

Issue 2

*Journal of Law and
Rural Development*

Renewable Energy and
Rural Development



Investing in rural people

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List of abbreviations

ADB	Asian Development Bank
AfDB	African Development Bank
AIIB	Asian Infrastructure Investment Bank
CIP	Italian price committee (Comitato Interministeriale dei Prezzi)
ENEL	Italian national electricity company
FDI	foreign direct investment
FiT	feed-in tariff
IBRD	International Bank for Reconstruction and Development
IEA	International Energy Agency
IFC	International Finance Corporation
IFI	international financial institution
MDG	Millennium Development Goal
MoF	Ministry of Finance
NREA	New and Renewable Energy Authority
PAN	National Action Plan for Renewables
PDES	Social and Economic Development Plan 2016-2020
PPA	power purchase agreement
RPS	renewable portfolio standards
SDG	Sustainable Development Goal
SE4ALL	Sustainable Energy for All
SIN	National Interconnected System
WCED	World Commission on Environment and Development
WSP	World Solar Programme 1995-2005
WSSD	World Summit on Sustainable Development

Introduction

Affordable clean energy has been recognized in the Sustainable Development Goals (SDG7) as an essential, cross-cutting issue for achieving a sustainable future. For the poor rural people targeted by IFAD-supported projects, energy is essential to modernizing their farms and businesses and improving their lives. This second issue of *The Journal of Law and Rural Development* looks at this sometimes complex subject, particularly in its legal ramifications.

In 2018, IFAD marks 40 years of investing in rural people. The past four decades have seen over 1,000 IFAD-supported projects, which have helped improve the lives and livelihoods of some of the most remote and underserved communities in the world. We have reached some 474 million people and invested US\$19.7 billion.

But, looking ahead, IFAD is dedicated to doing more, and doing it better. Under its new President, Gilbert F. Houngbo, IFAD recently completed the consultation for the Fund's Eleventh Replenishment of its resources. It was agreed with Member States to set a target that will enable IFAD to expand the size of its programme of loans and grants by 10 per cent, while deepening and improving its operations over a three-year period from 2019 to 2021.

IFAD has a unique role to play, not only as an investor but as a trusted broker, an assembler of development finance, and a proven innovator sharing its knowledge and expertise. *The Journal of Law and Rural Development* is part of those efforts to share knowledge and promote innovation.

When we first thought about launching this journal, we were told by an experienced editor that it is easy to publish a first issue but harder to keep up the enthusiasm for the second and subsequent issues. As Editor, I am delighted by the support that the journal has received from authors and the interest that it has attracted from practitioners. This issue includes articles written by IFAD staff members as well as colleagues from the International Finance Corporation, the Asian Infrastructure Investment Bank, the private sector and academia. Topics range from the theoretical to the practical, addressing global issues as well as specific subjects in Africa, Asia, Europe and South America.

At the end of the issue there are Arabic, French and Spanish translations of the abstracts. We encourage translation of the articles into these and other languages, and we will be happy to authorize reproduction of articles upon request. The 2019 issue will focus on the interrelation of some of IFAD's top priorities: youth, migration and rural development. We invite potential contributors to contact us at legaljournal@ifad.org.

Charles Forrest
Editor-in-chief

The United Nations' commitment to the promotion of renewable energy and the need to assist developing countries in integrating renewable energies into their legislative frameworks

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Abstract

The promotion of renewable energies is a necessary strategy for achieving sustainable development. Renewable energy plays a key role in enabling developing countries to ensure energy security without compromising the environment and the needs of future generations. The United Nations has progressively acknowledged the importance of promoting the use and production of green energy. In 1972 the United Nations held the United Nations Conference on the Human Environment in Stockholm and for the first time the use of renewable energy sources was linked to sustainable development. Since then, environmental protection and renewable energy have been an integral part of the international community's agenda. The importance of facilitating the transition from fossil fuels to renewable sources was recently reaffirmed by the post-2015 Sustainable Development Goals. At a national level, the successful shift towards renewable energy depends on the existence of strong institutions and specific legal and policy frameworks. Over time, countries have implemented supportive policy and regulation instruments, such as tax incentives and ad hoc payment schemes. This article aims to stress the importance of promoting and integrating renewable energies within developing countries' legal frameworks and to encourage both investors and consumers to increase their levels of production and consumption of renewable energies.

Introduction

For decades now the United Nations¹ has fostered sustainable development, and the production and use of renewable energies in developing countries. Having acknowledged the key role that renewable energy can play in enabling the transition of developing countries towards a developed society,² the United Nations has progressively strengthened its promotion of the use of new and renewable sources of energy and made it an integral part of its agenda. Structured in two main parts, this article first retraces the major steps of the progressive shaping of this commitment from the Stockholm Conference to the adoption of the 2030 Agenda for sustainable development. This part highlights the central role that the United

Nations has played in encouraging the international community to assist developing countries in transitioning to renewable energies through the provision of financial, technological and institutional support. The second part of the article develops from a more analytical perspective and focuses on the institutional component of developing countries' need of support to successfully implement renewable energy policies. Specifically, by contending that the creation of a supportive body of laws is a necessary requirement when introducing renewable energies in a country's agenda, the analysis stresses the importance of assisting developing countries to integrate renewable energies into their legislative frameworks and emphasizes the centrality of the United Nations' contribution to this end.

1 For the purpose of this article and unless specified otherwise in the text, the term "United Nations" generically refers to the whole body of organizations belonging to the United Nations system.

2 Vandaele, N. and W. Porter. 2015. "Renewable energy in developing and developed nations: outlooks to 2040". *Journal of Undergraduate Research* 15, no. 3.

The path from the Stockholm Conference to the adoption of the 2030 Agenda for sustainable development³

A formative year for the shaping of the United Nations' commitment to the promotion of sustainable development was 1972. That year, the United Nations Conference on the Human Environment (also known as the Stockholm Conference) was held in Stockholm, Sweden, to build a response and "forge a basic common outlook on how to address the challenge of preserving and enhancing the human environment".⁴ Among the most important outcomes of the conference was the creation of a new United Nations Agency, the United Nations Environment Programme, to act as the "main [United Nations] body in the field of environment"⁵ with a mission to "provide leadership and encourage partnership in caring for the environment by inspiring, informing, and enabling nations and peoples to improve their quality of life without compromising that of future generations".⁶ The conference also produced, among other things, three fundamental documents: a declaration (Declaration of the United Nations Conference on the Human Environment, commonly referred to as the Stockholm Declaration), an action plan (Action Plan for the Human Environment: Framework for Environmental Action) and a resolution (Resolution on Institutional and Financial Arrangements). With the adoption of the Stockholm Declaration, the protection of the human environment became an integral component of the international agenda. While morally calling for everyone to respond to the responsibility to safeguard and wisely manage the heritage of wildlife and its habitat, the Declaration assigned "the greatest burden for action" to safeguard the environment to governmental institutions at national, regional and local levels and, ultimately, to international organizations. In particular, the declaration

set out the need for international cooperation to raise resources to support the developing countries in carrying out their environmental responsibilities and to help them remedy the environmental deficiencies generated by conditions of underdevelopment through the "transfer of substantial quantities of financial and technological assistance ... and such timely assistance as may be required".⁷ Relevantly, an indisputable merit of the declaration is that it recognizes the direct relationship between environmental issues and development. In the words used in the declaration:

In the developing countries most of the environmental problems are caused by under-development ... the developing countries must direct their efforts to development, bearing in mind their priorities and the need to safeguard and improve the environment.⁸

Complementing the declaration, both the action plan and the resolution further delineated the responsibilities of international organizations for the enactment of the principles enshrined in the declaration. Among other things, the action plan called for competent international organizations to include in their programmes questions relating to rural planning in relation to environmental policy, and for development assistance agencies to support the less industrialized countries in solving the environmental problems of development projects.⁹ The resolution instead solicited the adoption by the United Nations system of any measure required to undertake concerted and coordinated programmes with regard to international environmental problems.¹⁰

Although the Stockholm Conference laid the foundations of the international commitment to the promotion of renewable energies in developing countries, and despite the Stockholm Declaration referring to the "need to maintain, restore, or improve

3 The reconstruction does not cover all the steps undertaken over the years. The selection of the reported phases/events and their order stems from an arbitrary choice of the authors.

4 United Nations Conference on the Human Environment. 1972. "Declaration of the United Nations Conference on the Human Environment" A/CONF.48/14/Rev.1 Chapter I in *UN Documents: Gathering a Body of Global Agreements*. <http://www.un-documents.net/unchedec.htm> (accessed 5 February 2018).

5 European Commission. n.d. United Nations Environment Programme. http://ec.europa.eu/environment/international_issues/relations_un_en.htm (accessed 5 February 2018).

6 United Nations Environment Programme. n.d. Overview. <http://web.unep.org/about/who-we-are/overview> (accessed 5 February 2018).

7 United Nations Conference on the Human Environment. 1972. Above, note 4.

8 Ibid.

9 United Nations Conference on the Human Environment. 1972. "Action Plan for the human environment: B.1. Planning and management of human settlements for environmental quality" A/CONF.48/14/Rev.1 Chapter II, B.1 in *UN Documents: Gathering a Body of Global Agreements*. <http://www.un-documents.net/aphe-b1.htm> (accessed 5 February 2018).

10 United Nations Conference on the Human Environment. 1972. "Resolution on institutional and financial arrangements" A/CONF.48/14/Rev.1 Chapter III in *UN Documents: Gathering a Body of Global Agreements*. <http://www.un-documents.net/unche-if.htm> (accessed 5 February 2018).

the capacity of earth to produce vital renewable resources,"¹¹ a few years had yet to pass before the strategic use of renewable energies for the growth of developing countries' economies became fully integrated into the international agenda. A major step towards this was taken in 1981 through the adoption of the Nairobi Programme of Action for the Development and Utilization of New and Renewable Sources of Energy. The programme was adopted during the United Nations Conference on New and Renewable Sources of Energy, held in Nairobi in August 1981, as convened by the United Nations General Assembly through Resolution 33/148. In the resolution, the General Assembly had called for the elaboration of measures for concerted action designed "to promote the use of renewable energies ... in particular in the context of efforts aimed at accelerating the development of the developing countries".¹² Together with the other documents produced during the conference, the programme reflected the rising awareness of the "gap between the demand for conventional types of energy and probable production," on the one hand, and, on the other, "the potential needs of the thousands of millions of individuals belonging to rural communities in the poor countries who continue to use forms of energy characteristic of pre-industrial countries".¹³ In contrast to the "often wasteful and inefficient utilization of hydrocarbon resources by some countries as well as their finite supply and depletable nature," the programme shed light on the potential of several sources of energy, both traditional and non-traditional (such as "charcoal and fuelwood, oil sands and shales, peat, biomass, geothermal energy, marine energy, solar energy, wind, hydropower, and draft animals"¹⁴), and identified five policy areas for concerted action: energy assessment planning; research, development and

demonstration; transfer, adaptation and application of mature technologies; information flows; and education and training.¹⁵ Within such areas, the contribution of the international community was identified as an indispensable requirement.

Moreover, the Nairobi Programme of Action was endorsed by the United Nations General Assembly, which requested "all organs, organizations and bodies of the United Nations system to participate fully in support of the Nairobi Programme, in the short-term, medium-term and long-term context, in particular for the benefit of developing countries in accordance with their national plans and priorities".¹⁶

In a matter of nine years, through the Stockholm documents and the endorsement of the Nairobi Programme, the foundations of the United Nations' commitment to the promotion of sustainable development and renewable energies had been laid.

Building on those foundations, through Resolution 38/161, "Process of preparation of the Environmental Perspective to the year 2000 and beyond" (1983), the United Nations General Assembly welcomed the intention expressed by a number of governments to establish a special commission with the mandate to, among other things, "propose long-term environmental strategies for achieving sustainable development to the year 2000 and beyond" and "recommend ways in which concern for the environment could be translated into greater cooperation among developing countries and between countries at different stages of economic and social development".¹⁷ According to the resolution, the commission was to produce "a report on environment and the global problematique ... including proposed strategies for sustainable development".¹⁸

11 United Nations Conference on the Human Environment. 1972. Above, note 4.

12 United Nations General Assembly. 1981. A/RES/36/193: United Nations Conference on New and Renewable Sources of Energy. <http://www.un.org/documents/ga/res/36/a36r193.htm> (accessed 5 February 2018).

13 United Nations Educational, Scientific and Cultural Organization. 1981. "Address by Mr Amadou-Mahtar M'Bow to the United Nations Conference on New and Renewable Sources of Energy". <http://unesdoc.unesco.org/images/0004/000474/047400eb.pdf> (accessed 5 February 2018).

14 Osmańczyk, Edmund Jan and Anthony Mango. 2003. *Encyclopedia of the United Nations and International Agreements*, 1562. New York, Routledge.

15 United Nations Conference on the Human Environment. 1972. "Report of the United Nations Conference on the Human Environment", 3-9. <http://www.un-documents.net/aconf48-14r1.pdf> (accessed 5 February 2018).

16 United Nations General Assembly. 1981. Above, note 12.

17 United Nations General Assembly. 1983. Resolution 38/161, "Process of preparation of the Environmental Perspective to the year 2000 and beyond", Article 8 (a) and (b).

18 *Ibid.*, chapter 2, 1.

Accordingly, the World Commission on Environment and Development (WCED), also known as the Brundtland Commission, was created and started operating through a “basic approach” based on two principles: (1) addressing “causes rather than manifestations of environmental degradation”; and (2) regarding “development and environment as interlinked”.¹⁹ In the words of Stanley Clinton-Davis, Commissioner for the Environment of the European Economic Community, spoken at the WCED public hearing in Oslo in June 1985:

First, if the problems of environmental degradation and of poverty, particularly in the Third World, are to be solved, a continued economic development is essential. Second, we must reconcile environmental protection with economic growth ... Third, there is also a great consensus that the application of strict environmental standards is good for economic growth, as well as for the environment, and that they encourage innovation, promote inventiveness and efficiency, and generate employment.²⁰

As mandated by the General Assembly, in 1987 the Commission issued the report “Our Common Future,” identifying environmental issues and problems and proposing viable strategies to counter them. The report, commonly referred to as the Brundtland Report, is most often recalled for having provided a first official definition of “sustainable development” as the type of “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”.²¹ Defining sustainable is not, however, the only merit attributable to the work of the Brundtland Commission. Undoubtedly among the further merits to be acknowledged is that it strongly emphasized and shed light on the need to adopt development policies that sustain the livelihoods of the rural poor in developing countries. The following extract is emblematic in this regard:

This marginalizes people, and marginalized people are forced to destroy the resource base to survive. ... to achieve global food security, the resource base for food production must be sustained, enhanced, and, where it has been diminished or destroyed, restored. ... more specific policies that protect the resource base are needed to maintain and even enhance agricultural productivity and the livelihoods of all rural dwellers.²²

Further, the promotion in the report of “the untapped potential” of renewable forms of energy and the encouragement of the transition to a broader and more sustainable mix of energy sources should also be recalled.²³ Behind that promotion lay the Commission’s belief that, “properly managed, efficiency measures could allow developing countries to achieve higher levels of growth with much reduced levels of investment, foreign debt, and environmental damage”.²⁴ In this regard, also of essential importance was the Commission’s identification of the major obstacles preventing developing countries from transitioning autonomously to renewable energies, which include but are not limited to the need for “large-scale financial and technical assistance” and for adequate social and institutional frameworks that would “ease these sources into energy supply systems”.

While the Brundtland Commission dissolved in 1987, the Brundtland Report laid groundwork for the following steps taken by the United Nations in promoting sustainable development and renewable energies.²⁵ In particular, the report acted as a “key driver” towards the United Nations Conference on Environment and Development (commonly referred to as the Rio Earth Summit) held in 1992 in Rio de Janeiro, Brazil.²⁶ During the Earth Summit, heads of state or government gathered to “come to an understanding of development that would support socio-economic development and prevent the continued deterioration of the environment, and to lay a foundation for a partnership between the developing and the more

19 Borowy, Iris. 2013. “The Brundtland Commission: sustainable development as health issue”. *Michael* 10, 198-208, 200.

20 World Commission on Environment and Development. n.d. *Report of the World Commission on Environment and Development: Our Common Future*. A/42/427 Annex in *UN Documents: Gathering a Body of Global Agreements*, chapter 12. <http://www.un-documents.net/wced-ocf.htm> (accessed 5 February 2018).

21 Ibid.

22 Ibid., chapter 5.

23 Ibid., chapter 7.

24 Ibid.

25 BCGI. 1999. Agenda 21: Programme of Action for Sustainable Development. <http://bgci.org/worldwide/article/0011> (accessed 6 February 2018).

26 United Nations Environment World Conservation Monitoring Centre. 2014. Sustainable development. <http://biodiversitya-z.org/content/sustainable-development> (accessed 6 February 2018).

industrialized countries".²⁷ The summit produced, among others, two important documents: the Rio Declaration on Environment and Development, also known as the Rio Declaration, and Agenda 21, a "comprehensive programme for global action in all areas of sustainable development".²⁸ In harmony with the spirit of the previous international interventions, the Rio Declaration defined through its principles "the right of people to development, and their responsibilities to safeguard the common environment"²⁹ and established that special priority should be given to "the special situation and needs of developing countries, particularly the least developed and those most environmentally vulnerable".³⁰ Reflecting "a global consensus and political commitment at the highest level on development and environment cooperation," Agenda 21 identified different programme areas, each programme area being "described in terms of the basis for action objectives, activities and means of implementation".³¹ Among these, chapter 14 outlined a specific programme for "Rural Energy Transition to enhance productivity" for the achievement of the following objectives: (1) the initiation of a "process of environmentally sound energy transition in rural communities, from unsustainable energy sources, to structured and diversified energy sources by making available alternative new and renewable sources of energy"; (2) "increase in energy inputs available for rural households and agro-industrial needs ...;" and (3) "implementation of self-reliant rural programmes favouring sustainable development of renewable energies and improved energy efficiency".³² Throughout Agenda 21, the provision of financial, technological and institutional support from the international community figures as a prerequisite for the implementation of the programmes and the achievement of the relevant objectives. With specific reference to the programme for Rural Energy

Transition to enhance productivity, the Agenda laid down the collaboration of international organizations in supporting local governments to, among other things, "promote plans and projects consisting of electrical, mechanical and thermal power (gasifiers, biomass, solar drivers, wind-pumps and combustion systems) that are appropriate and likely to be adequately maintained"; "intensify research and the development, diversification and conservation of energy, taking into account the need for efficient use and environmentally sound technology"; and "establish national institutional mechanisms for rural energy planning and management that would improve efficiency in agricultural productivity".³³ Furthermore, the programme established that the United Nations agencies should "exchange country and regional experiences on rural energy planning methodologies in order to promote efficient planning and select cost-effective technologies".³⁴

Following the issuance of Agenda 21, the endorsement by the United Nations General Assembly of the World Solar Programme 1995-2005 (WSP) in 1998 constituted a further step in the promotion of the use of renewable energies, particularly in developing countries. Launched during the World Solar Summit held in Zimbabwe in 1996, the WSP "was conceived as a concrete follow-up of the recommendations of the Rio Earth Summit"³⁵ with the aim of improving "the quality of life in both industrialized and developing countries through the wider use of renewable energies, notably in the rural areas of developing countries".³⁶ Self-proclaimed as the "energy conscience of the United Nations and other inter-governmental bodies,"³⁷ the WSP promoted the use of, despite its name, all types of renewable energy sources. Through Resolution 53/7, issued in October 1998, the United Nations General Assembly endorsed the programme "as a contribution to the overall sustainable

27 Earth Summit. 1997. United Nations Conference on Environment and Development, 2. <http://www.un.org/geninfo/bp/enviro.html> (accessed 6 February 2018).

28 Ibid.

29 United Nations General Assembly. 1992. "Report of the United Nations Conference on Environment and Development" A/CONF.151/26 (Vol. I). <http://www.un.org/documents/ga/conf151/aconf15126-1annex1.htm> (accessed 6 February 2018).

30 Ibid., principle 6.

31 United Nations Sustainable Development. 1992. "United Nations Conference on Environment & Development Rio de Janeiro, Brazil, 3 to 14 June 1992, Agenda 21", section 1.6. <https://sustainabledevelopment.un.org/content/documents/Agenda21.pdf> (accessed 19 March 2018).

