

Technologies to support climate change mitigation and adaptation

An overview of SEI tools, capacity-building and research activities

The vision of the Stockholm Environment Institute is a sustainable, prosperous future for all. With that in mind, our mission is to support decision-making and induce change towards sustainable development around the world by providing integrative knowledge that bridges science and policy in the field of environment and development.

Climate change has been a key focus of SEI's work throughout our 25-year history, including research, policy engagement and capacity-building. As part of this work, we have developed a range of tools and online platforms to support both mitigation and adaptation: from analysis, to decision-making and planning, to knowledge-sharing and mutual learning. Reflecting SEI's broader perspective on climate change as a sustainable development challenge, the tools and related SEI research do not focus on climate issues alone, but instead address them in the context of development and poverty alleviation, natural resource management, and sustainable consumption. Below we present highlights of this work.

LEAP: the Long-range Energy Alternatives Planning system

LEAP, the Long range Energy Alternatives Planning System, is a powerful, versatile software system for integrated energy planning and climate change mitigation assessment. It is used by thousands of organizations worldwide, at a wide range of scales, from cities and states, to global applications.

LEAP takes a holistic, scenario-based approach to climate, energy and broader sustainable-development challenges, and has become the *de facto* standard for countries undertaking integrated resource planning and GHG mitigation assessments, especially in the developing world, and for creating Low Emission Development Strategies (LEDS). It is also being widely used to inform Intended Nationally Determined Contributions (INDCs) in the context of the UN climate change negotiations.

LEAP and associated materials are available free of charge to qualified academic, governmental and nonprofit organizations based in the developing world and to students worldwide, and through licensing agreements for all others.

LEAP is distributed and supported through COMMEND, an online initiative to build a community of practice among developing-country energy analysts.

SEI also widely applies LEAP in its own work, supporting everything from a global analysis of how to transform energy systems to help meet the 2°C target, to national mitigation planning studies, to a scenario analysis to support Seattle, Wash., in its quest to become carbon-neutral by 2050.

To learn more, visit www.energycommunity.org.

WEAP: the Water Evaluation And Planning system

WEAP is a software tool for integrated water resources planning, and is increasingly being used to support “climate-proofing” and adaptation in the water sector. It provides a comprehensive, flexible and user-friendly framework for policy analysis. WEAP takes an integrated approach to water development that places water supply projects in the context of demand-side issues, water quality and ecosystem preservation and protection. It thus enables planners, decision-makers and stakeholders to examine alternative water development and management strategies, and identify the most robust.

SEI applies WEAP widely in its own work, linking WEAP models to a range of tools and methods to address climate- and development-related challenges to water systems from California, to Peru, to Ethiopia. For example, SEI has linked LEAP and WEAP to examine trade-offs between mitigation and adaptation. It has also adapted the Robust Decision Making approach to identify resource management and adaptation challenges through a participatory process, model different options in WEAP, present the results as data visualizations, and keep learning and improving plans through multiple iterations.

To learn more, visit www.weap21.org.

REAP and REAP Petite

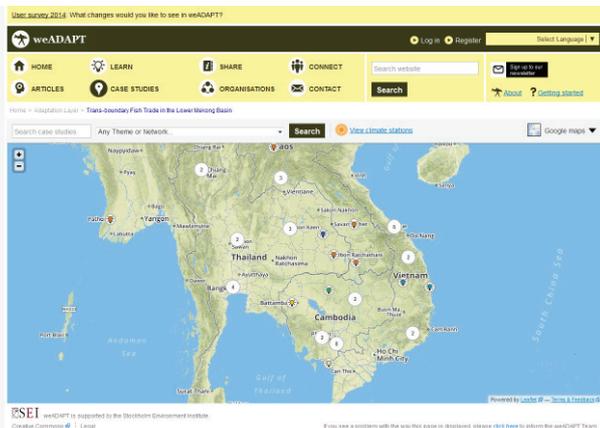
REAP, the Resources and Energy Analysis Programme, creates consumption-based accounts of environmental impacts by analysing supply chains, capturing environmental impacts and re-allocating impacts from producers to end consumers. SEI has applied the tool to the UK, Sweden and worldwide.

