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Energy aid in times of climate change

Designing climate compatible development strategies

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Abstract

The pursuit of economic development and the consequences of climate change in developing countries are increasingly seen as intimately connected issues that should be addressed simultaneously. Energy transitions form an important component of both economic development and climate change strategies. Yet, there are separate institutional regimes and financial resources to deal with problems of either economic development or climate change with unfortunate consequences for the coherence and focus of energy aid programmes. Climate compatible development strategies aim to bridge the gap between approaches targeting economic development and approaches targeting climate change, and are thus of particular relevance for guiding energy aid efforts.

The conventional way of framing the dialogue on climate compatible strategies is based on the concept of multiple-win solutions that attempt to address problems of growth, poverty, mitigation and adaptation simultaneously. This report argues that such a conception may be misleading and suggests there is a fundamental difference between solving problems related to rising affluence (energy infrastructure and mitigation) and problems related to persistent poverty (energy access and adaptation) with important consequences for energy aid. The dialogue on climate compatible development strategies should be reframed in terms of finding double-win solutions in two separate spheres of intervention and policy: green growth dealing with problems of rising affluence and energy access dealing with problems of persistent poverty. Replacing the traditional divide between economic development and climate change with a new divide between green growth and energy access may offer a better starting point to address the geopolitical and economic realities facing developing countries today.

The report explores the consequences of this approach for energy aid architecture by analysing three major challenges that confront the development aid and climate change communities today: mobilizing adequate funds, safeguarding aid effectiveness and stimulating appropriate systems innovation. It is suggested that traditional ODA funding should initially focus on problems of energy access involving poverty alleviation and climate change adaptation, while new climate change funding should ultimately focus on problems of green growth involving energy infrastructure and mitigation.

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1. SCOPE AND OBJECTIVE

1.1 Framing the climate compatible development dialogue

Institutional barriers between development and climate change communities

The pursuit of development and climate change targets has proceeded along largely separate tracks from an institutional point of view. This institutional divide has historical roots and reflects the initial separation of development and climate change responsibilities within the government administration of developed nations. Moreover, many developing countries insisted on funding additionality for climate change actions. They were concerned that climate change goals could easily result in more strings attached to existing development aid rather than in additional aid budgets. In response to the bureaucratic realities of developed nations and the additionality concerns of developing nations parallel institutions with their own set of financial mechanisms and administrative rules have been created for development aid and climate change funds.

This institutional divide has also affected the academic discourse on development and climate change leading to largely separate scientific communities dealing with respectively development and climate change. Until recently and with few exceptions the world seemed to be heading for more or less isolated funding fiefdoms with dysfunctional separation of tasks and responsibilities rather than synergistic strategies. This institutional fragmentation would be particularly detrimental for the domain of energy sector funding, a key component of both development and climate change strategies. Fortunately, awareness of this institutional barrier is increasing and attempts to reframe the development and climate change debate in an integrative way are gaining ground under the heading climate compatible development.

Triple-win vision of development and climate change

More and more policy makers in energy aid frame the dialogue about climate compatible development in terms of three interlocking circles representing three different key global challenges: development, mitigation and adaptation (see Figure 1.1). This diagram shows a large overlap between development and climate change strategies and distinguishes explicitly between adaptation and mitigation strategies. The overlapping area between development and mitigation is termed low-carbon development. The overlapping area between development and adaptation is termed climate resilient development. Finally, climate compatible development strategies are focussed on actions in the area where all three circles overlap.

Such a diagram has been used in presentations of Project Catalyst since the run-up to Copenhagen (Project Catalyst, 2009a) and is now used in development aid circles to frame the challenges climate change poses for development (CDKN, 2010). This diagram is persuasive in the sense that the interlocking circles suggest there is room for green growth in which goals of development, mitigation and adaption can be reached simultaneously. Such a triple-win perception of future challenges for development is attractive from a visionary point of view, but can be potentially misleading from an implementation point of view.

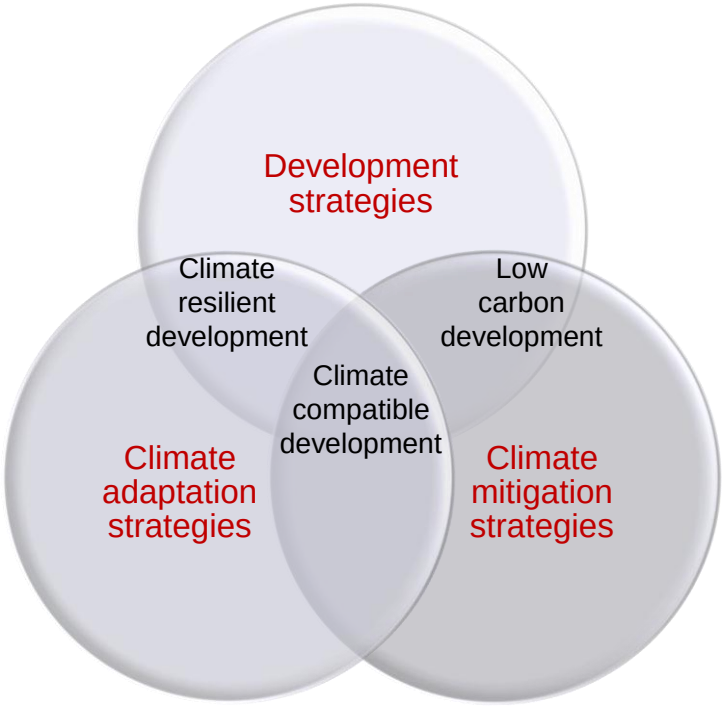


Figure 1.1 *Framing climate compatible development: triple-win perspective*

A harsh view of energy aid realities

A harsh view of realities suggests that fast development and slow climate change are more or less incompatible at present. Income growth is intimately linked with higher levels of energy supply and fossil fuel options are still essential to expand energy supply, because they tend to be cheaper and less capital intensive than renewable energy options. Moreover, many renewable energy options may be climate friendly from a mitigation point of view, but ultimately they may not always lead to enhanced climate resilience. Biomass options may reduce food security and hydro options may not be very climate safe when climate change becomes severe. These observations make triple-win options rather scarce in practice.

For a sense of perspective, one should also realise that attaining universal energy access by 2030, an important target of development strategies, raises global energy demand by just 1,1% and global CO_2-emissions by 0,7% (IEA, 2011a). To make universal energy access more compatible with low carbon development strategies is hardly worth the effort. Green growth strategies for the middle of the income pyramid are what really count for mitigation.

There obviously is a need to approach climate change and development problems in an integrated way, but framing the dialogue on climate change compatible development in terms of overlapping circles may obscure rather than illuminate the crucial decisions policy makers face when making concrete choices for interventions and technologies. Moreover, it ignores the key challenges already facing energy aid for development today without the additional complications of climate change.

Distinction between pro-growth and pro-poor development strategies

Energy aid for development targets two separate goals: economic growth and poverty reduction. In pro-growth development strategies energy is primarily viewed as the engine of aggregate economic growth. Pro-growth energy aid is targeted at facilitating adequate national supplies of energy, in particular in the form of electricity and for productive activities. Representative initiatives include large scale power generation and grid extension.

In pro-poor development strategies energy is primarily viewed as a basic need of the poor. Pro-poor energy aid targets universal energy access for the poor. This goal is usually defined as a two-pronged target aimed at reducing the number of people having no access to electricity and reducing the number of people dependent on traditional biomass. Representative initiatives include the dissemination of improved cooking stoves and solar lanterns and stand-alone mini-grids.

In theory, these two strategies are largely overlapping, because economic growth is supposed to trickle down to the poor eventually. In practice this is not happening. The world has been increasingly successful in achieving goals of aggregate economic growth with improved energy infrastructure, but it has not performed adequately in terms of improving energy access at the bottom of the income pyramid (IEA, 2011a). This is important to notice, because the relationship between climate change and development looks distinctly different from the perspective of rising affluence than from the perspective of persistent poverty. Climate change mitigation essentially implies a growth-focused perception of development in which climate compatible development is viewed as an attempt to increase economic growth with minimal greenhouse gas emissions. Climate change adaptation essentially implies a poverty-focused perception of development in which climate compatible development is primarily viewed as an attempt to prevent people from falling down the income ladder into persistent poverty because of climate change. In this respect framing the climate compatible development dialogue meaningfully requires a clear distinction between pro-growth development strategies incorporating mitigation objectives and pro-poor development strategies incorporating adaptation objectives.

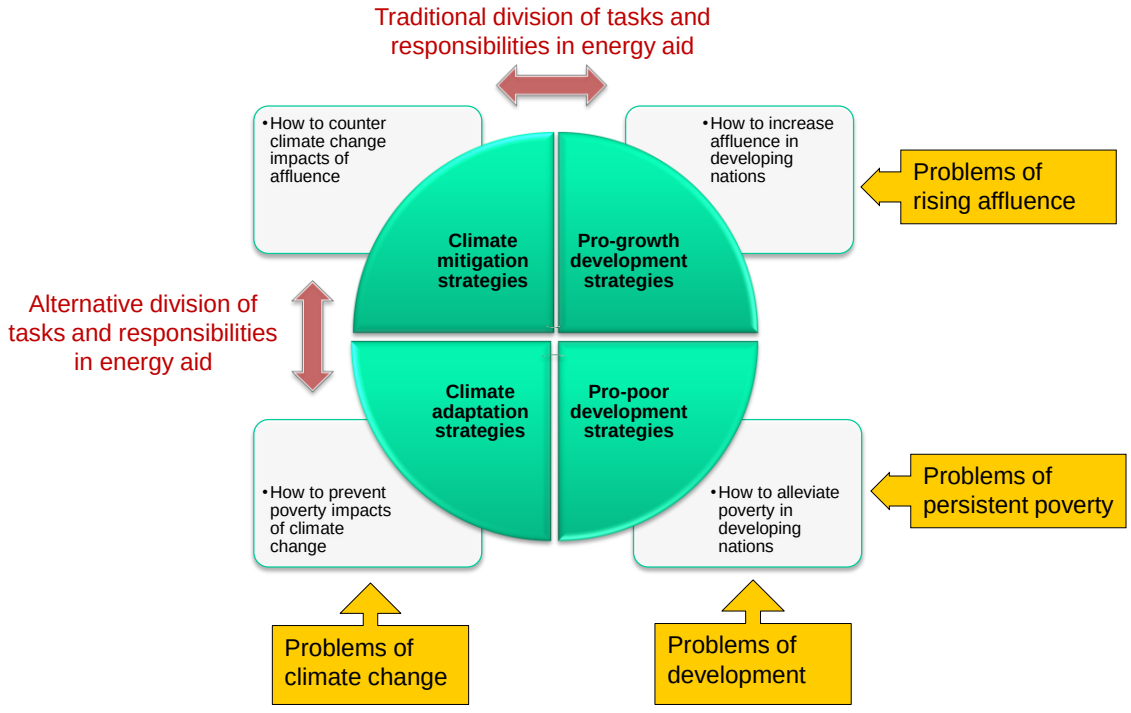


Figure 1.2 *Framing climate compatible development strategies: alternative perspective*

Reframing the climate compatible development dialogue: an alternative vision
The major message of the on-going dialogue about climate compatible development strategies is that there is an urgent need to approach problems of climate change and development in an integrated way and that the institutional divide of the past between the climate change and development communities must be bridged constructively. However, as argued in the preceding paragraphs, designing climate compatible development strategies on the basis of a triple-win vision (Figure 1.1) has two basic weaknesses: first, problems of development, mitigation and adaptation cannot be solved without major trade-offs and secondly, development strategies concern two rather different major goals that are hard to reach simultaneously.

This paper concerns an alternative vision of climate compatible development strategies that takes these two weaknesses into account and suggests another way of integrating climate change and development strategies (Figure 1.2). It splits development strategies into two separate domains (pro-growth and pro-poor) and proposes that climate compatible development strategies should focus on two separate integration efforts (integrating pro-growth and mitigation strategies, and integrating pro-poor and adaptation strategies).

