An Expert Workshop on
Energy Access and Climate Mitigation: Synergies and Trade-offs
a part of the New Climate Economy project
10-11 April 2014
The Safari Park Hotel, Nairobi, Kenya

Background and purpose

Last September the Global Commission on the Economy and Climate and its flagship project the New Climate Economy[1] was launched to help governments, business and society make more informed choices on how to achieve economic growth and societal prosperity while combating climate change. Chaired by former President of Mexico Felipe Calderón, the Commission's members include former heads of government and finance ministries as well as leaders in the field of economics and business. Its primary audience is economic decision makers in government, business, states and cities for whom climate change is rarely a primary concern, yet whose decisions have a substantial influence on the trajectory of greenhouse gases.

The purpose of the workshop is to better understand how carbon mitigation strategies and technologies change conditions for energy access and what trade-offs, if any, exist between these twin goals. By drawing on the experience of key decision makers and implementers across Africa, the meeting will explore: 1) the extent to which low-carbon options are being considered when expanding energy access; 2) the motivating factors behind pursuit of such options; and 3) how low-carbon options for energy access fare against other political goals such as affordability, inclusive access and energy security.

The output will be a set of key insights that can serve as input to the recommendations for action that the Commission will put forward in September this year at the UN Climate Summit 2014.

Key questions to be addressed

The workshop will aim to answer the following questions:

What is the current state of play?

1. Are low-carbon options and technologies considered when designing policies and programs to enhance energy access? To what extent are renewables being promoted to meet the needs of unserved or underserved populations?
2. Are existing energy access projects and programmes being evaluated for their emissions impacts? Is there a clear understanding of the emissions consequences of current energy use patterns? If yes, how is this information being used?

[1] For further information about the project, please visit www.newclimateeconomy.net

Why are these actions being taken?

3. What are the underlying incentives for undertaking investments in energy access? (National requirements? International requirements? Access to carbon finance?)
4. What framings and assumptions go into determining the cost-competitiveness of fossil versus renewable options and selecting from amongst them? Are there sections of the population or regions where renewables are considered cost-effective and economically viable? Where are there gaps in the data (e.g. demand side analysis)?

What are the implications of these investments and interventions?

5. Have the equity implications of currently planned or implemented climate mitigation activities been considered during their design? If so, what policies and protection mechanisms were considered to safeguard the poor from any potential welfare losses?
6. What trade-offs between energy access, climate mitigation and other political goals are implementers faced with, and how are these tackled?
7. Have low-carbon options changed conditions for energy access? How have low-carbon options fared against other political priorities such as cost effectiveness and inclusiveness?

What we already know

Where energy poverty is still prevalent, economic and social development is contingent on increasing energy access and supply of modern energy services. Indeed, expanding access to modern energy services for poverty alleviation and mitigating climate change are twin challenges facing much of the world today. However, these goals are usually treated independently. Traditionally, this has been the case because nations facing the biggest challenge in providing modern energy access are those that have historically contributed the least to climate change. However, this is unlikely to continue as in many emerging nations, large populations without access to modern energy services already coexist with populations living affluent lifestyles and having large carbon footprints.

Existing evidence suggests that meeting the energy needs of the poor will not contribute significantly to global greenhouse gas emissions even when met almost exclusively by expanding fossil fuels. A few recent studies that have assessed the emissions implications of achieving universal modern energy access for cooking and other domestic uses or eradicating energy poverty globally, conclude that these are likely to be negligible over the next 20-50 years[2]. A recent national-level study on the emissions implications of achieving complete access to electricity (both for cooking and domestic uses) in South Africa, through centralized carbon-intensive grid extension, also found that providing access to electricity to a backlog of 3.4 million households by 2020 would result in an additional 13Mt of carbon dioxide emissions, accounting for approximately only 1.8% of the total projected national emissions for that year[3].

However, achieving basic energy access is only the first step. Providing energy that enables broader development beyond meeting just basic domestic needs is likely to lead to larger increases in energy demand[4]. How to meet this demand in the long term is a critical challenge all over the developing world, and the choices made will have implications for energy security, affordability of energy, equality in access, imports and exports, as well as – of course – carbon emissions. Energy planners are

[2] See for e.g. Pachauri, et al., (2013) doi; Chakravarty & Tavoni, (2013) doi; IEA (2013) World Energy Outlook.
[3] Tait & Winkler, (2012) doi
[4] Nilsson et al., (2012) doi

concerned that low-carbon energy investments will lead to increases in energy costs, reducing the affordability of modern energy for the poor and for businesses. However, a comprehensive view is rarely taken on the costs and benefits of different strategies.

While the political momentum around expanding energy access and mitigating climate change has been high over the past years, there are yet few – if any – examples of countries that have managed to pursue both goals in tandem. There is thus a need to better understand both the incentives behind and implications of choosing, or not choosing, low-carbon options when expanding energy access, including the associated benefits that are not directly relevant to climate and/or energy policy priorities, and how these fare against other political goals.

Expanding energy access through improved cooking services

Currently, almost 40% of the global population cooks with solid fuels like unprocessed biomass, charcoal or coal. Though biomass is considered a renewable fuel, burning it in inefficient stoves results in emissions of greenhouse gases (GHG) such as methane and nitrous oxide. Carbon dioxide emissions from non-sustainable harvesting of biomass in specific locations also adds to its environmental impacts. This suggests that transitioning away from solid fuels could even reduce emissions[5].

