity Review](#) coalition in the run-up to Paris, providing not only research and analysis, but a critical strategic and convening role.

This unprecedented coalition included a broad spectrum of groups, spanning the more “realist” (and typically Northern-based) NGOs and the more “radical” (and typically Southern-based), and reflecting both environmental and social justice perspectives, representing faith groups, trade unions, youth, peasant, and other groups. It brought together groups that had not worked previously together, indeed even groups that had previously harboured mutual suspicion. Among the largest of the members were Oxfam, WWF, Christian Aid, Climate Action Network, Friends of the Earth, Action Aid, the ecumenical ACT Alliance network, Care, 350.org, Third World Network, and Jubilee South. The coalition grew through 2016, and by the Marrakech Conference of Parties more than 170 organizations supported and endorsed the outcomes of the CSO process, focused around two high profile reports released at the Paris and Marrakech COPs. Through its convening role, SEI helped to catalyze an unexpectedly high level of cooperation on climate equity and convergence between diverse groups of the coalition. This SEI effort was remarkably effective, both in terms of creating a community among its CSO boundary partners and fostering a dialogue on climate equity, and in its influence on the broader climate discourse. SEI’s work has shown that climate equity can mean much more than the stale and largely rhetorical statements that have been repeated since the UNFCCC was agreed. It can provide a basis for rigorous analysis, morally and philosophically grounded assessment, consistent with the hard facts of climate science.

Ultimately, the success derived from several elements. First was the rigorous and compelling equity work that SEI has pioneered for more than fifteen years, first in the development of the Greenhouse Development Rights approach to climate equity and later through its [Climate Equity Reference Project](#). Through academic publications, analytical work, and online tools, this work has widely influenced how equitable effort-sharing can be productively assessed. The second element was the years of working with these civil society groups and building trust, by providing technical input, building capacity, helping define strategy, and serving as technical experts in interactions with their policy-maker contacts.

The coalition [released](#) its [Civil Society Equity Review of the INDCs](#) immediately before Paris, and then [released](#) its [Setting The Path Towards 1.5°C](#) as an input to the Marrakech COP, both of which assessed national mitigation efforts on the basis of science and equity. SEI developed the assessment framework, provided technical analysis, and contributed much of the writing. The reports were heavily reported in the media, and also had a direct influence on the Party delegates. Several delegates took part in the launch events (e.g., China, India, Brazil), and the chair of the Group of 77 highlighted (and published in a media statement) the “impressive scientific analysis already conducted by key civil society groups” and its results; Ultimately, President Jacob Zuma of South Africa made several important statements about the CSO Equity Review in his official blog.

3.2.2 How the centre has increased the capacity of SEI staff to work at the interface between science and decision-making

During 2015, we increased the capacity of staff to work at the interface between science and decision-making through investments in professional development, media training, communications training, including on how to formulate key messages for policy-makers, technical writing support, and support for publications.

3.3 Capacity development

Capacity development is a core element of SEI-US's work, and is embedded in much of work. New initiatives and goals for this aspect of work are described in detail in Section 2 above.

As the developer of the WEAP modeling platform, the Water Group has long been engaged in capacity development around the use of the tool. These efforts have tended to focus on the organization of formal, in-person, multi-day training events and the development of the materials required to support these kinds of events. Over the past four years, the Water Group has been conducting online interactive training courses and has begun to develop some insights related to the best technologies and pedagogical techniques associated with these sort of capacity-building programs. While these so far have been for small groups (4-8 people per multi-day course), we are exploring approaches for broadening their reach, including training videos (we created ten videos in 2016 and we will continue to produce new videos in 2017), additional tutorial modules, and eventually the creation of an entire self-paced online course, combining written materials, example datasets, training videos and quizzes.

In addition, after a couple of years of experimentation, the Water Group has begun to consolidate around a set of specific steps related to implementing the WEAP-based RDS practice, including model ensemble automation and results visualization.

Capacity-building is also a core focus of the LEAP energy modelling program at SEI-US, and our COMMEND website has now been used for over 15 years as a key platform in supporting developing country experts working on sustainable energy policy analysis. (See section 2.2 for more specific capacity-building goals related to the energy modeling program.)

4 Enabling Results

4.1 Communications

SEI-US continues to be a leader in communications at SEI, publishing extensively, posting stories and Q&As regularly to the SEI website, and producing blogs and op-eds. With the addition of a dedicated SEI-US communications officer, Aubrey Cohen – if only for four months – we were able to engage with more of the staff, particularly in the Water Group, resulting in a richer diversity of content. Altogether, we produced 11 news articles and Q&As, 14 blog posts and one op-ed. Several SEI-US staff were also active on social media throughout the year. Looking ahead to 2017, our goal is to hire a new SEI-US communications officer, continue to build our researchers' communications capacity, and seize opportunities to reach diverse audiences through a range of channels, including SEI's redesigned website.

4.1.1 How the centre will support and enable staff to be better communicators, and mobilize the authentic and diverse voices within centre

Through our monthly staff meetings, one-to-one conversations, and targeted outreach, we were able to engage not only seasoned communicators at SEI-US (e.g. much of the Seattle team), but also staff with little or no communications experience. As always, we provided extensive guidance, in person and in writing, such as leading questions to elicit blog or Q&A material, suggested structures for story-lines, and multiple iterations of feedback on draft stories and blogs. We have found that hands-on is the best way to learn, and we are confident that staff who communicated their work for the first time in 2016 will be much better positioned to recognize and seize opportunities as they arise in 2017.