The basic rationale for this proposal is that issues of rising affluence (economic growth and climate change mitigation) have a lot in common when it comes to strategy design and international negotiation as do issues of persistent poverty (poverty alleviation and climate change adaptation). The traditional divide between the development and climate change communities should, therefore, not be tackled by looking for triple-win solutions that are difficult to identify and implement in practice. The traditional divide between solving problems of development and solving problems of climate change should be replaced by an alternative divide between solving problems of rising affluence and solving problems of persistent poverty. Such a divide allows a division of tasks and responsibilities that is much more in line with the requirements of strategy design and international negotiation for green growth and energy access respectively.

This perception of realities suggests that the climate compatible development dialogue with respect to energy aid should not focus on finding triple-win solutions where all major goals of climate change and development are reached simultaneously, but on finding double-win solutions in two separate spheres of intervention and technology choice: green growth and energy access. The main objective of this report is to explore the consequences of this alternative framing of climate compatible development challenges for energy aid.

1.2 Addressing the key challenges for energy aid

From conceptual framework to energy aid architecture
Diagrams depicting the integration of development and climate change strategies such as Figure 1.1 and Figure 1.2 are academic frameworks of a largely conceptual nature. But ultimately, they could and should affect thinking about energy aid architecture. The term energy aid architecture is used here as an umbrella term encompassing the institutions sourcing and disbursing energy aid and climate change funds, the division of tasks and responsibilities between these institutions and the diverse aid and funding modalities through which they perform their functions. The alternative vision of climate compatible development strategies as depicted in Figure 1.2 could have important consequences for energy aid architecture. Present energy aid architecture consists of two largely separate institutional mechanisms: the bilateral and multilateral regimes designed to mobilise and disburse Official Development Aid (ODA) and the bilateral and multilateral regimes designed to mobilise and disburse Climate Change Funds (CCF). They reflect the traditional division of tasks and responsibilities in energy sector funding as indicated by the horizontal double arrow at the top of Figure 1.2.

An alternative division of tasks and responsibilities is indicated by the vertical double arrow at the left side of Figure 1.2. According to this vision energy aid architecture should no longer be

split into organisations, rules and financial flows dealing primarily with problems of either development or climate change, but into organisations, rules and financial flows dealing primarily with problems of either rising affluence or persistent poverty. Redesigning energy aid architecture along these lines could possibly result in more effective strategies to resolve the key challenges of energy aid.

Restructuring of energy aid architecture required

The traditional division of tasks and responsibilities separating development aid from climate change funding is becoming a bottleneck for progress because both the development community and the climate change community are confronted by the difficulties of mainstreaming key aspects of respectively climate change and development effectively into their own institutions and procedures. The slow pace characterising progress in international negotiations on development and climate change reflects the difficulties of aligning the economic interests of major emerging, middle income economies and the environmental ambitions of post-industrial donor nations. This is not surprising because development targets cannot be treated as just an add-on concern for climate change funding nor can climate change targets be treated as just an add-on concern for development aid. The resulting deadlock is particularly harmful, because it affects progress in addressing the urgent needs of the least-developed countries.

The term mainstreaming also suggests that there is no fundamental need to change traditional energy aid architecture and climate change funding apart from integration issues. This is a rather optimistic interpretation of the challenges facing climate compatible development strategies. They must not only address the issue of integration, they must also address other key challenges that would affect development aid prospects today even if climate change problems had not arrived. These interdependent key challenges for restructuring energy aid architecture are threefold: adequate fund mobilization, improved aid effectiveness and appropriate systems innovation. It is worth considering how the suggested alternative way of framing the climate compatible development dialogue would help to address these key challenges. They are summarised here, before being explored in more detail in the subsequent chapters.

First key challenge for structural change: adequate fund mobilization

The first key challenge for energy aid concerns fund mobilization. Any overview that compares energy aid requirements for development and climate with actual energy aid flows is bound to conclude that there is an already large and fast growing gap between requirements and availabilities. Any effort to address both development and climate change simultaneously will become increasingly futile, if this financing challenge is not faced head on. There is little chance that a mere 0.7% of national income from present donor countries can address both problems effectively. And many ODA donor nations are far from that level of aid today. Unfortunately, in view of the seemingly perpetual financial crisis the plausibility of decreasing ODA aid flows appears larger than the plausibility of increasing ODA aid flows. It is argued that existing ODA aid flows should focus initially on energy access and adaptation as the most urgent concern, while hoping for the ultimate best in terms of generating additional multilateral flows from carbon markets or international taxation schemes for stimulating green growth and mitigation.

Second key challenge for structural change: improved aid effectiveness

Political preoccupations in donor nations have changed dramatically in recent years. The ongoing, public debate on both the effectiveness of development aid and the desirability of global climate change action have strengthened the political forces in favour of reducing rather than expanding aid commitments. Climate change sceptics are at least as successful as development aid sceptics in reaching the general public with their critical messages. Without a convincing strategy for improving aid effectiveness and safeguarding public acceptance few political parties will risk alienating voters by unconditionally supporting development aid. Because energy aid for climate compatible development strategies can be based on motives of both moral imperative and enlightened self-interest, it should be able to acquire broad public acceptance. At the

same time, climate compatible strategies must entail a structural change in energy aid modalities that offers a better chance of improving energy aid effectiveness.

Third key challenge for structural change: appropriate systems innovation

Climate compatible development strategies are not just an issue of adequate funding and improved effectiveness, they need systems innovation to deliver their promise on green growth and energy access. The term systems innovation is used here to stress the fact that technological innovation in a narrow sense is insufficient to set development on a green growth path and to reach universal energy access. That requires long-term energy transitions with parallel innovations in the business environment and regulatory domain of developing countries. One could argue that systems innovations for green growth and mitigation will first take place in industrialised nations and can then be adapted and transferred to developing nations more or less smoothly if sufficient funding is available. But this is much less the case for systems innovation for energy access and adaptation, because similar challenges in industrialised nations do not exist. This implies the need for additional technological research, human capacity building and business development at the bottom of the income pyramid. With respect to the corresponding energy aid architecture it can be argued that multilateral agencies would be in the best position to address problems of rising affluence (green growth) that are likely to concern relatively large-scale, close-to-market technologies. Such technologies can be procured with standard ways of financial and risk management and operate in the policy context of international competitive markets and existing multinational firms. Conversely, bilateral agencies may be in the best position to address problems of persistent poverty (energy access) that are likely to concern relatively small-scale, pre-commercial technologies. Such technologies require additional research and development and operate in the policy context of emergent, socially-inclusive markets and small-scale business development that are not the primary concern of existing multinational firms.

From diagnosis to remedy: outline of analysis

Viewing climate compatibility in terms of either green growth or energy access strategies (Figure 1.2) rather than an overlapping mix of development, mitigation and adaptation strategies (Figure 1.1) could help in designing development strategies that address these three key challenges facing present energy aid architecture more effectively. The purpose of the analysis in this paper is not to delineate the required global changes in aid architecture in any detail or to provide a workable blueprint for change. It is a preliminary exploration that is intended to contribute to the on-going dialogue on climate compatible development strategies. The next three chapters briefly sketch the key challenges for energy aid as mentioned above and indicate how the suggested framework for designing climate compatible development strategies may help to address these key challenges. The final chapter summarises the main conclusions and contains some observations of a more general, geopolitical nature.

2. ENERGY AID REQUIREMENTS AND FUND MOBILIZATION

2.1 Climate compatible development strategies and fund mobilization

Growing gap between required and available funds

The arrival of climate change has complicated development strategies. Targets of economic growth and poverty alleviation are more difficult to reach if the intended growth must also be based on a lower level of greenhouse gas emissions and energy access must also lead to more climate resilient livelihoods. If existing sources of energy sector funding are already insufficient to reach targets of development, the gap between required and available funds is likely to become even more daunting if climate compatible development strategies become generally accepted. The dialogue on climate compatible development strategies should, therefore, specifically address priorities for energy sector funding and additional fund mobilization.

Objective of this chapter

This chapter first presents an overview of the level of existing energy funding for development and climate change and compares the level of ODA energy aid funding with that from climate change related CDM funding. We then summarise the few studies available that address how much funding actually would be required to address both development and climate change targets. This allows us to draw some preliminary conclusions on the extent of the gap between required and available funds, particularly for the least-developed nations in Africa. The final section indicates what the consequences of this gap are for energy aid architecture in light of the conceptual framework for climate compatible development strategies as visualised in Figure 1.2

2.2 Level of energy sector funding for development and climate change

Defining energy sector funding for development and climate change

The term energy aid is usually restricted to funds falling under the ODA definition of development aid. These funds originate from public budgets of the OECD-DAC members and are limited to grants and concessional loans. They do not include private sector aid (sourced from foundations and not-for-profit NGO's) or aid from non-OECD/non-DAC members (south-south cooperation). These two categories of funding have become much more important in the past ten years. Private sector aid is particularly relevant for social sectors such as health and education and non-OECD aid is particularly relevant for transportation infrastructure and mining. Although the data on both categories of aid funds is sparse, it is unlikely that either is of significant importance for the energy sector.

Because climate change funds are viewed as a rightful compensation for past emissions of developed nations, the term climate change aid is not very common. Moreover, in practice, there is considerable overlap between development funding and climate change funding because of the flexible interpretation of funding additionality (Brown et al., 2010). For instance, World Bank climate change funding mechanisms such as the Global Environmental Facility and the Climate Technology Fund are mainly financed through aid commitments that are reported under ODA funding by most donor nations. This may change, when present pledges for additional climate change funding through the Green Climate Fund are implemented, but at present the level of additional climate change funding from public budgets not incorporated in ODA funding is limited.

A much more complicating factor is that in contrast to traditional development aid, climate change funding is not mainly sourced from public budgets. A recent report by the Climate Policy Initiative (CPI, 2011) includes climate change related foreign direct investment (FDI) and market rate loans in its summary of climate change financing. But these funds are definitely not aid in the traditional sense of grants or concessional loans. New financial instruments such as the Clean Development Mechanism (CDM) can be considered aid in the sense that they allow companies to invest in greenhouse mitigation in developing countries by selling the related Certified Emission Reductions (CERs) on OECD carbon markets thus improving the financial attractiveness of climate compatible energy projects in developing countries. But the revenues from CERs are sourced from private companies on the carbon market and not a burden on the public budget of developed countries. However, energy projects play a key role in CDM funding. It is misleading to define CER revenues as energy aid, but the CDM must certainly be viewed as part of energy sector funding for climate change. In the remainder of this paper the term energy aid will be reserved for the traditional ODA type of energy sector funding, but we will also look at the performance of the CDM as the major source of energy sector funding for climate change not concerning foreign direct investment (FDI) and other forms of commercial financial involvement.

Evolution of energy aid volumes

Historically, energy aid has had an important role in total development aid as it is considered a key infrastructural requirement for economic growth. In terms of the share in total ODA funding by OECD nations its role, however, is not impressive. In 2009 only 3,6% of total funding or 4,3 billion was dedicated to the energy sector (OECD, 2010a). A relative large part of these flows are channelled through multilateral banks, for instance the World Bank devotes 15,8% of all funds to the energy sector. Figure 2.2 provides an overview of ODA energy aid flows from 1971-2007. The long-term trend reveals an interesting pattern. In the 1970's aid into the energy sector increased rapidly from a level below 2 billion US$ to more than 4 billion US$. In the next 15 years it hovered between 4 and 7 billion US$. Then it started to fall rapidly to a minimum below 2 billion US$ in 2000. In the past ten years the level of energy aid has recovered again. This pattern more or less reflects different eras in energy aid financing that coincide with different ideas about the role and place of the energy sector in the economy. For convenience sake I have termed the first era the public utility era and the second era the sector reform era while adding a third, on-going era labelled the restructuring era. The question marks signal that the challenges of green growth and universal energy access may lead to changes in energy aid architecture and energy aid modalities.