32 Food and Agriculture Organization of the United Nations. 1995. "Chapter 2. Energy for sustainable agriculture and rural development and food security in Africa" in *Future Energy Requirements for Africa's Agriculture*. <http://www.fao.org/docrep/V9766E/v9766e03.htm> (accessed 22 March 2018).

33 Ibid., section 14.100.

34 Ibid., section 14.96.

35 UNOstamps. 2008. World Solar Programme. https://unostamps.nl/subject_world_solar_programme.htm (accessed 6 February 2018).

36 United Nations General Assembly. 1998. Resolution A/RES/53/7, "World Solar Programme 1996-2005". https://digitallibrary.un.org/record/261859/files/A_RES_53_7-EN.pdf (accessed 6 February 2018).

37 United Nations Educational, Scientific and Cultural Organization. n.d. "World Solar Programme 1996-2005: an outline", 3. <http://unesdoc.unesco.org/images/0010/001066/106646eo.pdf> (accessed 6 February 2018).

agenda” and invited “the Secretary General of the United Nations ... to undertake concrete action in order to ensure that the World Solar Programme 1996-2005 is fully integrated into and brought into the mainstream of the efforts of the United Nations system to attain the objective of sustainable development”.³⁸

At the beginning of the new millennium, a series of important initiatives were undertaken by the United Nations involving both directly and indirectly the use of renewable energies in developing countries. First and foremost among these was the adoption of the Millennium Development Goals (MDGs) in September 2000. Reflecting concern about “poverty, hunger, disease, unmet schooling, gender inequality, and environmental degradation,” the MDGs were conceived as a set of eight goals to be achieved by 2015, promoting “global awareness, political accountability, improved metrics, social feedback, and public pressures”.³⁹ Although the MDGs did not expressly include an energy-specific goal, energy access constituted an essential condition for the achievement of the MDGs.⁴⁰ In this respect, it is worth mentioning the United Nations Development Programme World Energy Assessment Overview 2004 update, wherein it was explicitly acknowledged that “none of the MDGs [could] be achieved without much greater access to improved quality and an increased quantity of energy services”⁴¹ and the report *Energy Services for the Millennium Development Goals*, which remarkably contributed to underlining “the importance of energy services for the MDG agenda”.⁴² The same direct connection between the MDGs and energy-related issues was also reiterated a few years later by the General Assembly through Resolution 65/151, which established “that access to modern affordable energy services in developing countries is essential for the achievement of the internationally agreed development goals, including MDGs, and sustainable development”.⁴³ In line with *Energy Services for the Millennium Development Goals*, the resolution expressly referred to the need to “take further action to mobilize the

provision of adequate financial resources” and to provide “support for the implementation of national policies and strategies to combine, as appropriate, the increased use of new and renewable energy sources and low-emission technologies, the more efficient use of energy, [and] greater reliance on advanced energy technologies”.⁴⁴

Shortly after the adoption of the MDGs and exactly 30 years after the Stockholm Conference, another step forward was made by the international community in the promotion of renewable energies when more than 100 world leaders met for the World Summit on Sustainable Development (WSSD) in Johannesburg, South Africa.⁴⁵ Held from 2 to 4 September 2002, the WSSD produced two fundamental documents: a declaration, generally known as the Johannesburg Declaration, and a plan of implementation (Plan of Implementation of the World Summit on Sustainable Development). Through the Johannesburg Declaration and the plan of implementation, the international community renewed its commitment to sustainable development in developing countries through, among other things, the use of renewable energies and agreed on a series of energy-oriented targets. In line with the previous interventions, international assistance was called upon for the implementation of such targets not only through financial contributions and supply of technology but also through the provision of support to national efforts to establish national energy policies and regulatory frameworks. Relevantly, the plan of implementation recommended that international financial institutions and other agencies’ policies “support developing countries, as well as countries with economies in transition, in their own efforts to establish policy and regulatory frameworks which create a level playing field between the following: renewable energy, energy efficiency, advanced energy technologies, including advanced and cleaner fossil fuel technologies, and centralized, distributed and decentralized energy systems”.⁴⁶

38 United Nations General Assembly. 1998. Above, note 36.

39 Sachs, Jeffrey D. 2012. “From Millennium Development Goals to Sustainable Development Goals”. *Lancet* 379, 2206-2211.

40 Modi, Vijay, Susan McDade, Dominique Lallemand and Jamal Saghir. 2005. *Energy Services for the Millennium Development Goals*, 73. Washington, D.C.: Energy Sector Management Assistance Programme, United Nations Development Programme, United Nations Millennium Project and World Bank.

41 Goldemberg, José, Thomas B. Johansson and Dennis Anderson. 2004. *World Energy Assessment*, 18. United Nations Development Programme, Bureau for Development Policy.

42 Modi et al. 2005. Above, note 40.

43 United Nations General Assembly. 2011. Resolution A/RES/65/151, “International Year of Sustainable Energy for All”.

44 Ibid.

45 World Summit on Sustainable Development. 2002. Background release: 24 August 2002. <http://www.un.org/events/wssd/summaries/envdevj1.htm> (accessed 6 February 2018).

46 World Summit on Sustainable Development. 2002. “Plan of Implementation of the World Summit on Sustainable Development”. http://www.un.org/esa/sustdev/documents/WSSD_POI_PD/English/WSSD_PlanImpl.pdf (accessed 6 February 2018).

At this point, a few words need to be spent on the previously mentioned report *Energy Services for the Millennium Development Goals* because of its valuable contribution in showing the “linkages between all the MDGs and energy” as well as in illustrating “the distinct routes needed to scale up energy services in rural and urban areas”.⁴⁷ Developed by experts from the World Bank, Columbia University and the United Nations Development Programme and issued in 2005, the report *Energy Services for the Millennium Development Goals* addressed “three crucial components: firstly, a rigorous understanding of the energy services that drive and, when absent, impede progress towards achieving the MDGs in different parts of the world; secondly, a clear sense of the operational challenges faced by the world’s poorest countries in providing these services; and thirdly, a systematic set of recommendations as to how these energy challenges can be met”.⁴⁸ Among the instructions contained in the report, central is the call for “countries [to] develop strategies for increasing access to energy services as an integral part of their national development strategies to meet the MDGs”.⁴⁹ With specific reference to developing countries, the report identified the challenges facing energy institutions and systems – including but not limited to difficulties with investment financing relating to energy services, and institutional issues such as the development of a proper regulatory framework – and outlined a series of actions to address them.

From May 2010 to May 2012, the international community prepared for a further fundamental event, the United Nations Conference on Sustainable Development (Rio+20) held in June 2012 in Rio de Janeiro, Brazil.⁵⁰ Convened by the United Nations General Assembly through Resolution 64/236,⁵¹ Rio+20 focused on the development of a “green economy in the context of sustainable development and poverty eradication and on institutional aspects for sustainable development”.⁵² The conference culminated with the adoption of “The future we want,” a declaration through which the heads of state and

government and high-level representatives renewed their commitment to sustainable development. In the context of this renewed commitment, the document, which was endorsed shortly after the conference by the United Nations General Assembly through Resolution 66/288, reaffirmed the principles and commitments established through all major outcome declarations and programmes of conferences and summits for the implementation of sustainable development, as developed over the years since Stockholm, and proclaimed the determination of the international community to “move the sustainable agenda forward, through the achievement of the internationally agreed development goals”.⁵³ Among such principles, the centrality of the rule of law at the national and international levels, the key role of all levels of governments and legislative bodies in promoting sustainable development, and support for national policy and regulatory frameworks advancing sustainable development were reaffirmed. In the words of “The future we want”:

The strengthening and reform of the institutional framework should not be an end in itself, but a means to achieve sustainable development.⁵⁴

With regard to the role of international organizations, the document reiterated the encouragement to, among others, “United Nations organizations and bodies ... to support developing countries, upon request, to achieve sustainable development”⁵⁵ and renewed the call to “promote, facilitate, and finance, as appropriate, access to and the development, transfer and diffusion of environmentally sound technologies ... in particular to developing countries”.⁵⁶ With specific reference to energy issues, the document reaffirmed “the critical role that energy plays in the development process” and confirmed support for “national and subnational policies and strategies ... using an appropriate energy mix to meet development needs, including through increased use of renewable energy sources and other low-emission technologies”.⁵⁷

47 Modi et al. 2005, 2. Above, note 40.

48 Ibid., 1.

49 Ibid., 65.

50 National Organizing Committee Rio+20. 2011. About Rio+20. http://www.rio20.gov.br/en/about_the_rio_more_20.html (accessed 6 February 2018).

51 Ibid.

52 United Nations General Assembly. 2010. Resolution 64/236, “Implementation of Agenda 21, the Programme for the Further Implementation of Agenda 21 and the outcomes of the World Summit on Sustainable Development”.

53 United Nations General Assembly. 2012. Resolution A/66/288, “The future we want”, paragraph 18.

54 Ibid., paragraph 76.

55 Ibid., paragraph 68.

56 Ibid., paragraph 73.

57 Ibid., paragraphs 125, 127.

Most importantly, “The future we want” paved the way towards the development of the post-2015 development agenda in the part where it established “an inclusive and transparent intergovernmental process on sustainable development goals ... open to all stakeholders with a view to developing global sustainable development goals to be agreed by the General Assembly” and mandated an ad hoc open working group to “submit a report, to the Assembly at its sixty-eighth session, containing a proposal for sustainable development goals for consideration and appropriate action”.⁵⁸ In the two years following the promulgation of “The future we want,” thematic and national consultations, intergovernmental discussions and activities involving “civil society organizations, citizens, scientists, academics, and the private sector from around the world” were held to prepare the ground for the new development agenda.⁵⁹

Before the post-2015 development agenda was announced, the United Nations General Assembly issued two other important resolutions, the first one being the already mentioned Resolution 65/151. Through that resolution, the Assembly declared 2012 the International Year of Sustainable Energy for All and encouraged “all Member States, the [United Nations] system, and all other actors to take advantage of the Year to increase awareness of the importance of addressing energy issues, including modern energy services for all, access to affordable energy, energy efficiency and the sustainability of energy sources and use, for the achievement of the internationally agreed development goals”.⁶⁰ Secondly, in March 2013 the General Assembly issued Resolution 67/215, “Promotion of new and renewable sources of energy,” through which it officially declared 2014-2024 the United Nations Decade of Sustainable Energy for All.⁶¹ Through the resolution, the Assembly reaffirmed the “importance of energy issues for sustainable development and for the elaboration of the post-2015 development agenda”⁶² and reiterated its call, among others, (1) “upon governments and international

and regional organizations ... to combine, as appropriate, the increased use of new and renewable energy resources, more efficient use of energy, greater reliance on advanced energy technologies”; (2) upon governments to make efforts to “create an enabling environment at all levels to ensure the promotion and use of renewable sources of energy”; and (3) upon “funding institutions and bilateral and multilateral donors, as well as regional funding institutions and non-governmental organizations, to continue to support, as appropriate, efforts aimed at the development of the energy sector in developing countries and countries with economies in transition ... and to assist in the attainment of the levels of investment necessary to expand energy supplies”.⁶³

In September 2015, 193 Member States of the United Nations reunited and approved the post-2015 sustainable development agenda, soon after endorsed by the General Assembly through Resolution 70/1, “Transforming our world: the 2030 Agenda for sustainable development”.⁶⁴ This time, energy issues were explicitly included among the core objectives of the new programme. Composed of 17 goals to be met by 2030, the agenda crystallized in goal 7 the aim to “ensure access to affordable, reliable, sustainable and modern energy for all”.⁶⁵ Together with the targets to “increase substantially the share of renewable energy in the global energy mix” and to “double the global rate of improvement in energy efficiency,” in goal 7 the commitment was set to “expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States and landlocked developing countries” and to “enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology”.⁶⁶

⁵⁸ *Ibid.*, paragraph 248.

⁵⁹ Sustainable Development Goals Fund. n.d. From MDGs to SDGs. <http://www.sdgsfund.org/mdgs-sdgs> (accessed 6 February 2018).

⁶⁰ United Nations General Assembly. 2011, paragraph 4. Above, note 43.

⁶¹ United Nations General Assembly. 2012. Resolution A/RES/67/215, “Promotion of new and renewable sources of energy”, paragraph 2.

⁶² Sustainable Energy for All. n.d. The United Nations Decade of Sustainable Energy for All 2014-2024. https://www.seforall.org/2014_10_17_democratization-energy-sign-times-said-president-bachelet-launch-un-decade-sustainable-energy-latin-america-caribbe (accessed 6 February 2018).

⁶³ Sustainable Energy for All. n.d., paragraphs 8, 12, 15. Above, note 61.

⁶⁴ United Nations Sustainable Development. 2015. Historic new sustainable development agenda unanimously adopted by 193 United Nations Members. <http://www.un.org/sustainabledevelopment/blog/2015/09/historic-new-sustainable-development-agenda-unanimously-adopted-by-193-un-members/> (accessed 6 February 2018).

⁶⁵ United Nations General Assembly. 2015. Resolution A/70/1, “Transforming our world: the 2030 Agenda for Sustainable Development”, goal 7, paragraphs 7(a), 7(b).

⁶⁶ *Ibid.*, 19.

Strengthening the institutional framework: renewable energies and the law

A close look at the shaping of the United Nations commitment to the promotion of renewable energies from Stockholm to Agenda 2030 reveals how the provision of institutional support has been encouraged as one of the prerequisites for the successful diffusion of such energies in developing countries. As much as the lack of adequate financial resources, the absence of a supportive institutional framework can indeed be a major obstacle to the integration of new forms of energy into a national system. While there are various forms of institutional efforts required to ensure the success of renewable energies in developing countries, the following paragraphs focus on one specific requirement: the need to integrate renewable energies into developing countries' legislative frameworks.

On several occasions, the United Nations has stressed the importance of law as an enabler for development and reiterated its commitment to ensure that the rule of law be strengthened throughout its Member States. Most recently, in March 2012, the United Nations General Assembly addressed this issue in document A/66/749, "Delivering justice: programme of action to strengthen the rule of law at the national and international levels". In this document, the Secretary-General recalled that the rule of law is essential and proposed a programme of action aimed at addressing the challenges of its implementation at both the international and national levels. Relevantly, the focus on the rule of law to foster enabling environments for sustainable economic growth was included among the commitments set out by the programme, requiring concerted efforts by Member States and United Nations organizations. While, on the one hand, the programme acknowledged that the general responsibility for "strengthening the rule of law lies with Member States," on the other hand it stressed that, when its implementation is "hampered by capacity deficits, Member States should seek international assistance".⁶⁷

As for the role of United Nations organizations, the programme called for them to assist Member States in strengthening the rule of law for, inter alia, the implementation of international conventions and texts adopted by the United Nations in the domain of development, highlighting that the United Nations is ideally placed to support Member States' efforts and to provide integrated and effective assistance.⁶⁸

Strengthening the rule of law is a long-term endeavour requiring the United Nations and other multilateral and bilateral actors to adopt flexible and coordinated mechanisms to assist States effectively. While progress has been made, assistance remains fragmented and its effectiveness uncertain.⁶⁹

The strengthening of the rule of law is regarded as a precondition for the successful achievement of the 17 Sustainable Development Goals (SDGs) adopted in 2015. The 15-year implementation period for the MDGs proved that the absence of "transparent and legitimate legal frameworks" and of "predictable enforcement of rules and procedures" has been a factor in many countries' failure to meet MDG targets across sectors.⁷⁰ Learning from this experience, increasing support should be provided to developing countries in building a solid legal framework in the context of the new SDGs. This is particularly so when it comes to supporting developing countries in transitioning to renewable energies.

The need for a supportive legal framework

A national energy policy cannot be effectively implemented without a supportive legislative framework. Accordingly, the process of development of an energy policy should go hand in hand with the development of a supportive legal framework.⁷¹ This is particularly true since most countries' national energy laws have been shaped and developed over time based on the use of traditional (non-renewable) energy sources.

67 United Nations General Assembly. 2012. "Delivering justice: programme of action to strengthen the rule of law at the national and international levels". A/66/749, 4.

68 Ibid.

69 Ibid., 16.

70 Berg, Louis-Alexandre, and Deval Desai. 2013. "Background paper: overview on the rule of law and sustainable development for the global dialogue on rule of law and the post-2015 development agenda". <http://www.undp.org/content/dam/undp/library/Democratic%20Governance/Access%20to%20Justice%20and%20Rule%20of%20Law/Global%20Dialogue%20Background%20Paper%20-%20Rule%20of%20Law%20and%20Sustainable%20Developme....pdf> (accessed 19 March 2018).

71 Omorogbe, Yinka. 2016. "The role of law in promoting renewable energies in Africa" in *Perspectives on Energy Security and Renewable Energies in Sub-Saharan Africa*, ed. Ruppel, Oliver C. and Bernd Althusmann, 219. Windhoek: Macmillan Education Namibia.

As Elizabeth Gachenga says, “The shift to renewable energy can only occur where there is a supporting policy and a legal regulatory environment that foster information and technical capacity, and financial incentives to boost the renewable energy sector.”⁷² In brief, by turning the statements of direction and intent contained in policies into binding provisions and by providing the “parameters within which activities in furtherance of the stated policy objectives will be carried out,”⁷³ laws play a central role in enabling the transition to renewable sources of energy.⁷⁴ To this end, renewable energy laws should establish “the strategic elements that facilitate the implementation of policy and target set” and the “institutional frameworks necessary for implementation and monitoring for compliance.”⁷⁵ In developing countries, a supportive legal framework is all the more necessary, given the fundamental role of private investments in enabling the successful integration of and transition to renewable energies. Each country engaging in the implementation of renewable energy policies should develop a legal framework that enables and incentivizes the participation of private actors in the renewable energy market and “boosts investors’ confidence”⁷⁶ by granting adequate securities and protections.⁷⁷ This is not only because national laws “make the regulatory environment clearer and more consistent” but also because, in most developing countries, they mitigate the various barriers perceived by investors, including but not limited to those related to political changes and “inconsistent State regimes.”⁷⁸

National legal and policy frameworks

The success of renewable energy projects in developing countries largely depends on the existence of enabling legal frameworks and specific energy policies.⁷⁹ Law is a fundamental tool for the creation of the necessary operational environments for promoting renewable energy. The various legal frameworks adopted by each country are an expression of the political goals that have to be achieved in a given sector. In the field of renewable energy, the law plays a key role in promoting the use of renewables by setting targets and providing incentives to investors and consumers, such as tax reductions or subsidies.⁸⁰ Legal frameworks can stimulate the use of green energy and support the transition from fossil fuels and other traditional energy sources. When countries adopt clear energy legislation that provides certainty and predictability, national and foreign investors are more willing to invest in “green energy” projects. This is particularly relevant to rural environments that face financial restrictions on implementing the shift towards renewables. Indeed, the cost of implementing energy infrastructures is considered an economic barrier that undermines the success of renewable energy projects.⁸¹ Clear laws and comprehensive regulations that create an investor-friendly environment in this field could be a way to overcome such constraints.

Enabling legal frameworks are necessary for stimulating the use of renewables and for attracting financial resources in that direction. Lawmakers are usually guided by general policies that define goals and strategies in a specific sector. Successful policies that foster access to energy in rural environments aim to achieve an “access for all” goal for both urban and rural populations. In this respect,

72 Gachenga, Elizabeth. 2016. “Legal and policy frameworks for climate-friendly energy generation in Africa: energy security for future development” in *Perspectives on Energy Security and Renewable Energies In Sub-Saharan Africa*, ed. Ruppel, Oliver C. and Bernd Althusmann. Windhoek: Macmillan Education Namibia, 177.

73 Omorogbe. 2016. Above, note 71, 215.

74 Ibid.

75 Gachenga. 2016, 177. Above, note 72.

76 United Nations Development Programme and Climate Parliament. 2013. “Renewable energy for parliamentarians how-to guide”. http://www.undp.org/content/undp/en/home/librarypage/democratic-governance/parliamentary_development/renewable-energy-for-parliamentarians--a-how-to-guide.html (accessed 19 March 2018).

