The SEI Initiative on Fossil Fuels and Climate Change

There is a growing recognition that if we are to avoid dangerous climate change, most fossil fuel reserves will need to stay in the ground. Achieving this outcome, however, will be a daunting challenge. For many countries, fossil fuel extraction and trade are central to energy security and economic development. There is also limited knowledge about how different approaches to climate policy might affect future patterns of fossil fuel production.

Climate policy analysts and decision-makers at both the domestic and international levels have focused almost exclusively on curtailing demand for fossil fuels, with scant attention, until recently, to the supply side. Yet research by SEI and others suggests that, for economic and political reasons, both demand- and supply-side approaches are needed. We also need to better understand how institutions, investments and infrastructure can lock in dependence on fossil fuels, and identify strategies to end that dependency. Such insights can help policy-makers, international organizations, businesses and civil society to craft more effective climate strategies.

This brief describes an SEI Initiative with two core objectives: (i) to better understand the factors that support movement towards or away from further fossil fuel development; and (ii) to influence policies, plans and investment decisions so the pace and location of further fossil fuel development are more consistent with sustainable development.

Launched in January 2015, the initiative is creating a platform for high-quality, timely, and policy-relevant research on various facets of fossil fuel development and their implications for climate change mitigation and development. Building on ongoing SEI activities and partnerships, it takes a multi-disciplinary approach in addressing:

- The emissions implications of development of fossil fuel infrastructure;
- The political dynamics of fossil fuel interests at the national and international levels;
- The domestic policy options that could induce a shift away from economic dependence on fossil fuels, keeping in mind the development needs of developing countries;
- The measures by international institutions that could influence a shift away from fossil fuel dependence; and
- The implications of constraints on the extraction of domestic fossil resources, specifically for developing countries.

The Initiative brings together expertise in energy studies, political science, economics and law, and multiple skill sets and tools – from energy modelling and greenhouse gas emissions accounting, to political economy analysis. It builds on ongoing SEI work on fossil fuel development, geopolitics, environmental governance and institutional fragmentation, and the economics of climate change, all of which has involved extensive new research and analysis. And it builds on SEI's partnerships and knowledge-sharing and capacity-building activities around the world.

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On the Mahakam River in Central Kalimantan, Indonesia, where coal is transported from forest to sea in open barges.

Through this work, SEI will engage recognized leaders on climate change mitigation, energy modelling, political economy, equity and the climate change negotiations. Our outreach strategy includes multiple publications, a strong online presence, and extensive participation in and convening of workshops, seminars and other activities. In 2016, the Initiative will also host a major international conference on fossil fuel development and climate change mitigation, followed by the publication of a journal special issue. Our goal is to build a thriving community of practice and to contribute to practical policy development and implementation at the national and international levels.

A growing sense of urgency

In mid-2013, International Energy Agency (IEA) Chief Economist Fatih Birol made headlines by warning energy executives, investors, and climate change negotiators that about two-thirds of all proven reserves of oil, gas, and coal will have to be left undeveloped if the world is to achieve the goal of limiting global warming at 2°C (see also Figure 1).[1] Yet according to the IEA, enough new fossil fuel infrastructure – mines, power plants, pipelines, refineries, etc. – is slated to come online by 2017 to lock in the remainder of carbon dioxide (CO_2) emissions allowable under a 2°C limit through 2035.[2] And although investment in renewables has risen sharply, around 70% of energy supply investment in 2013 – more than 1 trillion USD – was related to fossil fuel extraction, processing and transport, or construction of fossil fuel-fired power plants.[3]

Indeed, fossil fuel extraction remains central to energy and development plans in numerous countries. Lock-in occurs at political and economic levels as well, as vested interests and economic dependence on fossil fuel production favour policies that continue or expand that production, and discourage measures that would reduce it.