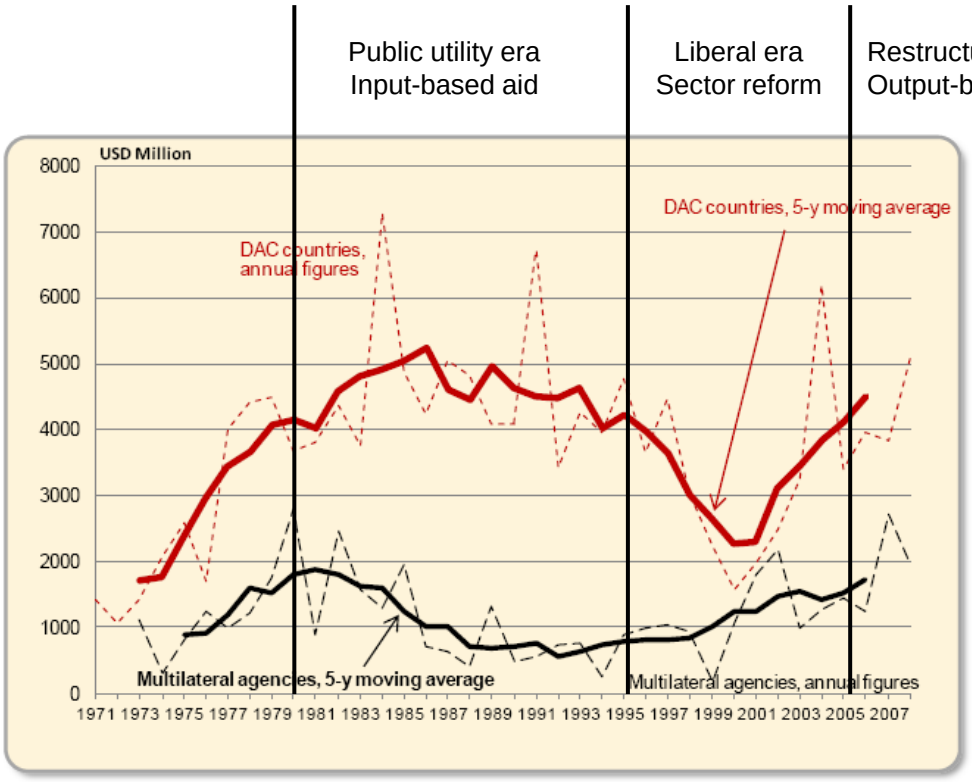


Figure 2.1 *Annual ODA energy aid funds from 1971 to 2007*
Source: OECD, 2010a

Level and composition of present ODA energy aid funds

According to a recent monitoring study by the OECD-DAC ODA energy aid in the period 2007-2008 amounted to 6,9 billion US$ (OECD, 2010b). The largest donors were the US and Japan (1,4 billion US$ each), followed by Germany (844 million US$) and Spain (261 million US$). Multilateral organisations channelled 2,3 billion US$ of total energy aid, bilateral agencies 4,6 billion US$. Iraq received by far the largest percentage of energy aid (18% or 960 million US$, of which 62% from the US and 38% from Japan). The second most important recipient country is India (8% or 440 million US$, of which 70% from Japan). Afghanistan is the third most important recipient (5% of the total or 274 million US$, of which 90% from the US). These figures provide a clear indication of the geopolitical drivers of energy aid flow decisions in addition to concerns regarding economic growth and energy access. The study also presents a sub-sectoral breakdown of energy aid. Two categories of aid account for over 50% of the total: electricity transmission and distribution (27%) and energy policy support (24%). The share of funds into renewable energy is slowly expanding: from 11% in 2000-2001 to 14% in 2007-2008. The share of funds into fossil fuels is sharply contracting: from 26% in 2000-2001 to 11% in 2007-2008.

Level and composition of present CDM energy aid funds

In the past decade developing nations received energy sector funding not only from energy aid budgets, as surveyed above, but also for from climate change funding under the clean development mechanism (CDM) of the UNFCCC Kyoto Protocol. Figure 2.2 and Figure 2.3 provide an overview of the categorical and regional distribution of CDM projects in the pipeline by 1-1-2011 (Source: UNDP Riso Centre for Energy, Climate and Sustainable Development CDM pipeline on-line database). To interpret these figures correctly, it is important to note that all figures refer to projects in the pipeline now and cumulative CERs potentially generated by 2012. There is a large difference between the categorical and regional distribution of CERs actually issued now and CERs potentially available by 2012 from projects in the pipeline. For the overall performance of the CDM the latter figures seem most relevant. The data show, that re-

newable energy accounts for the largest number of projects (61%) and the largest share of generated CERs (35%) by the end of the Kyoto Protocol in 2012 and that most of the projects (79%) generate CERs (79%) in the Asia Pacific, specifically China and India. Fluorocarbons and N_2O account for a small number of projects (2%) but a large share in cumulatively generated CERs (27%) The category other energy projects (18% of the total number generating 6% of all CERs) includes energy-efficiency projects on both the supply and demand side and fuel supply shifting projects. On January 1, 2011, there were a total of 5760 projects in the pipeline that could have generated a cumulative total of 2.8 billion CERs by 2012. These figures indicate that, although the CDM has been serving targets of green growth quite well, it has not been very instrumental in serving targets of energy access that are particularly relevant for Africa.

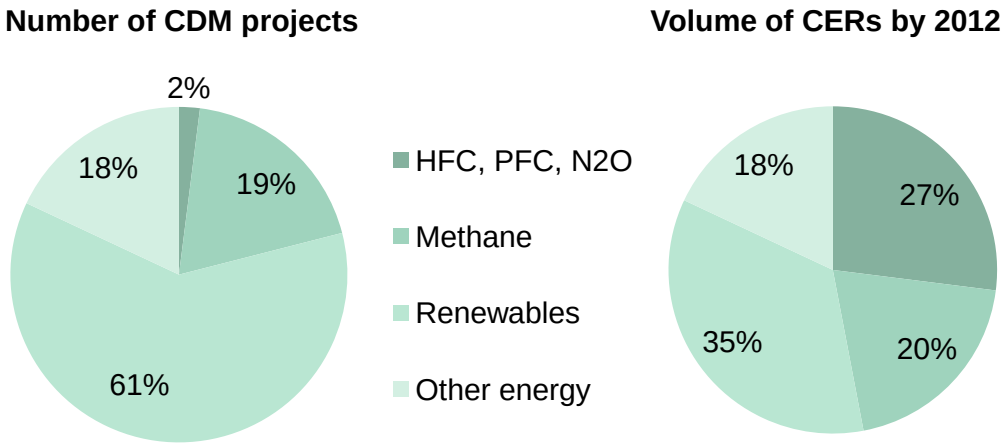


Figure 2.2 *Categorical distribution of CDM pipeline projects on 1-1-2011*

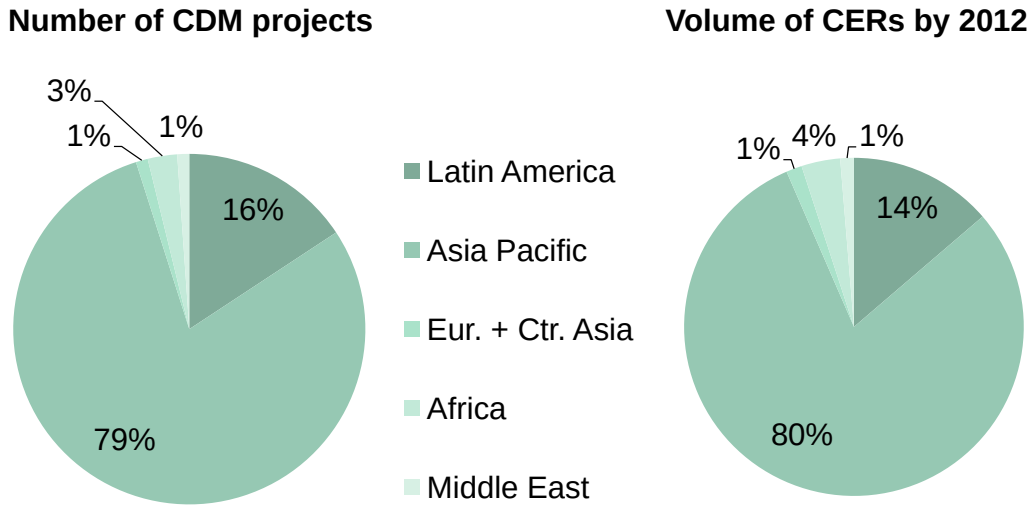


Figure 2.3 *Regional distribution of CDM pipeline projects on 1-1-2011*

Energy sector funding from ODA and CCF compared

The value of a CER on the ETS market was about 14 US$ in early 2011. If we make the admittedly heroic assumption, that this value is sufficient to cover the average incremental costs of climate compatible energy projects, we can infer the energy aid equivalent contribution of the CDM mechanism. Annual CERs issued have increased strongly in recent years and stood at 0.8 billion in 2010 of which 42% renewable energy and 21% other energy projects. Energy projects

in developing countries thus received a total funding equivalent to a value of about 7 billion US$ in 2010 from the CDM. This is about the same as the total for ODA energy funding in 2007-2008. With regard to renewable energy aid only, the CDM mechanism will contribute 5 times more to climate change funding than ODA energy aid to development funding. It thus appears that within a period of just a decade, climate change related funding has become much more important for renewable energy implementation in developing countries than development related funding. However, it is important to note, that almost none of this investment is energy access related. Also, with respect to the regional focus, there are important differences. As can be referred from Figure 2.3only 3% of the available CDM funds from CER's go to Africa, where energy access problems are most dramatic in term of the share of population affected.

2.3 How much energy aid is needed for development?

How adequate are present energy aid flows?

Monitoring present energy aid flows becomes particularly relevant if the reported achievements could be viewed in the light of actual requirements. Clearly, an endeavour to estimate the financial costs of accelerating development and combating climate change in developing nations is fraught with enormous problems of interpretation and judgement. That is why, few studies have attempted to do so in a systematic way and why results should be used with extreme caution. Nevertheless, they provide at least some notion about the order of magnitude of the financing problems that energy aid is supposed to address. In the following paragraphs of this chapter an overview of such studies is presented and the results are used to demonstrate the need for reframing the climate compatible development debate drastically.

Estimating required energy aid for economic growth: the case of Africa

One of the main targets of energy aid for development is to enhance economic growth and stability. How much energy aid is required for this purpose obviously depends on what is to be achieved. Clearly, it would be foolish to view development purely as a matter of sufficient energy supplies. It is a far more complex problem and energy supply is just one of the preconditions for growth and stability. Moreover, it would be equally foolish to view sufficient energy supply purely as a matter of sufficient energy aid funding. In fact, the search for a direct relation between aid funding and economic growth has been a futile exercise for decades. Energy aid will always be part of much broader package of measures to ensure sufficient energy supply. On the other hand, it is clear that the lack of reliable and affordable energy supplies will put a brake on potential economic growth levels and that energy aid can contribute effectively to enhancing the reliability and affordability of energy supplies.

This is most obvious in the case of power supply in sub-Sahara Africa. A recent World Bank study suggests that the lack of reliable and affordable power has reduced economic growth by 1-2% in sub-Sahara Africa (World Bank, 2010b). The same study estimates the total costs of improving the power infrastructure in sub-Sahara Africa at 40.8 billion US$ annually of which 27 billion in capital expenditures. Presumably, the associated investments would be sufficient to remove the constraints on the potential rate of economic growth caused by lack of reliable and affordable power. This compares to an annual total spending of 11,6 billion US$ in the African power sector today, of which 1,8 billion from energy aid (both ODA and non-OECD financiers). These funds are spent on a sector that functions very inefficiently because of major problems of unaccounted distribution losses, uncollected tariff revenues and substantial labour redundancies. The World Bank study estimates this efficiency gap at 6 billion US$. Even if we assume that these basic efficiency problems are solved first, a funding gap of 23.2 billion US$ remains, a figure twice as high as present annual investments. If this gap had be filled up with donor funds only, a scaling up of energy aid by an order of magnitude would be required. Of course, part of the investment would presumably come from private funds and public budgets in developing nations. But even if we assume that aid funds could be leveraged by a factor of 10, it would still imply a doubling of energy aid.