77 Ruppel, Oliver C. and Katharina Ruppel-Schlichting. 2016. “Comparative legal aspects of the potential of renewable energies to promote energy security, sustainable development and climate change mitigation: Germany, South Africa and Namibia” in *Perspectives on Energy Security and Renewable Energies in Sub-Saharan Africa*, ed. Ruppel, Oliver C. and Bernd Althusmann. Windhoek: Macmillan Education Namibia.

78 Baker & McKenzie and the World Institute of Sustainable Energy. 2008. “Identifying optimal legal frameworks for renewable energies APP Project REDG-06-09”.

79 Gachenga. 2016, 182. Above, note 72.

80 Omorogbe. 2016, 220. Above, note 71.

81 United Nations Development Programme. 2013. “Renewable energy for parliamentarians”. Above, note 76.

renewable technologies are essential for developing clean energy fuels and connectivity for off-grid rural communities.⁸² Policies are also a tool for identifying the available energy sources and for setting quantitative clean energy targets. Such targets should be concrete, measurable and time-bound, as they allow investors and consumers to make decisions regarding the possibility of accessing and investing in this sector.⁸³ Policies that lay down implementing strategies also address technical and economic issues in order to identify efficient work programmes and institutional structures.⁸⁴

The implementation of renewable energy projects in rural communities depends on the existence of consistent and coherent legal and policy frameworks. The successful implementation of such frameworks is made possible through solid institutions and economic instruments such as fiscal or market incentives, tax exemptions and investment subsidies. Overall, the national regulatory framework for renewable energy should take into account the barriers that prevent the maximization of alternative sources of energy. Governments and lawmakers play a key role in providing the necessary institutions and regulations for building renewable energy markets and attracting investments in this field. The following sections provide an overview of the main aspects of legal frameworks that promote renewable energy.

Supportive instruments through legislative interventions

In order to drive the transition to renewable energies and ensure the accessibility of renewable energy markets, several strategies can be enacted through “legislative support”.⁸⁵ Among the various instruments that have been introduced through national laws to stimulate the

production and use of renewable energies in developing countries are renewable portfolio standards (RPS), economic support and incentive mechanisms such as feed-in tariffs (FiTs), tax credits and deductions, net metering systems⁸⁶ and renewable energy auctions.

Renewable portfolio standards

One way of promoting renewable energy is to establish binding RPS. RPS set green energy quota obligations that impose shares of alternative sources of energy in a country's overall production and consumption of electricity.⁸⁷ RPS increase the production of green energy by setting obligations on electricity suppliers to source a quota of their electricity from renewable energy.⁸⁸ The quota set in a country's RPS usually increases over time in order to gradually increase the production and consumption of green energy. RPS are often supported by market-based tradable renewable energy credits systems, which ultimately stimulate investments in this sector. The legal or policy instrument that establishes RPS often includes sanction mechanisms for providers that do not respect green quotas.⁸⁹

In order to support rural environments to increase their access to renewable energies, RPS should clearly identify the energy sources available to each region. Secondly, RPS should provide strategies to reach their end goal of energy production and establish interim targets that gradually make it possible to achieve the long-term level of green energy production. The success of RPS also depends on the existence of compliance and control mechanisms for ensuring that quota obligations are fulfilled.⁹⁰

82 Omorogbe. 2016, 218. Above, note 71.

83 Liptow, Holger and Stephan Remler. 2012. *Legal Frameworks for Renewable Energy, Policy Analysis for 15 Developing Countries*. Eschborn: Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH. 12.

84 Ibid.

85 Emodi, Nnaemeka Vincent and Nebedum Ekene Ebele. 2016. “Policies enhancing renewable energy development and implications for Nigeria”. *Sustainable Energy* 4. <http://pubs.sciepub.com/rse/4/1/2/> (accessed 19 March 2018).

86 Bradbook, Adrian J., David Goldstein, Katherine Kennedy, Philip Musegaas, Ethan Rogers, Ibibia Worika, John Bowie, David R. Hodas, Teresa Malyshev, Richard L. Ottinger and Alexandra Warwyk. 2016. *United Nations Environment Programme Guide for Energy Efficiency and Renewable Energy Laws*. United Nations Environment Programme.

87 Hsu, Angel, Carlin Rosengarten, Amy Weinfurter, Yihao Xie, Evan Musolino and Hannah E. Murdock . 2017. “Renewable energy and energy efficiency in developing countries: contributions to reducing global emissions”. United Nations Environment Programme. http://wedocs.unep.org/bitstream/handle/20.500.11822/22149/1_Gigaton_Third%20Report_EN.pdf?sequence=1 (accessed 19 March 2018)

88 Azuela, Gabriela E. and Luiz A. Barroso. 2011. “Design and performance of policy instruments to promote the development of renewable energy: emerging experience in selected developing countries”. Washington, D.C.: World Bank.

89 Liptow and Remler. 2012, 19. Above, note 83.

90 Bradbook et al. 2016. Above, note 86.

Experience has proved that the applicability of RPS in developing countries is limited by a series of factors, including the fact that RPS tend to be effective where electricity markets are significantly large and numerous players at the generation and distribution levels are in competition. Additionally, a fairly stable economic situation is required for the green certificate system to be implemented efficiently.⁹¹ This notwithstanding, some countries in transition have embarked upon this option with reasonable success. Chile is one of these. Passed in 2008 and effective from 2010, the Non-Conventional Renewable Energy Law (Ley 20.257) established an “RE [renewable energy] quota obligation for power producers” in Chile.⁹² Specifically, the “law requires electricity providing companies, withdrawing electricity to supply their contract commitments, to demonstrate that a certain percentage of their total energy committed was injected in the system by non-conventional energy sources”.⁹³

Feed-in tariffs

Since 2008, several national policies have been designed to promote investments in the field of renewable energy technologies. Among the most effective policies are FiTs, which have been increasingly implemented in both developed and developing countries.⁹⁴ FiTs offer “a guarantee of payments to renewable energy developers for the electricity they produce”.⁹⁵ The methodology used to implement a FiT policy in each country varies according to different factors, “such as the political system, legal tradition, governmental structure, legislative process, market structure, etc.”⁹⁶ Therefore, depending on these elements, laws regulating FiT policies may be extremely precise, and handled as the “rule book” for FiTs, or

“rather be very general, only specifying that a FiT policy is authorized, delegating the development of specific procedures to a public organization or a government agency”. Both approaches can present pros and cons. For example, in the case of comprehensive and accurate FiT legislation, investors feel safer to invest in renewable energy projects. Laws are more difficult to amend than government- or agency-driven regulations.⁹⁷

In order to ensure the effectiveness of FiT policies, FiT remuneration has to be consistent and sufficient to cover project expenses, and lawmakers should make sure to integrate and link FiTs to existing national energy targets. Moreover, the specific FiT’s policy purposes should be made clear in the text of the legislation, “identifying clearly eligibility criteria in terms of technology, resource, ownership, size, and grid connection; indicating applicable tariff differentiations, setting the FiT rate and the payment duration”. Among the African countries, Algeria was the first to implement a renewable energy FiT system. Moved by the intent to “provide domestic consumers with sufficient and uninterrupted energy, [and] preserve energy resources for Algeria’s development”,⁹⁸ in 2004 Algeria issued the Renewable Energy Law and an Electricity Cost Diversification Law, requiring “the system operator to connect renewable energy power plants, guarantee the purchase of power and pay a technology specific premium per kWh of electricity produced”.⁹⁹ FiTs have also been introduced by legislation in Tunisia, where a new law on renewable energies was adopted by Parliament in May 2015, establishing, among other things, the complete sale of electricity to the utility STEG (FiTs) from photovoltaic and wind energy,¹⁰⁰ and in Turkey, where FiTs were adjusted and increased through the Renewable Energy Law of 2010.

91 Wamukonya, Njeri. 2005. “Legislative and policy instruments for promotion of renewable energy in the power sector”. Paper presented at the Parliamentarian Forum on Energy Legislation and Sustainable Development, Parliament of South Africa, Cape Town. http://www.un.org/esa/sustdev/sdissues/energy/op/parliamentarian_forum/njeri_paper.pdf (accessed 2 February 2018).

92 Liptow and Remler. 2012. Above, note 83.

93 IAEA. 2018. “Non-conventional renewable energy law (Law 20.257)”. <https://www.iea.org/policiesandmeasures/pams/chile/name-24577-en.php> (accessed 2 February 2018).

94 Rickerson, Wilson. 2012. “Feed-in tariffs as policy instrument for promoting renewable energies and green economies in developing countries”. United Nations Environment Programme.

95 NREL. 2018. “Feed-in tariffs”. <https://www.nrel.gov/technical-assistance/basics-tariffs.html> (accessed 26 January 2018).

96 Rickerson. 2012. Above, note 94.

97 Ibid.

98 Heinrich Böll Stiftung, World Future Council and Friends of the Earth. 2012. *Powering Africa through Feed-in Tariffs: Advancing Renewable Energy to Meet the Continent’s Needs*. https://ke.boell.org/sites/default/files/2013-03-powering-africa_through-feed-in-tariffs.pdf (accessed 19 March 2018)

99 Ibid.

100 Energypedia. n.d. Tunisia energy situation. https://energypedia.info/wiki/Tunisia_Energy_Situation (accessed 2 February 2018).

Tax

Taxation strategies are an effective way to attract investments in the field of renewable energy. Governments can implement tax laws that incentivize the production and use of renewables. Fiscal incentives can be achieved through specific measures such as capital cost subsidies, production tax credits, sales tax reductions and import duty waivers on renewable energy technologies.¹⁰¹ The most common taxation strategies are tax deductions and credits. Tax credits can be appealing for rural communities, as the reduction in the amount of taxes payable benefits low-income taxpayers, whereas investors with higher incomes benefit from tax deductions, as they reduce the amount of taxable income.¹⁰² Another fiscal policy is providing reductions or exemptions from import duties on renewable energy products. Specific taxation strategies can be used for improving the competitiveness of renewable energy projects. For example, governments can increase levels of consumption of renewable energy by reducing value added tax or energy taxes.¹⁰³ These strategies are being enacted through legislation in several developing countries. Following law no. 30/2007 on energy, requiring the government to increase the “provision and utilization of new and renewable energy,”¹⁰⁴ the Republic of Indonesia issued Minister of Finance Regulation no. 21/PMK.011/2010 and Regulation no. 24/PMK.011/2010 on renewable energy incentives, institutionalizing various forms of tax facilities such as “Income Tax, Import Duty and Tax Holiday, and Tax Exemptions”. Mexico has also opted for tax incentives to promote the use and production of renewable energies. Specifically, the Law of Corporate Income Tax “provides for accelerated depreciation of 100 per cent for investments in equipment and machinery for electricity generation through renewable sources”.¹⁰⁵ In Argentina, laws no. 25019 and no. 26190 established fiscal

incentives, which “allowed for deferred tax payments and provided 15 years of ‘fiscal stability’ to existing projects”.¹⁰⁶ In the Dominican Republic, Renewable Energy Incentives law no. 57-07 introduced several tax incentives such as “tax exemptions for imports on renewable energy components” and “income tax exemptions and fiscal incentives for self-suppliers”.¹⁰⁷

Net metering

Net metering is a billing system that allows renewable energy providers to obtain credits for the electricity they produce and to offset their value against the electricity they consume from the grid.¹⁰⁸ The aim of net metering billing is to encourage customer investment in renewable energy technologies that allow residential customers to produce energy and to feed it directly into the grid. Electricity meters record the amount of electricity consumed and produced. The difference between the two amounts provides the basis for the deduction of the electricity bill.¹⁰⁹

The advantage of implementing a net metering system is that it allows consumers to balance production and consumption of electricity and to pay for only the net energy they use. From a technical point of view, net metering does not require complex accounting technology, as it uses simple metering instruments. Retail consumers mostly benefit from this system, as it incentivizes them to produce renewable energy by setting up photovoltaics or wind turbines on their private properties. The success of net metering schemes largely depends on regulatory frameworks that provide incentives and clear interconnection and transition standards for energy consumers/producers.¹¹⁰

101 McCarthy, Nancy and Heath Henderson. 2014. “The role of renewable energy laws in expanding energy from non-traditional renewables”. Inter-American Development Bank. IDB working paper series No. IDB-WP-540.

102 Hsu et al.. 2007, 147. Above, note 87.

103 Gachenga. 2016, 186. Above, note 72.

104 Indonesian Renewable Energy Society (METI). 2011. “METI, policy and regulation of renewable energy in Indonesia”. <https://www.giz.de/fachexpertise/downloads/2011-en-senoaji-pep-informationswork-indonesien.pdf> (accessed 19 March 2018).

105 Norton Rose Fullbright. 2016. “Renewable energy in Latin America: Mexico”. <http://www.nortonrosefullbright.com/knowledge/publications/134776/renewable-energy-in-latin-america-mexico> (accessed 2 February 2018).

106 Muñoz Cabré, Miquel, Alvaro Lopez-Peña, Ghislaine Kieffer, Arslan Khalid and Rabia Ferroukhi. 2015. “Renewable energy policy brief, Argentina”. International Renewable Energy Agency. (accessed 19 March 2018).

107 International Trade Administration. 2017. “Dominican Republic – renewable energy”. <https://www.export.gov/article?id=Dominican-Republic-Renewable-Energy> (accessed 2 February 2018).

108 Gachenga. 2016, 185. Above, note 72.

109 Liptow and Remler. 2012, 25. Above, note 83.

110 Bradbook et al. 2016. Above, note 86.

Numerous developing countries have issued net metering laws to expand the use of renewable energies in small-scale systems. Among them, in May 2002, Thailand approved a specific legislative framework for net metering entitled “Regulations for the purchase of power from very small renewable energy power producers,” regulating both the commercial and technical aspects of net metering, such as “permitted renewable energy fuels, application and connection procedures, costs incurred by each party, tariffs, billing arrangements” and grid-connection requirements.¹¹¹ Similarly, the Philippines introduced net metering in its legal framework through the Renewable Energy (RE) Act of 2008¹¹² and so did Mexico in 2010, providing net metering for small- and medium-scale generators through Resolution 054/2010.¹¹³

Access to the national grid

One of the main barriers to investments in renewable energy is related to access to the national grid. One of the causes that prevents access to the grid is unclear rules regarding the procedures and technical requirements for accessing grids.¹¹⁴ Uncertainty on how to access grid connections is a barrier to renewable energy investments, as investors seek clarity on the requirements they need to satisfy in order to connect the energy they produce to national grids. A way to overcome this barrier is to implement national grid codes. Grid codes provide a set of rules for operating and connecting to grids that ensure fairness and transparency. The establishment of clear

and consistent conditions for accessing national grids is essential for developing renewable energy projects, as they allow investors and operators to identify the regulatory and technical requirements to interconnect to grids.¹¹⁵

In addition to lack of clarity and consistency in rules for accessing grids, rural environments also face specific technical problems. Communities that live in remote areas often cannot rely on the necessary infrastructures that allow them to reach grids. Governments can adopt policies aimed at supporting grid extensions and facilitate access to grid networks. Additionally, the implementation of mini-grids can be an alternative to grid extensions for rural communities, as they can operate autonomously from the central grid. The success of mini-grids largely depends on clear rules and standards as well as incentives for investors.¹¹⁶

Another instrument used in both developed and developing countries is the issuance by governments of calls for “tenders to install a certain capacity of renewable energy-based electricity”.¹¹⁷ Usually referred to as renewable energy auctions, when combined with “stringent bidding requirements ... and strong compliance rules” such as penalties and project guarantees, these calls have proved to be attractive because of their “potential to achieve deployment in a cost efficient and regulated matter”.¹¹⁸ Among the 30 developing countries currently offering renewable energy auctions are Brazil, which introduced the auction system in 2004 through laws no. 10,847 and no. 10,848; Peru, which introduced it through Supreme Decree no. 1002 as amended by Supreme Decree no. 012-211-EM;¹¹⁹ and Jordan, which introduced it through law no. 13 of 2012, “Renewable Energy and Efficiency Law”.¹²⁰

111 Greacen, Chris, Richard Plevin and Chuenchom Sangarasri Greacen. 2003. “Thai Power: net metering comes to Thailand”. https://ac.els-cdn.com/S1471084604000411/1-s2.0-S1471084604000411-main.pdf?_tid=beaa9398-d19a-437d-b5e6-5a781730990f&acdnat=1521473222_5c8bac2fc0075a8364f6a08b6ab6191b (accessed 19 March 2018).

112 Department of Energy. n.d. “Net metering guide”. <https://www.doe.gov.ph/net-metering/net-metering-guide> (accessed 7 February 2018).

113 Muñoz Cabré, Miquel, Alvaro Lopez-Peña, Ghislaine Kieffer, Arslan Khalid and Rabia Ferroukhi . 2015. “Renewable energy policy brief, Mexico”. International Renewable Energy Agency. http://www.irena.org/DocumentDownloads/Publications/IRENA_RE_Latin_America_Policies_2015_Country_Mexico.pdf (accessed 19 March 2018).

114 United Nations Development Programme. 2014. *Tunisia: Derisking Renewable Energy Investment*. New York, NY: United Nations Development Programme.

115 Kumar, Pradeep and Asheesh K. Singh. 2018. “Grid codes: goals and challenges”. *Renewable Energy Integration*. https://link.springer.com/chapter/10.1007/978-981-4585-27-9_2 (accessed 19 March 2018).

116 Deshmukh, Ranjit, Juan Pablo Carvallo and Ashwin Gambhir. 2013. *Sustainable Development of Renewable Energy Mini-grids for Energy Access: A Framework for Policy Design*. Berkeley, CA: University of California Berkeley.

117 Lucas, Hugo, Rabia Ferroukhi and Diala Hawila. 2013. “Renewable energy auctions in developing countries”. International Renewable Energy Agency. <http://www.irena.org/publications/2013/Jun/Renewable-Energy-Auctions-in-Developing-Countries> (accessed 19 March 2018).

118 *Ibid.*, 6-7.

119 *Ibid.*, 17, 34.

120 McDonough, Mike. 2017. “Addressing legal barriers to climate investment in Jordan, Morocco and Tunisia”. *Law in Transition Journal*. 63. <http://www.ebrd.com/publications/law-in-transition-2017-investment-climate-english.pdf> (accessed 7 February 2018).

Legal protections required to attract investments in renewable energy

The introduction by law of supportive instruments is just part of the legislative effort required to enable the transition to renewable energies. As mentioned above, private investments are essential and, to stimulate investments in renewable energies, especially in developing countries, further legal protections should be enacted and warranted. Although providing a fully comprehensive analysis of these protections is not in the scope of this analysis, some of them deserve to be briefly described because of their central importance in creating the necessary environment for attracting investors. These are the establishment of clear rules for access to the national grid; the introduction of an ad hoc regulator for the renewable energy sector; and the protection and regulation of intellectual property and land ownership and access rights.

- **Establishment of clear rules for access to the national grid:** Experience has proved that the “lack of transparency or uncertainty regarding the technical requirements for renewable energy projects developers to connect to the national grid” of a country is one of the underlying barriers to investments in renewable energies.¹²¹ The establishment of clear and consistent conditions for grid access by integrating national grid codes¹²² or the issuance of specific grid codes for renewable energies is a fundamental condition for enabling the renewable energy system and the parties involved in the sector, investors included, to function effectively and efficiently.¹²³ Among the developing countries that have taken steps in this direction, one valuable example is represented by

the Philippines, which, following the Renewable Energy Act dated 2008, has included an addendum in the national grid code “establishing the connection and operational requirements for VRE [variable renewable energy] generating facilities”.¹²⁴

- **Introduction of an ad hoc regulator for the renewable energy sector:** Data gathered by the World Resources Institute show that private enterprises indicate that government agencies involved in the sector often “have overlapping mandates, resulting in complex or confusing policy and regulatory environments”. This constitutes a major deterrent for private investors.¹²⁵ “Streamlining administrative procedures,” assisting “in the development of private RE projects” and coordinating various stakeholders’ activities are among the functions that should be carried out by specific agencies with clear and defined mandates.¹²⁶ Establishing the competences, roles and responsibilities of such agencies in the relevant country’s legislation is arguably the best way to enhance investors’ confidence. Many developing countries that have committed to the use and production of energy through renewable sources have followed this path. Egypt and Libya are among them. Egypt established the New and Renewable Energy Authority through law no. 102 of 1986,¹²⁷ to “act as a focal point for the country for expanding renewable energy efforts ... on a commercial scale”.¹²⁸ The Renewable Energy Authority of Libya was created through law no. 426, issued in 2007, with a mission to “implement proper policies so as to meet the governmental target of a 10% share of the total energy mix coming from renewable energy sources by 2020”.¹²⁹
- **Protection of intellectual property and land ownership and access rights:** The establishment of an adequate legislative framework for the protection of intellectual property rights and land ownership and access rights is a further precondition a country should

121 United Nations Development Programme. 2014. Above, note 114.

122 International Renewable Energy Agency. 2016. “Scaling up variable renewable power: the role of grid codes”. <http://www.irena.org/publications/2016/May/Scaling-up-Variable-Renewable-Power-The-Role-of-Grid-Codes> (accessed 7 February 2018).