Highlights from this year included a bilingual story and Q&A with Francisco Flores about research in Peru; blogs in English and Spanish by Marisa Escobar connecting SEI's work in Colombia with the peace process; a blog by Rob Bailis on ongoing cookstoves research in India; and an introduction to data visualization by Laura Forni.

In addition, the Seattle team, which has particularly strong communications skills, produced multiple opinion pieces (all published externally) as well as SEI news stories, garnering substantial attention to their work, particularly on fossil fuels (but also on aviation).

Due to logistical challenges, we had only one communications training workshop in 2016, but we hope to resume group training sessions as soon as a new SEI-US communications officer is hired. In addition, we expect to provide small-group and one-on-one training to the extent possible, giving priority to staff who are not yet confident in their writing and other communications skills.

4.1.2 How the centre will invest in more structured and pro-active planning for communications and policy engagement

The engagement of communications staff in planning and proposal-writing remains a challenge at SEI-US; we have not yet been able to persuade researchers that this would add value. In the future, through closer engagement between the new SEI-US communications officer and research staff, we hope to be able to involve comms not only in writing discrete communications sections in proposals, but also in improving proposals overall, so they reflect a clear sense of their target audience, its needs, and the best ways to reach that audience. This may require additional skills development on the comms side.

4.1.3 How the centre will develop more targeted content and formats that better meet the needs of users

As noted above, SEI-US continued to be actively involved in SEI's online communications in 2016, regularly contributing to the website, publishing externally, and participating in social media (along with Twitter, we should note that Charlie Heaps' LEAP group on Facebook is quite active: <https://www.facebook.com/groups/LEAPSoftware/>). These efforts have allowed us to connect with broader audiences and to make our work more accessible to non-experts.

One area where we see greater potential is in Spanish-language publications and web content. In preparation for an SEI mission to Colombia, we have now translated the SEI brochure to Spanish. As noted above, we also produced two online items in Spanish in 2016. Going forward, we see potential to increase Spanish-language outputs and, through existing and new networks, share them with audiences across Latin America.

Overall, the SEI Initiative on Fossil Fuels and Climate Change, co-led by Michael Lazarus, and related projects were the source of most of our most successful communications activities. The Initiative's conference in Oxford in September 2016 not only attracted some of the top thinkers in the field, but on YouTube, the full-day videos have been viewed more than 1,000 times, and individual sessions, more than 700 times. In addition, at COP22 in Marrakech, the Initiative hosted two side-events, both very successful and well attended. The SEI booth also featured quite a bit of material from SEI-US.

4.1.4 How the centre will deploy peer-reviewed output more effectively in order to further develop the credibility of SEI's communications

We succeeded this year in producing several website stories and Q&As based on peer-reviewed research, but we can still do much better. We have also identified potential for further promotion and repurposing of work produced for clients. We expect to make further progress in 2017.

4.2 Tools, knowledge/capacity platforms and ICT

4.2.1 How the centre has advanced its efforts to develop and integrate SEI's analytical tools

In addition to advancements made within SEI's analytical tools (see Section 2), progress has been made in the integration of WEAP and LEAP for Nexus studies.

4.2.2 How the centre has made SEI's tools more accessible to policy-makers and stakeholders

Highlights in 2016 included:

- WEAP and COMMEND websites redesigned to improve their accessibility, including further foreign language translation.
- Campaigns on social media (Facebook and Twitter) to help disseminate information about our tools.
- Improved visualization of results, especially those involving very large datasets.
- Continued development of our Robust Decision Support (RDS) methodology and practice using WEAP, and disseminated information about this approach through SEI-branded and peer-reviewed publications (see Section 2).
- Several online interactive WEAP trainings for capacity-building

4.3 Organisation and Finance

At the U.S. Center, nearly all fundraising activity occurs at the program level. This approach makes sense given that most programs work in distinct areas (e.g. energy or water) with limited overlap among funders. That said, there are important overlaps on occasion, and thus some coordination is needed, and occurs through informal conversations across program staff.

4.4 Monitoring and institutional learning

4.4.1 How the centre has worked to further embed the PMEC system within SEI's workflows

The U.S. Center continues to undertake efforts to improve staff use of PMEC. Our long-standing PMEC node left SEI-US (Carrie Lee), and we are currently transitioning Kim Shaknis into this role. We will be investing time in 2017 to get Kim up to speed and able to support research staff in more comprehensive PMEC use.

4.4.2 How the centre has monitored, evaluated and learn from key project outcomes

Much of the monitoring, evaluation, and learning occurs at the program levels, where staff meet regularly to plan as well as to review project activities. On occasion, especially where problems are encountered, “post mortem” meetings may be held. We also use brown bag lunch presentations to share lessons more widely across the Center.

4.4.3 How the centre has developed and implemented relevant feedback processes between project activity and higher management

The U.S. Center has a risk management policy to ensure that the Management Committee is aware of any project risks, and can work together to mitigate them in advance. For projects over a certain size, project managers must complete a risk assessment form, which in turn the MC must review and approve.