Estimating required energy aid for universal energy access: UN recommendations

Since the establishment of the Millennium Development Goals (MDGs) there has been a continuous debate on the key role of energy as a prerequisite for reaching these goals (UNDP/World Bank, 2005; UN-Energy, 2005). A recent report by the Advisory Group on Energy and Climate Change of the UN Secretary-General contains two key recommendations for the UN system and its Member States in this respect: to ensure universal access to modern energy services by 2030 and to reduce energy intensity by 40 per cent by 2030 (UN-AGECC, 2010). The report mentions that providing universal energy access will require annual investments of 35-40 billion US$ of which 35 billion for access to electricity and only 2-3 billion for access to modern fuels. It goes on to suggest that 15 billion US$ should be disbursed in the form of grants and 25 billion in the form of loans from both private and public budgets. It is unclear if these loans are concessionary (and thus financed from energy aid) or commercial. Somewhat surprisingly, the report suggests that aid funds for universal energy access should come from new climate finance initiatives rather than traditional development aid. In fact, universal access to energy may well increase actual carbon emissions and efficiency improvements do not directly influence the transition to low-carbon supply technologies. It appears difficult to base this recommendation on the mitigation impacts of universal access to energy and this recommendation will be hard to implement in a climate change aid community that is keen on strict conditions with respect to actual carbon emission reductions.

Estimating required energy funds for universal energy access: IEA scenarios

The IEA has also presented an estimate of the annual cost of universal access to energy in the latest World Energy Outlook (IEA, 2011). The original analysis (IEA, 2010) was conducted in cooperation with UNDP and UNIDO and can be viewed as a preliminary exercise to prepare the way for a 9th MDG on energy access by 2015 when the current MDGs will expire. In fact, the 2010 IEA study lays a direct quantitative link between the MDGs and energy access targets by assuming that the MDGs for 2015 are feasible if the number of people without access to electricity are reduced from the present 1.6 billion to 1 billion and if the number of people dependent on traditional biomass are reduced from the present 2.7 billion to 1.7 billion. The 2011 IEA study looks specifically at the financial implications of universal energy access. All figures mentioned are calculated for investments additional to those already incorporated in the so-called New Policies scenario, comparable to a reference case. Universal energy access would require additional annual investments of 34 billion US$ on average, of which 30,5 billion US$ for electricity access and 3,5 billion for clean cooking. The average annual figures over 2010-2030 for sub-Sahara Africa are respectively 18.5 billion US$ for electricity access and 1.1 billion US$ for clean cooking. The study assumes that providing universal electricity access would be based on a mix of new grid connections, mini-grids and stand-alone systems. For clean cooking the technology mix is based on biogas systems, LPG and improved cooking stoves. Finally, the IEA assumes that electrification in rural areas starts at an average annual use of 250kWh/cap, in urban areas at 500 kWh/cap. All new connections increase electricity demand annually until the regional average is reached in a 5 year period.

Estimating required energy funds for universal energy access: UNIDO approach

A recent article by a number of scientists reporting in private capacity but mostly associated with UNIDO presents both existing estimates and own calculations on energy funds required for universal energy access (Bazilian et al., 2010). The calculations are based on full levelised costs instead of investment costs as in the studies cited earlier. They also vary assumptions on average per capita electricity needs: from 100 to 456 kWh/y for urban areas and from 50 to 360 kWh/y for rural areas. Estimated total costs of universal electricity access (including transmission & distribution) vary from 14 billion US$ to 141 billion US$ annually depending on the level of electricity supply per capita assumed. For clean cooking they refer to the studies above and present figures in the range of 1.4 to 2.2 billion US$.

Conclusions on energy aid funds required for development

It is clear that a straightforward comparison between these studies is impossible. They lack sufficient detail, they concern different definitions of costs and they make different assumptions on the level of aggregate electricity demand compatible with universal access by 2030. Yet, there are some fundamental messages to be derived from the four studies cited. First of all, they all agree that the required funds for universal electricity access exceed the required funds for clean cooking by a factor 10. Secondly, the order of magnitude of investment costs for pro-growth electrification and pro-poor electrification, at least in Africa, may be similar. The World Bank growth-oriented study provides an estimate of 23 billion US$ as the gap to be filled in order not to hamper potential growth, while the IEA access-oriented study provides an estimate of 18.5 billion US$ as the gap to be filled in order to reach universal access. It must be added, that these figures must be overlapping to some extent because presumably the World Bank certainly includes some electricity demand for consumptive purposes (trickling down impact), while conversely the IEA study may include some electricity demand for productive purposes (income generating impact).

It should be noted, that these investment requirements could be met by private sector funds, public budgets in developing countries and energy aid. So, the implications for energy aid funds are strongly dependent on how much leverage aid funds would be able to create and how much additional financing from public budgets in developing countries would be available. The IEA estimates, that financing for energy access in 2009 consisted of 22% from private sources, 30% from public budgets of developing countries and 48% from energy aid (IEA, 2011a). It is therefore important to realise, that reaching universal access is not just a matter of raising energy aid funding, but also of raising the relatively low rate of leverage of energy aid and the public budget share of developing countries. The first challenge is addressed in the chapter on aid effectiveness. The second challenge could potentially be addressed by tying increased support for energy access to decreased subsidies for fossil fuels that are often ill-targeted in terms of reaching the bottom of the income pyramid.

2.4 How much energy sector funding is needed for climate change?

Level of required energy funds for climate change mitigation

Estimating the long-term need for additional energy sector funds to mitigate climate change is at least equally difficult and potentially misleading as estimating required energy aid for development. Not all mitigation costs are energy-related, but may concern costs related to land use or industrial non-CO_2 greenhouse gases. Here, we only cite energy-related investment costs. It should also be pointed out, that these investment costs reflect the net effect of lower investment in fossil fuels and higher investment in renewables and exclude fuel costs. This more or less implies that existing flows of funds in relatively cheap fossil fuel technologies will be automatically available for new flows of funds in relatively expensive renewable energy technology. The largest share of mitigation costs is usually due to energy efficiency improvements in industry, buildings and transportation. But once again, this represents a net effect, in the sense that such additional costs must be calculated compared to a reference case of efficiency improvements in the absence of climate change targets.

The multitude of estimation problems and pervasiveness of uncertainties are reflected in the wide range of funding requirements estimated by international organisations. Estimates of annual incremental investment needs in the energy sector vary between 144 and 720 billion US$ at the global level and between 31 and 432 billion US$ for developing countries only (UNFCCC, 2007 respectively IEA, 2010b). It should be pointed out, that the very high investment costs for developing countries in the IEA study is primarily due to mitigation efforts in emerging economies such as China and India. Other well-known studies such as those of Project Catalyst (2009b) and McKinsey (2009) fall within this wide range. The figures cited are averaged out over a long period. It is generally assumed that mitigation investments will rise steeply over

time and these annual figures must be considered an overestimation for the short term and an underestimation for the long term.

The McKinsey study also details incremental investment needs for different global regions. Required incremental energy funds for climate change mitigation in Africa are estimated to be 12-35 billion US$ annually in this study. The figure of 12 billion US$ refers to the period 2011-2015, while the figure of 35 billion US$ refers to the period 2026-2030.

Level of required energy funds for climate change adaptation
Estimating the required funds for adaptation to climate change is even more difficult than estimating the required funds for mitigation to climate change because of two reasons. First, required funds for adaptation obviously depend upon the highly uncertain pace and pattern of climate change. Secondly, the additionality criterion stipulates that required funds should be incremental to the funds already necessary for a reference case of development. But defining such a reference case is rather arbitrary because investments for adaptation are an integral part of investments for development and are hard to separate out. Clearly, the least-developed countries are already susceptible to unacceptable risks in the present climate regime and it is rather arbitrary to separate which costs must be considered part of incremental costs and which costs should be part of foreseen development costs.

A recent study by the World Bank (World Bank, 2010) suggests that the incremental annual costs to adapt to a 2 degree warmer world in developing nations would be between 70 and 100 billion US$ in the period up to 2050. For Sub-Saharan Africa the regional figure would be 14 to 17 billion US. It should be noted explicitly that these incremental costs primarily refer to activities outside the energy sector concerning agriculture, water supply, human health, coastal protection and infrastructure. Although the indirect energy component in these activities may be substantial, figures for required adaptation funds cannot be meaningfully related to figures for required energy funds.

Conclusions on energy sector funds required for climate change
Again, one can wonder about the key messages that can be derived from the wide range of figures cited in the literature about required energy sector funds for climate change. First of all, it appears that estimated mitigation costs for developing countries tend to be far higher than adaptation costs. Of course, one should realise, that these figures are not independent. Clearly, higher mitigation costs should ultimately lead to lower adaptation costs. In fact, the adaptation cost estimates cited are based on a world that does not succeed at all in avoiding a two degree warmer world. At least for developing countries, it thus appears, that focusing first on adaptation, particularly in a capital-constrained world, that appears unable to settle on a stringent global climate change regime any time soon, would be a preferable choice from a funding challenge perspective.

2.5 Energy aid architecture and fund mobilization

Mobilizing climate change funds: UN recommendations
A recent report of the High-level Advisory Group on Climate Change Financing (UN, 2010) addresses the issue of how to mobilize climate change funds. It explicitly avoids any statements on actual investment requirements. It takes the figure of 100 billion US$ by 2020 first mentioned in Copenhagen agreement as an unassailable point of departure. The analytical foundations of this amount remain unspecified, but perhaps not surprisingly, it conforms to the estimates for either mitigation or adaptation costs mentioned earlier. It is also in the same order of magnitude as the lower range for total of ODA commitments today, which stand at 120 billion US$ (OECD, 2010). In principle, this is a pragmatic approach avoiding potential political controversies on the size of required funding at a stage of international dialogue where the focus should really be on where to obtain any level of sizable funding at all. It is problematic in the

sense, that the report also leaves open the question of how such funding should be spend, a question that can best be answered if there is a better idea on investment requirements for different targets, for instance mitigation versus adaptation or energy versus forestry. The figure of 100 billion US$ is also not intended as a 100% claim on the public budget of developed countries. Indeed, some would argue that the wording mobilizing is used intentionally to indicate that the majority of fund commitments would directly or indirectly come from the private sector (through the carbon market or international taxation schemes) or even the public budget of developing countries (in the form of funds released and captured by scrapping fossil fuel subsidies). In a sense, the goal of 100 billion US$ for climate change funding in the climate change community is conceptually similar to the goal of 0.7% of GDP for development funding in the development community. Both lack a solid analytical foundation based on estimated funding needs. It is even suggested in the report, that a significant part of climate change funding could be funnelled through the same multilateral channels that are already used for development funding and are able to deliver a substantial degree of leveraging of private funds. The report provides a catalogue of possible sources of finance; summarises the difficulties of measuring aid capital flows consistently and estimates the level of carbon market related sources of capital. However, it says little about how such resources should be disbursed and is therefore silent on potential major overlaps with targets related to development.

Threat of increasing fragmentation of ODA energy aid

The amount of public funds likely to be available from public budgets in developed countries for climate change purposes is dwarfed by the size of financial requirements for climate change mitigation and adaptation as has been shown above. As a result, mobilizing additional funds for the energy sector through the Green Climate Fund at sufficient scale will, for all practical purposes, be dependent on successful operation of carbon markets and international taxation initiatives. The success of such mobilization attempts is dependent upon a global post-Kyoto climate change regime and will be the subject of intensive global dialogue in the coming decade. One of the conditions for successful mobilization efforts is undoubtedly a clearer consensus on how forthcoming funds will be spent. Disagreements on earmarked allocation to targets of mitigation and adaption, as well as governance issues such as direct access to funds and procedures for disbursal are likely to slow progress substantially. Negotiations in the Transitional Committee on the design of the Green Climate Fund have so far revealed widely divergent positions of participating nations. This situation may actually lead to increasing fragmentation of ODA energy aid budgets in the coming decade as the pressure to serve both development and climate change targets from existing ODA sources increases.