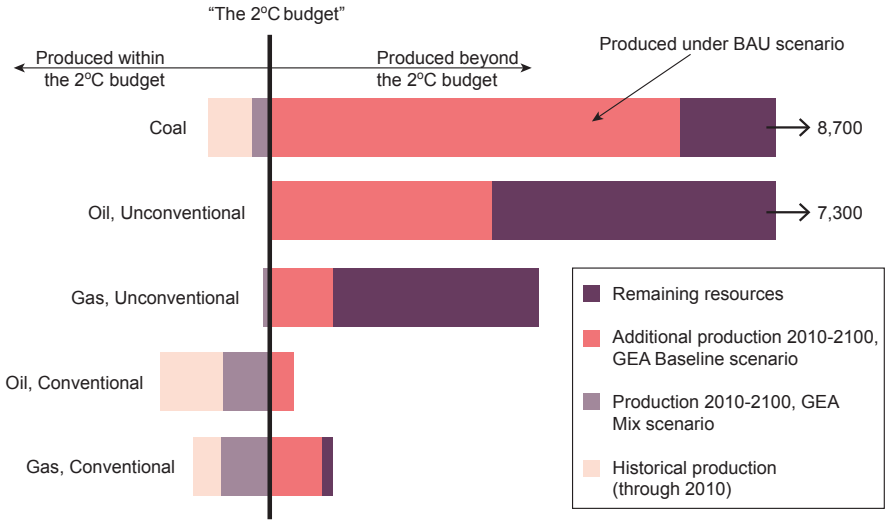

Figure 1: Fossil fuels exploited vs. left in the ground, through 2100, relative to a 2°C emissions budget.
This figure shows the amounts of five categories of fossil fuel – conventional natural gas, conventional oil, unconventional gas, unconventional oil, and coal – that have been burned (pale pink bars) and could be exploited and combusted through 2100 (pale purple bars) under a scenario (GEA Mix) that represents at least a 50% chance of staying below 2°C. The dark pink bars illustrate the additional amounts of fossil fuels exploited and combusted through 2100 under a business-as-usual scenario (GEA Baseline). The dark purple bars represent the amount of additional recoverable resources. As shown, the vast majority of the resources left in the ground as the result of achieving a 2°C target would be coal and unconventional oil.[4]

Understanding the emissions implications of fossil fuel development

One major area of focus for the Initiative is to examine the emission implications of existing and new fossil fuel supply infrastructure. The fossil fuel supply chain requires mines and wells to extract the resource; refineries and other facilities to process them; and pipelines, railways and seaports to bring them to markets. Each of these elements can influence the price, availability and consumption of fossil fuels, and thus greenhouse gas emissions. For example, how might building a new coal export terminal affect emissions? Until recently, few analysts or policymakers had even raised this question.

This is rapidly changing, however. U.S. President Obama has stated that he would only approve the controversial Keystone XL pipeline, which would enable export of 830,000 barrels a day of Canadian oil sands crude, if it "does not significantly exacerbate the problem of carbon pollution".[5] Recent SEI work has developed an approach for quantifying the market impacts of expanding fossil fuel supply, and piloted it for the Keystone XL pipeline in the United States.[6]

In several countries, environmental review processes are also starting to be applied to the expansion of coal infrastructure. At the same time, policies persist that may encourage fossil fuel supply expansion, most notably fossil fuel supply and consumption subsidies. The Initiative aims to help fill analytical gaps in these cases and beyond, and to help apply these tools within existing communities of public policy practice, including green growth communities.[7]


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The Trans-Alaska Pipeline System cuts across the Central Arctic region to bring oil to the Valdez Marine Terminal.

We will explore two key research questions in this regard:

- *What are the greenhouse gas emissions implications of new fossil fuel infrastructure and of policies that support such investment?* We are developing and applying new methodologies and analytical tools to assess the increase in global greenhouse gas emissions as the result of expansion of fossil fuel supply infrastructure – or, in some cases, of policies designed to support them (e.g. fossil fuel production subsidies).

- *How can tools and methods for assessing greenhouse gas emissions implications be integrated into existing planning processes and communities of practice?* We are working with partners in countries that are considering expanded fossil fuel supply (especially developing countries), to develop, apply, and adapt analytical tools to existing policy processes. We also aim to connect with wider communities of practitioners in those countries and beyond, including in green growth forums.

Political economy and geopolitics

This Initiative starts from the recognition that both fossil fuel consumption and production are deeply embedded in the economy, globally and in individual countries. Large financial flows are channelled into them, including government subsidies and large institutional investments such as pension funds.[8] Governments in many fossil fuel-producing countries are also heavily dependent on the resulting rents. At the same time, fossil fuel producers comprise some of the world's largest companies, with enough influence to stymie energy and climate policies not to their liking or frame them in ways that promote their interests. In short, the barriers to a transition away from fossil fuels are high.

These challenges point to a key question: Under which conditions might a national government forgo extraction and its associated rents? Responses are inevitably country- and context-specific. This aspect of the Initiative's work will apply political economy analysis to shed light on the political, social and

economic origins of government decisions in specific countries and contexts, and draw attention to the winners and losers in such decisions. We will also consider how "big energy geopolitics" affects national and local dynamics – for instance, linkages between energy security and military security.

