

Renewable Energy Communities: An Alternative Electricity Generation Financing via Regional Public-Private Partnership in Morocco

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ABSTRACT

Regional public-private partnership is a joint venture-based business model by way of musharakah contract in order to enable interest-free electricity generation financing within renewable energy communities each region in Morocco. Musharakah contract is a kind of Islamic finance instrument. Musharakah joint venture is well suited to renewable energy community business models because it is based on capital partnership within profit/loss participation. Renewable energy has played significant role in the world in recent times. Morocco has also got weight to renewable energy sources since when Moroccan authorities extensively tackled with enhancing energy supply diversification at National Energy Strategy in 2009. In this context, it is aimed in this study that provide more clean electricity generation and all economic factors are active in cooperation, especially households, through regional renewable energy communities. Therefore, regional industry and household electricity consumers are expected to become investors by evaluating their savings without interest thanks to musharakah contract.

Keywords: renewable energy communities, energy financing, public-private partnership, joint venture, musharakah

الملخص

الشراكة الإقليمية بين القطاعين العام والخاص هي نموذج أعمال مشترك قائم على عقود المشاركات لتمكين تمويل مشاريع توليد الكهرباء برؤوس أموال بدون فوائد من خلال مجمعات الطاقة المتجددة في كل منطقة من المغرب. عقد المشاركة هو نوع من أدوات التمويل الإسلامي. يعتبر مشروع المشاركة المشترك مناسباً تماماً لنماذج أعمال مجمعات الطاقات المتجددة لأنه يعتمد على شراكة رأس المال في إطار المشاركة في الربح / الخسارة. وقد لعبت الطاقة المتجددة دوراً هاماً في الآونة الأخيرة حيث يولد المغرب 10٪ من خلال الطاقة الريحية و2٪ من الطاقة الشمسية في إجمالي إنتاج الطاقة مستغلاً الظروف المناسبة للمناخ لتوليد الطاقة المتجددة. من خلال تطوير مجمعات الطاقة المتجددة الإقليمية، سوف يتم توفير المزيد من الكهرباء النظيفة، وأن جميع العوامل الاقتصادية تنشط في التعاون، لا سيما الأسر كمستهلك أخير للمنتوج. وبالتالي، من المتوقع أن يصبح المصنعون المحليون بالإضافة إلى المستهلكين الكهربائيين في المنطقة مستثمرين من خلال تقديم مدخراتهم دون فائدة بفضل عقد المشاركة.

الكلمات المفتاحية: مجمعات الطاقات المتجددة، تمويلات الطاقة، شراكة القطاع العام والخاص، المشروع المشترك، المشاركة

INTRODUCTION

The need for electricity, like energy, has been increasingly growing. Electricity/energy concerns close areas of both human life and the entire industry sectors, especially with the growing population and the developing technology. Therefore, developed countries attach importance to energy generation to ensure sustainability, meanwhile developing countries attach importance to energy generation for development. Hence, countries seek to create fund or provide inflow of funds for these energy projects financing as in all investments. Consequently, many financing models have been occurred in the world for years.

Energy financing is implemented in different ways in the world. Especially renewable energy community (REC) co-operatives or other partnership models have come to the forefront so as to finance renewable energy generation in Europe lately. RECs can be defined as projects where communities collectively exhibit a high level of ownership, control and benefit from the results (Seyfang et. al, 2013). Besides, with increasing localization of energy generation, individuals and businesses could play much more important role in the energy management. This situation leads to emergence of new business models and ownership structures in the energy generation area (Interreg Europe, 2018). In this regard, renewable energy cooperatives have been established in developed countries of the world such as Canada, USA and Australia, especially in Germany, England and Denmark with the contribution of successful incentive mechanism which is feed-in tariff (T.R. Ministry of Commerce, 2019).

From on Islamic point of view; nature, business and finance methods of the projects must suit to Shariah (McMillen, 2009). RECs models are well suited to Islamic philosophy because of creating social, political, environmental, economic and technological benefits (Hicks et. al, 2014). Moreover, musharakah is also well suited to raise fund to REC projects financing since it is based on capital partnership within profit/loss participation.