Restructuring energy aid architecture for climate compatible development strategies

Energy sector funding in Africa to meet all basic goals of development and climate change must be increased by at least a factor two and possibly an order of magnitude depending on assumptions about private sector leverage and domestic public budget share. This is not likely to happen any time soon and tough choices must be made with respect to energy aid targets and energy aid architecture. Fragmentation of existing resources across all problem domains and across competing institutions may not be the best course to address the widening gap between expected funding requirements and available ODA budgets. Shifting existing energy aid towards targeting energy access (with emphasis on advanced cooking) and adaptation problems (with emphasis on resilient livelihoods) would be facing a much less daunting problem in terms of total fund mobilization than including targets of economic growth and mitigation at the same time. In such a situation it may be wise to admit that problems of rising affluence should increasingly be based on other channels parallel to ODA aid. The CDM mechanism can be viewed as a pilot in that respect, but unfortunately its effectiveness has been compromised at the recently concluded Durban negotiations and its continuity may even been in danger. It is likely that plurilateral negotiations between groups of countries offer more promise for addressing urgent climate compatible development problems in the next few years. In this situation, OECD nations should make it clear that they are not only unable, but also unwilling to address problems of rising affluence in developing nations with existing ODA funds and that the concept of additionality be-

tween development and climate change funds is a dead-end track, in the sense that the real issue at stake is priority setting within existing ODA funds. Therefore, OECD countries should make it clear that they will gradually focus more on problems of persistent poverty while constructively seeking to mobilise additional funds for problems of rising affluence through other channels than ODA aid.

3. ENERGY AID EFFECTIVENESS AND PUBLIC SUPPORT

3.1 Climate compatible development strategies and aid effectiveness

Evolution of energy aid motives and modalities

Energy aid strategies have changed over time, reflecting the evolution of thinking about both the role of the energy sector in development and the most appropriate way of channelling funds for investment and capacity building (energy aid modalities). The arrival of climate change and climate compatible development strategies will affect this on-going evolution. On the one hand, it is likely that energy aid motives will be strengthened in view of the transformative role of energy for both mitigation and adaptation. On the other hand, it may become more difficult to guarantee energy aid effectiveness when both traditional targets of economic growth and poverty alleviation as well as new targets relating to mitigation and adaptation have to be accomplished simultaneously. Climate compatible development strategies must therefore carefully consider how to restructure energy aid modalities in line with these new challenges and how to address issues of energy aid effectiveness adequately, particularly in view of safeguarding public support.

Objective of this chapter

The next section discusses why the arrival of climate change is likely to strengthen the motives for energy aid and why this may help in safeguarding public support. We than proceed to emphasize the role of aid effectiveness in maintaining public support and discuss the weakening appeal of the 'trickle down' assumption regarding the link between economic growth and poverty alleviation. We argue that the evolution of energy aid modalities is entering a new phase with more emphasis on output-based financing tools. This new phase of restructuring must lead to improved energy aid effectiveness. The final section indicates what the consequences of more emphasis on output-based financing tools are for energy aid architecture in light of the conceptual framework for climate compatible development strategies as visualised in Figure 1.2.

3.2 Energy aid motives in times of climate change

Traditional energy aid motives

There are two main motives for development aid: the moral imperative and enlightened self-interest and it appears that the second motive is gaining in importance relative to the first (WRR, 2010). The moral imperative views development aid as an issue of global justice and solidarity. People everywhere have the right to a minimal level of economic welfare and unconstrained development of individual capabilities and those better off in this respect are obliged to help those less privileged. Enlightened self-interest views development aid as an indirect means of reaching goals of geopolitical stability and trade promotion. By supporting developing nations on the road to economic growth and individual freedom, the probability of civil strife and the propensity for emigration are diminished, while the prospect for mutually advantage trade are increased.

Both motives are important drivers of energy aid at present. The millennium development goals are primarily related to aid as moral imperative and energy access is increasingly viewed as a key condition to reach these goals. The UN Assembly has declared 2012 as the year of Energy Access for All and the International Energy Agency has made a valiant attempt to put energy access on the agenda of developed nations (IEA, 2010; IEA, 2011). These events can be viewed as a prelude to declaring energy access as a new Millennium Development Goal in 2015. At the same time, the strength of the enlightened self-interest has not receded. As mentioned earlier a lot of ODA energy aid is directed to fragile states and this reflects traditional views on enlightened self-interest. Helping fragile states is an obvious road to geopolitical stability. More gen-

eral, building up energy infrastructure is capital- and import-intensive and thus likely to have a comparatively large impact on exports from donor nations.

Energy aid motives strengthened by climate change objectives

In addition to traditional justifications for energy aid, the arrival of climate change has added other justifications for energy aid. In particular, combating climate change can be viewed as a global public good and, as such, clearly a form of enlightened self-interest. Mitigating greenhouse gas emissions in developing nations is of obvious advantage to developed nations. It is also clear that mitigation efforts in both developed and developing countries should increase substantially very soon. The latest IEA World Energy Outlook (IEA, 2011) states that, if present patterns of energy investment do not change before 2017, the world will be unable to keep CO_2-concentration below 450 ppm without massive capital destruction. This concentration is generally considered to lead to a global temperature increase of 2 degrees Celsius with dire consequences for economic welfare, particularly in vulnerable countries with large populations below the poverty line.

Unfortunately, such a change in patterns of energy investment is unlikely in times of financial crises, because it would require a substantial scaling up of financial aid flows to developing countries as noted earlier. This is only feasible in the long term and any change would arrive too late to prevent damaging climate change. This makes it all the more likely that many people in developing nations will soon face the prospect of falling down instead of rising up the income ladder. To stop people from falling down the income ladder is an altogether different challenge than to help people up the income ladder. This justification should strengthen the appeal of the moral imperative for energy aid in times of climate change, because energy access is certainly a key precondition for resilient livelihoods. Therefore, the design of climate compatible strategies should at least pay as much attention to climate resilient strategies as to low carbon strategies. It may soon be too late to prevent serious climate change impacts, but it may not be too late to take effective adaptive actions.

Climate compatible development strategies and public support

Many practitioners in development aid take it for granted that public support is essential for maintaining financial commitments. But they often misinterpret the sceptical attitude of the public about effectiveness as a sign of the waning importance of the moral imperative. Opinion research shows that the moral imperative remains as strong as ever (EC, 2010).

In times of climate change this moral imperative will be reinforced. Aid is no longer just about addressing the basic needs of the poor now, but also concerns safeguarding livelihoods in the future. In this respect, energy aid must put more emphasis on its transformative role in securing food and water supplies when seasonal weather patterns change and become more unpredictable. Any convincing narrative based on ethical considerations must emphasize the urgency of designing climate resilient strategies and describe how such self-reliance oriented strategies differ from previous energy access strategies.

3.3 Energy aid effectiveness and energy aid modalities

Public support and the effectiveness debate

Public acceptance of energy aid is not just a matter of why energy aid ought to be mobilized (energy aid motives); it is also a matter of how energy aid can be disbursed effectively (energy aid modalities). As argued above, the moral imperative motive will remain a strong driver of energy aid in times of climate change, but public confidence in the capabilities of donor and recipient nations to spend available funds wisely is eroding fast. This necessitates much more attention for energy aid modalities and effectiveness.

Aid modalities range along a broad spectrum with, on the one side, very general modalities such as balance-of-payments support, general public budget support and debt relief (high-level modalities) and, on the other side, very specific, earmarked funding for narrowly defined projects (low-level modalities). In between is a whole range of intermediate modalities that are neither very general nor very specific. Intermediate modalities disburse funds on the sector and programme level. In general, high-level modalities require substantial faith in good governance in developing nations because such modalities depend to a great extent on optimal conditions of procurement and accountability at the receiving end. Low-level modalities on the other hand require substantial faith in good governance in donor nations because such modalities are easily threatened by lack of local ownership, insufficient alignment with national policies, unpredictable fund flows and unclear accountability rules.

Sceptical attitudes about aid effectiveness tend to focus exclusively on either end of the spectrum. At the high level end, it is very difficult to relate aid flows directly to concrete results and some observers would conclude that such aid simply removes incentives for performance and provides additional room for corruption. At the low-level end, it is easier to relate aid flows directly to concrete results, but the dangers of excessive overheads in implementation, discontinuities at the end of project lifetimes and fragmentation of efforts loom large. Climate compatible strategies focus on broad energy transitions that are in principle promoted through energy aid modalities oriented at the sector and programme level. In this sense they are less susceptible to traditional forms of aid scepticism. In the dialogue on aid effectiveness, much more attention should be paid to the transformative role of energy in society and the sector or programme-oriented nature of energy aid.

The trickle-down assumption and energy aid effectiveness

A fundamental problem with energy aid has been the intertwining of the economic growth objective and the energy access objective. Energy aid aims to improve economic growth while at the same time increasing energy access. In practice, the former goal has played a far more important role in energy aid in the past than the latter goal. The tacit assumption has always been that providing energy infrastructure allows economic growth and employment creation. Energy aid would somehow trickle down to the poor through improved prospects for income generation and thus allow energy access improvement. Unfortunately, this is not happening. The recent overview of the IEA shows (IEA, 2011a) that there still are 1.3 billion people without access to electricity and 2.7 billion people without access to clean cooking. From an effectiveness point of view, the major problem of energy aid may not be that it is dependent on the wrong type of aid modalities, but that the existing aid modalities are insufficiently focussed on energy access and that the trickle-down effect is not operating in practice.

Evolution of energy aid modalities in the past

As previously depicted in Figure 2.1, energy aid modalities have evolved over time from input-based support of public utilities to programme-based support of sector reforms toward liberalisation. These two energy aid eras reflect broad changes in ideological thinking about the energy sector in donor nations.

In the traditional era the energy sector was viewed as a typical public utility sector in the infrastructure domain. Energy aid was primarily intended as a public capital injection to help build up critical infrastructure in the form of large-scale power plants and expanding networks. In the later years of this phase, dramatic changes took place in the energy sector of OECD nations when liberalisation trends led to privatisation of former public utilities and separation of the generation, transmission and distribution, and final supply functions in distinct companies.
This market-oriented change started to effect energy aid funding in the early 1990's and led to a new era of energy aid in which an attempt was made to transfer the traditional role of ODA funds to the private sector in particular by attracting independent power producers. Energy aid decreased dramatically in volume and shifted from hard investments to soft sector reform programmes including policy support and energy efficiency programs. Ultimately, this sector

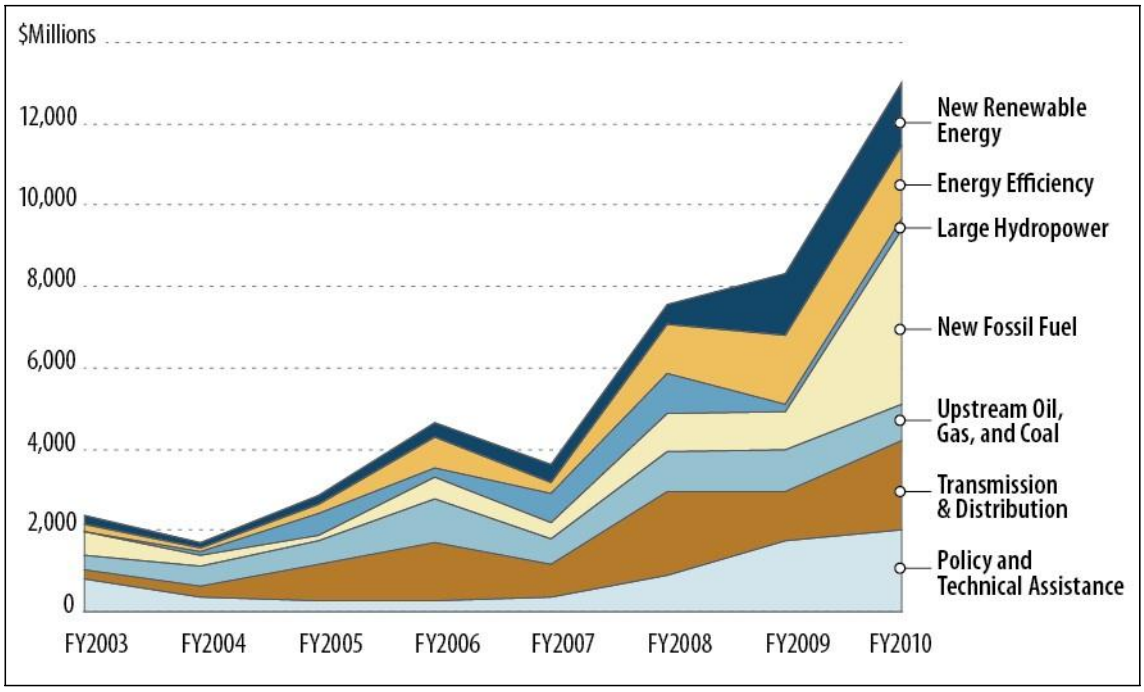
reform era proved frustrating because liberalisation in developing countries encountered severe problems. Many independent power projects (IPP's) succeeded in attracting foreign private capital, but the accompanying power purchase agreements (PPA's) often worsened rather than improved financial performance of power companies. The pace of liberalisation and privatisation faltered. Sector reform did not often succeed in solving the large inefficiencies in the energy sector having to do with the inability and unwillingness to abolish large fossil fuel subsidies. Electricity companies often remained poor performers when it came to recovering cost (subsidized tariffs), lowering unaccounted distribution losses (including theft) and shedding redundant labour (protected jobs).

