viewpoint

climate and development

An alternative to a global climate deal may be unfolding before our eyes

JOHAN LILLIESTAM[1,2,*], ANTONELLA BATTAGLINI[2], CHARLOTTE FINLAY[3], DANIEL FÜRSTENWERTH[2], ANTHONY PATT[1], GUS SCHELLEKENS[3] and PETER SCHMIDT[2]

[1]International Institute for Applied Systems Analysis (IIASA), Schlossplatz 1, 2361 Laxenburg, Austria
[2]Potsdam Institute for Climate Impact Research (PIK), Telegrafenberg A31, 14473 Potsdam, Germany
[3]PriceWaterhouseCoopers, 7 More London Riverside, London SE1 2RT, UK

The core objectives of the United Nations Framework Convention on Climate Change (UNFCCC) are to stabilize greenhouse gas concentrations to non-dangerous levels quickly enough to allow ecosystems to adapt naturally, while not threatening food production or sustainable economic development. The approach embedded in the Kyoto Protocol, reflecting the concept of common but differentiated responsibilities, has been to start by setting binding emissions targets for industrialized countries, while using carbon markets to mobilize international finance for mitigation efforts in developing countries. The critical challenges for negotiators since then, however, have been in agreeing when the time is right to move towards binding emissions targets for developing countries and what level of financial assistance from developed countries is appropriate and politically feasible, given the well-founded perception that such targets, if sufficiently stringent to limit climate change and unaccompanied by strong financial assistance, could in fact hinder many countries' immediate economic development.

Since the collapse of these negotiations in Copenhagen, there has been a rising chorus of experts suggesting quite different governance pathways (Pielke, 2010; Prins et al., 2010; Selin and VanDeveer; 2011, Victor, 2011). A common ingredient for many of these alternatives is the notion of a small number of countries pushing new carbon-free technologies sufficiently strongly to make them economically attractive alternatives to fossil fuels (Patt, 2010). When these technologies become reliable and inexpensive enough so as not to impose a drag on immediate economic development is when their deployment will expand beyond the initial leader countries, to all industrialized and developing countries, even in the absence of a global treaty (Verweij and Thompson, 2006). Such an approach may be a feasible pathway to completely transform the global energy system, although any certainty in such prediction would be premature. What can be said, which we document in this article, is that in the electricity sector, it is already happening before our eyes.

Today, the costs of renewable power are higher – often much higher – than those of power from coal, which is both the least expensive and the most carbon-intensive of the fossil fuels. There are plenty of reasons to believe that developing countries, and especially least developed countries, do not have the finance or the resources to justify spending more money to provide new energy access than they absolutely

■ *Corresponding author: ***E-mail*: johan@pik-potsdam.de**

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need to. This is the reason for the issue of financial assistance, which has become an integral part of the treaty approach and one that is very difficult to solve. This need for assistance could change, removing a major obstacle for global climate protection, if renewables keep moving forward and their total costs come down to be at or below those of fossil fuels. Importantly, however, the barriers towards a full-scale transition to these new technologies lie not just in their cost, but in their lack of fit with the existing energy system (Chandler, 2011). Solutions to this problem require careful long-term infrastructure planning at larger geographic scales than currently exists (Battaglini et al., 2009). Thus, the needed groundwork lies not just in experimenting with new technologies to bring their costs down, but in experimenting with them at sufficient scale so as to force the institutional development issues that come with them.

A critical question is whether this approach, the energy transitions approach, could work any better than the Kyoto approach in practice, something its proponents claim it can (Prins and Rayner, 2007), while recognizing that the two approaches may ultimately complement each other. A core element of the global treaty argument is that countries will not undertake costly or politically difficult actions unilaterally, because with a global externality they have no incentive to do so. Observing real changes in the absence of a binding treaty obligation would suggest this argument to be flawed. A core element of the energy transition argument is that the needed changes are politically possible, compared to the global treaty approach, which seems to present intractable problems. Hence, an important indicator of whether the energy transition approach is feasible is whether these immediately required policy changes are already ongoing or imminent.

The interesting case studies for such an indicator are the leaders in technology development and deployment, including the United States, China and Brazil. In this article we examine Europe. Europe is a particularly interesting case study for three reasons. First, Europe has been a constant leader in renewable energy deployment. Second, Europe's complex political geography and high population density will likely require greater international cooperation than in other regions (Marris, 2008; Schellekens et al., 2010). Third, Europe borders North Africa, which has solar and wind resources vastly exceeding its domestic electricity demand, and which many are now suggesting is an attractive candidate for renewable energy partnership (MacKay, 2009). Such a *Supergrid* future could be one of the most cost-effective ways of delivering a viable and secure alternative to fossil fuel power, an essential element of any climate solution (Williges et al., 2010; Lilliestam and Ellenbeck, 2011). Although the technical barriers are few, the institutional and political ones are great (Komendantova et al., 2011, 2012).

