The Development of China’s Renewable Energy Policy and Implications to Africa

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Abstract. In the context of global climate change, renewable energy has developed rapidly. Due to the lack of definite policy guidance and barriers to the renewable energy technology transfer (RETT) between China and Africa, Africa’s renewable energy developed slowly. In order to promote the RETT between China and Africa and the popularization and utilization of renewable energy, this paper sorts out the development process of renewable energy policy and provides the corresponding proposals for the formulation of renewable energy policy in Africa.

1. Introduction
Developing renewable energy can not only save fossil energy, but also reduce the emission of atmospheric pollutants and greenhouse gas [1], so it has the dual role of energy conservation and environmental protection. In recent years, renewable energy has developed rapidly around the world. In 2015, the world’s total primary energy supply was 13.647 million ton oil equivalent (toe), of which 13.4% (18.3Mtoe) came from renewable energy sources [2]. In particular, to cope with climate change, China has also been actively developing the renewable energy.

However, the African continent, which is rich in renewable energy resources, is generally plagued by energy shortage. At present, about half of West Africa's population and three quarters of East Africa's population do not have a stable power supply [3, 4]. To get rid of the poverty and provide a stable power supply for energy-scarce areas, China has conducted renewable energy technology transfer (RETT) to Africa since 2014. However, due to the fact that the renewable energy industry in Africa is still in infancy and lacks proper guidance of relative policies, leading to a slow development in renewable energy.

Under the above background, this paper aims to seek policy implications for the development of renewable energy in Africa based on a review of China's renewable energy policy and promote the popularization and utilization of renewable energy in Africa.
2. The Development of China’s Renewable Energy Policies

2.1. From 1949-early 1980s: Initial stage of renewable energy development

During this period, China has actively developed various renewable energy sources to solve the problem of insufficient supply, and started to develop and utilize small hydropower, biogas digester, solar stove, wind water pumping, small wind turbine, medium and low temperature geothermal utilization and small tidal power station successively.

At that time in China's rural areas, burning plant stalks was the main way of the energy supply. And then the development of biogas technology made the biomass can be better used, therefore, some areas began to use biogas instead of fuelwood.

China has been accelerating the development of small hydropower since the founding of the country in 1949. The scale of small hydropower in China has developed to 88555 small hydropower stations, 6930 MW installed capacity by the end of 1980 compared with 26 small hydropower stations, about 2.8 MW installed capability in 1949, which is equivalent to more than three times the capacity of the national power generation equipments at the beginning of the nation [5]. Hydropower generation was 12.7 billion kWh in 1980, accounting for about 34% of the national agricultural electricity consumption in the same year [6].

Overall, development of renewable energy during this period in China mainly focused on the utilization of hydropower and rural biomass energy, the technical content was not high, and there were no systematic renewable energy policies.

2.2. In 1980s: Beginning to form policies with guiding significance

With the development of the reform and opening-up, China's energy demand was increasing continuously. Under this case, macro-policy environment in favour of the renewable energy growth appeared in China. The “Agricultural Law of the People's Republic of China (PRC)” in 1983 pointed out that the use of straw in agricultural production could provide new energy and solve the problem of rural energy shortage. The “Water Law of the PRC”, which was enacted in 1988, encouraged the exploitation of hydropower resources. In the December 30, 1986, the “Opinion on Strengthening Rural Energy Construction” issued by the former National Economic Commission put forward the idea of "developing long-term planning for rural energy development".

In addition to the formulation of guiding policies, China began to use economic incentives to support the development of renewable energy since the 1980s. For example, the "Notice of Strengthening Rural Energy Construction" stipulated that renewable energy projects would be provided with subsidies in terms of 50% of commercial bank interest rate, covering small-scale wind turbine manufacturing, wind power plant construction, photovoltaic cell production lines, solar water heater production, bagasse power generation and other projects.

It can be seen that in the 10 years after the reform and opening-up, a systematic guidance and subsidy policy system for renewable energy development was forming progressively in China, and the development of renewable energy began to step on a road of legalization and standardization gradually.

2.3. In 1990s: Further development and improvement stage

After entering 1990s, China's guiding policies on renewable energy have been further developed, and the national planning policies have also begun to propose specific development goals. For instance, the “Outline of New Energy and Renewable Energy (1996-2010)”, released in January 5, 1995, pointed out that the actual use of renewable energy should be over 390 million ton of standard coal equivalent (tce) in the next 15 years (including the utilization of the traditional biomass energy). At the same time, the outline also pointed out that taxes reduction preferential policies for new energy producers or users would be given. In 1998, the "Catalogue of Industries, Products, and Technologies Currently Focused on Development by the State” pointed out that solar energy, geothermal energy, ocean energy, garbage power, biomass power generation and large wind turbines were included in the industries and products to be encouraged.
The “Notice on Relative Problems of Further Supporting the Development of New and Renewable Energy” in 1999 stipulated that provided a favorable infrastructure loan for new and renewable energy sources. New energy and renewable energy projects construction that with a scale of more than 3000 kilowatts and above would be assisted by the National Planning Commission to implement the bank loan; the power generation projects with infrastructure loan arranged by banks would be given 2% discount, the central projects would be discounted by the Ministry of finance (MOF), the local projects would be discounted by the local finance. It also reiterated the requirements of the former Ministry of Power Industry’s on-grid wind power management regulations and extended the range of requirements to the whole energy and renewable energy power generation projects. The projects using local manufacturing equipment would be given a preferential of investment profit rate of 5%.

