

Moving towards 100% renewable electricity in Europe & North Africa by 2050

Executive Summary

*Evaluating progress in 2010
May 2011*



Executive summary

Introduction

Climate change and increasing demands for affordable energy are two of the biggest challenges faced by society today. With appropriate scale, a shift to renewable energy could become a self-sustaining, and genuinely competitive investment proposition with the potential to address both of these concerns. Investment in renewable energy reached new heights in 2010, up 30% to US\$243bn (Renewable Energy World, 2011). However, even these record levels fall short of what is needed to achieve 100% renewable electricity by 2050 (IEA, 2010).

Government support has played a key role in encouraging this transition, with favourable policies and frameworks being progressed in many countries across the globe. However, it is still far from certain whether these will be sufficient to drive the scale of transition which will be required. This report looks at recent developments and events over the past twelve months to March 2011, to understand whether, for Europe and North Africa, a vision of 100% renewable electricity by 2050 has moved closer or further away.

We assess this progress by looking at five ‘enabling factors’ that we deem are necessary for renewables to become the dominant generation platform – clear political leadership; a

supportive market structure; the right investment climate; adequate planning and permitting for new infrastructure; and technological progress. We identify three relevant criteria for each of these factors against which to assess progress.

We then use this analytical framework to review the impact of nine major events and trends of the past twelve months. These events are by no means exclusive or exhaustive and their inclusion does not reflect any judgement on their relative significance or importance, but all have influenced the transition to greater use of renewables.

Three of these developments are global in nature: the financial and debt crises, the climate negotiations and international policy developments, and the ramifications of the Japanese earthquake, in particular for new nuclear in Europe; three are regional: EU electricity policy developments, regional renewable developments and the civil unrest in North Africa; and three have a more national focus: national renewable electricity developments, capacity expansions and public opposition to major infrastructure projects.

Figure 1: Heat map summarising progress for each enabling factor

Enabling factor	Overall rating	Criteria	Individual rating
Political leadership		Existing leadership and political commitments	
		Economic, environmental and strategic arguments	
		Interest group politics	
Market structure		Integration	
		Adaptation of market design	
		Competition	
Investment climate		Sustainable support mechanisms	
		Perceived risks in new markets	
		Long-term expectations	
Planning and permitting		International infrastructure planning	
		Regulatory harmonisation and streamlining	
		Public acceptance and a climate of trust	
Technological progress		Growth	
		Efficiency of renewable power mix	
		Cost/performance development	

Key

 No movement or progress away from a 100% renewable electricity outcome.

 Some activity, but progress is insufficient or too slow.

 Good progress with sufficient scope and speed.

Results

Our results are summarised as a ‘heat map’ to illustrate the progress achieved in each of the five ‘enabling factors’. It shows that there has been good progress and a number of positive developments in the last 12 months. Particular areas of contribution include the continued growth of renewables capacity, steps towards market integration and the growing political commitment to renewable electricity generation in Europe through binding targets and the provision of funding. There has been little progress in some areas, such as infrastructure planning and permitting, but no major setbacks.

Looking at each of the five enabling areas in turn, our assessment is that **political leadership** remains supportive of continued development of renewables. Despite the disappointments and delays in the UN climate negotiations prior to Cancun, the development of the National Renewable Energy Action Plans (NREAP) across member states, and announcements by North African governments all demonstrate a continued political desire to aim for more ambitious renewable energy targets, albeit only to 2020 in most cases. The economic, environmental and social arguments underpinning this political leadership have been given further impetus by some of the recent events outlined in this report. Detracting from this has been the comparative lack of political engagement necessary to support new transmission and infrastructure development. Our overall rating for political leadership is therefore ‘green’, representing good progress with sufficient scope and speed.

Market structure developments are more mixed. While significant steps have taken place in the integration of electricity markets across EU borders, further progress is now becoming more dependent on associated grid

developments. There has also not been much in the way of policy developments or progress towards adapting the market design to support increased generation of electricity from renewable sources. Similarly, steps to address competition issues in the electricity market have been well focused but insufficient in their scope, rate of progress and achievements. Our overall rating for market structure is therefore ‘amber’, representing some activity which is however insufficient or too slow to support a 100% transition.