The government of Morocco outlined enhancing energy supply diversification at National Energy Strategy in 2009. One of the featured issues was development of Morocco's industry and economy in the sectors of renewable energy by integrating with regional and international markets (IEA, 2019). According to the 2016's data, net energy generation was 35.415 bn kWh, meantime electricity generation was 30.840 bn kWh in Morocco. In addition, Morocco had 8.262 bn kWh installed electricity capacity of the national plants which of it 10% was wind energy and 2% was solar energy (ONEE, 2016). National purpose of Morocco has been increasing use of renewable sources for electricity generation. By 2020, 42% of the installed

electricity generation capacity is planned to be provided from renewable energy sources, and by 2030, it is planned to increase 52% (export.gov, 2019).

The purpose of this study is to build business model for regional public-private partnership (PPP) within joint venture-based business model by way of musharakah contract in order that enable interest-free electricity generation financing inclusive of renewable energy communities for each region of Morocco. RECs have been a subject of research by many researchers. These studies differ in terms of the business model and financing method. In this study, musharakah contract via regional PPP is approached so as to finance renewable energy projects.

The rest of paper is structured as follows: Section 2 consists of development, structure and impacts of RECs. Afterwards, structure of the proposed regional REC model for Morocco is given in section 3. Finally, section 4 presents the conclusions.

1. Review of Renewable Energy Communities (RECs)

The first examples of energy communities are traditional energy cooperatives that founded by residents in order to serve them-selves via community-owned power plants in Germany at the beginning of the 20th century (Dilger et. al, 2017). Also, the first implementation of REC is Twindkraft project which installed as a wind turbine by community of Ulfborg in Denmark in 1978. Since then, energy communities have become common in Europe, especially Denmark and Germany (Interreg Europe, 2018). Nowadays, RECs models have been implemented in different ways in Canada, USA, Australia, most of European and some of Asian countries.

The term of REC has different definitions because of implementing in various forms. In its most basic definition, RECs that are local citizens, public authorities, entrepreneurs and community organizations play an active role in regional energy production from partially or fully renewable energy sources or technology (Interreg Europe, 2018) within development, management or financing of the projects (Walker and Devine-Wright, 2008). Local renewable energy production is managed by citizens so as to contribute to transition to a sustainable energy system (van der Schoor and Scholtens, 2019). In this sense, RECs are example of “community innovation” (Mirzania et. al, 2019). Furthermore, RECs for electricity are that “*reflect the motivations and aspirations of the local community; maximize local ownership; share the financial benefits widely; match energy production to local usage*” (Hicks et. al, 2014). The most common definition to characterize of RECs is projects where communities

exhibit a high level of ownership, control and benefit from the results collectively (Seyfang et. al, 2013).

1.1 Models of RECs

Business models and legal entities of RECs vary in terms of structure of community, kind of project (Hicks et. al, 2014), scale of investment (Holstenkamp, 2018; Yildiz, 2014), organization structure, ownership (Becker et. al, 2017) and participants of RECs (Eitan et. al, 2019). These variations determine how RECs should constitute business model to create value, generate energy and provide return.

According to Interreg Europe (2018), different legal forms are possible for RECs. Nevertheless, exact details and requirements may alter from country to country. The table below presents the most preferred legal forms in Europe.

Table 1: Legal Forms for Community Energy

| Legal Form | Characteristics |
|------------------------|--|
| Co-operative | Co-operative societies are intended to primarily benefit their members. Membership is voluntary and open to anyone willing to accept responsibilities and risks. Members benefit from generated energy, and have a say in governance and profit allocation with one vote per member. They may provide training and other benefits to members, as required to maintain to the co-operative. |
| Partnership | Individuals may decide to work together to establish a legal partnership with the aim of providing energy to a community. Unlike a co-operative, voting power will be determined by the stake that each individual put into the company. As well as providing a community benefit, partnerships can generate a profit. |
| Trusts and Foundations | Trusts and foundations are established as charitable organisations, with the aim of delivering a social benefit rather than profit. These forms enable whole communities to benefit, even when individuals cannot afford to participate. |
| Public Utility Company | Public utility companies are run by municipalities, who invest in and manage the utility on behalf of taxpayers and citizens. These forms are less common than the above forms, but are particularly suited for rural or isolated areas. |

| | |
|----------------------------|--|
| Public-Private Partnership | Local authorities can decide to enter into agreements with citizen groups and businesses in order to ensure energy provision and other benefits for a community. |
|----------------------------|--|

Source: Extracted from Interreg Europe (2018, p. 6-7).