Under the guidance of the policy of opening to the outside world actively, China has carried out a number of cooperation with foreign countries in the field of renewable energy, including solar, wind, geothermal and biomass energy. In March 1999, Chinese government reached an agreement with the United Nations Development Program (UNDP) to strengthen the capacity of commercialization of renewable energy in China through the use of the Global Environment Facility.

It can be seen that after the 1990s, China's renewable energy polices began to have some long-term plans, and to formulate specific development goals. Moreover, the scope of renewable energy has become more extensive. In this period, the scope of renewable energy has extended to wind power and geothermal power generation. In addition, international cooperation in the field of renewable energy has existed, fully absorbing and utilizing foreign advanced technology and funds.

2.4. 2000-2005 years: the overall plan for renewable energy
During this period, China began to issue overall plans for the development of renewable energy. In August 2000, the “2000-2015 Main Points of Development Planning of New Energy and Renewable Energy Industry” proposed that the annual development amount of new and renewable energy sources should reach 43 million tce in 2015, accounting for 2% of the total national energy consumption at that time (if small hydropower were included in, it would reach 3.6%).

In 2002, the “10th Five-Year Plan for the Development of New Energy and Renewable Energy Industry” pointed out that the annual development and utilization amount of new and renewable energy sources (excluding the traditional utilization of small hydropower and biomass energy) should reach 13 million tce by 2005, solving the problem of no electricity for 1.3 million households of farmers and herdsmen in remote areas (about 500-600 million people) and providing nearly 200 thousand jobs.

2.5. 2005-2015: Rapid and comprehensive development stage of renewable energy policies
In 2005, “Renewable Energy Law of the PRC” was adopted, in which the article 4 clearly stipulated: "The state will arrange the development and utilization of renewable energy as the priority area of energy development, and promote the establishment and development of renewable energy markets by formulating various total amount target of the renewable energy and the corresponding measures. The State encourages various ownership entities to participate in the market of renewable energy, and will protect the legitimate rights and interests of renewable energy users.” This identified the priority development status of the renewable energy field in China from the legal level, indicating that China has taken a key step in the legal construction of renewable energy, and China's renewable energy policy has entered a rapid development stage.

On the other hand, after years of developing, China's renewable energy industry achieved great achievements, and initially formed a certain scale. In view of the development status of renewable energy in China, the National Development and Reform Commission (NDRC) issued the "Medium and Long Term Plan of Renewable energy" in 2007 as a guiding document for renewable energy development in the new period. The plan made the overall goal of making renewable energy consumption ratio up to 10% by 2010 and to 15% by 2020.
On the basis of the plan, the NDRC began to develop a five-year plan specifically for the development of renewable energy, such as the "11th Five-Year Plan for Renewable Energy Development" released in 2008 and the "12th Five-Year Plan for Renewable Energy Development" in 2012. From the period of "12th Five-Year Plan", the National Energy Agency began to develop more specific five-year plans based on different types of renewable energy, such as the "12th Five-Year Plan for Hydropower Development", "12th Five-Year Plan for Solar Power Development" and "12th Five-Year Plan for Bioenergy Development" in 2012. These plans summarized current development status and problems in the field of renewable energy, as well as developed practical objectives under the guidance of the "Renewable Energy Law", aiming to guide the healthy development of the renewable energy field in China.

At the same time, there was a clear guidance for feed-in tariff of the renewable energy electricity. In 2006, the "Pilot Scheme of Renewable Energy Generation Price and Cost-sharing Management" issued by NDRC stipulated that the price of renewable energy generation included two forms of government pricing and government guidance price. In 2009, the "Notice on Improving Wind Power Feed-in Tariff Policy" issued by NDRC divided the national area into 4 types of wind energy resource areas systematically, which implemented different onshore wind power feed-in tariff; similarly, the "Notice on Exerting the Role of Price Leverage to Promote the Healthy Development of Photovoltaic Industry" issued in 2013 also divided the national area into three types of solar energy resource areas, and made the corresponding feed-in tariff of photovoltaic power differently.

On the other hand, tax relief was also an important policy approach to support the development of renewable energy industry in this period. For example, the "Notice on the Value-added Tax (VAT) Policy of PV Power" in 2013 stated that from October 1, 2013 to December 31, 2015, taxpayers who sold their own solar power would enjoy the policy of returning 50% of VAT; In 2014, "Notice on the Value-added Tax Policy for Large Hydropower Enterprises" stipulated that from January 1, 2013 to December 31, 2015, hydropower plants (including pumped storage power stations) which had more than 1 million kilowatts installed capacity would enjoy the policy of returning of VAT for the section of actual VAT exceeded 8%, from January 1, 2016 to December 31, 2017, they would enjoy the policy of returning of VAT for the part of actual VAT more than 12%; In 2015, the "Notice on Value-added Tax Policy of Wind Power" stated that since July 1, 2015, taxpayers who sold their own wind power would enjoy the policy of returning 50% of VAT.