The health benefits that come with introducing cleaner cooking technologies are now widely recognised by the scientific and policy communities and are increasingly also being used to market improved cookstoves to end-users[6]. However, the performance of improved stoves varies widely and improved thermal efficiency (important for climate outcomes), although often linked with improved livelihoods (e.g. time and fuel savings), does not necessarily lead to reduced emissions (required for improving household health)[7]. The choice of household energy "intervention" will have implications for these various outcomes and for the implementation approach taken by cookstove entrepreneurs/project developers as well as the financial incentives available to support these.

Despite numerous improved cookstove interventions over the past decades, the world has still not seen a sector transformation, i.e. the sustained and widespread adoption of improved cookstoves. Various explanations have been offered for this lack of progress; one problem that has become evident is that programmes have too often failed to understand the market for their stoves – the needs, preferences and constraints of stove users in their unique contexts. Developing a cleaner stove is relatively easy, however ensuring that communities use these stoves, especially in the long term, has proven difficult since it requires a deep knowledge of culture and traditions, social norms, household needs and habits, etc. In this light it is vital to understand what are the most pressing challenges facing cookstove implementers today are, and how can these be overcome.

Expanding energy access through electrification

About 20% of the global population also still lives without access to electricity. Supplying these populations with electricity can be achieved by extending existing transmission infrastructure and connecting them to central grids, or through developing decentralized off-grid or mini-grid solutions. Considering renewable options for expanding access to electricity, especially for remote rural populations with low population and demand densities or living in difficult terrains, is becoming

[5] See for instance - Grieshop, et al. (2011). doi; Johnson, et al. (2008) doi; Rehman, et al. (2011) doi
[6] For the latest estimates of the Global Burden of Disease attributable to household air pollution (HAP) from solid fuel use, see Lim et al. (2012) doi
[7] Smith et al. (2013) doi; Duflo et al. (2012); Grieshop et al. (2011)

increasingly popular[8]. Assessing the appropriateness of renewables for expanding electricity access is, however, challenging as it requires detailed information on local demands and distances to existing grids in addition to estimates of costs and potentials in an area. Barriers to electrifying rural areas, whether through off-grid or grid electrification, are still significant in many developing nations and strengthening the policy and institutional frameworks for this remains an important prerequisite.

Leapfrogging to new renewable or low-carbon technologies in developing nations is certainly desirable, but how much this might contribute to global mitigation efforts as well as other societal goals such as economic growth and social wellbeing remains uncertain. Given the urgent need to increase access to electricity, it is natural that nations choose options with which they have the most familiarity and that are perceived to have the least cost. In practice, this often means going with conventional technologies and fossil fuels. There is thus a need to better recognize how an environment that enables low-carbon interventions can be put in place, i.e. the necessary institutional, financial and political support structures, and how choosing such a path can bring about achievements toward other political goals of social and economic well-being. Furthermore, how national and international policies might foster a quicker diffusion of low-carbon technologies in such circumstances needs further consideration.

Areas still lacking clarity

The net emissions impacts of such energy transitions are clearly dependent on the emissions characteristics of existing technologies and energy sources used and of those with which these are replaced. A comprehensive assessment of emissions impacts of access policies and projects will need a deeper understanding of: 1) current and future energy demands; 2) future electricity generation mixes; 3) the extent to which future demands can be cost-effectively met from low-carbon or renewable sources.

Although existing research suggests that sustainable development and energy poverty eradication can go hand in hand with mitigating climate risks, there are important considerations surrounding costs, energy security and ancillary benefits that must be taken into consideration more systematically. Bringing modern energy access to many more people around the world—which one might initially expect to lead to increased greenhouse gas emissions—can also be consistent with reducing emissions because renewables could be more widely deployed and energy efficiency will improve with better access to modern energy technologies and fuels[9]. However, knowledge is lacking on the barriers and opportunities involved in introducing such technological and systems change, including the incentives that lie behind the needed investments. Linking forward looking projections with a thorough understanding of the socio-technical dynamics of implementation, will give us a clearer understanding of the synergies and trade-offs between potential systems pathways and implementation in practice.

Organizers

This workshop is jointly organised by the Stockholm Environment Institute (SEI) and the International Institute for Applied Systems Analysis (IIASA).

SEI is one of seven research partners in the New Climate Economy project. It is an independent international research institute that has been engaged in environment and development issues at local, national, regional and global policy levels for more than 20 years. SEI's goal is to bring about change for sustainable development by bridging science and policy and does this by providing integrated

[8] See for e.g. van Ruijven, et al. (2012) doi; Deichmann, et al. (2011) doi; Karki, et al. (2008) doi
[9] See Rogelj, et al. (2013) doi

analysis that supports decision makers. SEI has offices in Estonia, Kenya, Thailand, the UK and the US, with its headquarters located in Stockholm, Sweden.

IIASA is a scientific research institute that conducts policy-oriented research into problems of a global nature that are too large or too complex to be solved by a single country or academic discipline. IIASA uses advanced systems analysis to conduct policy-oriented research into the most pressing areas of global change – energy and climate change, food and water, poverty and equity – and their main drivers. IIASA is located in Laxenburg, near Vienna, Austria.