Results of present restructuring efforts disappointing

It appears, that energy aid agencies have already entered a new era of energy aid modalities where the intention to increase the share of renewables and improve energy access has become more prominent. The emphasis on renewable energy started already a decade ago, but the emphasis on energy access is relatively recent. This initial process of restructuring is far from finished and seems to be lacking momentum. An overview of World Bank energy financing by the US Congressional Research Service reports a remarkable growth in the level of energy aid in the past decade, but notes that the shift from fossil fuel financing to renewable financing has stalled (Latanzio, 2011) as indicated in Figure 3.1. The categorization of aid spending used may even underestimate actual disbursements related to fossil fuels, because a large part of the categories transmission and distribution and policy and technical assistance is likely to relate to fossil fuels rather than renewables.

NGO's have also been highly critical about the incorporation of energy access targets in World Bank lending (Mainhardt-Gibbs et al., 2010). Although the World Bank is in the process of fundamentally restructuring its energy aid strategies with clean energy and energy access as overarching goals (World Bank, 2011a), this restructuring process is stalled. Emerging nations consider any attempt to impose carbon-related restrictions on their energy mix as unacceptable and detrimental for fast growth, while NGO's complain that the proposed restrictions are inadequate and detrimental for fast mitigation.

In addition to mitigation concerns, it should be noted, that creating a bankable project pipeline for energy access solutions at scale is entirely different from keeping a bankable project pipeline for large-scale power plants going. Many observers even question the credibility of the World Bank in the area of implementing energy access solutions and reaching the poor. However, this problem is not a matter of institutional lethargy as some would have it. Embarking on energy access strategies is simply a much more complex and risky venture that may require fundamental changes in energy aid modalities. With respect to energy aid, this dialogue presently focuses on the shift from input-based to output-based aid and the opportunities to engage local entrepreneurs constructively in the energy market at the base of the income pyramid.



Source: World Bank Group Energy Portfolio Data at http://go.worldbank.org/ERF9QNT660.

Figure 3.1 *World Bank Energy Aid Portfolio 2003-2010*

3.4 Improving energy aid effectiveness

Three eras in energy aid modalities coincide with shifts in financing mechanisms

Doubts about the effectiveness of aid have a history as long as aid itself. Most professionals in the aid community are as convinced about the need for improving the effectiveness of aid as critical outsiders. Major international agreements about development aid specifically address the very conditions that would make aid more effective. The Paris Declaration of 2005, the Accra Agenda for Action of 2008 and the Busan Partnership Document of 2011 all call for more focus on results, improved accountability, greater ownership on the recipient side and less fragmentation on the donor side. Many believe that new financial mechanisms will help achieve such aims.

Not surprisingly, the evolution of energy aid modalities as described above has been accompanied by a parallel change in energy aid financing mechanisms over the past decades as illustrated in Figure 3.2 for investments in the power sector. During the traditional era most of the financing concerned direct investments in energy equipment for public utility expansion plans. In the liberal era, public aid funds were more and more viewed as additional to private funds from privatised utilities or independent power producers. The share of aid into sector reform (capacity building and performance improvements) increased as did the aid into energy efficiency programs and public policy support. Disappointment with the lack of progress in many reformed electricity companies and the arrival of climate change problems then shifted to more specific targets within the sector, in particular renewable energy implementation. In principle, energy aid could be used to support feed-in tariffs and renewable portfolio standards in developing countries; financial instruments that are already widely applied in industrialised nations and that would be classified as output-based or result-based aid in the development community. Designing such instruments for universal energy access will however be much more challenging.

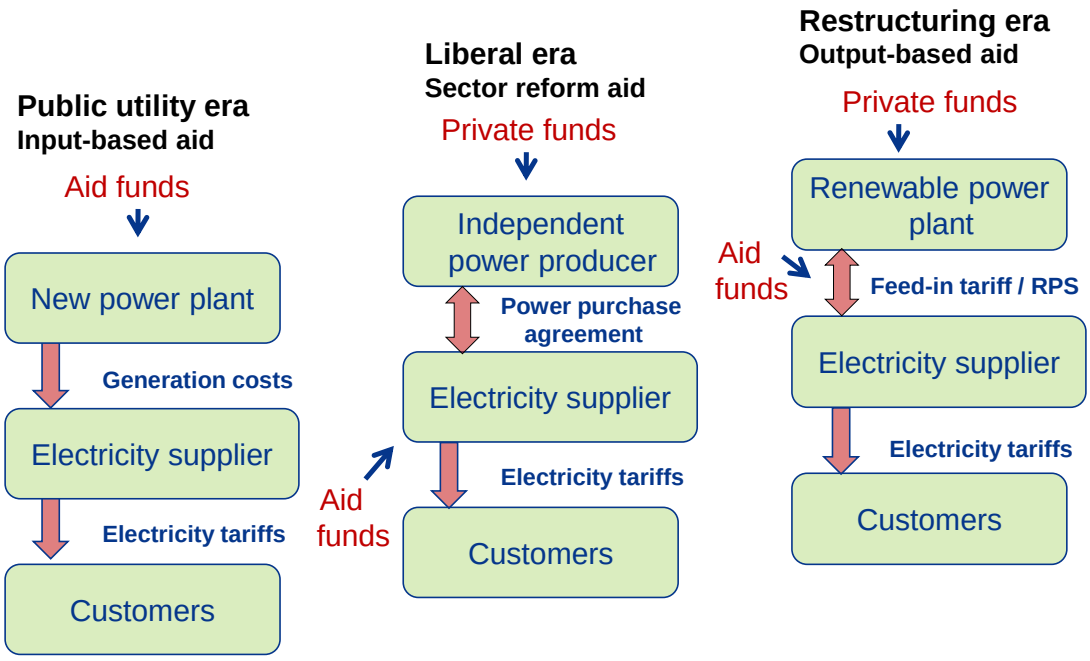


Figure 3.2 *Evolution of energy aid financing approaches in the power sector*

Principles of output-based financing instruments

Result-based aid or output-based aid (OBA) intends to improve the effectiveness of aid by making aid commitments conditional on performance. Other terms have been introduced with slightly different connotations such as cash-on-delivery (when the focus is on government performance) or advanced market commitments (when the focus is on business performance). Aid funds could be disbursed as a price or quantity guarantee on the market for energy deliveries of a specific target source (renewable energy) and/or for a specific target client (the poor).

Like the introduction of liberalisation policies in the 1990's from OECD to developing nations, energy aid professionals are now considering introducing feed-in tariffs or renewable portfolio standards in developing countries. In this case the difference with market prices is not financed from national public budgets or tariff revenues like in OECD nations but from foreign aid. However, the experience with transferring public policy developments in OECD nations to developing nations during the liberalisation era is certainly cause for concern if feed-in tariffs or renewable portfolio standards are introduced uncritically in a new era of output-based financing. Output-based aid financing could also help the private sector to overcome the substantial price and quantity risks associated with operating in markets at the base of the income pyramid by guaranteeing a minimum price for items sold or a minimum quantity of items demanded.

Although terms like output-based funding are primarily used in the development community, it is the climate change community that has actually developed a unique financing mechanism that conforms most closely to this definition. The CDM is a perfect example of a financial mechanism with a very clear, output-based target involving rules about payments for realised deliveries on the carbon market under strict conditions of measurability, reportability and verifiability (MRV).

Output-based financing must be designed as a transitional form of subsidy

Although the promise of output-based financing must be viewed positively because it links aid funds directly to results on the ground, one should realise that output-based financing is nothing else than another way of subsidising energy services that the market is unwilling or unable to provide. Like any other type of subsidy, OBA-type financed subsidies run the risk of becoming

either one-off or permanent subsidies. Simply replacing fossil fuel subsidies with renewable energy or energy access subsidies or worse, adding additional subsidies to fossil fuel subsidies, could compound financial problems in the long run and ruin the prospects for a balanced public budget in developing countries. Of course, the implicit assumption is often that OBA-type financing will be transitional, setting in motion entrepreneurial solutions that will ultimately turn out to be self-supporting. It is thus of evident importance that OBA-type financing mechanisms include a solid exit strategy, stipulating why and when the disbursed subsidies are likely to be phased out.

Output-based financing requires delicate financial engineering
Output-based financing appears attractive, because pay-outs presumably occur only once concrete output has been delivered. Unfortunately, if funds become available at the end of the project cycle, when results are available for monitoring, reporting and verification, the question remains how do projects get started in the first place? Indeed, the need for aid exists precisely because of insufficient funding for inputs. Potential service providers are unable to finance initial investments up-front and intended customers may be unable to pre-finance household expenditures for lack of access to microfinance. Climate compatible development strategies should thus be based on a mix of measures, including output-based financing. It is worth noting here, that the long delays between registering approved CDM projects and receiving proceeds from CER sales has been a major complaint of the private sector in climate change financing where involved companies are usually in much a better financial position for up-front financing than companies operating at the bottom-of-the-pyramid. Output-based financial mechanisms must therefore find an optimal fit between the investment logic and practice of mainstream financial management and the exceptional conditions of the bottom-of-the-pyramid market. This involves transferring part of the entrepreneurial and financial risks to aid donors without sacrificing incentives for performance. Delicate financial engineering is thus required with part of the capital provided up-front for pre-financing investment and/or re-financing consumer debt and part of the payments reserved for rewarding services actually delivered.

3.5 Energy aid architecture and energy aid effectiveness

Promise of output-based financing for energy programmes seems justified
The increasing attention for output-based financing in development aid seems justified for several reasons. First of all, it has become abundantly clear, that decades of energy aid have so far not resulted in major impacts on energy access problems. This is partially a result of insufficient funding, particularly in the case of electricity access, but it is also a result of insufficient targeting of energy access problems and too much faith in trickle-down processes. Because output-based financing implicitly requires a clear focus on targets, it seems a priori a more suitable mechanism for pro-poor energy aid policies.

Secondly, output-based financing may be crucial to attract private entrepreneurial talent and finance as well as leverage public funds for scale-up. Companies require clear targets and financial incentives to perform optimally and output-based financing can provide these. The failures of the past with too much emphasis on government-driven, top-down approaches should lead to an attitude of venture capitalism and social entrepreneurship in the development aid sector, an attitude that has already taken root in the philanthropic aid sector. Finally, output-based financing implicitly puts a premium on standards of measurability, reportability and verifiability (MRV) in order to be implemented transparently. Conforming to such standards would certainly accommodate the public demand for greater transparency and accountability in addition to accommodating the pressure to yield concrete results.

Emphasis on output-based financing has consequences for energy aid architecture

The alternative vision of climate compatible development strategies presented in the first chapter suggests that energy aid architecture should no longer be split into organisations, rules and financial flows dealing primarily with problems of either development or climate change, but into organisations, rules and financial flows dealing primarily with problems of either rising affluence or persistent poverty. This allows for much better targeting of objectives, rather than striving for multiple win solutions where all objectives are aimed at simultaneously. In terms of improving energy aid effectiveness, such a split would also seem more compatible with output-based financing tools that can only be applied consistently when targets can be defined uniquely.

4. CLIMATE COMPATIBLE DEVELOPMENT AND SYSTEMS INNOVATION

4.1 Climate compatible development strategies and energy transitions

Dual nature of required systems innovations in developing countries
The dialogue on climate compatible development strategies is often confined to a purely technological perspective where the focus is on the role of specific energy technologies in addressing problems of economic growth, mitigation, energy access and adaptation. Clearly individual technologies will play a key role in climate compatible development strategies. But the dialogue about climate compatible development is not just about specific energy technologies; it is about sector-wide energy transitions that encompass co-evolutionary developments in technological, economic and institutional systems.