It can be seen that during this period, the development of renewable energy policies in China has entered a rapid and comprehensive development phase, whether from the aspect of overall planning or the preferential and guiding policies for renewable energy sources. Detailed planning, feed-in tariff and tax relief policies for various types of renewable energy sources were made. Therefore, China's renewable energy industry has also obtained a relatively rapid development in this stage and renewable energy utilization amount reached 512.48 million tce in 2015, over-fulfilling the target of the annual utilization amount of 478 million tce issued in “12th Five-Year Plan” of 7.2%.

2.6. From 2016 to the present: the stage of stable development

Nowadays, green and sustainable development have become the mainstream of the current China. In the “Report of 19th National Congress of the Communist Party of China”, President Xi Jinping proposed the new concept of development: “Development is the basis and key to solve all problems in our country. Development must be scientific development, and we must unswervingly carry out the concept of innovation, coordination, green, open and shared development”. After entering the new era, China began to pay more attention to the green transformation of development, and the core of the transformation is energy transformation.

In order to achieve development strategic targets of non-fossil energy consumption amount accounted for 15% and 20% of energy consumption in 2020 and 2030 respectively, in 2016, the NDRC issued the "13th Five-Year Plan for Renewable Energy Development” and stipulated that the total amount of renewable energy should reach 7.3 million tce, of which the total amount of
commercialized renewable energy should reach 5.8 million tce by 2020, providing guidance for the development of renewable energy in the new period.

In 2016, the National Energy Agency issued the “Guidance on the Establishment of the Target-Guidance System for the Development and Utilization of Renewable Energy Sources”, where the renewable energy proportion in the total energy consumption of each province is recommended. In the same year, the NDRC issued the "Management Measures for the Full Guaranteed Purchase of Renewable Energy Power Generation", to promote the consumption of renewable energy power through the guaranteed purchase of renewable energy power generation.

In January 18, 2017, the NDRC, the MOF and the NEA jointly issued the "Notice on the Certification and Voluntary Subscription of Renewable Energy Green Electricity Certificates" where government organs, enterprises and institutions, social institutions and individuals are encouraged to voluntarily subscribe green electricity certificates from the national green electricity certification and subscription platform as proof of the consumption of green electricity, and planned to started up the renewable energy electricity quota examination and green electricity certificate compulsory restriction transaction at the suitable time from 2018.

It can be seen that the development of renewable energy policy in China have begun to stabilize in the new period, and China began to pay more attention to the point of promoting energy transformation by quota mechanism, so as to realize the sustainable green development of our country.

3. Policy Implication for African Countries

Through combing and summarizing the development of China's renewable energy policy, this paper draws the following points for the development of renewable energy policies in African countries:

1. Establish a target-guiding system for renewable energy. The government should formulate indicators on renewable energy consumption in total primary energy consumption of all provinces and the proportion of renewable energy power consumption in the whole society electricity consumption. Identify the responsible subject of tasks and decompose the annual targets; strengthen the constraint ability of the management approach, continue to refine the target for the regions and provinces whose objectives unachieved, so as to increase the pressure and motivation for the local government to achieve the target.

2. Formulate explicit relevant standards for renewable energy power generation, including benchmarking feed-in tariffs and definite subsidy standards, and set up special fund for renewable energy development. Due the characteristic of having high initial cost but low marginal cost that renewable energy power possessed, it is necessary for the renewable energy power generation to be provided a certain amount of subsidies by government in the initial stage. At the same time, the central government should define the potential for renewable energy development in various regions combined with their development status and formulate a clear feed-in tariff and subsidy standards, so as to create a good initial environment for domestic renewable energy power development.

3. Implement the security acquisition system for renewable energy power generation. Power grid companies should implement the renewable energy priority generation system in accordance with the national renewable energy benchmarking feed-in tariffs and guaranteed acquisition hours, combined with market competition mechanisms, and fully purchase the grid-connected electricity for renewable energy power generation projects within the planned scope. Through the renewable energy security acquisition system renewable energy power enterprises can obtain the basic benefits to lay a good foundation for fully entering the electricity market after it becoming competitive.

4. Promote the establishment of two markets for renewable energy power resource subscription transactions and Green Certificate compulsory subscription transactions. The renewable energy industry needs the government's subsidies at the initial stage of development, this may result in a gap between subsidies fund and actual subsidy, exerting adverse effect on the renewable energy industry chain from the electricity market downstream to the renewable energy power generation equipment manufacturers upstream. However, through the establishment of a voluntary subscription market for Green Certificate, the concept of renewable energy consumption can be popularized, and the
establishment of a compulsory market can be facilitated. It can also help bridge the gap between renewable energy fund and actual subsidies finance needed.

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