The REAP framework can be used to explore the impacts of any consumer group, from the country level through to local municipalities or individuals. Baseline data provide a starting point from which to understand current consumption impacts, and REAP also has a scenario function that allows users to explore the possible impacts of changes in policy or behaviour.

SEI has also adapted REAP to work with individual households. REAP Petite asks users about their energy use, travel, food and goods consumed to build complete footprints at the household level. The tool includes a “pledges” section



The Energy Scenario Explorer in LEAP allows users to analyse the implications of different energy choices.



The **Adaptation Layer** in weADAPT provides a quick overview of case studies posted on the site, colour-coded by topic area.

which suggests ways for users to decrease their footprints through, for example, home improvement or behaviour change.

To learn more, visit www.sei-international.org/realp.

weADAPT: brokering knowledge and developing capacity for adaptation

weADAPT is a collaborative web-based platform where practitioners, researchers and decision-makers share knowledge on adaptation planning. It includes guides for interpreting and analysing climate information, methods for assessing social and climate vulnerability, and a range of tools to support adaptation. The site has links to more than 2,000 global projects, articles and case studies in the Google Earth Adaptation Layer and Knowledge Base, and has grown rapidly in the past three years, with more than 2,500 members and 700 organizations now registered and users in more than 190 countries.

Many of the members have begun to co-create knowledge from historically “hard-to-reach” areas with low or no bandwidth through intermediaries both connected to the platform and knowledgeable about the work of partners on the ground. SEI also uses weADAPT widely as a capacity-building tool and as a venue for sharing adaptation research in a more accessible language, and at no cost to users.

To learn more, visit www.weadapt.org.

Ongoing work

SEI is engaged in multiple partnerships and collaborations to develop resources and tools for mitigation and adaptation. A notable example is the *PROVIA Guidance on Assessing Vulnerability, Impacts and Adaptation to Climate Change*, an SEI-led project to provide clear, up-to-date technical guidance for adaptation that combines robust science with explicit consideration of user needs. Along with the Guidance itself, we have produced a User Companion to support the development of National Adaptation Plans (NAPs), and will soon launch a web-based version of PROVIA, building on related work for the EU-funded MEDIATION project.

The SEI Strategy 2015–2019 prioritizes expanded capacity-building, including wider dissemination of our tools and training and support for users. We are also launching several SEI Initiatives – hubs for research in areas where SEI has particular expertise – that will advance our tool development, adding new capabilities and building “toolkits” to address complex issues. For example, a “nexus toolkit” links LEAP, WEAP and other

tools to address competing demands for resources and mitigation/adaptation trade-offs. Another SEI Initiative is linking LEAP with tools focused on short-lived climate pollutants (SLCPs). Yet another is combining economic, energy systems and GHG emissions analysis to explore the climate implications of fossil-fuel infrastructure investments.

Looking ahead, a priority for SEI is to make our tools more accessible to users who are not technical experts, as well as to users with limited resources. This includes compiling the data sets required to run the tools, constructing scenarios that could be run through the models, and adding visualization capabilities to share the results as easy-to-understand graphics. In addition, we are increasingly shifting to web-based platforms, cloud-based computing and data-sharing.

More SEI-developed tools and resources for mitigation and adaptation

BalticClimate toolkit: <http://www.toolkit.balticclimate.org>

Climate Equity Reference Calculator:
<http://www.climateequityreference.org>

EUREAPA scenario modelling and policy assessment tool: <http://sei-international.org/eureapa>

NBIM – the National Bioenergy Investment Model:
<http://sei-international.org/nbim>

NETPositive – a new approach to Corporate Social Responsibility: <http://www.net-positive.org>

PROVIA Guidance and MEDIATION Adaptation Platform: <http://www.unep.org/provia> and <http://mediation-project.eu/news/output/mediation-adaptation-platform>; see also <http://www.sei-international.org/news-and-media/2990>

SEI-PCS – Spatially Explicit Information on Production to Consumption Systems:
<http://www.sei-international.org/sei-pcs>

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