RECs are closely related to structure and expectations of the community. Therefore, sustainable of REC projects are strongly linked to regional participants (Lakshmi and Tilley, 2019), empirical operationalization (Becker et. al, 2017), government policy and subsidies (Mirzania et. al, 2019). In addition, government policy and incentives are important for society acceptance of REC projects (Azarova et. al, 2019).

1.2 Impacts of RECs

RECs provide social, political, environmental, economic and technologic benefits by strengthening the local economy; ensuring the participation and reinforcement of the regional society; educating people about renewable energy; significantly reducing carbon footprint; developing in the renewable energy industry and business (Hicks et. al, 2014).

Soeiro and Ferreira Dias (2019) researched renewable energy co-operatives from the point of Southern European countries. They deduced that renewable energy co-operatives appear well-positioned alternatives in Southern European countries. According to them, the role of these cooperatives seems to be determinant for the achievement of the sustainability aims of each country. In addition, this new emergence cooperatives might be due to the dissatisfaction of citizens and consumers with the current market. Besides, Eichermüller et. al (2018) examined a few rather successful pilot REC projects by doing comparative analysis in Eastern countries and Western Balkans. They determined that the examples of good practice include overcoming barriers in the collaboration of various stakeholders, high expertise in technology, good networking with small investors, international cooperative experts and successful information campaigns. Also, Beggio and Kusch (2015) came to conclusion that “*community-based projects achieve active participation of the citizen, a vital element in sustainable development, and therefore have particularly high attractiveness*” in their study.

2. An Alternative Business and Financing Model for Morocco Regional Electricity Generation Projects

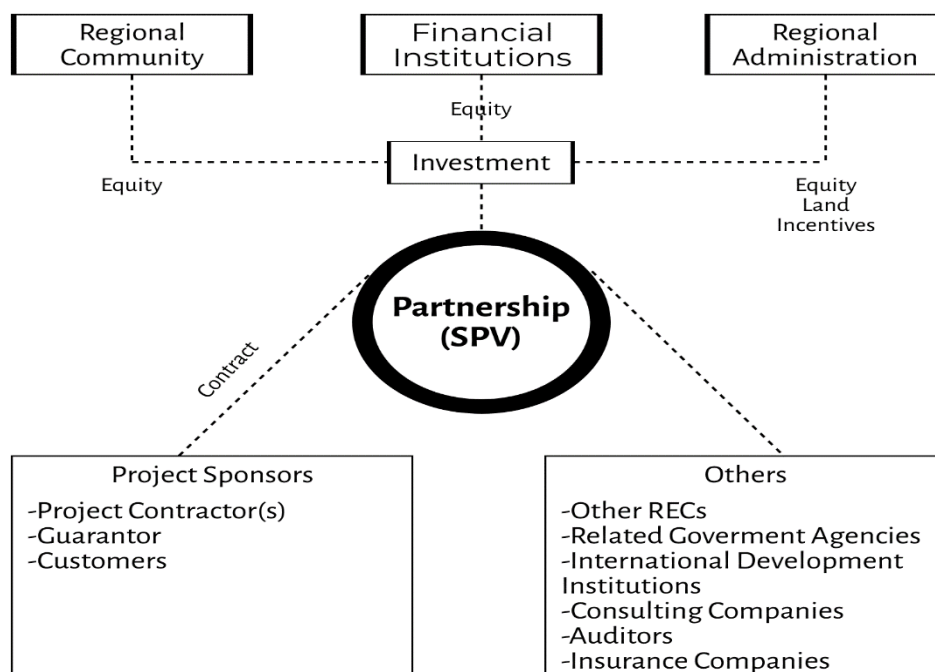
Electricity generation from renewable energy projects requires high initial investment, management experience and technological knowledge. Morocco has been developing in renewable energy sector since private electricity generation was allowed in 1994. Especially,

ONEE and MASEN have presented their experience in renewable energy sector with their different implementations (IEA, 2019). However, savings and purchasing power of Moroccan people are not enough to be financed REC projects by regional public/community in Morocco (Kasraoui, 2019; World Bank, 2018). Yet, a regional administration that participated to REC projects influence acceptance and investment of regional community to REC projects (Azarova et. al, 2019; Mirzania et. al, 2019). In this context, regional PPP model is the most optimal legal form for regional REC projects in Morocco. Thanks to this model, investment, know-how and management experiences in renewable energy projects are undertook by the participants.