We will focus on the following key questions:

- How is fossil fuels development framed by the domestic political, social, economic and cultural context?
- To what extent are national governments and other stakeholders influenced by international-level factors, such as global market demand, energy security and geopolitical leverage?
- Where can "levers of change" and "coalitions of the willing" that can steer development away from fossil fuel extraction be found?

The combination of an enhanced analytical approach with political feasibility studies will provide valuable insights to decision-makers in the case study countries on the incentives and barriers towards or away from fossil fuel development. By examining who wins and who loses in each scenario, this work also follows SEI's priorities of addressing development and equity concerns.

Exploring the role of international institutions and governance

Although national policies play a key part in governing the transition toward or away from fossil fuels, international institutions also influence behaviour, constrain activity, and shape expectations. Major institutions with influence on fossil fuel extraction include the IEA and the Organisation for Economic Co-operation and Development (OECD), the Organization of Petroleum-Exporting Countries (OPEC), multilateral development banks, the World Trade Organization (WTO), and the United Nations Framework Convention on Climate Change (UNFCCC). In addition, high-level political processes also play a role in global climate and energy governance, with the G20 becoming a focal point for discussions on phasing out fossil fuel subsidies.[9]

The governance of fossil fuel extraction needs to be viewed in the context of the so-called "energy trilemma": energy policy at the same time needs to secure the supply of energy, reduce energy poverty, and ensure environmental sustainability (e.g. by promoting decarbonization).[10] Given these different energy policy goals, it is not surprising that fossil fuel extraction falls

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Statoil says the Gudrun oil drilling platform represents 'a new era' of oil field development on the Norwegian continental shelf.

under the purview of several international institutions. None provides direct oversight, however – only tangential. There are also questions about whether the entire institutional complex works in harmony or is at cross-purposes, and about the future role of some of these institutions.

In this context, the Initiative is exploring the (actual and potential) role of international institutions in governing the transition away from fossil fuel development, with a focus on two questions:

- *How do different international institutions govern fossil fuel development?* Drawing on theoretical notions of regime complexity and fragmentation, we will examine which incentives emerge from different institutions, and to what extent and how governance approaches overlap, complement or conflict with each other.

- *What role could these institutions potentially play in governing the transition away from fossil fuel extraction as well as consumption?* We will examine different prospective functions carried out by international institutions in the governance of fossil fuels, including facilitating learning, enhancing transparency through reporting and review, financing, and standard-setting.

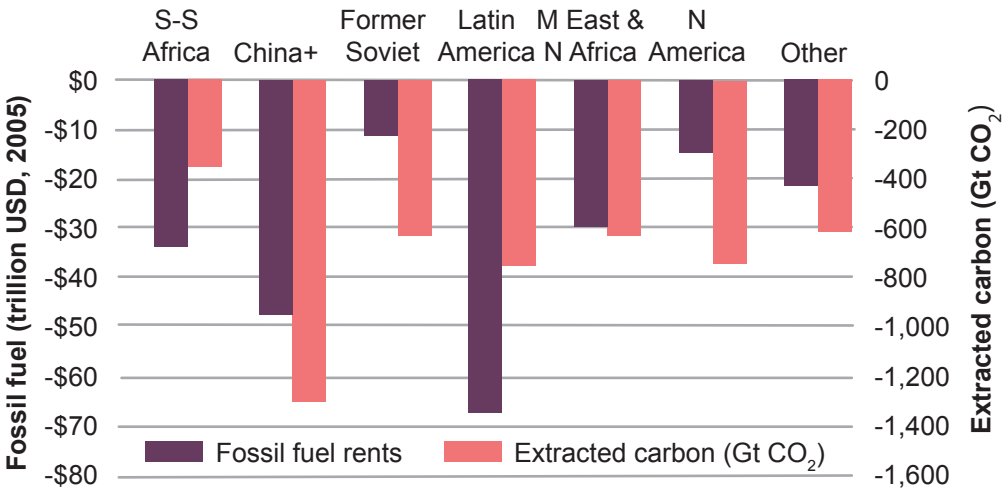

Figure 2: Cumulative change (2011–2100) in fossil fuel extraction (in tCO2) and rents (in USD, 2005) under a 2°C scenario, by region.
These figures are drawn on forthcoming SEI analysis, which in turn is based largely on the Global Energy Assessment11 scenarios also featured in Figure 1 as well as on current rates of rent per unit production drawn from World Bank data.