123 Mahmoud, Maged, Nurzat Myrsaliev, Mariam El Forgani, Hamza Bouadane and Louise Sarant. 2016. *Arab Future Energy Index*. United Nations Development Programme. http://www.rcreee.org/sites/default/files/final_afex_re_2016.pdf (accessed 7 February 2018).

124 International Renewable Energy Agency. 2016. Above, note 122.

125 Doukas, Alex and Athena Ballesteros. n.d. “Clean energy access in developing countries: perspectives on policy and regulation”. World Resources Institute. <http://www.wri.org/sites/default/files/clean-energy-access-developing-countries-issue-brief.pdf> (accessed 20 March 2018).

126 Mahmoud et al. 2016. Above, note 123.

127 Davies, Michelle, Bethan Hodge, Shakeeb Ahmad and Yanxiang Wang. 2015. *Developing Renewable Energy Projects: A Guide to Achieving Success in the Middle East*. <https://www.pwc.com/m1/en/publications/documents/eversheds-pwc-developing-renewable-energy-projects.pdf> (accessed 19 March 2018).

128 Bahgat, G. 2013. *Alternative Energy in the Middle East*. London: Palgrave Macmillan UK.

129 International Energy Agency. 2018. “Law no. 426 establishing the Renewable Energy Authority of Libya (REAOI)”. <http://www.iea.org/policiesandmeasures/pams/libya/name-24772-en.php> (accessed 7 February 2018).

meet to create a renewable energy investment-friendly environment.¹³⁰ As explained in the OECD “Policy guidance for investment in clean energy infrastructure” (2015), since technologies involved in renewable energy investments “are both research and capital-intensive,” adequate legal protections are needed to secure the investors’ right to “capture the benefits from their technological innovations” and also to provide the necessary warranties to investors transferring “clean energy technologies ... to developing countries”.¹³¹ All the same, since energy projects require investors to “engage with more than one landowner” and, as is often the case in emerging countries, “with actors who do not necessarily have formal property rights to the land that they occupy,” legal and regulatory measures aimed at securing land tenure and protecting land rights should be introduced.¹³²

The United Nations’ contribution to enhancing the legislative capabilities of developing countries

As discussed, the provision of institutional support to developing countries with renewable potential has long now been an integral part of the United Nations’ commitment to the promotion of sustainable development and renewable energies. All the same, the respect and promotion of the rule of law has been consistently upheld within the United Nations and was most recently reaffirmed by the United Nations General Assembly through document A/66/749. The combination of such commitments with the need for a solid legal background to stimulate the production and use of renewable energies lays the foundations for the active role the United Nations should play in supporting developing countries integrating renewable energies into their national legal frameworks. Renewable energies are relatively “young” and so is the concept of renewable energy law.¹³³ For this reason, developing countries with renewable potential should be informed and advised on the advantages of implementing renewable energy policies through a solid supportive legislative framework and should be supported in formulating such frameworks. In line with the institutional commitment promoted by the United Nations, the transfer by international organizations of the necessary knowledge

and information required to enable national governments to make informed choices on the renewable policies and the relevant legislative measures to adopt, their support in assessing what kind of laws or legislative instruments may be more appropriate having considered each country’s specificities, and their guidance on how to integrate such laws into pre-existing national legislation are all factors that can make essential contributions to the transition of developing countries from non-renewable sources of energy.

Bibliography

- Azuela, G.E. and L. Barroso. 2011. “Design and performance of policy instruments to promote the development of renewable energy: emerging experience in selected developing countries”. Washington, D.C.: World Bank.
- Bahgat, G. 2013. *Alternative Energy in the Middle East*. London: Palgrave Macmillan UK.
- Baker & McKenzie and the World Institute of Sustainable Energy. 2008. “Identifying optimal legal frameworks for renewable energies APP Project REDG-06-09”.
- BCGI. 1999. Agenda 21: Programme of Action for Sustainable Development. <http://bgci.org/worldwide/article/0011> (accessed 6 February 2018).
- Berg, L.A. and D. Desai. 2013. “Background paper: overview on the rule of law and sustainable development for the global dialogue on rule of law and the post-2015 development agenda”. <http://www.undp.org/content/dam/undp/library/Democratic%20Governance/Access%20to%20Justice%20and%20Rule%20of%20Law/Global%20Dialogue%20Background%20Paper%20-%20Rule%20of%20Law%20and%20Sustainable%20Developme....pdf> (accessed 12 April 2018).
- Biau, C. and M. Pfister. 2014. “Creating an environment for investment and sustainable development” in *Development Co-operation Report 2014: Mobilising Resources for Sustainable Development*. OECD.

130 Biau, Carole and Mike Pfister. 2014. “Creating an environment for investment and sustainable development” in *Development Co-operation Report 2014: Mobilising Resources for Sustainable Development*. OECD.

131 Organisation for Economic Co-operation and Development. 2015. “Policy guidance for investment in clean energy infrastructure: expanding access to clean energy for green growth and development”. <http://www.oecd.org/environment/policy-guidance-for-investment-in-clean-energy-infrastructure-9789264212664-en.htm> (accessed 20 March 2018).

132 Ibid., 22.

133 Omorogbe. 2016. Above, note 71.

- Borowy, I. 2013. "The Brundtland Commission: sustainable development as health issue". *Michael* 10, 198-208.
- Bradbook, Adrian J., David Goldstein, Katherine Kennedy, Philip Musegaas, Ethan Rogers, Ibibia Worika, John Bowie, David R. Hodas, Teresa Malyshev, Richard L. Ottinger, Alexandra Warwyk. 2016. *UNEP Guide for Energy Efficiency and Renewable Energy Laws*. United Nations Environment Programme.
- Conca, J. 2014. "Net energy metering: are we capitalists or what?". <https://www.forbes.com/sites/jamesconca/2014/11/28/net-energy-metering-are-we-capitalists-or-what/#18508eaf2fbf> (accessed 2 February 2018).
- Davies, M. et al. 2015. *Developing Renewable Energy Projects: A Guide to Achieving Success in the Middle East*. <https://www.pwc.com/m1/en/publications/documents/eversheds-pwc-developing-renewable-energy-projects.pdf> (accessed 19 March 2018).
- Department of Energy. n.d. Net metering guide. <https://www.doe.gov.ph/net-metering/net-metering-guide> (accessed 7 February 2018).
- Deshmukh, R., J. Carvallo and A. Gambhir. 2013. *Sustainable Development of Renewable Energy Mini-grids for Energy Access: A Framework for Policy Design*. Berkeley, CA: University of California Berkeley.
- Doukas, A. and Athena Ballesteros. n.d. "Clean energy access in developing countries: perspectives on policy and regulation". World Resources Institute. <http://www.wri.org/sites/default/files/clean-energy-access-developing-countries-issue-brief.pdf> (accessed 20 March 2018).
- Earth Summit. 1997. UN Conference on Environment and Development. <http://www.un.org/geninfo/bp/enviro.html> (accessed 19 March 2018).
- Emodi, N.V. and N.E. Ebele. 2016. "Policies enhancing renewable energy development and implications for Nigeria". *Sustainable Energy* 4. <http://pubs.sciepub.com/rse/4/1/2/> (accessed 2 February 2018).
- Energylopedia. n.d. Tunisia energy situation. https://energylopedia.info/wiki/Tunisia_Energy_Situation (accessed 2 February 2018).
- European Commission. n.d. United Nations Environment Programme. http://ec.europa.eu/environment/international_issues/relations_un_en.htm (accessed 5 February 2018).
- Food and Agriculture Organization of the United Nations. 1995. "Chapter 2: Energy for sustainable agriculture and rural development and food security in Africa" in *Future Energy Requirements for Africa's Agriculture*. <http://www.fao.org/docrep/V9766E/v9766e03.htm> (accessed 22 March 2018).
- Gachenga, E. 2016. "Legal and policy frameworks for climate-friendly energy generation in Africa: energy security for future development" in *Perspectives on Energy Security and Renewable Energies in Sub-Saharan Africa*, ed. Ruppel, Oliver C. and Bernd Althusmann. Windhoek: Macmillan Education Namibia.
- Goldemberg, J., T.B. Johansson and D. Anderson. 2004. *World Energy Assessment*. United Nations Development Programme, Bureau for Development Policy.
- Greacen, C., R. Plevin and C. Greacen. 2003. "Thai Power: net metering comes to Thailand". https://ac.els-cdn.com/S1471084604000411/1-s2.0-S1471084604000411-main.pdf?_tid=beaa9398-d19a-437d-b5e6-5a781730990f&acd nat=1521473222_5c8bac2fc0075a8364f6a08b6ab6191b (accessed 19 March 2018).
- Heinrich Böll Stiftung, World Future Council and Friends of the Earth. 2012. *Powering Africa through Feed-in Tariffs Policies Advancing Renewable Energy to Meet the Continent's Needs*. https://ke.boell.org/sites/default/files/2013-03-powering-africa_through-feed-in-tariffs.pdf (accessed 19 March 2018).
- Hsu, Angel, Carlin Rosengarten, Amy Weinfurter, Yihao Xie, Evan Musolino, Hannah E. Murdock and United Nations Environment Programme. 2017. "Renewable energy and energy efficiency in developing countries: contributions to reducing global emissions". United Nations Environment Programme. http://wedocs.unep.org/bitstream/handle/20.500.11822/22149/1_Gigaton_Third%20Report_EN.pdf?sequence=1 (accessed 19 March 2018).
- Indonesian Renewable Energy Society (METI). 2011. "METI, policy and regulation of renewable energy in Indonesia". <https://www.giz.de/fachexpertise/downloads/2011-en-senoaji-pep-informationswork-indonesien.pdf> (accessed 21 March 2018).

- International Energy Agency. 2018. Non-conventional renewable energy law (Law 20.257). <https://www.iea.org/policiesandmeasures/pams/chile/name-24577-en.php> (accessed 2 February 2018).
- International Energy Agency. 2018. Law no. 426 establishing the Renewable Energy Authority of Libya (REAOL). <http://www.iea.org/policiesandmeasures/pams/libya/name-24772-en.php> (accessed 7 February 2018).
- International Renewable Energy Agency. 2016. "Scaling up variable renewable power: the role of grid codes". https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2016/IRENA_Grid_Codes_2016.pdf (accessed 20 March 2018).
- International Trade Administration. 2017. Dominican Republic – renewable energy. <https://www.export.gov/article?id=Dominican-Republic-Renewable-Energy> (accessed 2 February 2018).
- Kumar, P. and A. Singh. 2018. "Grid codes: goals and challenges". *Renewable Energy Integration*. https://link.springer.com/chapter/10.1007/978-981-4585-27-9_2 (accessed 19 March 2018).
- Liptow, H. and S. Remler. 2012. *Legal Frameworks for Renewable Energy*. Eschborn: Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH.
- Lucas, H., Rabia Ferroukhi and Diala Hawila. 2013. "Renewable energy auctions in developing countries". International Renewable Energy Agency. <http://www.irena.org/publications/2013/Jun/Renewable-Energy-Auctions-in-Developing-Countries> (accessed 19 March 2018).
- Mahmoud, M., N. Myrsaliev, M. El Forgani, H. Bouadane and L. Sarant. 2016. *Arab Future Energy Index*. United Nations Development Programme. http://www.rcreee.org/sites/default/files/final_afex_re_2016.pdf (accessed 7 February 2018).
- McCarthy, N. and H. Henderson. 2014. "The role of renewable energy laws in expanding energy from non-traditional renewables". Inter-American Development Bank. IDB working paper series No. IDB-WP-540.
- McDonough, Mike. 2017. "Addressing legal barriers to climate investment in Jordan, Morocco and Tunisia". *Law in Transition Journal*. <http://www.ebrd.com/publications/law-in-transition-2017-investment-climate-english.pdf> (accessed 7 February 2018).
- Modi, Vijay, Susan McDade, Dominique Lallement and Jamal Saghir. 2005. *Energy Services for the Millennium Development Goals*. Energy Sector Management Assistance Programme, United Nations Development Programme, United Nations Millennium Project and World Bank.
- Muñoz Cabré, Miquel, Alvaro Lopez-Peña, Ghislaine Kieffer, Arslan Khalid and Rabia Ferroukhi. 2015. "Renewable energy policy brief, Argentina". International Renewable Energy Agency. https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2015/IRENA_RE_Latin_America_Policies/IRENA_RE_Latin_America_Policies_2015_Country_Argentina.pdf?la=en&hash=4A7F4CDAB9E00B7739363467AB2B2ADA67C94CDC (accessed 19 March 2018).
- Muñoz Cabré, Miquel, Alvaro Lopez-Peña, Ghislaine Kieffer, Arslan Khalid and Rabia Ferroukhi. 2015. "Renewable energy policy brief, Mexico". International Renewable Energy Agency. http://www.irena.org/DocumentDownloads/Publications/IRENA_RE_Latin_America_Policies_2015_Country_Mexico.pdf (accessed 19 March 2018).
- National Organizing Committee Rio+20. 2011. About Rio+20. http://www.rio20.gov.br/en/about_the_rio_more_20.html (accessed 6 February 2018).
- Norton Rose Fulbright. 2016. Renewable energy in Latin America: Mexico. <http://www.nortonrosefulbright.com/knowledge/publications/134776/renewable-energy-in-latin-america-mexico> (accessed 2 February 2018).
- NREL. 2018. Feed-in tariffs. <https://www.nrel.gov/technical-assistance/basics-tariffs.html> (accessed 2 February 2018).
- Omorogbe, Y. 2016. "The role of law in promoting renewable energies in Africa" in *Perspectives on Energy Security and Renewable Energies in Sub-Saharan Africa*, ed. Ruppel, Oliver C. and Bernd Althusmann. Windhoek: Macmillan Education Namibia.
- Organisation for Economic Co-operation and Development. 2015. "Policy guidance for investment in clean energy infrastructure: expanding access to clean energy for green growth and development". <http://www.oecd.org/environment/policy-guidance-for-investment-in-clean-energy-infrastructure-9789264212664-en.htm> (accessed 20 March 2018).
- Osmańczyk, E.J. and A. Mango. 2003. *Encyclopedia of the United Nations and International Agreements*. Routledge.

- Rickerson, W. 2012. "Feed-in tariffs as policy instrument for promoting renewable energies and green economies in developing countries". United Nations Environment Programme.
- Sachs, J.D. 2012. "From Millennium Development Goals to Sustainable Development Goals". *Lancet* 379, 2206-2211.
- Sustainable Development Goals Fund. 2018. From MDGs to SDGs. <http://www.sdgfund.org/mdgs-sdgs> (accessed 6 February 2018).
- Sustainable Energy for All. n.d. The United Nations Decade of Sustainable Energy for All 2014-2024. <http://www.un.org/millenniumgoals/pdf/SEFA.pdf> (accessed 19 March 2018).
- United Nations Conference on the Human Environment. 1972. "Action Plan for the human environment: B.1. Planning and management of human settlements for environmental quality" A/CONF.48/14/Rev.1 Chapter II, B.1 in *UN Documents: Gathering a Body of Global Agreements*. <http://www.un-documents.net/aphe-b1.htm> (accessed 5 February 2018).
- United Nations Conference on the Human Environment. 1972. "Declaration of the United Nations Conference on the Human Environment" A/CONF.48/14/Rev.1 Chapter I in *UN Documents: Gathering a Body of Global Agreements*. <http://www.un-documents.net/unchedec.htm> (accessed 5 February 2018).
- United Nations Conference on the Human Environment. 1972. "Report of the United Nations Conference on New and Renewable Sources of Energy". <http://www.un-documents.net/aconf48-14r1.pdf> (accessed 5 February 2018).
- United Nations Conference on the Human Environment. 1972. "Resolution on institutional and financial arrangements" A/CONF.48/14/Rev.1 Chapter III in *UN Documents: Gathering a Body of Global Agreements*. <http://www.un-documents.net/unche-if.htm> (accessed 5 February 2018).
- United Nations Development Programme and Climate Parliament. 2013. "Renewable energy for parliamentarians how-to guide". http://www.undp.org/content/undp/en/home/librarypage/democratic-governance/parliamentary_development/renewable-energy-for-parliamentarians--a-how-to-guide.html (accessed 19 March 2018).
- United Nations Development Programme. 2014. "Renewable energy for parliamentarians".
- United Nations Development Programme. 2014. *Tunisia: Derisking Renewable Energy Investment*. New York, NY: United Nations Development Programme.
- United Nations Educational, Scientific and Cultural Organization. n.d. "World Solar Programme 1996-2005: an outline". <http://unesdoc.unesco.org/images/0010/001066/106646eo.pdf> (accessed 6 February 2018).
- United Nations Educational, Scientific and Cultural Organization. 1981. "Address by Mr Amadou-Mahtar M'Bow to the United Nations Conference on New and Renewable Sources of Energy". <http://unesdoc.unesco.org/images/0004/000474/047400eb.pdf> (accessed 5 February 2018).
- United Nations Environment Programme. n.d. Overview. <http://web.unep.org/about/who-we-are/overview> (accessed 5 February 2018).
- United Nations Environment World Conservation Monitoring Centre. 2014. Sustainable development. <http://biodiversity-z.org/content/sustainable-development> (accessed 6 February 2018).
- United Nations General Assembly. 1981. A/RES/36/193: United Nations Conference on New and Renewable Sources of Energy. <http://www.un.org/documents/ga/res/36/a36r193.htm> (accessed 5 February 2018).
- United Nations General Assembly. 1983. Resolution 38/161, "Process of preparation of the Environmental Perspective to the Year 2000 and Beyond".
- United Nations General Assembly. 1992. "Report of the United Nations Conference on Environment and Development" A/CONF.151/26 (Vol. I). <http://www.un.org/documents/ga/conf151/aconf15126-1annex1.htm> (accessed 6 February 2018).
- United Nations General Assembly. 1998. Resolution A/RES/53/7, "World Solar Programme 1996-2005". https://digitallibrary.un.org/record/261859/files/A_RES_53_7-EN.pdf (accessed 6 February 2018).

- United Nations General Assembly. 2010. Resolution 64/236, "Implementation of Agenda 21, the Programme for the Further Implementation of Agenda 21 and the outcomes of the World Summit on Sustainable Development".
- United Nations General Assembly. 2011. Resolution A/RES/65/151, "International Year of Sustainable Energy for All".
- United Nations General Assembly. 2012. Resolution A/RES/66/288, "The future we want".
- United Nations General Assembly. 2012. "Delivering justice: programme of action to strengthen the rule of law at the national and international levels". A/66/749.
- United Nations General Assembly. 2012. Resolution A/RES/67/215, "Promotion of new and renewable sources of energy".
- United Nations General Assembly. 2015. Resolution A/70/1, "Transforming our world: the 2030 Agenda for Sustainable Development".
- United Nations Sustainable Development. 2015. "Historic new sustainable development agenda unanimously adopted by 193 UN Members". <http://www.un.org/sustainabledevelopment/blog/2015/09/historic-new-sustainable-development-agenda-unanimously-adopted-by-193-un-members/> (accessed 6 February 2018).
- Unostamps. 2008. World Solar Program. https://unostamps.nl/subject_world_solar_programme.htm (accessed 6 February 2018).
- Vandaele, N. and W. Porter. 2015. "Renewable energy in developing and developed nations: outlooks to 2040". *Journal of Undergraduate Research* 15, no. 3.
- Wamukonya, N. 2005. "Legislative and policy instruments for promotion of renewable energy in the power sector". Paper presented at the Parliamentarian Forum on Energy Legislation and Sustainable Development, Parliament of South Africa, Cape Town. http://www.un.org/esa/sustdev/sdissues/energy/op/parliamentarian_forum/njeri_paper.pdf (accessed 2 February 2018).
- World Commission on Environment and Development. n.d. *Report of the World Commission on Environment and Development: Our Common Future*. A/42/427 Annex in *UN Documents: Gathering a Body of Global Agreements*. <http://www.un-documents.net/wced-ocf.htm> (accessed 5 February 2018).
- World Summit on Sustainable Development. 2002. "Plan of Implementation of the World Summit on Sustainable Development". http://www.un.org/esa/sustdev/documents/WSSD_POI_PD/English/WSSD_PlanImpl.pdf (accessed 6 February 2018).
- World Summit on Sustainable Development. 2002. Background release: 24 August 2002. <http://www.un.org/events/wssd/summaries/envdevj1.htm> (accessed 6 February 2018).

