



# Energy Transition with Renewables in Africa and Globally

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## Introduction

In view of global climate change, the growing consensus is that the world must switch to a sustainable energy system. While historical transitions between major energy sources have occurred, most of these shifts occurred over a substantial period of time (a century or longer) and were stimulated by resource scarcity, high labour costs, and technological innovations. The energy transition of the 21st century will need to be more rapid.

## Background

There has been a rising awareness worldwide that renewable energy and energy efficiency are critical not only for addressing climate change, but also for creating new economic opportunities and for providing energy access to the billions of people still living without modern energy services. Over the past decade, and particularly in recent years, advances in renewable energy technologies, global increases in capacity, and rapid cost reductions have been due largely to policy support. This has attracted significant investment and has further driven down costs through economies of scale.

Policy support for renewables has contributed to a growth in market volume and to strong global competition. Significant cost reductions, especially for solar PV and wind power, have played a part in the increasing electrification of transportation and heating applications, highlighting the potential for further overlap among the sectors in the future. In many countries, renewables are broadly competitive with conventional fuels, particularly in the power sector.

Renewables are a mainstream energy resource. The penetration and use of both variable and non-variable renewables are increasing, thereby contributing to diversification of the energy mix. As of early 2015, 164 countries from all around the world have renewable energy targets in place, many of which have engaged in an energy transition path towards renewable energy and energy efficiency.

## Where we are Now

Many renewable energy technologies have experienced rapid expansion; however on a global scale growth in renewable capacity as well as improvements in energy efficiency are still relatively modest. During the past several years countries such as Germany, Denmark, China, Japan, Brazil, Chile, Morocco, Ghana, Kenya, and South Africa have engaged in an energy transition trajectory. Each one has been driven by different motivations (security of energy supply, environmental concerns, and economic considerations) and approaches vary from country to country.

Germany's "Energiewende", the country's path to a secure, environmentally friendly and economically successful future, is based on the decision to reform fundamentally the country's energy system: moving away from nuclear power, towards renewable energy sources. By the year 2050, 80% of the country's electricity is to come from renewable sources. At the same time, Germany aims to halve energy consumption by using energy more efficiently and to reduce greenhouse gas emissions

by 80-95%. Germany's trajectory to date is a positive one: greenhouse gas emissions caused by the energy sector decreased as did fossil-fuel import costs. Expansion of renewable energy led to significant reduction of renewable energy technology cost and increased investment in renewable energy and energy efficiency.

South Africa's reliance on coal is unlikely to change significantly in the next two decades owing to the existence of many deposits that can be exploited at favourable costs. However, given the country's need for energy, the country aims to increase capacity from renewables to 17,800 MW by 2030. South Africa was the leader in renewable energy investment in Africa since 2012. The Renewable Energy Independent Power Producers Procurement Programme of South Africa has been a success story to generate socio-economic and environmentally sustainable growth, and to start and stimulate the renewable industry in South Africa. Since the inception of this programme, the average per kilowatt hour tariff for onshore wind has declined by 55% and by 76% for solar PV.

## **The Future**

In general, the following key s-factors need to be addressed when planning a country's successful energy transition:

### ***Renewable power: energy system thinking is required***

To increase shares of variable solar and wind power generation, a variety of technologies must be integrated into one resilient power supply. Thus, policy programmes should shift away from single-technology support schemes towards measures that support a balanced combination of diverse technologies. Policy and regulatory mechanisms must: support/enable more flexible power grids; increase demand-side management; and integrate renewable energy-based power systems with the transport, buildings, industry, and heating and cooling sectors.

Utilities and grid system operators also play an important role in managing demand and generation in renewable energy-dominated energy systems. Demand-side management of industries, transport systems, and households, as well as the operation of distributed generation fleets, require different energy policies to support new business models. The deployment of new technologies to allow for mainstreaming higher shares of dispatchable renewable generation is also necessary and requires new incentives to drive infrastructure investment. Policymakers should work with utilities and grid system operators, in addition to major energy consumers (e.g., energy-intensive industries), to define new policy mechanisms and regulatory structures.