2.1 Participants of Regional REC Projects

Whether natural or legal entity, individuals/private sectors and public administration partnership are called PPP (Küçük, 2019). PPP for regional REC projects are that regional authorities can decide to make agreements with citizen groups and businesses in order to provide energy supply and other benefits for a community (Interreg Europe, 2018). Accordingly, participants of regional PPP are proposed for Morocco regional REC projects which are as follows:

Figure 1:Participants of PPP in Regional REC Projects



Source:Formed by the author.

As shown on Figure 1, regional PPP-based REC models are mainly made up of a regional administration, regional community and private sector collaboration. Participants of the

regional PPP are comprehensive system that consist of many parties and operate at the headquarters as special purpose vehicle (SPV). Whereas the regional community, administration and financial institutions take part in investment side as project-owner (shareholder), other participants act as complementary and supportive factors. On the other hand, project sponsors are responsible for the construction, organization and operation of the regional REC project as contractor. The partnership carries out regional REC project activities through the SPV.

Regional Community: Households and other economic units in a region of Morocco are that provide equity financing to the project.

Financial Institutions: Banks and other financial intermediates are that provide equity financing to the project.

Regional Administrative: A regional administrative of Morocco is that provide equity, land and incentives to the project.

Project Contractor(s): Contractors are responsible for the construction, operation and business stages of the project. Project contractors also provide equity and know-how to the project.

Customers: Regional electricity consumers, other RECs and government.

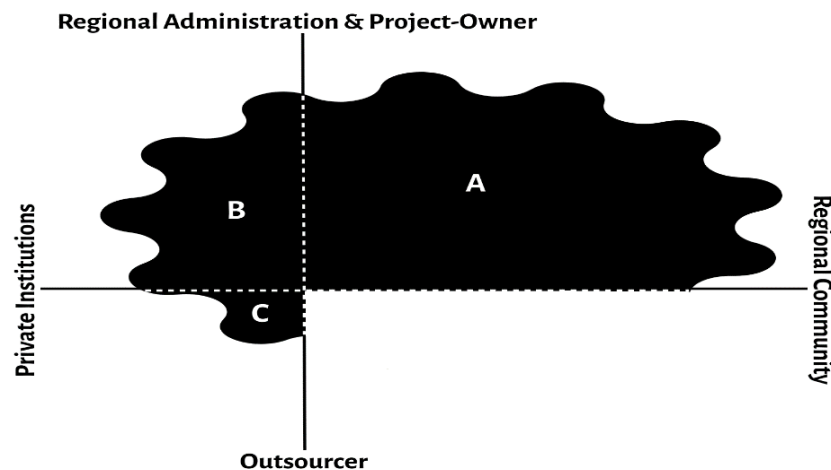
Guarantor: Regional government is to assure purchasing guarantee of surplus electricity generation.

Other RECs: The partnership (the project company) collaborates with other RECs in terms of trade, training and experience sharing.

Related Government Agencies: The partnership collaborates with the government in respect to legal issues, incentive issues and guarantee process.

International Development Institutions: International organisations are that subsidize to development projects such as IsDB, AfDB, EDB.

The most important goals of REC projects are to increase community cooperation and project ownership. For this reason, structure of REC projects differs from other project models. Access to land, natural resources (Eitan et. al, 2019), fund resources and knowledge also effect preferred PPP archetype in regional REC projects. The archetype of preferred regional PPP participants for Morocco regions is as follows:

Figure 2: The Archetype of PPP in Regional REC Projects

Source: Formed by the author.

In Figure 2, the archetype of PPP exhibit intensity of the participants how they should participate to the regional REC projects such as project-owner or outsourcers. The archetype consists of three area which are A, B and C. In area A is shown participation of regional administration and community; in area B is shown participation of regional administration and private institutions. Both of area A and B compose of project-owners which participate with equity, capital and the contractor firms in the regional REC project. On the other hand, in area C is shown outsourcers which are other RECs, related government agencies, international development institutions, consulting companies, auditors and insurance companies. In addition to all these, financial institutions that have agreements with the regional REC partnership for risk/liquidity management are also included in area C. In this sense, the form of the archetype may vary from region to region with regard to regional community savings, regional administration subsidies and project sponsors.