Rural development through renewable energy: a case study in Bolivia

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Abstract

Without renewable alternative sources of energy, Bolivia's rural development is in jeopardy. This paper explores the potential for renewable energy in Bolivia to foster development in rural areas. It analyses the sector's legal framework, describes Bolivia's renewable energy policies' alignment with Sustainable Development Goal 7 and explores Bolivia's potential for electricity generation through renewable sources in rural areas. If Bolivia overcomes the challenges of changing its energy matrix, by promoting renewable energy suitable for the country's geographical, economic and social characteristics, it will succeed in making a paradigm shift and boosting rural development.

Introduction

Since 2008, Bolivia has been the fastest-growing economy in Latin America. This is mainly thanks to sound economic policies and developments that took place during the 1990s and the high prices of commodities during the last couple of years. Bolivia, a developing country, benefited from this unprecedented commodity boom and was able to reduce poverty levels. According to the International Monetary Fund, Bolivia's gross domestic product growth has averaged about 5 per cent since 2006, and its poverty rate has declined by 16 percentage points. Bolivia is still highly dependent on raw material extractive industries, and changing prices deeply affect the country's stability and development path. This was particularly true in 2016, when a slowdown in Bolivia's economic growth forced the country to adapt to lower commodity prices and look for alternative ways to boost the economy. The government envisions Bolivia as the energy hub for Latin America. By diversifying its energy matrix, it looks to increase energy production not only to satisfy internal demand but, most importantly, to export the surplus to neighbouring countries.

Bolivia's population of 10 million people is extended over 1,098,581 km² according to the latest census. More than 30 per cent of its population live in dispersed rural areas without access to basic services such as health and education. Sparsely populated rural areas

and an extensive territory with highlands, lowlands and midland valleys present serious challenges when it comes to energy provision and electric interconnection. Despite having good urban electricity coverage, Bolivia is falling short on providing access to all, especially the least developed areas. In 2015, 98 per cent of Bolivia's urban areas had electricity coverage. The problem arises when it comes to rural areas. Only 66 per cent of rural areas have electricity. Decentralized renewable energy has an important role to play in providing access to energy to populations that are isolated from large cities. By diversifying its energy matrix, Bolivia will not only satisfy internal development basic needs, but also be in compliance with international standards and commitments such as the Sustainable Development Goals (SDGs), which the country adopted in 2015.

This paper explores the potential for renewable energy in Bolivia to foster development in rural areas. The first part focuses on the legal considerations of the sector. The second part describes Bolivia's renewable energy policies and how these are aligned with SDG7. The third part explores Bolivia's renewable energy potential for electricity generation in rural areas. Finally, this paper addresses some of the renewable energy development challenges in the country.

Legal considerations of the renewable energy sector in Bolivia

The energy sector is going through an interesting transition in Bolivia. In 2009, the government adopted a new Constitution, which promotes the development of alternative energy and investigation of new forms of production that are compatible with the environment. Also, the state guarantees energy generation for internal consumption and envisions enough production to export the surplus.¹

The National Development Plan of 2007, approved by Decree 29272, had already planned the energy matrix diversification for electricity generation.² Furthermore, in 2009 the government created a Vice-Ministry of Electricity and Alternative Energies through Decree 29894, whose responsibilities included proposing policies for the development of alternative energy technologies.³ Additionally, law 300 of 2012 (Legal framework of Mother Earth and integral development to live well) aims to establish energy policies and measures to achieve gradual change in the energy matrix. It also looks to ensure that a percentage of energy generated through alternative energy sources is incorporated into the National Interconnected System (SIN in Spanish) and gradually increased. Finally, it provides for the development of plans and programmes for the generation of alternative renewable energy and incentives for production and domestic use, prioritizing solar, wind, micro-hydro plants and national energy savings.⁴

The legal framework for electricity generation in Bolivia was established in 1994 by the government of Gonzalo Sánchez de Lozada through law 1604. That law is going to be replaced by a new law that was submitted to the Legislative Assembly in 2017. The new law aims not only to guarantee Bolivia's internal demand but also to increase production and energy generation in order to export to neighbouring countries that will experience energy shortages in the coming years, such as Brazil. Furthermore, in 2018 the government will propose a new hydrocarbons law that will determine the guidelines for

new oil contracts, the expansion of existing contracts, and the possibility of exploring in protected areas. This last item has created some scepticism among Bolivia's population because this will set a precedent for other types of development in protected areas, and indigenous communities that live in some of those areas fear their rights and livelihoods will be at risk. Finally, the government is going to propose a nuclear energy law that will enable the construction of a nuclear power plant in the city of El Alto in the department of La Paz. Some protests took place in 2015 when the population learned about the government's intention to build a nuclear plant. The last section of this paper focuses on some of the negative aspects of promoting nuclear power and suggests some alternatives.

Compared with other countries in Latin America, Bolivia's legislation on renewable energy is falling short. The International Renewable Energy Agency has prepared a table comparing renewable energy legislation, fiscal incentives and access to transmission lines, and Bolivia is ahead of only Suriname and Belize (Figure 1).⁵

Renewable energy development is one of the government's priorities. It is expected that by 2025 the country will generate 74 per cent of its electricity from clean sources. Until 2016, 69 per cent of Bolivia's electricity generation was provided by thermoelectric plants that use natural gas.⁶ If Bolivia succeeds in developing renewable energy sources, it will not only foster development in the most neglected areas of the country but also be in compliance with international commitments such as the SDGs, particularly SDG7.

Renewable energy policies and Sustainable Development Goal 7

The government has been very emphatic in repeating that Bolivia's energy matrix diversification and renewable energy development are among its development priorities. In 2011, Bolivia launched its Renewable Energy Policy for the Electric Sector in the Plurinational State of

1 Bolivia, Constitution, Article 379. <http://bolivia.justia.com/nacionales/nueva-constitucion-politica-del-estado/cuarta-parte/titulo-ii/capitulo-sexto/#articulo-378> (accessed 12 April 2018).

2 Decree 29272, 166-168. http://www.minedu.gob.bo/files/documentos-normativos/leyes/boliviaplan_desarrollo_nac_ds_29272.pdf (accessed 12 April 2018).

3 Decree 29894. http://www.comunicacion.gob.bo/sites/default/files/docs/Decreto%20Supremo%20N%C2%BA%2029894%20Estructura%20Organizativa%20del%20Poder%20Ejecutivo%20del%20Estado%20Plurinacional_0.pdf (accessed 12 April 2018).

4 Law 300, Article 30. <http://www.fonabosque.gob.bo/wp-content/uploads/2017/04/Ley-No-300.pdf> (accessed 12 April 2018).

5 International Renewable Energy Agency. 2015. *Energías Renovables en América Latina 2015: Sumario de Políticas*, 10. http://www.irena.org/DocumentDownloads/Publications/IRENA_RE_Latin_America_Policies_2015_ES.pdf (accessed 12 April 2018).

6 Villca, Claudia. 2016. "Hasta 2025 se prevé generar 74% de la energía con fuentes limpias". *La Razón*, 25 April. http://www.la-razon.com/economia/preve-generar-energia-fuentes-limpias_0_2478952155.html (accessed 12 April 2018).

Bolivia, establishing the framework for the development of alternative energy, describing the current situation of the electricity sector and the potential for renewable energy, identifying problems and proposing innovative projects. The aforementioned policy will be consolidated through four specific programmes: (1) generating electricity through alternative sources; (2) generating electricity for living with dignity; (3) generating normative development and institutional strengthening; and (4) promoting research and development.⁷

On 22 January 2017, Bolivia went even further in its commitment to invest in renewable energy as a priority for the energy sector, and created a new Energy Ministry, which has a Vice-Ministry of Electricity and Alternative Energies, which will focus on developing renewable energies.⁸ The new ministry will increase renewable energy projects and shift from gas-generated energy to renewable energy. The idea behind this ambitious initiative is to position Bolivia at the centre of the energy needs of South America so that Bolivia can export its surplus to neighbouring countries. The new ministry has aligned projects that will require an investment of US\$30 million until 2025, aiming to generate 15,000 MW.⁹

In 2015, the Government of Bolivia launched the Social and Economic Development Plan 2016-2020 (PDES in Spanish), which contains 13 development pillars.¹⁰ Pillar 2 aims to universalize basic services, meaning that the government wants to provide electricity to the entire Bolivian territory. Currently, only urban areas have almost full access to energy; scattered rural areas continue to be a challenge. Additionally, Pillar 7 envisions full sovereignty over Bolivia's resources. The idea behind this pillar is to be able to produce enough to cover Bolivia's internal demand and to export

its electricity surplus. In 2020, the government will evaluate which of the measures of the PDES have been successfully implemented to secure their continuity. The PDES was drawn up based on the Patriotic Agenda 2025.¹¹

The Patriotic Agenda 2025 was established in August 2013, to be achieved in time for the country's bicentennial celebration in 2025. Through this agenda, the government established 13 pillars for the construction of a dignified and sovereign country. The Patriotic Agenda has many things in common with Agenda 2030.¹² They have at their heart the same principal goal of eradicating poverty. By 2030, the international community aims to end hunger, achieve food security and improved nutrition and promote sustainable agriculture. In Bolivia's case, the government looks to guarantee its sovereignty above all. Six of its 13 pillars talk about national sovereignty regarding basic services, natural resources, diversified production and integral development, a science and technology field with a unique identity, and a financial system oriented towards development respecting Mother Earth's rights. In parallel, the international community has agreed to dedicate 4 of its 17 goals to the following three issues: secure water, sustainable energy, and sustainable and inclusive economic growth.

The Patriotic Agenda 2025 was transformed into law in January 2015 through law 650.¹³ Additionally, the Patriotic Agenda was included in the annual national budget of 2016. The government has been implementing the Patriotic Agenda 2025 through the PDES. The Ministry of Economy and Public Finances drew up the annual budget with the goal of securing the implementation of the PDES towards the Patriotic

7 Hydrocarbons Ministry. 2011. *Política de Energías Alternativas para el Sector Eléctrico en el Estado Plurinacional de Bolivia*. https://observatoriocdbolivia.files.wordpress.com/2015/08/politicas_energias_alternativas_2011.pdf (accessed 12 April 2018).

8 Decree 3058. <http://www.derechoteca.com/gacetabolivia/decreto-supremo-no-3058-del-22-de-enero-de-2017/> (accessed 12 April 2018).

9 Energía Estratégica. 2017. "Bolivia reemplaza Ministerio de Hidrocarburos por uno de Energías Renovables". <http://www.energiaestrategica.com/bolivia-crea-nuevo-ministerio-electricidad-energias-renovables/> (accessed 12 April 2018).

10 Ministry of Development Planning 2015. *Plan de Desarrollo Económico y Social 2016-2020*. <http://www.planificacion.gob.bo/pdes/> (accessed 12 April 2018).

11 Ministry of the Presidency. 2015. *13 Pilares de la Bolivia Digna y Soberana Agenda Patriótica del Bicentenario 2025*. http://medios.economiafinanzas.gob.bo/MH/documentos/agenda_patriotica_2025.pdf (accessed 12 April 2018).

12 Sustainable Development Knowledge Platform. 2015. "Transforming our world: the 2030 Agenda for Sustainable Development". <https://sustainabledevelopment.un.org/post2015/transformingourworld> (accessed 12 April 2018).

13 Law 650. <https://www.ctic.gob.bo/wp-content/uploads/2016/03/Ley-N%C2%B0-650-13-Pilares-de-la-Agenda-Patri%C3%B3tica-del-Bicentenario-2025.pdf> (accessed 12 April 2018).

Figure 1 Renewable energy policies in Latin America.

	National Policy							Fiscal Incentives							Grid Access						
	Renewable Energy Target	Renewable Energy Law / Strategy	Solar Heating Law / Programme	Solar Power Law / Programme	Wind Power Law / Programme	Geothermal Law / Programme	Biomass Law / Programme	Biofuels Law / Programme	VAT Exemption	Fuel Tax Exemption	Income Tax Exemption	Import / Export Fiscal Benefit	National Exemption of Local Taxes	Carbon Tax	Accelerated Depreciation	Other Fiscal Benefits	Transmission Discount / Exemption	Priority / Dedicated Transmission	Grid Access	Preferential Dispatch	Other Grid Benefits
Argentina	■	■			■			■	■	■	■	■		■	■						
Belize	■	■																			
Bolivia	■							■			■	■									
Brazil	■				■		■		■	■	■	■			■	■	■				
Chile	■	■		■		■	■		■		■		■		■	■	■		■		
Colombia	■	■						■	■	■	■	■		■	■	■					■
Costa Rica	■					■	■	■		■	■				■						
Ecuador	■					■	■	■		■	■				■			■	■		
El Salvador	■			■						■	■							■	■		
Guatemala	■						■	■		■	■				■	■		■			
Guyana	■							■			■										
Honduras	■	■					■			■	■				■	■	○	■			
Mexico	■	■	■			■	■	■		■	■	■	■	■	■	■	■	■		■	■
Nicaragua	■	■				■	■	■		■	■	■	■	■	■	■				■	■
Panama	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■				■
Paraguay							■	■	■	■	■				■	■		■			
Peru	■	■		■		■	■	■		■	■			■	■	■		■	■	■	■
Suriname	■																				
Uruguay	■	■	■				■	■	■	■	■				■	■	■			■	■
Venezuela	■	○						■	■						■						
TOTAL (Active)	19	11	4	4	2	6	8	11	9	6	10	12	5	2	5	12	7	3	8	5	6

■ Active; ■ Expired, superseded or inactive; ■ Subnational level; ○ Under development

Source: http://www.irena.org/-/media/Files/IRENA/Agency/Publication/2015/IRENA_RE_Latin_America_Policies/IRENA_RE_Latin_America_Policies_2015.pdf

Regulatory Instruments												Finance						Other						
Auctions	Feed-in Tariff	Premium	Quota	Certificate System	Hybrid	Net Metering	Ethanol Blending Mandate	Biodiesel Blending Mandate	Solar Mandate	Registry	Currency Hedging	Dedicated Fund	Eligible Fund	Guarantees	Pre-investment Support	Direct Funding	Renewable Energy in Social Housing	Renewable Energy in Rural Access Programmes	Renewable Energy Cookstove Programme	Local Content Requirements	Special Environmental Regulations	Food / Bioenergy Nexus	Social Requirements	
												•				•								Argentina
																								Belize
	○																							Bolivia
									•															Brazil
																								Chile
																					○			Colombia
																								Costa Rica
								•																Ecuador
																								El Salvador
																								Guatemala
																								Guyana
																								Honduras
							•		•															Mexico
																								Nicaragua
																								Panama
																								Paraguay
																								Peru
																								Suriname
																○								Uruguay
																								Venezuela
12	4	3	4	2	4	10	7	6	4	4	10	9	9	6	11	11	5	18	4	5	5	4	5	TOTAL (Active)

Agenda.¹⁴ By 2016, the government had invested more than US\$1,052 million in renewable energy projects.¹⁵ Financing and developing renewable energy projects is fundamental to achieving sustainable development in Bolivia.

Sustainable development as a concept has come a long way since 1972, when the term received international recognition for the first time at the United Nations Conference on the Human Environment, held in Stockholm. Since then, the international community has been exploring the best way to achieve it. International experts and policymakers researched and designed policies that could end poverty, protect the planet and ensure prosperity for all. It took more than 40 years to agree on a set of goals that would guarantee that the world as a whole was moving uniformly in the right direction towards sustainable development. September 2015 marked the beginning of the biggest international agreement to finally achieve sustainable development. At the United Nations General Assembly in New York, 193 United Nations Member States adopted 17 SDGs to end poverty, protect the planet and ensure prosperity for all. There are 169 specific targets distributed among the goals to be achieved over the following 15 years. At the plenary of the United Nations General Assembly, when adopting the goals, the Government of Bolivia not only committed itself to pursuing them but highlighted that Bolivia promotes a policy of good living.¹⁶

Bolivia's laws, regulations and policies are in line with the SDGs, and particularly with SDG7, as it is an important milestone for the energy sector's development. SDG7 aims to ensure access to affordable, reliable, sustainable and modern energy for all. In comparison, the Millennium Development Goals considered energy only as a means to reach the goals, but not as a goal itself. The SDGs consider energy access for all a fundamental step to achieve other goals. Aware of this premise, Bolivia is looking to guarantee access to energy for all its citizens. In order to do that, it is looking to increase electricity coverage

in rural areas so that they can achieve their best development potential with access not only to energy but to basic services such as health and education. This will not be feasible without electricity. Nevertheless, there is a long road ahead and Bolivia has to find new energy sources to guarantee full access to energy for all. Renewable energy could be the solution to provide electricity to the entire territory, even to those populations located in remote rural areas.

Bolivia's renewable energy potential for electricity generation in rural areas

The supply of electricity in Bolivia is made up of hydropower, wind and thermoelectric generation. In 2015, the total effective power at the national level was 2,191.3 MW, which includes the SIN, isolated systems and auto-producers. The net generation of SIN plants was 8,473.8 GWh, while that of isolated systems and auto-producers was 646.7 GWh. The demand for electricity is mainly from distribution companies and unregulated consumers. In 2015, distribution companies drew 7,353.7 GWh from the SIN and 320.8 GWh from the isolated systems.¹⁷ Energy demand is growing in Bolivia. In the past, the country suffered energy shortages, but it is moving in the right direction to increase its installed capacity. However, rural areas continue to lack electricity.

According to the Bolivian National Institute of Statistics, 31.3 per cent of Bolivia's population of more than 10 million people lived in rural areas in 2016.¹⁸ There is a strong correlation between lack of electricity and high levels of poverty. People in rural areas who lack access to mains electricity supply their energy needs with batteries for electronic devices, candles and kerosene lighters for illumination, and wood for cooking meals. This is not only expensive for them but also unhealthy. The environmental impact of the use of firewood is mainly contained in the interiors of rural houses, causing

14 Ministry of Economy and Public Finances. 2015. <http://www.fndr.gob.bo/bundles/fndrdemo/downloads/pdes/pdes2016-2020.pdf> (accessed 12 April 2018).

15 Ministry of Hydrocarbons. 2016. "Bolivia como nunca en su historia invierte en energías alternativas y avanza en el cambio de matriz energética". <https://www3.hidrocarburos.gob.bo/index.php/comunicaci%C3%B3n/prensa/3769-bolivia-como-nunca-en-su-historia-invierte-en-energ%C3%A9ticas-alternativas-y-avanza-en-el-cambio-de-matriz-energ%C3%A9tica.html> (accessed 12 April 2018).

16 United Nations General Assembly. 2015. "Unanimously adopting historic Sustainable Development Goals, General Assembly shapes global outlook for prosperity, peace". <https://www.un.org/press/en/2015/ga11688.doc.htm> (accessed 12 April 2018).

17 Autoridad de Fiscalización y Control Social de Electricidad. 2016. *Annual Report 2015*, 17. http://srvdocs.ae.gob.bo/ae/publicacion/LibroMemoriaAE2015WEB_final.pdf (accessed 12 April 2018).