### ***Expanding the grid: the Achilles' heel of the energy transition***

The shift in the electricity supply system towards more electricity from renewable energy sources means that the structure of the grid also needs to change: power lines need to be built or upgraded; in parallel decentralised generation and dispatching through mini-grids should be fostered for enhancing energy access in remote areas. This is essential, because the Energy Transition is radically changing the electricity generation map. For many decades, centralised power plants have supplied most of the power to the large demand centres. Powers grids of the future need to be much more resilient and flexible.

### ***Increase support to the renewable heating and cooling sector***

Globally, heating accounts for almost half of total global energy demand. However, this sector continues to lag far behind the renewable power sector when it comes to policies that support technology development and deployment.

Building obligations (both for energy efficiency improvements and deployment of renewable technologies) are central to increasing the penetration of renewable heating and cooling technologies. In addition to buildings, it is important that there are requirements to integrate renewable energy into industrial and district heating systems. These support not only the development of renewable energy heating, but also the integration of variable power generation, relieving pressure on power grids. Policymakers at all levels of government need to support the development of renewable heat given the large share of heat in final energy demand. Further development of integrated approaches for the heating and electricity sectors also can contribute to reducing grid pressure.

### ***Energy research: fit for the future***

New challenges call for new ideas and solutions. This also holds true for the energy transition. To make it a success, intensive research efforts are needed to spur on the development of innovative technologies. Research is needed to explore and develop new technologies for tomorrow's energy supply system. This gives rise to innovations that also open up new business opportunities. Funding is provided especially for innovations in the fields of energy efficiency and renewable energy.

### ***Improve access to finance***

Access to financial resources is central to establishing a diversified, stable energy supply. With renewable energy, expansion of the energy supply for all customer groups is becoming increasingly a political and financial challenge, not a technical one. Deployment is often constrained by a lack of available financial resources, high costs of capital, or reluctance on the part of investors.

In order to expand energy markets to reach full energy access, the public sector needs to ensure political stability, which in turn sends a positive signal to investors. Public finance mechanisms such as preferential loans and grants as well as loan guarantees can be effective in leveraging private sector investment by overcoming the lack of private financial instruments, facilitating market development, and mitigating risk. Financial instruments can be implemented on both the supply and demand sides, supporting project developers and energy users to drive the evolution of projects to high-capacity deployment. Additionally, acquiring financing and buy-in necessitates trust in the technology, which requires the development of standards, certification, etc. to ensure quality. This is similarly important for developing local industries and the ability to export renewable energy products.

### ***Strengthen international cooperation and coordination***

The international energy markets are converging increasingly and bringing major advantages for customers: more choice, lower prices and a more dependable energy supply. The fact that CO<sub>2</sub> emissions and climate change do not stop at national borders is an additional incentive. Moreover, there has been a prioritisation of renewable energy on the political and international development agenda in recent years. As a result, numerous initiatives have been created with the common goal to bolster and support the achievement of a sustainable energy future; however, coordination between initiatives is generally limited. Therefore, a successful energy and climate policy must not be conceived

only at the national level; engagement with multilateral organisations, initiation of regional partnerships and coordination with numerous international energy initiatives is essential. Hence, dialogue forums such as SAIREC are key events to foster such partnerships and collaborative agreements. They help to advocate for competitively structured, open and transparent markets, further growth of the renewables, and a global improvement in energy efficiency.

### **Challenge Questions**

1. What are the key characteristics of the energy transition happening in your country? Why did you engage in an energy transition?
2. Which key players need to be involved in making an energy transition happen?
3. What needs to happen to make the shift towards a sustainable energy system happen quicker?
4. How do the business models of utilities have to evolve to cope with changing cost and production patterns?
5. What can be done to drive the energy transition in the heating and cooling sector?
6. What needs to be done at the international level to advance the global energy transition?