To investigate this case, we analysed the effects of a wide set of recent events on a transition towards 100 per cent renewable electricity in Europe and North Africa by 2050, a level of ambition roughly consistent with achieving a 450-parts-per-million stabilization scenario (Knopf et al., 2010). The detailed methods and results can be found in Schellekens et al. (2011), available online, but we summarize these here in order to support our conclusions.

We developed a framework drawn from the technological transitions literature (Geels, 2002, 2005), which suggests the drivers and barriers of transformation operate at three levels. Figure 1 shows these levels, with political leadership operating from the top down, technological performance operating from the bottom up and three social and political systems in the middle being the places where enabling changes need to occur. These three are the markets over which power is bought and sold, the climate for new investment in renewables and infrastructure, and the planning and permitting rules that dictate the pace and placement of new infrastructure and generation development.

For each of these five systems, we identified a set of criteria to evaluate progress towards 100 per cent renewable electricity by 2050. In the area of political leadership, for example, three criteria were the status of existing leadership and political commitments towards long-term renewable

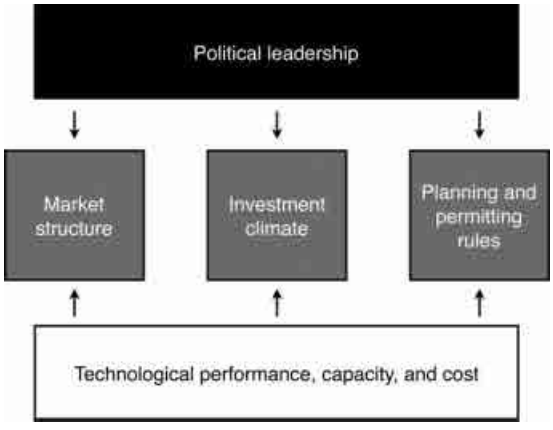

FIGURE 1 Analytic framework for appraising recent events
Source: Schellekens et al. (2011).

growth, the addition of new strategic arguments for supporting renewable growth and the strength of interest groups. We used such criteria to evaluate the effects of nine important events and trends[1] in the last 12 months. Figure 2 summarizes the effects of these events on 15 criteria associated with the analytic framework we have provided.

Overall, progress was made in a number of areas – marked green in Figure 2 – with some areas showing remarkable progress. Some policy areas showed no or insufficient progress – marked red – but no policy area showed development in a direction that could potentially move Europe onto a path incompatible with 100 per cent renewables by 2050.

We identified good progress in the market and technology areas. The growth of renewables in 2010 was very high – 30 per cent, or 23 GW, new capacity – which helped bringing down costs further. It was an even better year for gas power, with 28 GW capacity added. This may be a positive development: an increase in flexible, low capital cost gas generation enables higher renewable penetration rates in the medium term, without causing a long-term fossil lock-in (ECF, 2010; McKinsey, 2010). The National Renewable Energy Action Plans, in which each Member State describes its intended path to the 2020 renewables targets, give reason to be optimistic that the expansion will continue. The North African countries, especially Morocco, continued to lay the groundwork for renewables, and a number of European–North African industry initiatives started working during 2010. At the