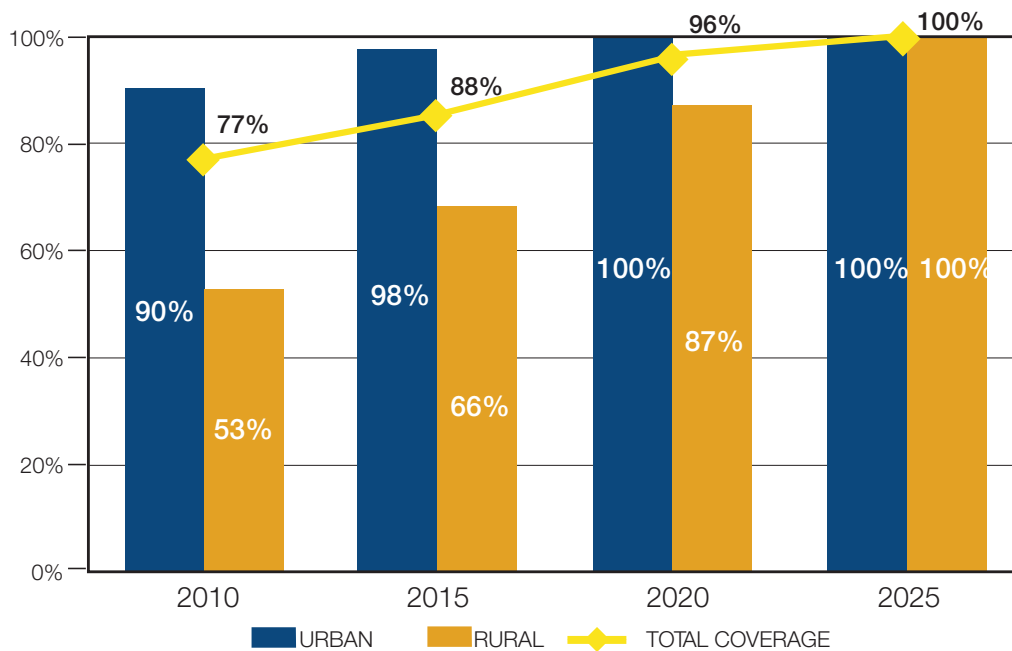
18 National Institute of Statistics. 2016. "Más de 10 millones de bolivianos y bolivianas celebran el aniversario de Bolivia". <http://www.ine.gob.bo/index.php/prensa/notas-de-prensa/item/257-mas-de-10-millones-de-bolivianos-y-bolivianas-celebran-el-aniversario-de-bolivia> (accessed 12 April 2018).

indoor pollution. Measurements of the presence of carbon monoxide and products of the combustion of firewood have been carried out in rural households in Bolivia, and show that the country exceeds, by six times, the levels defined by the World Health Organization as dangerous.¹⁹ Additionally, lack of electricity not only has a negative impact on health and education service provision but also limits the productive potential of rural areas.²⁰ Rural populations do not have a chance of development without access to electricity. According to Miguel Fernández Fuentes, an energy expert in Bolivia, a large part of the rural sector is practically marginalized from conventional energy systems. While the urban population of Bolivia already lives in the twenty-first century, rural populations, dispersed and isolated, still live in the nineteenth century. There is a difference of two centuries between the rural and urban areas.²¹

In 2008, the government created a programme called Electricity to Live with Dignity to provide electricity to rural areas and improve their living conditions and standards. More needs to be done. Bolivia plans to have full electricity coverage by 2025 according to the Electricity Plan of the Plurinational State of Bolivia 2025.²² The country's rural electricity coverage levels have increased significantly in the last 15 years. In 2001, coverage in the rural area reached only 25 per cent.²³ In 2015, it reached 66 per cent, as shown in Figure 2, produced by the Vice-Ministry of Electricity and Alternative Energies.²⁴

In 2015, there were still 323,292 rural households in Bolivia that lacked electric coverage.²⁵ Renewable energy could play an important role in providing energy in remote areas with low-density populations. Solar, wind and biomass are already affecting Bolivia's renewable energy development.

Figure 2 Electricity coverage, 2010-2025 (%).



Source: Plan Eléctrico del Estado Plurinacional de Bolivia 2025. <https://observatoriocdbolivia.files.wordpress.com/2015/08/peebol2025.pdf>

19 Fernández Fuentes, Miguel. 2010. *Rol e impacto socioeconómicos de las energías renovables del área rural de Bolivia*. Centro de Estudios para el Desarrollo Laboral y Agrario, 15. https://www.cedla.org/sites/default/files/rol_e_impacto_socioeconomico_de_las_energias_renovables_en_el_area_rural_de_bolivia.pdf (accessed 12 April 2018).

20 Empresa Nacional de Electricidad – Bolivia. 2016. *Programa de Electrificación Rural – Bolivia*, 10. <http://www.ende.bo/public/publicaciones/pdf/pgas-per-ii-bo-l-1117-componente-ii-junio.-docx.pdf>. (accessed 12 April 2018)

21 Fernández Fuentes. 2010, 6. Above, note 19.

22 Plan Eléctrico del Estado Plurinacional de Bolivia 2025. <https://observatoriocdbolivia.files.wordpress.com/2015/08/peebol2025.pdf> (accessed 12 April 2018).

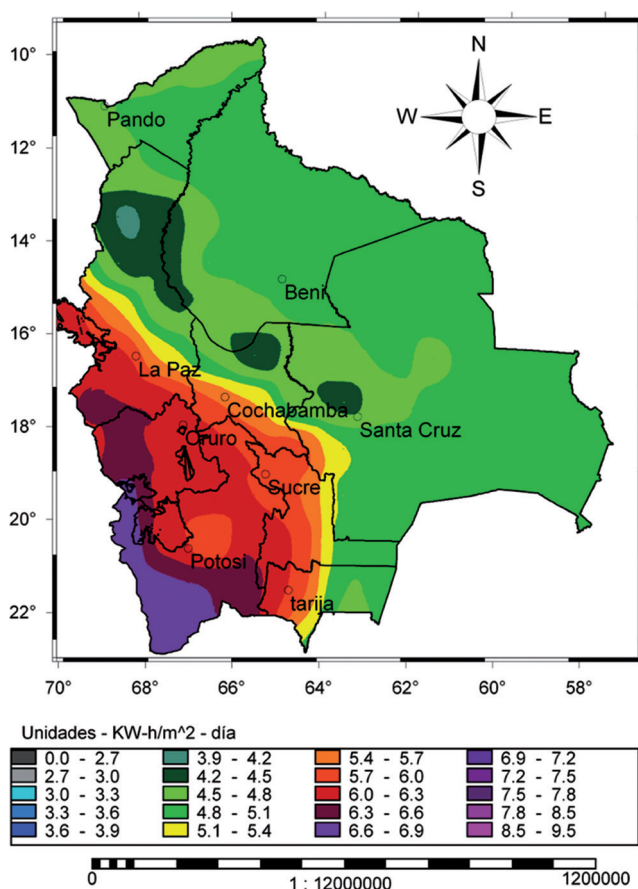
23 Ibid., 36.

24 Ibid., 40.

25 Ibid., 41.

According to a study developed by the Centro de Estudios para el Desarrollo Laboral y Agrario, 97 per cent of Bolivian territory is suitable for solar energy use. This is thanks in large part to the high levels of irradiation in much of the country. In Bolivia, the highlands and inter-Andean valleys receive a high rate of solar radiation: between 5 and 6 kWh/m²/day, depending on the time of year. In the plains zone, the average radiation rate is between 4.5 and 5 kWh/m²/day. This energy is enough to provide 220 Wh/day of electrical energy through a photovoltaic panel of 50 Wp, as shown in Figure 3.²⁶

Figure 3 Annual daily solar radiation in Bolivia.



Source: Universidad Mayor de San Simón, Dirección de Investigación Científica y Tecnológica. n.d. *Atlas de radiación solar global de Bolivia*. <http://pascal.dicyt.umss.edu.bo/oct/pdfs/DCAF0002.pdf>.

Technologically speaking, there is nothing to prevent in the use of solar energy in Bolivia, according to Fernández. One of the most important barriers to the use of solar energy in rural electrification with photovoltaic systems or solar thermal systems of water heating, however, lies in the initial investment. It would not be possible to use photovoltaic systems without subsidies, so it is vital for the country to identify the best management schemes to guarantee viability and sustainability.²⁷

Bolivia is on the right track, investing heavily in solar energy plants. The first solar project was built in Cobija, Pando, in the northern part of the country, on the border with Brazil. This plant produces 5 MW and provides continuous electricity to five municipalities in the Department of Pando.²⁸ Pando is one of the least developed departments of Bolivia, and the plant changed its development prospects. In 2016, the government announced a major solar project with the capacity to produce 60 MW. The project is located in Uyuni, in the Department of Potosí, an area with a great deal of sunshine, which enables the plant to perform efficiently.²⁹

Even if solar power is the best alternative for Bolivia, there are other renewable energy sources that could also be developed, such as wind. There is very little information in the country about the potential of wind. The geographical diversity of Bolivia makes it impossible to acquire accurate knowledge of the country's wind potential. Wind regimes in Bolivia have a high degree of variation depending on the geographical location and the time of the year.³⁰ Despite its not being the most suitable renewable energy for Bolivia's geography, the government inaugurated the first wind farm in Bolivia in 2014. The plant is located in the town of Qollpana, in the Pocona municipality of Carrasco province of the Department of Cochabamba, and was completed with an investment of US\$7.7 million. The plant generated 3 MW, which was injected into the SIN and strengthened the electric power supply in the area.³¹

²⁶ Fernández Fuentes. 2010, 35. Above, note 19.

²⁷ Fernández Fuentes. 2010, 37. Above, note 19.

²⁸ EnerGea. 2016. "Planta solar fotovoltaica en Cobija-Pando". <http://www.energea.com.bo/en/2016/01/18/planta-solar-fotovoltaica-en-cobija-pando/> (accessed 12 April 2018).

²⁹ *JornadaNet*. 2016. "Bolivia arranca el mayor proyecto de energía solar en Uyuni". <http://www.jornadanet.com/n.php?a=134885-1> (accessed 12 April 2018).

³⁰ Fernández Fuentes. 2010, 38. Above, note 19.

³¹ Communications Ministry. 2014. "Se inaugura el primer parque Eólico en Bolivia". <http://www.comunicacion.gob.bo/?q=20140102/13897> (accessed 12 April 2018).

Together with wind, biomass could increase considerably the energy generation in Bolivia. However, there are some limitations. Barriers to the use of biomass, beyond the traditional consumption for cooking food, lie in the absence of specific rules and regulations that, in the context of forestry regulations, establish the conditions for its exploitation. Another barrier is the lack of knowledge about technologies for obtaining electricity from biomass.³² There is one project in Bolivia, called Guabirá, in the Department of Santa Cruz, that produces cane bagasse biomass and generates 22 MW.³³ More research into and investment in technologies is needed to strengthen biomass production, but, above all, laws and regulations are required.

Bolivia has 30 renewable energy projects to be completed by 2025. Together, these projects aim to generate 545 MW. Among the projects, eight are hydroelectric, six thermoelectric, five related to wind, four solar, four biomass and three geothermal.³⁴ Despite Bolivia's advances in the renewable energy sector, there are still challenges to address to guarantee that the priorities are well established and the funds available.

Renewable energy development challenges in Bolivia

Bolivia is on the right track for changing its energy matrix. However, large investments are still required to finance large-scale renewable energy projects. Bolivia is not known for being a technologically advanced country. It needs to outsource much of its research and has to sign cooperation agreements with other countries in order to move forward in that field. This has sometimes conditioned Bolivia to pursue development projects suggested by international agencies and not originated in the country. Currently, choosing other types of energy sources could jeopardize funding for renewable energy and could change the country's priorities. In 2016, the government signed a cooperation agreement with

Russia through law 787 for the pacific use of nuclear energy.³⁵ That agreement was followed by an additional cooperation agreement with Russia through law 788 for the construction of a nuclear technology investigation and development centre in Bolivia.³⁶

The government is promoting the construction of a nuclear plant in El Alto, the region with the greatest amount of solar radiation in the country, and one of the best areas for developing solar energy in the world. Bolivia's excellent position for developing solar plants is due to its geographical position, which is in the tropical zone of the south, between the 11th and 22nd parallels. Thanks to this location, the radiation rates in winter and summer differ by no more than 25 per cent, unlike in other regions of the globe that are at higher latitudes.³⁷ Instead of promoting a nuclear plant, the government should take advantage of the large amounts of solar radiation in Bolivia and build solar plants.

Nuclear energy should not be prioritized. It is undeniable that nuclear power is in decline. It is the slowest-growing energy source and it is expected and projected to continue declining, as Figure 4 shows.³⁸

Economics, poor management, safety concerns, the need for greater government subsidies, uranium transportation concerns and the need for large quantities of water are among the causes of its decline. Worldwide, one of the main concerns when producing nuclear energy is the management and treatment of radioactive waste generated by the energy production cycle. Bolivia is not ready to manage such waste, which is toxic not only for the environment but also, most importantly, for humans. Additionally, nuclear power is becoming obsolete worldwide because of its high maintenance and repair costs.

Bolivia should pay attention to this trend and develop renewable energy sources that are far less risky, such as solar, wind and biomass, which have the best potential. Bolivia should not develop a type of energy that is falling into disuse, expensive and associated with well-known

32 Fernández Fuentes. 2010, 41. Above, note 19.

33 *El Día*. 2015. "Siete proyectos de energía archivados". https://www.eldia.com.bo/index.php?cat=357&pla=3&id_articulo=163598 (accessed 12 April 2018).

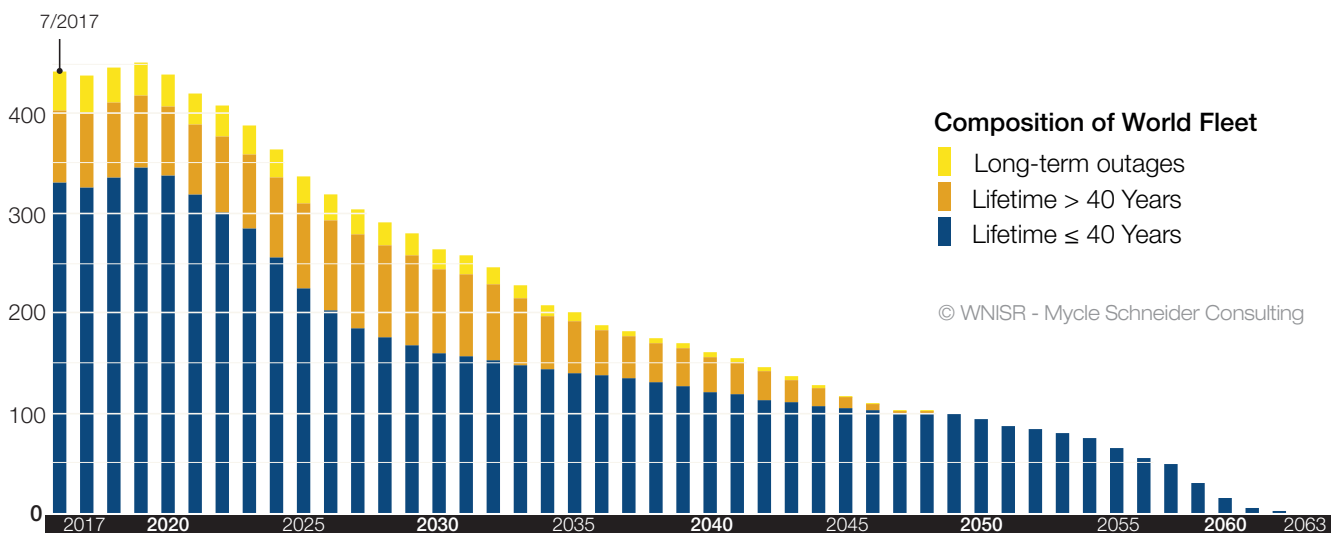
34 Vice-Ministry of Electricity and Alternative Energies. 2016. *Proceso de Integración Eléctrica Regional de Bolivia*. http://www.kas.de/wf/doc/kas_20048-1442-5-30.pdf?160825231229 (accessed 12 April 2018).

35 Law 787. <https://www.lexivox.org/norms/BO-L-N787.html> (accessed 12 April 2018).

36 Law 788. <https://www.lexivox.org/norms/BO-L-N788.html> (accessed 12 April 2018).

37 Plataforma Energética Bolivia. 2012. "Estudio: Bolivia tiene un gran potencial de energía solar e hídrica". <http://www.plataformaenergetica.org/content/3385> (accessed 12 April 2018).

38 The World Nuclear Industry Status Report 2016, 38. <http://www.worldnuclearreport.org/IMG/pdf/20160713MSC-WNISR2016V2-HR.pdf> (accessed 12 April 2018).

Figure 4 Projected numbers of reactors in operation in the world in units from July 2017 to 2063.

Source: Schneider, M. and A. Froggatt. 2016. *The World Nuclear Industry Status Report 2016*, 38. <http://www.worldnuclearreport.org/IMG/pdf/20160713MSC-WNISR2016V2-HR.pdf>. © WNISR – Mycle Schneider Consulting.

risks. Nuclear energy requires large amounts of water. In 2016, Bolivia suffered its worst drought in decades. Melting glaciers, the El Niño phenomenon, unqualified personnel and poor water management systems are causing water shortages in the country, and Bolivia will continue to face droughts. Instead of promoting and financing the construction of a nuclear technology research and development centre in Bolivia, the government should invest in research into other sources of energy such as solar, wind or biomass, and prioritize the improvement of water management systems. Hopefully, the rise in construction costs for nuclear plants together with the fall in prices for renewable wind and solar technologies will marginalize the use of nuclear power.³⁹

Conclusion

Bolivia is committed to diversifying its energy matrix not only to guarantee internal supply but also to become an energy hub for the region by exporting its surplus. The government has intensified its energy sector reforms to provide the necessary legal frameworks to accelerate renewable energy development, increase electricity

provision in rural areas and eventually guarantee full energy access throughout its territory by 2025. Since 2007, the government has had a coherent approach to the promotion of the use of renewable energy that is in line with international goals such as SDG7. If Bolivia overcomes the challenges of promoting renewable energy suitable for the country's geographical, economic and social characteristics, it will succeed in changing its energy matrix. The major measure of its success will be if, in 2025, the entire country has access to energy. Energy access will contribute significantly to poverty reduction and development. It will enable people in rural areas to create opportunities in their locations without having to migrate to the big cities. It will also improve health and education services. This will immediately improve rural people's quality of life and will allow them to live with dignity, as the government constantly advertises. Hopefully, Bolivia will finally be able to change its status from a developing to a developed nation by 2025. The basic legal frameworks are soon to be in place; let us hope that compliance and accountability follow to make Bolivia's energy matrix diversification a reality, foster development in rural areas and end poverty.

³⁹ Schneider, M. and A. Froggatt. 2016. *The World Nuclear Industry Status Report 2016*, 115. <http://www.worldnuclearreport.org/IMG/pdf/20160713MSC-WNISR2016V2-HR.pdf> (accessed 12 April 2018).

Issues in developing renewable energy in developing countries

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Abstract

The past decade has shown significant changes in the global energy market, especially in the field of renewable energies. Solar and wind energy have become more efficient and less expensive, thus creating unprecedented opportunities for developing countries to provide sustainable energy to their citizens. With the assistance of the World Bank Group, Egypt has undertaken significant reforms in order to create the necessary economic, legal and contractual frameworks for attracting foreign direct investments for solar energy projects. These reforms enabled clear and transparent risk allocation, which ultimately attracted investors.

Policymakers in developing countries play a key role in increasing the viability of renewable energy programmes. The reforms conducted by Egypt focused on five main areas: (1) stabilizing macroeconomic environment; (2) clarifying regulatory and licensing arrangements; (3) developing well-drafted and equitable contracting arrangements; (4) providing government undertakings to lenders; and (5) providing effective regimes for the enforcement of security for lenders. The success of Egypt's experience demonstrates how the commitment of governments to policy and regulatory reforms can successfully lead to the implementation of renewable energy programmes in developing countries.

Introduction

The world energy market has gone through dramatic changes since 2008, particularly in respect of renewable energy. The rise in efficiency and the decrease in the cost of solar and wind energy have created unprecedented opportunities for developing countries to provide sustainable energy for their citizens, and to facilitate sustained economic growth. These opportunities resonate with the twin goals of the World Bank Group, which are to alleviate extreme poverty and promote sustainable prosperity.