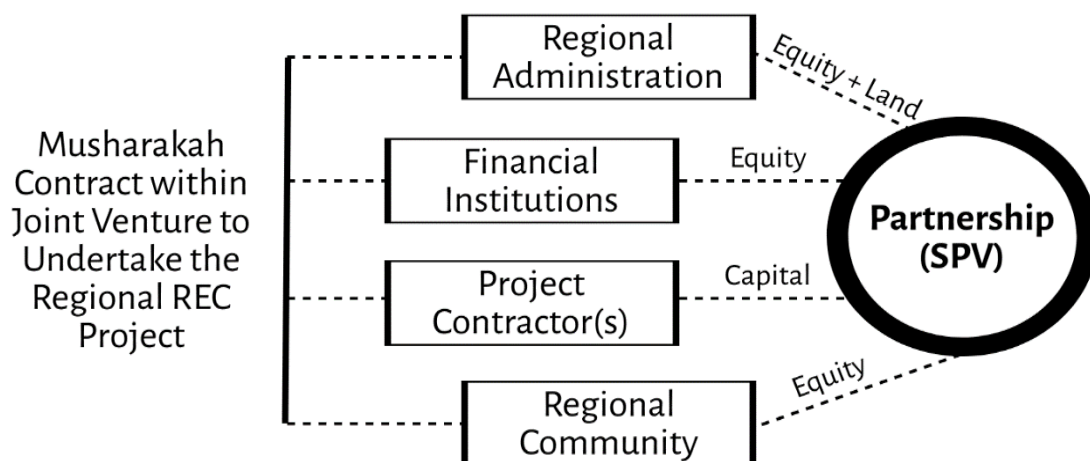
2.2 Financing of Regional REC Projects

The regional PPP is a joint venture-based business model by way of musharakah contract which is a kind of Islamic finance instrument. Musharakah means the partnership by two or more people in order to invest a certain amount of capital so as to share the profit/loss that may arise in the course of the planned work (Hammad, 1996). In other words, as part of business or trade entrepreneurship in which all partners share the profit or loss in the joint venture (Usmani, 1999). Musharakah is also called as sharing (Salehuddin and Saiti, 2016; Usmani, 1999), partnership (Gamal and Abdalla, 1999) and kind of venture capital (Al-Suwailem, 1998).

When investors make an investment decision, the parties investing in a project finance take into consideration the profit to be realized at end of the project due to the cash flow and realization the project collateral (Arıcan et. al, 2013). It is not envisaged a fixed rate of return in musharakah, on the contrary the return that provided by musharakah is based on the actual profit earned by the joint venture (Usmani, 1999). Musharakah-based financing has more returns than normal debt-based financing because of the higher risk inherent (Salehuddin and Saiti, 2016).

According to proposed regional PPP model, necessary capital is provided with musharakah contract in joint venture by regional administration, community, financial institutions and project contractors via SPV. The capital raised shall be used to finance the regional REC project that generate revenue with the objective of making profit. This joint venture can be done thanks to musharakah joint venture agreement.

Figure 3: Musharakah Joint Venture Agreement



Source: Formed by the author.

As shown on Figure 3, the purpose of this financing model is to canalize funding direct to the regional REC project over the SPV. Accordingly, investor parties finance the regional REC project through musharakah joint venture. They share profit from electricity trade generated through REC project within the proportion of unit cost contribution. They also share the loss that may occur in the same way. Thereby, project risk is allocated among project investors.

2.3 Business Model of Regional REC Projects

RECs that are local citizens, public authorities, entrepreneurs and community organizations play an active role in regional energy production from partially or fully renewable energy sources or technology (Interreg Europe, 2018). Accordingly, business model of regional REC projects is built on the generation of electricity, which provided renewable energy sources -

according to the potential and weather condition of the region, by cooperation of regional administration, community and private sectors for each region in Morocco. Hereunder, business model canvas of regional REC projects is as follows:

Table 2: Business Model Canvas of PPP in Regional REC Projects

| Key Partners | Key Activities | Value Propositions | Customer Relationships | Customer Segments |
|--|--|---|---|---|
| -Regional Authorities -Regional Community -Finance Institutions -Project Contractor(s) -Government -International Development Institutions -Other RECs | -Management and Financial Operations -Regional Cooperation -Trainings Key Resources -Natural Resources -Community -Physical and IT Infrastructure -Human Resources | -Raising funds through musharakah contract to finance renewable energy projects. -Electricity Generation -Generating profits through the project within musharakah joint venture agreement. | -Operational Support -Personal Support Channels -Banks -Other Financial Institutions -Electronic Platform | -Regional Electricity Customers -Other RECs -Government -Other Countries |
| Cost Structure | | | Revenue Streams | |
| -Construction Cost -Operating Cost -Sunk Cost -Outsourcing Service Expenses -Allocation of Profit Margin | | | -Sales Revenue -Profit/Loss Sharing Income -Incentives -Subsidies | |