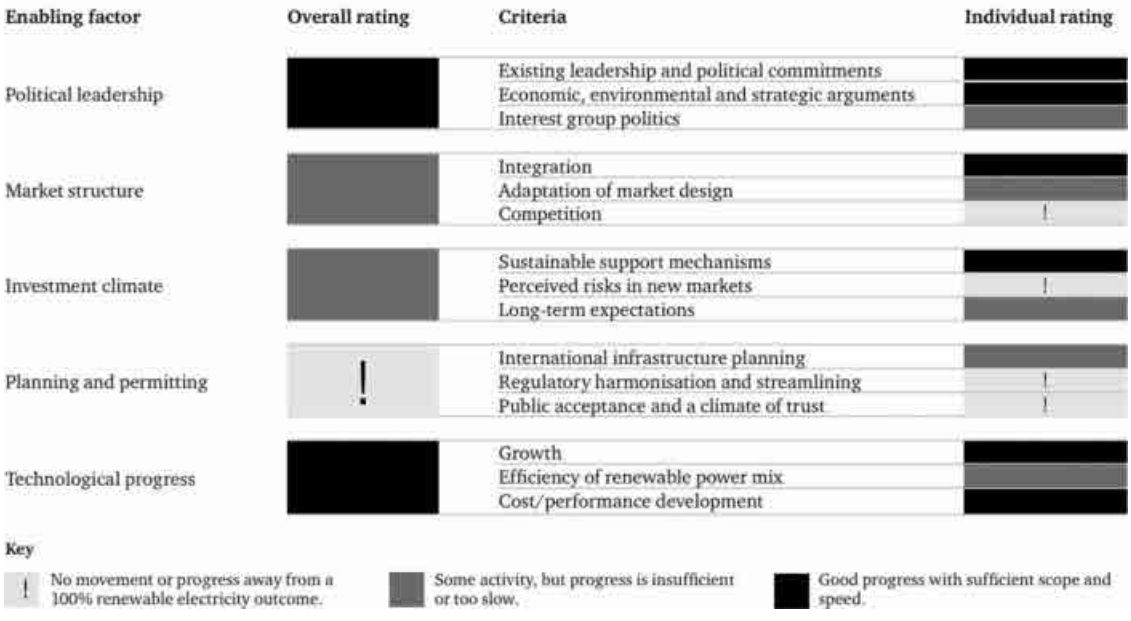

FIGURE 2 Heat map of renewable energy development progress
Source: Schellekens et al. (2011).

same time, very rapid progress was made towards integrating the European markets, a precondition for a wide-area perspective on the electricity system. Market couplings taking place in 2010 have resulted in 60 per cent of the European markets now being integrated.

However, the expansion of the transmission grid is an area of great concern, as grid bottlenecks are problematic both for integrating renewables and merging markets. In 2010, almost no transmission capacity was added, much due to massive public opposition and complex and lengthy permission processes. European policy has acknowledged the problem and seems committed to solving it, but so far it has not presented any credible solution. Further, the unrest in North Africa dramatically increased investment risks there and effectively stopped all foreign investment in most countries, Morocco being an exception. In the long term, however, if the democracy movements are successful and corruption is overcome, this could improve the investment climate for clean electricity in North Africa considerably.

A mixed result could be observed regarding some short-term issues. A small number of countries performed retroactive tariff cuts for existing facilities, which led to considerable unsettledness among investors. In most countries, however, these changes were reasonable improvements, aimed at increasing the economic efficiency of the support schemes and thereby ensuring their long-term public acceptability, while still leaving investors with adequate incentives. In contrast, policy makers did not alter the structure of power markets to better accommodate renewables. At the same time, however, this is a longer-term problem, one that will become important when renewables are no longer protected by feed-in tariffs and quotas.

All in all, these events show that Europe is making progress towards a massive scale-up of renewable power, towards the medium-term 20-20-20 targets. Significant obstacles remain in some areas, but a strong policy effort to solve these problems is underway. This policy effort, while positive in itself, must be seen within the framework of overall political leadership for renewables, and this is an area in which dramatic, positive changes have taken place over the last year.

European energy policy continues to send clear signals that the rollout of renewables will continue and accelerate, despite the breakdown of international climate negotiations, and beyond 2020. One can observe a strategic shift taking place, from seeing renewables as a costly climate protection add-on to energy policy, to a green growth paradigm in which renewables are a tool to create sustainable economic growth and employment. For example, the European Parliament stated in the run-up to the COP16 in Cancun that 'irrespective of the outcome of international negotiations, it is in the EU's interest to pursue an emissions reduction goal of more than 20% because it will promote green jobs, growth and security at the same time' (European Parliament, 2010). Similar statements can be found in numerous Member States, among them Sweden, UK, Germany and Greece. Furthermore Europe is increasingly, unilaterally, locking itself into very ambitious longer-term targets: The European Council in early 2011 reconfirmed the EU objective of reducing GHG emissions by 80–95 per cent by 2050 compared to 1990. Equally, the Commission published pathways to reaching this objective in its recently published Roadmap 2050 Communication: this determines that in order to reach 80 per cent domestic emission reduction by 2050, the power sector must be 93–99 per cent decarbonized (European Commission, 2011). Combined with the political consequences of Fukushima, it appears that the political case for renewables as the carrying pillar of the power sector decarbonization has been strengthened.

Changes in the political, policy and regulatory landscape in Europe, as well as North Africa to its south, are taking place consistent with a continued and accelerated deployment of renewable power in the region. This is important as it supports the proposition that a technology push can be substantial and sustained, enough to offer sources of renewable energy that can outcompete fossil fuels, perhaps by the end of this decade. This would make them attractive globally

in time to help address not just climate change but also limited energy access, even in the poorest of countries, even in the absence of a global treaty. Making emissions reductions an outcome of green growth policies, rather than the reverse, is a policy strategy that may be beginning to materialize. If this is true, we may indeed be witnessing the start of a process that, as a complement or an alternative to a global treaty, stands a good chance of soon enabling all industrialized and developing countries to decarbonize their electricity systems without sacrificing short-term economic development.

Note

1. The events were: the global financial and European debt crisis; international climate negotiations and policy; European Union-level electricity policy developments; North African-European renewable electricity initiatives; national renewable electricity policy developments; electric generation capacity development in 2010; public opposition to new infrastructure; civil protests and unrest in North Africa; the Japan earthquake and nuclear crisis.

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