The project cost for relatively mid-sized solar projects is approximately US\$60 million, of which 70 to 80 per cent would generally be financed with long-term debt. While some of this capital can be raised locally, most of it is likely to come through foreign direct investment. In order to attract this investment, it is important that developing countries create economic, legal and contractual frameworks which allocate risk clearly and transparently, and that they do so in a manner which will attract such investment.

Egypt, with assistance from the World Bank Group, is one country that has undertaken (and continues to undertake) significant reforms in the energy sector, and which has recently successfully mobilized foreign direct investment for solar energy in Egypt. In October 2017, the International Finance Corporation (the private sector arm of the World Bank Group) and nine other international banks reached financial close on a debt package of US\$653 million to finance the construction of 13 solar power plants near the Egyptian city of Aswan under a feed-in tariff (FiT) programme (i.e. a programme whereby the Government of Egypt agreed to guarantee through offtake arrangements a specific price for electricity). The facilities will join 19 other solar plants in making up the Benban Solar Park. Once complete, the array of facilities will be the largest solar power installation in the world. The Benban Solar Park will generate over 1,500 MW of electricity (enough to power 600,000 residential customers) and displace more than 1.1 million tons of CO₂ each year. The project is also an example of successful private sector investment in Egypt, which will facilitate future investments in energy and other sectors.

The road to the success of this programme was long and arduous. Round 1 of the programme was not ultimately a success, resulting in only one completed project and another one still under construction. Round 2 has been an enormous success. It took an enormous commitment by the Government of Egypt and cooperation from all of the World Bank Group's constituent organizations, including the International Bank for Reconstruction and Development (IBRD), which played an instrumental role in advising the government on policy proposals to restructure the energy sector; the Multi-lateral Investment Guarantee Corporation, the political risk insurance arm of the World Bank Group, which provided political risk insurance for equity on a number of these projects; and of course the International Finance Corporation (IFC), which structured the financing and mobilized other lenders to provide a complete debt package for its projects. Those lenders included the Asian Infrastructure International Bank, the African Development Bank, CDC (UK), Finfund, Development Bank of Austria (Oesterreichische Entwicklungsbank AG), Industrial and Commercial Bank of China, Arab Bank and Finance in Motion/Green Growth Fund. Many of them were investing in Egypt for the first time. The programme also owes its success to the engagement by other international lenders, which worked with the IFC to structure bankable project documents and financed other solar plants in Benban, such as the European Bank for Reconstruction and Development, Proparco and KfW Development Bank.

This note will review five areas where policymakers in developing countries can act to increase the viability of successful renewable energy programmes, and will analyse through the example of Egypt how such areas were addressed.

Stabilizing macroeconomic environment

Any international investor considering an investment in a country will consider the overall macroeconomic environment in that country and in particular the availability of foreign currency. In a FiT programme, typically revenues will be paid in local currency but linked in whole or part to a foreign currency benchmark. If it is not possible to convert local currency into dollars because a government does not possess sufficient reserves for the conversion, both international equity investors and lenders will be reluctant to invest.

In Egypt, political uncertainties compounded by the difficult macroeconomic conditions resulted in scarcity of foreign currency. Foreign reserves fell sharply from over US\$35 billion in January 2011 to under US\$18 billion for most of 2012 and into August 2016. Following the decision by the Central Bank of Egypt to free float the Egyptian pound (EGP) and secure the International Monetary Fund loan package, the reserve position has improved considerably, and reserves stood at around US\$36.7 billion at the end of November 2017. There were several underlying factors that contributed to the limited availability of foreign currency. First, security concerns and overall subdued investor confidence led to a slowdown in key sectors such as tourism and a drop in foreign direct investment inflows, respectively. Second, there was a dramatic decline in the balance of payments for energy, which worsened by nearly US\$8 billion. Natural gas exports declined from a surplus of over US\$4 billion in 2011 to a deficit of nearly US\$4 billion in 2016. Third, the budget deficit grew unsustainably, partly because of continued large subsidies to the energy sector, with the energy subsidies representing 6.6 per cent of GDP in FY 2014. Fourth, Egypt continued to peg its currency at a fixed exchange rate of approximately EGP 8 to the US dollar; through currency controls and an inflexible monetary policy, the overvalued currency created stresses in the system and an unsustainable build-up of demand to convert local currency into hard currency by both international and domestic investors.

The Government of Egypt, with assistance from the International Monetary Fund and the World Bank Group, responded to these challenges by implementing dramatic structural changes. Among the most important initial changes are the following. First, the Central Bank of Egypt decided in November 2016 to free float the Egyptian pound, which caused an initial devaluation of the currency by 32.5 per cent against the US dollar. Second, the government agreed to a plan, which it has implemented, of reducing energy subsidies; this has increased the cost of electricity by 33 per cent and 40 per cent in 2016 and 2017, respectively, although some of the increase has been offset by currency devaluations. Third, the government has sought to generate additional revenue through the introduction of a value added tax of 14 per cent, while restructuring public enterprises to reduce wage bills. As a result of these changes, the Government of Egypt was able to access funds of US\$12 billion from the International Monetary Fund through its largest existing extended funds facility, and facilities of over US\$3 billion from the IBRD

(which in December 2017 approved a third tranche of US\$1 billion to support structural reform). The effect of these changes has been to spur growth, increase foreign reserves to US\$42.5 billion as of February 2018 and increase investor confidence.

Prior to the implementation of these changes, Egypt had proceeded with an earlier effort to launch a FiT programme, and a primary concern of both equity investors and lenders had been the ability to convert local currency. Round 1 of the programme, which closed in October 2016, ultimately had limited success notwithstanding the fact that it had a FiT significantly higher than that ultimately available in the financing for Round 2, which closed in October 2017. While the reasons for this reduction in tariff were many (improved contractual framework, reduced global solar prices, etc.), one of the primary reasons for the success of the programme was the overall improvement of the macroeconomic situation in Egypt and the increased perception that the government would make available hard currency to convert local currency payments into hard currency. Furthermore, new investors were willing to take some additional risk by accepting 70 per cent of payments in local currency, which would not be pegged to US dollars. That 70 per cent is indexed to the floating exchange rate, while the other 30 per cent is fixed to an exchange rate of EGP 8.8 to the US dollar; all payments are in Egyptian pounds. Their willingness to take this risk was largely a result of the currency flotation whereby Egyptian pounds are today roughly at a constant value.

Beyond these foreign currency availability concerns, Egypt went further and took steps to ensure the long-term viability of the energy sector in Egypt. It did so through its commitment to increasing electricity tariffs and targeting energy subsidies at the poor rather than at those who could afford to pay for electricity. These changes are transforming the sector by introducing incentives for energy efficiency, and transforming the economy by introducing the true costs of energy inputs into the production of goods.

Clarifying regulatory and licensing arrangements

Investors and lenders in renewable energy strive for transparency and clarity in the award of concession arrangements, certainty that the authorities granting power purchase arrangements are authorized to do so and certainty that guaranteed support from governments is unassailable.

In Egypt, the government took a number of positive steps to make these matters clear, although even then we faced some challenges. First, the government enacted a law on incentivizing power generation from renewable sources by a presidential decree of 21 December 2014 (the “Renewables Law”). The law made it clear that the Egyptian Electricity Transmission Company (EETC) could award offtake arrangements for power through a FiT programme pursuant to tariffs approved by the Cabinet. In addition to the Renewables Law, the government went further and undertook a restructuring of the electricity sector pursuant to the unified electricity law no. 87 of 2015 (the “New Electricity Law”). The New Electricity Law restructured the roles of various state-owned power sector participants and allows private sector participation in the generation and distribution of electricity through overhauled licensing and permit schemes. The World Bank Group was instrumental in assisting the government to structure these reforms, which created a framework for analysing the legality of the various arrangements. Indeed, the passing of a well-structured renewables law can significantly facilitate the implementation of renewables projects.

One concern in this context in Egypt was that there was some precedent for Egyptian courts challenging the privatization of government assets. Accordingly, in assessing these projects, lenders and developers took some comfort from the regulatory regime, which made it clear that the EETC had the authority to enter into power purchase agreements (PPAs). Developers and lenders also received comfort that the time period to challenge the validity of such awards under Egyptian law would expire before they made significant expenditures on the projects. However, even more importantly, the process by which the pre-tender for the projects was conducted was open to a wide variety of developers and essentially available to anyone qualified who could meet the time lines and requirements for the financing. Furthermore, the perception was that the award of so many (over 30) projects to so many developers on identical terms would make it difficult for an individual or government agency to challenge the validity of any individual award.

One interesting challenge that we did face was in respect of the authority of the Ministry of Finance (MoF) in Egypt to guarantee the obligations of the EETC, the offtaker under the offtake arrangements/PPAs. Under the provisions of the New Electricity Law, the Egyptian government sought to create greater independence for public sector participants in the sector and accordingly transformed a number of such entities, including EETC, into autonomous private sector joint stock companies fully owned by the state but

functioning autonomously. While power projects under the New Electricity Law were eligible for MoF guarantees for an off-taker's payment obligations, under the law such guarantees could be issued only to support state sector obligors. A solution to this was found through the making available by the government of a Cabinet letter which confirmed authorization for the MoF to issue the relevant guarantee, and through legal analysis tying such approval to the relevant guarantee.

Developing well-drafted and equitable contracting arrangements

In developing contracting arrangements for financing, it is important that risks be allocated clearly and equitably among developers, lenders and government counterparties. While the term "equitably" is subjective, practices have developed in different regions for an appropriate allocation of such risks, which is necessary to attract investment, and it is important that the parties take cognizance of such parameters in developing the contracting arrangements.

In the Egyptian programme, the IFC worked closely with its government counterparties and their lawyers for over a year, adjusting the documentation to clarify and find the right balance in risk allocation. There were other models to start from which might have made this process more efficient. For example, IFC has developed a programme in Africa called Scaling Solar, in which a suite of power documents have been developed together with financing terms which allocate risks in a manner that IFC believes is equitable, and the documents are exceptionally well drafted. In Egypt, a decision was made to start from an existing Egyptian precedent and the process took perhaps longer than it might have. However, in the end a good document resulted from the process.

For example, as one would expect, the Egyptian PPA included provisions which protected international investors from changes in the tax or legal regime that would increase the costs to investors beyond an agreed level. In this scenario, the PPAs require an agreement or determination of what amendments are to be made to the PPA to keep the seller in a financially neutral position. If an agreement cannot be reached, the buyer may terminate the PPA and fully compensate the seller pursuant to agreed formulas. These type of provisions are called "financial stabilization" provisions and they are fundamental to ensuring a return for investors and lenders who are committing capital for long periods.

One area of negotiation, which was ultimately partly responsible for the failure of the Round 1 financing, was the dispute resolution provisions of the PPA. In Round 1, the Egyptian government insisted that the PPA and guarantee arrangements in favour of developers and lenders be governed by Egyptian law and be subject to Egyptian arbitration under the Cairo Rules. While the power market in developing countries has grown accustomed to seeing more PPAs and guarantees subject to local law (as opposed to English or New York law, which international investors typically prefer), it is generally expected that dispute resolution will be resolved through international arbitration so that the risk of intervention by local courts is remote.

In the end, after much analysis and debate, international lenders to the Egyptian programme became comfortable with Cairo Rules arbitration (as it has many similarities to the arbitration rules of the United Nations Commission on International Trade Law), but it was agreed that the seat of the arbitration would be in Geneva in the event of any dispute involving international lenders. The impact of making the seat of the arbitration in Geneva is that, if there is any dispute regarding the validity of the underlying contractual arrangements, the applicable court to resolve such disputes is the one where the seat is. National pride is often a factor in the government's decision on these matters; however, where legal systems lack clarity on the contractual arrangements to be litigated and/or local courts have limited capacity to resolve such disputes equitably, compromises such as that reached in the Egypt FIT case are vital to the ultimate bankability of the financing programme.

Providing government undertakings to lenders

Lenders of project finance invariably require some sort of direct agreement or consent to assignment with the government authority granting the concession. The granting authority should anticipate and allow for these sorts of agreements, which typically deal with the following issues: (1) formal recognition by the granting authority that lenders are financing the project, have an interest in the concession agreement and are relying on representation from the granting authority regarding the validity of the concession agreement; (2) acknowledgement by the granting authority that the lenders have security over the concession agreement and the rights associated with the project; (3) a commitment to notify the lenders if a concessionaire

is breaching its obligations under the concession agreement; (4) a commitment by the granting authority not to terminate the concession without allowing lenders an opportunity to cure breaches which give rise to such termination; (5) permission for the lenders to introduce a substitute concessionaire if an existing concessionaire is not fulfilling its obligations under the relevant financing agreements; (6) agreement that any termination payments due to the concessionaire shall be payable to the lenders; and (7) a clear waiver of sovereign immunity.

In the Egyptian FiT programme, the authorities accepted the importance of these provisions and worked with lenders to accommodate most of these points. One area of debate related to the period of time allowed for lenders to cure defaults and the requirement that lenders step in to cure them. Lenders were allowed 60 business days from a termination notice to decide whether to step in or not, and thereafter in most cases 120 business days to cure such default. Given the remote location of the facilities and the need to take control of such facilities on foreclosure, there was some concern among the lending group that these periods were inadequate. In order to address this concern, documentation with borrowers includes stringent monitoring and reporting provisions to help anticipate potential termination events.

Providing effective security

One challenge in financing projects in developing countries is ensuring that an effective regime exists for the enforcement of security for lenders. When financing a project, lenders would expect to take security over all moveable and immovable assets, contractual rights, insurances, bank accounts and shares of the project company. In some jurisdictions, taking such security can be challenging, and enforcement rights ineffective.

In assessing security packages, lenders often divide security into two buckets: defensive security and offensive security. Defensive security ensures that no other creditor has a claim to assets of a borrower ahead of a creditor. However, it can also prove difficult to enforce other than in the context of the liquidation of the company. Types of defensive security often include security over land or moveable assets. Offensive security is more focused on leverage over the borrower by being able to disrupt ownership or access to cash. Types of offensive security often include offshore share pledges and security over bank accounts.

In Egypt's FiT programme, developing the security package did pose a number of challenges. First, the land granted to developers to implement the project was held by the New and Renewable Energy Authority (NREA) and the usufruct was granted to developers. However, given that the NREA's land is held by virtue of a presidential decree, the NREA must first register land with a notary in its name, and then register usufruct arrangements with the notary. Only after that process is complete can the lender's security over the usufruct be completed. Recognizing that this security is primarily defensive, the lenders worked with developers to implement such security over time.

Similarly, in respect of moveable assets, security could be taken over the relevant solar panels under the Moveables Securities Law. However, enforcement of such security is challenging in Egypt and involves a court process. The likelihood of being able to implement such security enforcement over solar panels in Benban remains remote. However, in the event of insolvency or challenges by other creditors, such security does add some value to lenders.

In terms of offensive security, the IFC and other international lenders required security over both onshore and offshore share pledges. Onshore share pledges involve the pledging of shares of the local borrower. Such pledges are effective in some jurisdictions and may be effective in Egypt. However, the time necessary to enforce such a share pledge would probably extend beyond any relevant termination periods under direct agreements, as enforcement requires a court process. Accordingly, lenders sought offshore share pledges whereby shares are held in escrow and enforcement can be effected more quickly.

Overall, developers and the Egyptian government worked with lenders to structure a security package for the relevant financing which was cognizant of lender requirements. Having said that, as Egypt develops a more effective regime for security implementation and enforcement, access by companies in Egypt to financing will be enhanced.

Conclusion

The tremendous decline in the cost of renewable energy is creating opportunities for developing countries to improve the quality of life for their citizens. As the example of Egypt demonstrates, a commitment to policy and regulatory reform, together with the development of an equitable contractual framework, can lead to the successful implementation of a renewable energy programme.

Different applications of renewable energy policies in the agricultural sector: a comparison between developing and developed countries

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Abstract

This article illustrates the urgency of moving towards a sustainable renewable resources system, and explains how this transition has become a major point that developing and developed countries have in common. Accordingly, the ecological transition or, more accurately, the conversion towards a cleaner production model, relies on sustainable energies: renewables with smaller carbon footprints.

This article will analyse the different applications of renewable energy policies in the agricultural sector between two types of countries: the developed countries of the northern hemisphere and the developing countries of the southern hemisphere. It will then focus on the renewable energy policy implemented by Italy as part of the European Union strategy to promote and increase the production of electricity from renewable energy sources.

Introduction

A major point that developing and developed countries have in common is the urgency of moving towards a sustainable renewable resources system. The ecological transition, or more accurately the conversion to a cleaner production model, relies on renewable energy with a limited carbon footprint.

The world depends on the exploitation of natural resources and, as a result of it, intensive energy production. Renewables such as solar, hydroelectric, wind, geothermal and biomass are sought after because of their low-carbon production, economic benefit and relatively stable prices on the energy market, given that high energy production is closely linked with economic growth.

Connecting renewable technologies and the agricultural sector is an essential task, considering that the farming process, and above all large-scale agricultural production, is likely to generate fuel wastes that pollute land.

In this respect, sustainable development, applied to the rural sphere, goes far beyond the sole challenge of preserving the planet. Green growth, defined by the Organisation for Economic Co-operation and Development (OECD) as “promoting growth and development while reducing pollution and greenhouse gas emissions, minimizing waste and inefficient use of natural resources, maintaining biodiversity, and strengthening energy security,” indicates that the use of renewable energy can and must be a way to achieve prosperity.¹

¹ <https://www.oecd.org/greengrowth/44273385.pdf> (accessed 12 April 2018).

Alison Burrell in her article “Renewable energies from the rural sector: the policy challenges” affirms that green growth involves an economic development path that is consistent with long-run environmental values, using natural resources less intensively than the current growth model, while nevertheless providing acceptable living standards and poverty reduction in both the developed and developing parts of the world.² This leads us to analyse the different applications of renewable energy policies in the agricultural sector between two types of countries, differentiated by their levels of development: the developed countries of the northern hemisphere and the developing countries of the southern hemisphere.

Different applications of renewable energy policies in the agricultural sector between northern hemisphere and southern hemisphere countries

Whereas northern hemisphere countries have generally higher energy production levels than southern hemisphere countries, the latter have generally a greater array of renewable energy resources. Africa bears witness to this, given its great solar exposure, with a far higher solar potential than the less exposed continent of Europe. This factor has never discouraged developed countries from expanding the energy sector in an environmentally friendly manner, as, in 2011, their investments in solar energy were more than twice those of developing countries.

Another source of asymmetry arises from the installation of environmentally friendly power plants in developed countries. Rich countries rely on the higher investment potential of their research and development sectors and often have more room for manoeuvre on the implementation of renewable energy. In contrast, disadvantaged countries may have less potential for green energy investment and have generally fewer eco-friendly systems in their territories. For example, in 2012, 93 per cent of energy produced in South Africa came from coal, while, in the same year, only 38 per cent of the energy originated in the United States came from the same fuel.

Luckily, other renewable sources are shared equally. For example, biomass, geothermal and wind resources are present all over the world. In addition, some disparities in the field of renewables potential are often overcome. For instance, although developing countries have less investment capacity, a recent study shows that in 2010 they invested more in wind power than the developed countries.³ Nonetheless, it has to be recalled that there are some less rich emerging countries (mainly in Central Africa), which cannot compete with the developing “big three” (China, India and Brazil) in investment.

Notwithstanding, it has been shown that developing states (in particular, newly industrialized countries) often invest more than developed ones in the renewable energy sector.⁴ Green technology is not a luxury industry, and therefore a global transition to renewables is far from unattainable. In 2014, emerging economies devoted US\$156 billion to renewables, 20 times more than the 2004 estimates for the same category of countries.

In each part of the planet, people make honourable efforts to meet shared challenges, but those same incentives reveal some imbalances. The course to take to achieve a planet fuelled solely by renewable energies varies depending on the different economies’ structures and levels of development, due to contrasting transition capacities on one hand and natural reserves potential on the other.

The different legal systems, including transition policies applicable to rural management, clearly illustrate this particularity, as they enable us to set out the guidelines for the ecological transition and, thereby, show how different the issues are between economies.

In the southern hemisphere, particular purposes for the ecological transition must be considered. The existing deficit in exploitation of resources in rural regions gives rise to a specific approach in implementing renewable energy policies. The presence of outdated laws and inadequate institutions in most Central African countries leads to the need for a transition towards more fair and sustainable policies in terms of production and ecology.