Energy transitions to address problems of rising affluence (economic growth and mitigation) require altogether different co-evolutionary changes in technological, economic and institutional systems than energy transitions to address problems of persistent poverty (energy access and adaptation). This observation has a lot to do with the fact, that the former type of energy transition should be primarily focussed on the rising middle class and industrial activities, while the latter type of energy transition should be primarily focussed on the bottom-of-the-pyramid and agricultural activities. The design of climate compatible strategies should take this dual nature of required systems innovations into account.

Objective of this chapter
This chapter begins with a discussion of the basic differences between system innovations for green growth and energy access. We then observe that integrating economic growth and mitigation targets for green growth seems to be proceeding very slowly. This not only poses a procedural bottleneck for the urgent pursuit of universal energy access, but it also leads to insufficient attention for the equally important integration of poverty alleviation and adaptation targets. The case of climate-smart agriculture is mentioned as an example. In the final section, we argue that solving these issues of systems innovation separately has consequences for energy aid architecture, as illustrated in the conceptual framework for climate compatible development strategies of Figure 1.2.

4.2 Systems innovations for green growth and energy access

Differences in scale and scope of technology
Energy technologies vary enormously in scale and scope and these characteristics determine the nature of the required systems innovation for green growth and energy access respectively. The difference in scale has to do with the capacity ratings of equipment and the related complexities of fuel supply, operation and maintenance, and transmission and distribution. The difference in scope has to do with the type of services delivered and the related complexities of customer demand and process integration. Providing the poor with affordable, stand-alone electric light and battery charging and clean cooking and heating is just as much a technological innovation challenge as providing industry with reliable, grid-connected, electric drive and process steam and heat.

The arrival of climate change leads to a shift in challenges at both ends of the range. While mitigation really counts at the high end of the scale and scope range, where most greenhouse gases are emitted, adaptation really counts at the low end of the range where vulnerabilities are most immediate. Climate change will reinforce the need to expand energy use in the rural, agricultur-

al domain to safeguard food and water supplies, while at the same time reinforcing the need to limit energy use in the urban, industrial domain by efficiency measures. While energy access technology has, so far, largely focussed on micro-scale, consumptive technology (cook stoves, biogas digesters, solar lamps and home systems), the demands of rural productive uses at mini-scale (mechanical drive, mini-grids) will now become much more important to safeguard food and water security. On the other end of the range, mitigation demands will lead to a larger share of smaller scale renewable technologies and intensified energy efficiency efforts. It is likely however that technologies at the high end of the range, including both mitigation and efficiency options, will be developed principally in high-income countries and subsequently transferred to developing nations, while this is not the case for technologies at the low end of the range. Addressing problems of persistent poverty and resilient livelihoods require an intensified research and development strategy that is not addressed adequately in present approaches to climate compatible development strategies.

Nature of systems innovations differ for green growth and universal energy access

The challenges to induce green growth and improve energy access are not just of a technical and engineering nature; they require systems innovations that have to do with a host of supporting systemic functions. Those commonly mentioned in the literature concern financial and human resources, research and development, entrepreneurial involvement, regulatory and legal embedding, market development and quality standards. In general, such systemic functions are much easier to fulfil for the large scale, urban and industrial market than for the small-scale, rural and agricultural market. This is because the risk-return profile for small-scale options in a rural, agricultural setting looks quite different than that for large-scale options in an urban, industrial setting, particularly from a business model perspective. Doing business at the top-of-the-pyramid is not at all comparable to doing business at the bottom-of-the-pyramid and this has important consequences for energy aid. Systems innovations should be coherent from this business environment perspective, but establishing a coherent package of system innovations for multiple-win solutions that address problems of economic growth, poverty alleviation, mitigation and adaptation simultaneously is hardly possible. This is an important reason for reframing the dialogue on climate compatible development strategies along two parallel tracks: one for the problems of rising affluence (energy infrastructure and mitigation) and one for the problems of persistent poverty (energy access and adaptation).

Technology transfer for energy transitions

Technological transfer to developing countries for purposes of green growth often concern large-scale technologies that are close-to-commercial and past the research and development stage. Such technologies face similar conditions of operation and maintenance in developed and emerging nations and play already a major role in foreign direct investments. In this case, energy aid can facilitate such transfers and be instrumental in enlarging the volume of investment for growth and making such investments perform better in terms of sustainable targets such as level of efficiency and level of emissions. Technology transfer to developing countries may also concern small-scale technologies, that are in an initial stage of commercialisation and need further development and demonstration, are facing entirely new condition of operation and maintenance and do not play a major role in foreign direct investments. Portfolios of the first kind of energy technologies are characterised by a completely different risk-return profile than portfolios of the second kind. While the first type of portfolio can be easily financed following the standard logic and processes of financial management, the second type of portfolio necessitates a new logic and new processes of financial management having more to do with emerging practices of social entrepreneurship than existing practices of large-scale project financing. In general, the nature of the risks involved is also very different. Where large-scale, fossil-fuel technologies are concerned, fuel price escalation forms a major risk factor; where small-scale, renewable technologies are concerned, investment cost forms a major risk factor.

4.3 Two types of integration efforts needed

Integration of economic growth and mitigation targets is proceeding slowly
As has been pointed earlier, fast development and slow climate change are more or less incompatible at present, because income growth is intimately linked with higher levels of energy supply and fossil fuel options are still essential to expand energy supply. This complicates the integration of economic growth and mitigation targets, particularly for emerging economies that are strongly dependent upon coal. Negotiations between developing nations and donors are proceeding very slowly in this respect as exemplified by the discussion on the new energy strategy of the World Bank in the past year. This draft strategy incorporates objectives of both low carbon growth and energy access (WB, 2011a). But the approval process is not progressing, because the strategy is caught between the driving forces of the past (building up energy infrastructure at low cost to boost economic growth) and the future (low carbon development).

On the one hand, emerging middle-income countries strongly object to constraints attached to their choice of energy technology mix (in particular no further support for coal). On the other hand, development NGOs complain that the sustainability ambitions of the World Bank are in fact too weak (no farewell to fossil fuels and large-scale hydro). A similar controversy is undermining the credibility of the Clean Development Mechanism (CDM). The support for supercritical coal plants is considered justified by emerging nations, but viewed as a time bomb for the environmental integrity of the CDM by NGO's (SEI, 2011).

This struggle to shape green growth strategies may actually be hampering progress on promoting the energy access agenda, which is still strongly tied to the green growth agenda in terms of energy aid architecture and institutional responsibilities.

Integration of energy access and adaptation targets for resilient livelihoods urgent
Although the issue of universal energy access has certainly become much more prominent in the dialogue on sustainable energy transitions, the integration of energy access and adaptation targets receives only marginal attention. In fact studies on energy access are more inclined to lay a link with mitigation issues than with adaptation issues. Yet, as has been pointed out before, energy transitions at the bottom-of-the-pyramid hardly matter at the global scale from a mitigation point of view. However, the energy technologies involved in universal energy access are to a large degree intimately connected with agriculture and forestry; the sectors most likely to be in need of adaptation measures when extreme events increase and rainfall patterns change. From a systems perspective, strategies for energy access should pay much more attention to linkages with small-scale agriculture and forestry than to linkages with large-scale energy supply. Such integration efforts are likely to strengthen the role of productive technologies such as mechanical power compared to consumptive technologies such as clean cooking and micro-scale electricity access. Energy systems innovations for resilient livelihoods concern small-scale rural communities and the agricultural sector and they have little in common with large-scale, urban communities and the industrial sector that should be the focus of strategies for green growth.

Energy access transitions, climate smart agriculture and adaptation
Climate smart agriculture has recently received strong attention in development aid circles (FAO, 2010; World Bank, 2011b). Climate smart agriculture seeks to simultaneously increase farm productivity, improve rural livelihoods, adapt to climate change, reduce GHG emissions or remove atmospheric GHG. They are a perfect example of climate compatible development strategies outside the domain of energy. The dialogue on climate smart agriculture is also characterised by a triple-win vision of interventions in which development, mitigation and adaptation are simultaneously targeted. Although this analysis is not intended to address issues of agricultural productivity and rural livelihoods directly, it is important to note that the dialogue on climate smart agriculture lacks a clear link with energy access issues and seems to be focussed more on the mitigation aspects of energy than on the critical role of energy availability as such.

From the perspective of energy systems innovation, the integration of climate smart agriculture and energy access transitions should receive much more attention.

4.4 Energy aid architecture and systems innovation

Dynamics of poverty when climate changes

Although this analysis does not address general aspects of poverty reduction and alleviation, there is one aspect of poverty that is of particular importance when it comes to the architecture of future energy aid. Climate change will lead to fundamental changes in the dynamics of poverty. Often, energy poverty is subconsciously perceived from a static perspective as if the world has a fixed pool of poor people at the bottom-of-the-pyramid whose energy needs have to be addressed. In reality, people move in and out of this pool constantly. The number of poor may be the same ten years from now, but they are not the same people. The dynamics of poverty will change dramatically when climate change starts to affect local livelihoods. As a result the challenges for pro-poor energy aid policies will multiply. In addition to trying to lift people out of poverty and servicing basic energy needs, pro-poor policies must now include efforts to prevent people from falling down the income ladder into poverty and safeguard their livelihoods at a higher level. Although this threat is not primarily an energy challenge, adaptation is to a significant extent related to adequate energy supplies. In particular, securing water supplies for drinking water and food production will become crucial and consequently desalination and irrigation may become more and more indispensable to guarantee sufficient local resilience. That is to a large degree also a problem of adequate energy infrastructure at the local level.

Bilateral ODA energy aid most appropriate for energy access innovation

Universal energy access programmes involving small-scale energy technologies to reach pro-poor, climate resilient targets are likely to concern pre-commercial technologies. Such technologies are difficult and costly to procure under conditions of international competitive bidding and are likely to involve innovative financial solutions strongly dependent on national conditions and involvement of new local companies. Under these conditions projects and programmes may be best implemented by bilateral cooperation initiatives characterised by high risks and complex exit strategies with an experimental character. Preferably, such initiatives should be organised in plurilateral coalitions of the willing in order to avoid further fragmentation of efforts. Such initiatives require innovative financial engineering and a risk-taking attitude of development agencies that operate in emergent, socially-inclusive markets where new business models will be confronted with high risks. Such an attitude has more in common with the present role of some major philanthropic funds than with the traditional, accountability-conscious and risk-aversive role of traditional development agencies. It also requires a clear message to donor tax payers about the need to scale-up energy aid and to move from ad-hoc palliative aid to long-term, transformative aid.

Multilateral CC energy sector funding most appropriate for close-to-market technologies

Green growth programmes to reach pro-growth, clean energy targets are likely to concern close-to-market, large-scale energy technologies that should be supplied under conditions of competitive bidding and standard logic of financial management. Such projects are best implemented by multilateral agencies that have a track record in financial engineering of complex but near-commercial investments where risk management is relatively straightforward. Such technologies are also more likely to involve existing national companies thus avoiding the high risks associated with establishing an altogether new business environment as is the case for energy access technologies.

5. CONCLUDING REMARKS

5.1 Conclusions on climate compatible development strategies

Main conclusion

Until recently, the pursuit of development and climate change targets has proceeded along largely separate tracks from an institutional point of view. The need to integrate development and climate change targets constructively has led to a dialogue on climate compatible development strategies. At present, this dialogue focuses on the design of triple-win strategies that aim to further goals of development, mitigation and adaptation simultaneously (Figure 1.1). This vision on integrating development and climate change goals, however, tends to obscure rather than illuminate the crucial decisions policy makers must make when shaping strategies to promote sustainable energy transitions in developing countries. Moreover, it ignores the key challenges already facing energy aid for development today without the additional complications of climate change. These key challenges concern the growing gap between required and available sources of funding, the need to improve energy aid effectiveness and safeguard public support, and the difficulties of pursuing energy transitions that target economic growth and energy access simultaneously in practice.

An alternative vision is presented in which the traditional divide between solving problems of development and solving problems of climate change is replaced by an alternative divide between solving problems of rising affluence and solving problems of persistent poverty. It splits development strategies into two separate domains (pro-growth and pro-poor) and proposes that climate compatible development strategies should focus on two separate integration efforts (integrating pro-growth and mitigation strategies, and integrating pro-poor and adaptation strategies).