The **investment climate** is similarly mixed - governments over the past 12 months have in general maintained existing support mechanisms. However, the way in which reductions in support and other changes have been implemented in a number of EU countries have concerned the private sector. Ongoing civil unrest has affected the perception of risk in many North African countries, and as a result, private sector investment has been wary of new commitments. The longer-term expectations for renewables are also uncertain, mainly due to the lack of longer-term political commitments by governments post 2020. Our overall rating for investment climate is therefore ‘amber’, representing some activity which is insufficient or too slow to support a 100% transition.

The **infrastructure planning and permitting** area is less encouraging. While there has been good progress in the EU with the publication of the European Network of Transmission System Operators for Electricity (ENTSO-E) ten-year network development plan and the EU blueprint for an integrated European energy network, there has been little progress on the ground with only a few projects in development and even fewer of these involving cross border cooperation. In the area of regulatory harmonisation and streamlining, our

view is that there has been almost no progress to simplify permitting processes especially on a regional level. Individual member states also lack credible proposals for addressing this area. Without this, new infrastructure development in the EU, as well as greater market integration and capacity expansion, is likely to be held back. Our overall rating for infrastructure planning and permitting is therefore ‘red’, representing a significant barrier to a 100% transition.

The **technological progress** area has been more positive. There has been a significant expansion in renewables capacity in the region over the past 12 months, especially in solar and wind. This has however been slightly tempered by consolidation within a number of renewable energy industries and supply chain constraints. The renewable power development mix remains skewed towards certain technologies for reasons other than resource abundance and the lack of a supportive and cohesive planning process. Managing this at an EU level may create problems for the longer-term efficiency and acceptability of the renewable power mix. Finally, the growing track record in renewable investment has continued to drive significant and rapid cost reductions across technologies. Planned capacity increases in the coming years will also help less established technologies become more cost competitive, assuming that the finance is available to support these project developments. Our overall rating for technological progress is therefore ‘green’, which represents good progress with sufficient scope and speed.

Recommendations

Looking ahead, this report identifies three broad areas for suggested consideration by policy makers to keep the region on track towards the vision of 100% renewable electricity in Europe and North Africa.

1. Development of a longer term and international electricity policy perspective

Achieving a 100% renewable electricity power system will require European electricity policies to incorporate a longer-term perspective and a broader geographical scope. Current short-term horizons serve to limit investment confidence and activity. We will need a vision through to 2050, with broad stakeholder involvement in its development. At a more detailed level, clear guidelines and principles would then support the design of regional generation capacity, demand management, the types of market in operation, how the electricity would be supplied, and finally how transmission grids should look and operate.

The development of such a vision will provide a significant boost to a renewables transition, particularly if this is designed with an EU wide (rather than a national) electricity system in mind. The inclusion of both Europe and North Africa in this vision is also critical. It is likely to result in increased efficiency and effectiveness of the regional power markets, which can make a significant contribution to the security of supply concerns if accepted as part of the regional solution.

2. Improvements to electricity market operation

There is also a need for more efficient and effective regional power markets, which not only provide predictability and stability for participants, but also create a level playing field for renewables entering the market. Although the European markets are liberalised and theoretically competitive, in reality most markets do not function in the way that they need to. This is despite various EU market directives (which are embodied in the second and third energy packages) that provide the policy framework needed for power market liberalisation and competition.

For a competitive electricity market to develop at the pace required to support a 100% renewables vision, as a first step, there is an urgent need for both the spirit and the letter of these directives to be implemented more rigorously. Europe could introduce and enforce penalties for non-compliance, to encourage member states to implement the directives in a timely manner. There is also a need to think about further measures that will support the longer-term and international vision for the future power system. This will require addressing a number of controversial questions including whether Europe wants a fully liberalised power market or whether some form of re-regulation would be more conducive to a rapid transition to a low or zero carbon sector. It will also need to address the structure and ownership of the sector and, in particular, of the grid.