Case studies and additional activities

As noted above, a core objective of the Initiative is to deliver research, capacity-building and outreach that is relevant and targeted to specific planning and decision-making venues. To help achieve this, we are conducting multiple case studies. Based on initial scoping studies, we have chosen to focus on Colombia, South Africa, Indonesia, Norway and the U.S.

The selection aims to ensure a mix of developed and developing countries, and highlight countries with significant resources – coal and high-cost and unconventional oil in particular – that would likely be exploited under business as usual, but remain in the ground in a low-carbon future (see Figure 2). These case studies also enable us to examine the interplay between fossil fuel supply investments and existing climate and/or low-carbon development policies, and they allow our research to inform ongoing policy and planning processes.

Furthermore, recognizing that the politics and economics of fossil fuel development continue to evolve, we have designed the Initiative to be responsive and adaptable. We are pursuing cross-cutting and new research activities and new project proposals; and participating in meetings, workshops and other activities. We also hope to respond to direct requests from policy-makers and other key audiences.

Two initial cross-cutting research projects include a review of the macroeconomics of fossil fuel development – specifically, the extent to which the assumption that exploiting fossil fuel resources is good for development is borne out empirically – and an exploration of how cost-benefit analysis could better address the impacts of business-as-usual practices such as fossil fuel development. We are also examining the equity implications of potential climate policies that discourage or prevent further development of fossil fuel resources, particularly for countries in which those resources are seen as crucial assets needed to finance development and poverty alleviation.

We also have a strong commitment to ongoing, two-way communication and engagement. Robust academic research is the foundation of all our work, and we are also producing an array of policy briefs and other materials for policy audiences.

At the same time, recognizing the importance of dialogue in "safe" spaces, outside the public realm, we are engaging with decision-makers individually and in a wide range of activities, working closely with trusted partners in different countries. Our goal is not only to share our work, but also to "ground-truth" and refine our analyses through dialogue with stakeholders.

To learn more and see the latest Initiative news and publications, go to:
http://www.sei-international.org/fossil-fuels-climate-mitigation

Endnotes

1 See: http://www.irishtimes.com/news/world/europe/two-thirds-of-energy-sector-will-have-to-be-left-undeveloped-bonn-conference-told-1.1425009.

2 IEA (2012). *World Energy Outlook 2012*. International Energy Agency, Paris. http://www.worldenergyoutlook.org/publications/weo-2012/.

3 IEA (2014). *World Energy Investment Outlook: Special Report*. International Energy Agency, Paris. http://www.iea.org/publications/freepublications/publication/WEIO2014.pdf.

4 Lazarus, M., and Tempest, K. (2014). *Fossil Fuel Supply, Green Growth, and Unburnable Carbon*. SEI Discussion Brief. Stockholm Environment Institute, Seattle. http://www.sei-international.org/publications?pid=2454.

5 The White House (2013). Remarks by the President on Climate Change, Georgetown University. 25 June. http://www.whitehouse.gov/the-press-office/2013/06/25/remarks-president-climate-change.

6 Erickson, P. and Lazarus, M. (2014). Impact of the Keystone XL pipeline on global oil markets and greenhouse gas emissions. *Nature Climate Change*, 4(9). 778–81. DOI:10.1038/nclimate2335.

7 We use the term "green growth" broadly here to refer to public policy practice that seeks to balance economic development and environmental protection. In this sense, green growth encompasses green economy, low-carbon growth, low-emission and climate-resilient development, and related strategies.

8 Leaton, J., Ranger, N., Ward, B., Sussams, L. and Brown, M. (2013). *Unburnable Carbon 2013: Wasted Capital and Stranded Assets*. Carbon Tracker and Grantham Research Institute on Climate Change and the Environment, London School of Economics, London. http://www.carbontracker.org/wastedcapital.

9 Van Asselt, H. (2014). *Governing the Transition Away from Fossil Fuels: The Role of International Institutions*. SEI Working Paper No. 2014-07. Stockholm Environment Institute, Oxford, UK. http://www.sei-international.org/publications?pid=2583.

10 See, e.g., World Energy Council (2013). *World Energy Trilemma 2013: Time to Get Real – The Case for Sustainable Energy Investment*. London. http://www.worldenergy.org/publications/2013/world-energy-trilemma-2013/.

11 GEA (2012). *Global Energy Assessment: Toward a Sustainable Future*. Cambridge University Press, Cambridge, UK, and New York, and International Institute for Applied Systems Analysis, Laxenburg, Austria. http://www.globalenergyassessment.org.

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