Source: The framework is extracted from Osterwalder and Pigneur (2010, p.44)

Regional authorities, community and financial institutions participate to the project as capital investors. Project contractors also provide capital and know-how to the project. On the other hand, subsidies and incentives cooperation shall be made with government and international

development institutions such as IsDB, AfDB, EDB. In addition, collaboration shall be made with other regional RECs on trade, training and experience sharing.

Capital contribution to the regional REC project through musharakah joint venture contract is subject to negotiation, feasibility study, internal policies, board approval and project's meeting the relevant risk's requirements (Salehuddin and Saiti, 2016). Regional administration, regional community, project contractors and investor financial institutions, like in Figure 3, shall be regulated their roles as the shareholder of the project in the musharakah joint venture agreement. All investor parties shall be represented in the regional REC board committee in proportion to their investments. Besides, project contractors responsible for the construction, operation and business stages of the project. On the other hand, trainings shall be organized about renewable energy to raise awareness the regional community and other participants.

The model has three value propositions are that raise funds through the musharakah joint venture, generate clean electricity from renewable energy sources -according to the potential and weather condition of the region-, and generate profit through the project without interest.

The natural customers of the projects are electricity consumers in the region. In addition, trading with other regional RECs is possible. Even electricity distribution to other countries may be realized with additional projects of electricity distribution lines and additional plants in later stages. The government assure purchasing guarantee of surplus electricity generation. Operational support is facilitated to customers on institutional base. The regional community also get service personal-based support.

Financing of the project could be provided with a special musharakah account via banks or musharakah sukuk via the electronic platforms and other financial institutions. Moreover, the generated project revenues can also be collected via banks, financial institutions and electronic platforms.

Cost structure of the project consists of construction cost arisen in construction stage of the project; operating cost occurred in business and organisation stage; sunk cost that is relevant with the project risk; outsourcing service expenses that are related with consulting, audit and insurance service; and allocation of profit margin that is profit of investors from the project. On the contrary, revenue streams of the project consist of sales revenue provided from electricity generation; profit/loss sharing income that is the amount of the partnership share

within musharakah contract; incentives and subsidies that provided by the regional administration, the government and international development organizations.

Conclusion

After REC projects had started in Germany and Denmark through cooperatives, they gained importance in Europa and the rest of the world. Global transition to RECs has had social, political, environmental, economical and technological impacts. Overall, studies have reflected these effects of RECs. In terms of definition, RECs can be described as including all economic factors of a region participating direct in energy transition by jointly investing, producing, selling and distributing renewable energy. Business model of RECs vary according to the main characteristics which are community structure, scale of investment, ownership structure. These variations determine how RECs should be constituted business model and collaborate in order to create value, generate energy and gain revenue. The most preferred legal entities are cooperatives, partnerships, public-private partnerships, public utility companies, trust and foundations.

In this study, it is endeavored to form a business and financing model for RECs by way of musharakah joint venture via regional PPP model so as to enable interest-free electricity generation financing for each region of Morocco. In this context, Morocco has been developing in renewable energy sector, especially collaboration of government with ONEE and MASEN, but savings and purchasing power of Moroccan people are not enough for financing of regional REC projects. For these reason, regional PPP is identified as the most optimal legal form for regional REC projects in Morocco. As financing of regional REC projects, musharakah joint venture model is well suited model for interest-free financing of regional REC projects due to base on capital partnership within profit/loss participation. Correspondingly, project risk is allocated among participants. Hence, regional administration, regional community, project contractors and investor financial institutions are represented in the regional REC board committee in proportion to their investments as shareholders, i.e. project-owners.

As a result, the biggest obstacle to the regional REC projects in Morocco is lack of fund due to undersaving. Nevertheless, if the regional REC projects can be realized, it is expected clean electricity generation, regional development, capital allocation, strengthening regional economy, interest-free investment field and social awareness in micro perspective. Furthermore, regional industry and household electricity consumers are expected to become

investors by evaluating their savings. From on macro perspective, it will contribute to the achievement of Morocco Energy Strategy's 2020 and 2030 targets about renewable energy.

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