3. Accelerating the development of sustainable infrastructure that supports renewables

The transition to renewables relies heavily on the development of an international, and subsequently an intercontinental, transmission grid. However, today it is barely possible to build a single transmission line, especially across national borders, as a result of inefficient regulation and public opposition. There is an urgent need to increase political cooperation between countries, to improve the efficiency of legislation and permission processes for new transmissions projects. Development of consistent standards for infrastructure planning and permitting will make grid expansions across the border less problematic, but changes to make the process more streamlined will certainly be necessary.

In addition, mechanisms to improve incentives to invest in and build grid connections at local, national and regional scales are also required. In some cases this may require additional financial incentives for TSOs to ensure the delivery of key projects. There is also a need for greater engagement with citizens to understand public opposition to new developments and find ways to make projects more acceptable to the local communities. Mechanisms such as benefit sharing and community involvement in the planning processes need to be explored further, and the development of new legislation needs to take citizens' rights into account: co-development of a solution to this underlying problem will be key to achieving any significant renewables based vision.

Conclusion

Our conclusion is that progress over the past twelve months towards a 100% renewable electricity target has been largely positive, with achievements outweighing the negative trends and developments. Progress has been underpinned by good achievements in the areas of political leadership and technological progress – both vital as top down and bottom up drivers of the transition to renewables. The integration of markets has also moved at a good pace and in the right direction, but much more will be needed here in the coming years. In other areas, the impacts of developments are mixed and progress is more fragile. Market competition and infrastructure permitting and planning are the areas of greatest concern. The lack of progress on improvements to planning and permitting is the single biggest threat to future major expansion of

renewables technology in Europe and North Africa. Closely linked are also issues associated with project investment, such as regulatory uncertainty (in particular the potentially negative impact of further changes by governments to regulatory regimes and support schemes) and the need for continued market reform to promote access and competition.

All of these areas, along with the engagement of stakeholders and interest groups to increase public acceptance, need to be tackled urgently if the region is to stay on track to 100% renewable electricity vision by 2050. If accompanied by clear and supportive government policies and the continued support of the investment communities, renewable technologies will remain well positioned to address both energy security and climate change for the EU and North Africa.

“Progress has been largely positive with achievements outweighing negative developments.”



Report information

*In spring 2010, European and international climate experts at PwC, the European Climate Forum, the Potsdam Institute for Climate Impact Research and the International Institute for Applied System Analysis published **100% Renewable Electricity – A roadmap to 2050 for Europe and North Africa**. The report examined the potential for powering Europe and North Africa with renewable electricity exclusively by 2050. It set out a series of financial, market, infrastructure and government policy steps that would need to occur if such a ‘what if’ vision was to be achieved.*

Now, a year on, this latest report provides a complementary analysis to the original roadmap. PwC, the Potsdam Institute for Climate Impact Research and the International Institute for Applied System Analysis, look at whether the vision of 100% renewable electricity has moved closer or further away as a result of current and recent developments over the last 12 months. The report, intended to support the wider debate in this area, examines five areas that are most critical to achieving progress and, through the lens of these five areas, looks at the impact of recent and current events.

The full report looks in detail at the following areas:

- A framework for measuring progress
 - Political leadership
 - Market structure
 - Investment climate
 - Planning and permitting for new infrastructure
 - Technological progress
- Assessing progress – a look at recent developments and events
 - Global financial and sovereign debt crises
 - Climate negotiations and policy
 - EU electricity policy developments
 - Regional renewable developments
 - National renewable electricity developments
 - Capacity expansions
 - Public opposition
 - Civil unrest and protest in North Africa
 - The Japan earthquake
- Conclusion
 - The impact of recent events on a 100% renewable future
 - Outlook
- Appendices
 - A. References
 - B. Acronyms and Glossary

This report is available online at: www.pwc.com/sustainability

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