Key challenges can be addressed more effectively in a two-pronged approach

An overview of present energy aid funding and future requirements shows that existing funding is increasingly insufficient to target both problems of increasing affluence and persistent poverty effectively. Priorities for energy aid funding from ODA budgets should therefore shift progressively to an integrated focus on pro-poor and adaptation strategies, while priorities for energy sector funding from climate change funds should be set conditionally on mobilization of additional funds from global carbon markets or international taxation initiatives.

Energy aid efforts that exclusively address problems of persistent poverty can possibly arrest the decline in public support for ODA-financed development aid. This requires a new era in energy aid modalities, in which the transformative role of energy for rural livelihoods is fully recognised. In this era of restructuring, output-based financing mechanisms should be creatively explored to address energy access and adaptation targets and make aid effectiveness measurable, reportable and verifiable.

Green growth and universal energy access both require complex system innovations. However, the portfolio of appropriate technologies, the business environment and the institutional setting required for systems innovations regarding green growth respectively universal energy access have little in common and warrant separate development strategies and a restructuring of energy aid architecture. This restructuring of energy aid architecture may initially involve a strong focus of bilateral aid on universal energy access and ultimately an increasing role of multilateral energy sector funding for green growth if sufficient multilateral funding from global carbon markets or international taxation is forthcoming.

Additional concluding remarks
The following sections contain some concluding remarks, that do not directly or specifically concern the design of climate compatible development strategies, but that are important to understand the context in which climate compatible development strategies must succeed. They are provided as a background for interpreting the rationale of the alternative vision on climate compatible strategies presented.

5.2 Geopolitical realities and poverty dynamics

Geopolitical realities in the new century
The present institutional and financial mechanisms for both development and climate change aid are a heritage from the past century and reflect the geopolitical realities of the past century. Dividing the world in developed and developing countries has become highly misleading from many perspectives. The arrival of emerging economies that succeeded in unimagined and continued high rates of economic growth has had a profound impact on the pace and character of globalisation.

From the perspective of development aid strategies it is important to notice that no longer are the poor confined to poor countries and the rich to rich countries (Sumner, 2010). In the near future the majority of both the global middle class and the global poor will live in the emerging economies of Asia. From the perspective of climate change mitigation, it is equally true that the division in annex 1 and non-annex 1 countries agreed upon at the start of the 1992 UNFCCC has become inappropriate to address post-2012 global problems of climate change. China has surpassed the US both in terms of cars sold and in terms of carbon emitted. Of course, the per capita emissions of China are still far below those of the US, but the differences are diminishing fast. Similar observations can be made for countries such as Brazil and India. The concurrent global shifts in market forces make the past division of the world in developing and developed nations or annex I and non-annex I countries obsolete.

The continuing ideological posturing of countries along traditional lines of geopolitical demarcation is becoming an obstacle to progress in both development and climate change. Development cooperation and climate change policy can no longer be viewed as separate problems and the institutional and financial mechanism to address them can no longer be based on simply splitting the world in developing and developed nations as has been the case in past decades.

Poverty dynamics in the new century
The future of stringent climate change mitigation is becoming more and more uncertain and the necessity of substantial climate change adaptation is becoming more and more certain. Poverty policies used to be focussed purely on lifting people up the income ladder, but unfortunately they will have to focus increasingly on preventing people from falling down the income ladder because of climate change impacts. Moreover, aiding poor countries can no longer be viewed as equivalent to aiding the poor, because aid is not performing adequately in terms of targeting the poor. Because the majority of the poor are not living in poor countries anymore, emerging economies with a substantial middle-class will be addressing poverty problems at the national level through domestic redistribution policies and south-south cooperation rather than traditional development aid. Poverty dynamics are likely to become much more complex as a result of these two evolutions. These new dynamics must be recognized and addressed by international development efforts and ultimately lead to appropriate changes in the architecture of international aid.

Multilateral negotiations on development, energy and climate stalling
There are worrying signs that the progress in reaching multilateral agreements on development cooperation and climate change policies is slowing down. The main reason for this is the increasing conflict between the economic interests of emerging, middle income economies and the environmental ambitions of post-industrial, high-income nations. There is a real danger that the agenda in both developing aid and climate change financing is increasingly determined by this clash of interests to the detriment of the poverty and adaptation needs of the least-developed nations. The problems of rising affluence are overwhelming the problems of persistent poverty on the agenda of energy aid and climate change financing negotiations.

The stalemate in international negotiations is particularly damaging in view of the fact that energy access issues are actually gaining priority on the global agenda. The World Bank energy sector is now placing renewed emphasis on energy access next to low-carbon growth. Similarly, the CDM has attempted to amend its track record in reaching the poor and is improving its procedures to get small-scale, bottom-of-the-pyramid projects of the ground. The International Energy Agency has made the issue a defining feature of its annual World Energy Outlook. But so far, issues of energy access and adaptation have attracted far less financial resources and capital investment than issues of energy infrastructure and mitigation.

5.3 Redistributing tasks and responsibilities

New division of tasks and responsibilities
The new geopolitical realities may change the landscape of energy sector funding for development and climate change drastically. Traditional ODA might increasingly shift in emphasis from palliative to transformative goals, because of the need to combine pro-poor and adaptation strategies. The former goals are likely to be targeted more by private non-profit funds (health and education) or to become part of expanding short-term disaster relief. It will also become more geographically focussed with a major emphasis on least-developed countries and fragile states.

With respect to multilateral agreements, it will be increasingly hard to reach global consensus because of diverging national interests and ambitions. This may weaken the position of multilateral intermediaries in the short term. In the long term, when climate change funding through international taxation and carbon markets may start to play a much more fundamental role, multilateral intermediaries are likely to regain their previous dominance, but only if they succeed in accommodating both the economic interests of emerging economies and the environmental ambitions of post-industrial economies.

Bilateral agreements, on the other hand, may put an undue burden on administrative capacities not only of least-developed nations, but also of the donor nations themselves. Plurilateral initiatives pooling the financial and administrative resources of donor nations are therefore likely to increase in importance. Examples of plurilateral initiatives involving agreements between several donor nations in the field of energy access, such as the Dutch-German Energising Development Partnership Programme and the Norwegian Energy+ initiative, already exist and may become more important than multilateral programmes implemented by multilateral intermediaries such as the World Bank. Bilateral agreements are also the prevalent form of development aid by emerging economies. Although such agreements are not yet very transparent, recent multilateral negotiations on aid effectiveness have made some progress in the sense that some emerging economies have agreed to voluntary adhere to the principles of transparency now being pursued by ODA-DAC donors.

The changes in energy aid architecture resulting from the evolution of energy sector funding as described above will thus have important, institutional consequences in terms of the division of tasks and responsibilities between bilateral, plurilateral and multilateral aid.

Top-down, rationally planned restructuring unlikely

The rationale for a new division of tasks and responsibilities in climate compatible aid strategies as suggested here does not imply that changes in energy aid architecture can be brought about by a top-down and rationally planned programme of restructuring. The present energy aid architecture itself has not resulted from a rational process of global design and unanimous decision. It has evolved in a chaotic and complex process of relentless bargaining and trial-and-error and it will continue to do so in the future.

However, for those involved in this relentless process of change it is important to frame future challenges and opportunities in energy aid architecture in new ways and reflect constructively on the consequences of new geopolitical realities and poverty dynamics. The increasingly overlapping concerns of energy aid from a development and climate change perspective should at least shape thinking about the future architecture of energy aid.

Events like the failure to reach a post-Kyoto agreement, the steadily weakening role of the CDM, the threats of cuts in ODA budgets and the dialogue on universal energy access as a new MDG will drive multiple decisions by donors and recipients to revise their own perceptions of bilateral and multilateral commitments and claims. The future of the Green Climate Fund will certainly evoke a continuous dialogue on fund mobilization, optimal design of financial tools and choice of appropriate disbursal windows that may ultimately lead to more effective global mitigation action. The suggested changes can only emerge from a succession of piecemeal steps and continuous adjustment and are certainly not intended as an all-encompassing blueprint.

Is this change in energy aid architecture attractive for the least developed countries?

Additionality of development and climate change funds has so far been a key demand of developing countries. So, is the wish to disburse climate change funds through UNFCCC supervised channels and new national entities rather than existing multilateral intermediaries and national development ministries. Moreover, the new concerns of climate change are rightly viewed as a form of earmarking aid funds and as an infringement of national priority setting prerogatives. A split between poverty prevention and green growth aid with the former tied to public budget ODA and the latter tied to carbon market CCF, is certainly a form of increased earmarking. Such earmarking by donors conflicts with the cherished goal of national ownership so often promoted in development aid circles.

All this implies that the suggested restructuring of energy aid architecture may not be very welcome in at least part of the developing world. The counterargument is that many of the least developed countries so far have been unable to receive much climate change funding in the first place and that it is in their own interest to support a new energy aid architecture with better systemic coherence and better prospects for fund mobilization. Without such systemic coherence they will be confronted with increasing fragmentation of national public policy and corresponding institutions for the sake of accommodating international aid initiatives split along artificial boundaries. That aid commitments must be repackaged in order to safeguard them and provide clear focus and critical mass must be a key message of all efforts to fit energy aid architecture to the geopolitical and poverty dynamics of the new century. It will also mean a profound change in the positioning of emerging nations with consequences for administrative oversight of multinational organisations involved in energy aid.

5.4 Involving the private sector

Key role of private sector in making international cooperation work
Available public budgets in OECD nations are only a fraction of the funds necessary to solve both problems of persistent poverty and problems of green growth. Without massive mobilisation of climate change funds through carbon markets or international taxation, it is unlikely that climate compatible development strategies will make a dent in expected levels of global greenhouse gas emissions. Mobilizing additional funds through carbon markets and international taxation necessitates a constructive dialogue with the private sector. Reliance on public sector funds is not a realistic option. Similarly, without substantial leverage of ODA funds by private capital through innovative financial engineering, it is unlikely that energy access strategies will improve expected levels of energy access in developing countries substantially.

However, it should be emphasized at the same time that the private sector should not be viewed purely as a source of funds to be tapped for a better world. The role of the private sector is equally crucial in implementing climate compatible development strategies creatively. Energy transitions require system innovations in which business development and entrepreneurial initiative play a fundamental role. Such strategies are bound to be risky and they can only become successful if exceptionally high risks in the short term are partially absorbed by public funds, but acceptable commercial risks in the long term are fully transferred to the private sector. This requires entrepreneurial involvement from the start with innovative business models that aim to tap the entrepreneurial capacities in developing countries. Moreover, this entrepreneurial involvement is essential not just at the bottom-of-the-pyramid for energy access development strategies, but also higher up the pyramid for green growth development strategies.

Is a key role for the private sector attractive for the least developed countries?
Mildly formulated, the role of the private sector, particularly multinational corporations, is not always viewed positively by developing countries and development NGO's. This is partially due to ideological perceptions. Even in OECD nations the private sector has lost a large part of its credibility due to the on-going financial crisis and the dubious role of private financial institutions. For the least developed countries this credibility is even more challenged, because of past experiences with OECD-based multinational corporations and multilateral financial intermediaries. Proposals for a private sector oriented financing window within the Transitional Commission for the Green Climate Fund have met fierce resistance. Arguably, this is not a position that will help the least developed countries in developing their own private sector constructively.

It is clear that the former might of OECD-based multinational corporations and multilateral financial intermediaries will need to be constrained by firm public action and such constraints should be based on the ideas of climate compatible development strategies. It is equally clear, that without the involvement of private enterprise there is little chance of mobilizing the amount of funds necessary to implement climate compatible development strategies successfully. Moreover, without unleashing the entrepreneurial and innovative talents of the private sector within the least developed countries with the help of OECD public budgets, it is quite likely that the base-of-the-pyramid market will remain unserved, while the rest of the market will become an unsustainable battle field for OECD multinational corporations and state companies from major emerging economies. Rather than ideological posturing according to grudges based on the private sector deficiencies of the past century, the least developed nations may be better off to come to grips with the crucial role of the private sector in their own countries. In this respect, they should seek for ways to safeguard local entrepreneurial performance by creative ventures with foreign enterprise in both developed and emerging economies while pursuing climate compatible development.

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