2 Burrell, Alison. n.d. “Renewable energies from the rural sector: the policy challenges”. <http://www.oecd.org/greengrowth/sustainable-agriculture/48309185.pdf> (accessed 12 April 2018).

3 <http://www.independent.co.uk/environment/climate-change/renewable-energy-investment-developed-world-developing-world-ren21-report-a7058436.html> (accessed 12 April 2018).

4 Ibid.

As far as the production aspect is concerned, the rural exploitation deficit is characterized by a lack of clear land policies, inadequate real estate laws and gender issues, feeding discrimination against women owning property rights over land, as well as administrative systems of territories that are excessively centralized and held by a select few authorities.

Regarding the ecological aspect, in contrast, southern hemisphere countries, and in particular the less industrialized ones, have produced less industrial and non-biodegradable waste during the last 30 years than rich countries. Developed nations produce more commercial packaging and have higher levels of consumption, while, in developing nations, 50 per cent of the total waste produced is organic and the rate of energy consumption per capita is far lower (in Kenya, only 18 per cent of the population has access to electricity, 68 per cent of which is generated by renewable sources).

By investing in energy sources, southern countries can economize much more than they would by using fossil fuel in their production schemes. This is why some bodies are organizing and implementing environmentally friendly operations in emerging spaces. For example, since 2011, Biogas International has installed 200 flexi biogas systems in Kenya and, in partnership with IFAD, 9 biogas systems on dairy farms within a dairy commercialization programme in Nakuru and 4 biogas systems at an orphanage in Naivasha. In the same country, financial investments were made by the African Development Bank, the International Finance Corporation and the World Bank with the purpose of expanding Kenya's renewable energy sector through the Scaling up Renewable Energy Program of 2011.

Upsides and limits

The developing countries have a specific advantage for integrating renewable energy in their agricultural expansion process, as farms are often fuelled by new renewable energies generated in off-grid stations, driven by the ready availability of renewable energy options that are cheaper than grid connections. In addition,

"it is more expensive to deliver non-renewable energy in some places than others. For example, rural communities in developing countries are often not connected to grids, so that localised, 'off-grid' energy production – particularly solar power – is more competitive than in a fully networked context".⁵

In addition, information technologies can improve the livelihoods of socially disadvantaged people in developing countries. The same positive impact of renewable energies has been registered in rural areas of countries. Recent innovations in information and communication technologies have proved to give benefits in the intersecting areas of development evaluation and rural transformation (better use of data to evaluate rural interventions, providing a more precise assessment of development impact).

Rural areas attract a large proportion of investment in renewable energy. There are multiple benefits from deployment in rural communities: new revenue sources, new job and business openings, machinery innovation in agricultural practices and affordable energy. Remote rural regions can thus produce their own energy as a solution to protect developing countries from excessive dependence on energy importation. Renewables can even bring about political changes in relation to land administration, for example in Central African countries.

The need for a global distribution of diverse agricultural techniques involving renewable energy must fit climate particularities. Certain types of renewable energies should be avoided in areas that are not suited to them. Attention is to be paid when identifying sites suited for energy plant construction, and central and local authorities should reject arbitrary policies to distribute renewable energy projects across national landscapes.

On the flipside of the coin, it must be noted that the overall impact on economic growth is generally less than would be reasonably expected. High expectations of renewable energy productions have triggered profit-seeking behaviours, and power plants often compete with traditional agricultural techniques and tourism. This triggers opposition from local communities.

⁵ Griffith-Jones, Stephany, Jose Antonio Ocampo and Stephen Spratt. n.d. *Financing Renewable Energy in Developing Countries: Mechanism and Responsibilities*. European Report on Development. http://www.stephanygj.net/papers/Financing_Renewable_Energy_in_Developing_Countries.pdf (accessed 12 April 2018).

Focus on Italy and EU legislation

Whereas Italy's economic support for renewable energy investments began in earnest in the 1990s, the origins of Italy's policies to promote renewable energy derive from the early 1980s, when the Italian Parliament enacted law no. 308 of 29 May 1982, establishing a basic framework for future regulations and incentive schemes to achieve Italy's dual goals of promoting energy consumption and increasing non-fossil fuel energy sources.

However, Italy did not implement a specific programme to incentivize renewable energy development for almost a decade, focusing instead on the development of nuclear energy. The Chernobyl nuclear disaster changed that focus, resulting in an Italian referendum in 1987 discouraging further nuclear facility development. Thereafter, Italy renewed its interest in renewable energy, noting the strategic value of renewable energy in its National Energy Plan of 1988.

Italy's first official programme to support renewable energy facilities was a feed-in tariff programme implemented through law no. 9 of 9 January 1991 (law 9/1991), which aimed to guarantee that all renewable energy facilities could benefit from the competitive pricing established by the Italian price committee (the CIP). By means of the so-called CIP-6 programme, Italy established incentive pricing comprising the "avoided costs" component – corresponding to what it would have cost the national electricity company (ENEL; at the time fully owned by the Italian government) to produce the same quantity of purchased energy – and an incentivizing component, differentiated depending on the source of energy and based on the price of fossil fuels and operating costs. However, the CIP-6 programme had a significant flaw, which was the inclusion of "dirty" power generators such as gas turbines and incinerators. More than 70 per cent of the economic support in the CIP-6 programme went to those "assimilated sources" of energy, rather than to truly renewable energy generation. In any case, CIP-6 served as an early prototype of the incentive programmes Italy would later promote to achieve significant investments in the photovoltaic energy sector.

In the early 1990s, the European Union Member States resolved to harmonize their respective electricity systems as part of their overarching goal of establishing a common internal market within Europe. At the time, the electricity systems of several Member States, including Italy, were not privatized; state organizations held a monopoly over them. In 1996, the European Commission issued Directive 96/92/EC, which established the rules for the common electricity market and required Member States to take measures to liberalize their electricity systems.

The Directive, which entered into force in February 1997, also highlighted the importance of environmental protection and stated that, in harmonizing the various electricity systems, Member States could give priority to the production of electricity from renewable sources.

In February 1998, the European Commission prepared a report on the Directive 96/92/EC harmonization requirements, which focused almost exclusively on the promotion of renewable energy. The report acknowledged the existence of "a large variety of support schemes" promoted across Member States and the necessity of such schemes in order to reach European targets under the Kyoto Protocol.⁶

In this context, it is worth noting that EU rural development policy includes measures aimed at encouraging the production and use of renewable energy, which allow EU countries to introduce specific measures to support renewable energy in their rural development programmes. For example, among the targets of the Rural Development Programmes 2014-2020 linked to climate change and resource efficiency, the European Commission set out EUR 2.7 billion to be invested in renewable energy production.⁷

Consistent with the Commission's view, Italy had committed itself to supporting renewable energy. In 1998, Italy signed the Kyoto Protocol and committed itself to reducing carbon dioxide emissions by 8 per cent before the end of 2012. In April 1999, Italy's National Agency for New Technologies, Energy and Sustainable Economic Development issued a White Paper on the development of renewable energy sources.

⁶ First Report to Directive 96/92/EC.

⁷ European Commission. n.d. Rural Development Programmes 2014-2020. https://ec.europa.eu/agriculture/sites/agriculture/files/rural-development-2014-2020/country-files/common/rdp-list_en.pdf (accessed 12 April 2018).

Italy's principal energy objectives included enhancing environmental protection, reducing energy production costs and promoting energy security through energy independence. Italy considered the development of renewable energy projects to be particularly beneficial because it promoted local employment, and it also promoted economic development in the less developed southern part of the country, where solar and wind resources are most abundant.

Importantly, the White Paper expressly declared that Italy intended to increase energy production from renewable energy sources to 20.3 Mtoe from 2008 to 2012, and to promote the industry in the coming decades.

The government also acknowledged that, without a stable and serious policy of support, the renewable energy sector would remain nascent, and Italy would not reach its twin goals of enhancing energy security through energy independence and achieving its environmental targets. Therefore, Italy needed to prioritize energy efficiency and promote investment in the sector to increase its domestic renewable energy capacity.

In March 1999, Italy promulgated Legislative Decree no. 79 (known as the "Bersani Decree"), implementing European Commission Directive 96/92 and considerably reforming its energy sector. The Bersani Decree liberalized Italy's electricity market and implemented anti-monopoly rules that required ENEL to sell off part of its capacity during 2000 and transferred the activities of generation, distribution and sale of energy to newly incorporated companies, further eroding ENEL's monopoly.

Consistent with Directive 96/92/EC, the Bersani Decree provided that the electricity produced by renewable energy plants would enjoy priority access to the grid and established a "green certificate" incentive programme that has remained substantially unchanged to date.

Thus, by the time that Italy liberalized its electricity market, it had put in place two programmes to encourage renewable energy facilities: CIP-6 and the green certificate programme. However, those programmes did not result in the level of investment that Italy needed to achieve its domestic policy goals or to meet its international targets.

As mentioned, the CIP-6 programme was particularly troublesome, as the vast majority of facilities that had taken advantage of the CIP-6 programme were "assimilated source" producers, which pollute the environment.

On 27 September 2001, the European Parliament and Council enacted Directive 2001/77/EC, which established a plan to promote production of electricity from renewable energy sources and meet international targets established in the Kyoto Protocol. The Directive established aggressive national targets for each EU Member State for the production of electricity from renewable sources in view of the EU's objective of having 22.1 per cent of total EU electricity consumption produced from renewable energy sources by 2010.

Italy's target was to have 25 per cent of total electricity consumption produced from renewable energy sources by 2010.

On 1 March 2002, the Italian Parliament moved to implement Directive 2001/77/EC by enacting law no. 39/2002 (*Disposizioni per l'adempimento di obblighi derivanti dall'appartenenza dell'Italia alle Comunità europee. Legge comunitaria 2001*). That law instructed the government to issue, within the following 18 months, one or more legislative decrees that would provide incentive policies for renewable energy.

Within this regulatory context, Italy set out to create a support scheme to attract massive investment in the renewable energy sector by private investors in order to achieve Italy's policy goals. As instructed in law no. 39/2002, on 29 December 2003, Italy enacted Legislative Decree no. 387 to promote the production of electricity from renewable energy sources.

Issuing a favourable opinion on the legislative decree in Parliament, the Productive Activities Committee confirmed that increasing the production of electricity from renewable sources was an "absolute priority," and that incentive schemes were necessary to ensure the competitiveness of renewable sources vis-à-vis traditional electricity producers.⁸

The Committee also observed that the effectiveness of Italy's measures would depend upon the "stability of the regulatory framework which the investors shall rely on in the medium-long term period".⁹

⁸ See favourable opinion issued by the Productive Activities Committee (Commissione X) on the scheme of Legislative Decree no. 387/2003.

⁹ *Ibid.*

Among other programmes, Legislative Decree no. 387 required the Ministry of Productive Activities (now the Ministry of Economic Development) to work with the Ministry of the Environment to establish specific criteria to incentivize electricity produced from solar energy.

In the context of those normative acts, over the following decade Italy enacted five different Ministerial Decrees known as Energy Bills or the *Conto Energia* programme. The first *Conto Energia* decree was issued in 2005 and the last one in 2012. They established specified incentive tariff rates available to eligible photovoltaic facilities for a period of 20 years.

Thanks to the *Conto Energia*, the Italian government supported the development and expansion of solar photovoltaic power in Italy, especially in the south of the country, where irradiation is high (up to 1,700 equivalent hours a year) and agriculture is important to the local economy. This led to the concept of “solar greenhouses,” a way to connect electricity production by solar modules with an improvement of the cultivation possibilities.

Provided that certain legal and technical requirements are met (e.g. the effectiveness of cultivation for the whole incentivized period, the illumination ratio, the module types, and other factors and technical features), the *Conto Energia* treats solar greenhouses as part of a special category of solar plants, which benefit from a higher incentive tariff than the one granted to ground-based solar plants belonging to the same capacity class.

In addition, unlike ground systems, greenhouses avoid the debate about land use, as they do not take away areas that could be used for cultivation. Ultimately, this debate led the Italian government to restrict incentive tariffs from newly installed ground-mounted photovoltaic facilities on agricultural land (see discussion of the *Romani Decree* below). Furthermore, on certain conditions, greenhouses also benefit from tax incentives.

On 23 April 2009, the European Parliament and Council enacted Directive 2009/28/EC on the promotion of the use of energy from renewable sources. The Directive established national targets for each EU Member State for renewable energy production in the light of the EU’s objective of having more than 20 per cent of the Community’s gross consumption of energy produced from renewable sources by 2020.

Those objectives were known as the “20-20-20” objectives. Italy’s target was to have 17 per cent of its gross consumption of energy produced from renewable sources by 2020. The Directive expressly stated that “the main purpose of mandatory national targets is to provide certainty for investors and to encourage continuous development of technologies which generate energy from all types of renewable sources”.¹⁰

Although Italy did not formally implement the Directive until 2011, by 2009 Italy’s efforts to promote photovoltaic investments were paying off, and the programme was discussed widely in the renewable energy market, both within Italy and abroad.

In June 2010, Italy finalized its National Action Plan for Renewables (PAN), which summarized its strategy to reach binding EU renewable energy targets.

On 3 March 2011, Italy implemented the 2009 EC Directive by Legislative Decree no. 28/2011 (the “*Romani Decree*”). Confirming the general political strategy expressed in the PAN, the *Romani Decree* reinforced the legal, economic and institutional framework to incentivize investment in renewable energy that was necessary for Italy to achieve its 20-20-20 objectives.

The previous year, Italy had established guiding criteria for implementing Directive 2009/28/EC, which included the need to “adapt and reinforce the system of the incentives for renewable sources and the efficiency of energy savings”.¹¹

¹⁰ Directive 2009/28/EC, 23 April 2009. <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009L0028&rid=1> (accessed 12 April 2018).

¹¹ Law of 4 June 2010, no. 96, art. 17.1(h).

The Romani Decree altered the mechanics of the Conto Energia by reducing the availability of the relevant incentive tariffs to photovoltaic plants by introducing limitations on the eligibility of plants to receive incentive tariffs, based on their size, organization and zoning of land, mainly on the basis of the fact that over the years, with the succession of feed-in schemes, there has been a sudden expansion of the solar industry and a corresponding reduction in price for solar modules.

In particular, the Romani Decree, with the aim of balancing the level of public support with the costs of technologies, to provide stability and certainty to the market, stated that new rates had to be implemented by way of a new Conto Energia taking into account certain key principles, including (1) the establishment of an annual limit on the installed capacity that could benefit from the incentive tariffs and (2) tariff values that would encourage further investment in the light of the reductions in cost of the technology and of photovoltaic plants generally, as well as the level of incentives in other EU Member States.

In addition, as mentioned above, the Romani Decree restricted the eligibility of newly installed ground-mounted photovoltaic facilities on agricultural lands to receive the incentive tariffs.

By early 2012, Italy approached the EUR 6 billion threshold for its incentive tariffs programme set out by the last Conto Energia. Italy also determined that, as of year-end 2011, renewable electricity production capacity was 94 TWh per year, only 6 TWh short of its 2020 target of 100 TWh.

Therefore, Italy considered that it was well on its way to meeting its EU targets and the last Conto Energia ceased to apply on 6 July 2013.

Thus, after 6 July 2013, no incentive tariffs were available to any new photovoltaic plant installed and connected to the Italian electricity grid. In addition, in June 2014, Italy took the dramatic step of directly abrogating its incentive payment regime: under a decree and legislation that came to be known as the "Spalma

Incentivi Decree" or the "Incentive Distribution Decree," Italy abolished the incentive payment system, with effect from 1 January 2015, and replaced it with a new system that provided for significantly reduced payments over varying terms.

We expect to see (1) how the above will affect Italian small farmers in the medium/long term, as the installation of solar systems clearly represents a supplementary income while reducing costs related to energy supply, especially for greenhouse specialized crops, which entail the highest energy costs, and (2) if the Italian government will implement special measures aimed at supporting rural development by encouraging people to consume energy that they themselves have produced from renewable sources.

Bibliography

Burrell, Alison. n.d. "Renewable energies from the rural sector: the policy challenges". <http://www.oecd.org/greengrowth/sustainable-agriculture/48309185.pdf> (accessed 12 April 2018).

European Commission. n.d. Rural Development Programmes 2014-2020. https://ec.europa.eu/agriculture/sites/agriculture/files/rural-development-2014-2020/country-files/common/rdp-list_en.pdf (accessed 12 April 2018).

Gardner, Stephen, Ed Thorpe and Cornelia Vutz (eds.). 2007. *Renewable Energy: Potential and Benefits for Developing Countries*. Proceedings of a conference of the European Office of the Konrad-Adenauer-Stiftung and the EastWest Institute. http://www.kas.de/wf/doc/kas_10993-1522-2-30.pdf?110504153814 (accessed 12 April 2018).

Griffith-Jones, Stephany, Jose Antonio Ocampo and Stephen Spratt. n.d. *Financing Renewable Energy in Developing Countries: Mechanism and Responsibilities*. European Report on Development. http://policydialogue.org/files/publications/Financing_Renewable_Energy_in_Developing_Countries.pdf (accessed 12 April 2018).

Hamilton, Kirsty. 2010. *Scaling Up Renewable Energy in Developing Countries: Finance and Investment Perspectives*. Energy, Environment & Resource Governance Programme Paper 02/10. Chatham House. https://www.chathamhouse.org/sites/files/chathamhouse/public/Research/Energy,%20Environment%20and%20Development/0410pp_hamilton.pdf (accessed 12 April 2018).

OECD (Organisation for Economic Co-operation and Development). n.d. *Linking Renewable Energy to Rural Development*. <http://www.oecd.org/cfe/regional-policy/Policy%20BriefJD%208%20june.pdf> (accessed 12 April 2018).

Vandaele, Nicole and Wendell Porter. 2015. "Renewable energy in developing and developed nations: outlooks to 2040". *Journal of Undergraduate Research* 15, no. 3. https://warrington.ufl.edu/centers/purc/purcdocs/papers/1501_Vandaele_Renewable%20Energy%20in%20Developing%20and%20Developed%20Nations.pdf (accessed 12 April 2018).

India's solar cities: the case for renewable energy in Shimla, Himachal Pradesh

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Abstract

As the world's population is projected to reach 10 billion by 2050, energy consumption will need to keep pace. Environmentally harmful fossil fuels, which satisfy most of our current energy needs, are expected to be entirely depleted in 50 years, and renewable energy, solar power in particular, is predicted to be the top source of energy. India and China are leading the way as global solar market leaders, and India aims to derive 40 per cent of its energy needs from renewables by 2030 through innovative solar parks and technologies, whose cost has been reducing. India has instituted a series of laws to incentivize renewable energy use and prioritized 60 cities across the country to become solar cities. With relatively modest investment, the city of Shimla, in the north Indian state of Himachal Pradesh, is proving that relatively simple solar energy projects can reap significant benefits in the form of reduced greenhouse gases and increases in green electricity, as an example of how we can turn to the sun to power our future.

It is an incredible fact that all human energy consumption in one year is equivalent to that delivered by the Sun to the Earth in one hour. Harnessing a mere quarter of this energy would save humanity 2,000 years of energy consumption under current usage.

As the world's population increases from today's 7.6 billion¹ to the projected almost 10 billion in 2050,² almost one third, the world's energy consumption is also expected to increase by one third by 2050.³

In 2017, under 1 per cent of the world's electricity was generated through solar power, with the vast majority still derived from fossil fuels (oil, coal and natural gas);⁴ however, by 2050 the International Energy Agency (IEA) predicts that solar energy could be the top source of energy. According to McKinsey research, most new capacity will come from solar and wind, which are expected to grow four to five times faster than every other source of power.⁵ A revolution is already taking place, as in 2016, for the first time, solar power additions rose faster than those of any other fuels and even surpassed the net growth in coal.

With fossil fuels expected to be fully depleted in 50 years⁶ and society and governments aware of the impact of higher carbon dioxide emissions on lives, the rise of renewable energy is largely driven by concerns about air pollution.

India is acutely aware of the impact of air pollution. Notably, in November 2017, the World Health Organization awarded New Delhi, the capital city of Asia's third largest economy, the unenviable title of the world's most polluted city, in large part because of burning fuel and deforestation for coal mining. During the hot summer months, New Delhi residents often face power cuts of up to five hours daily, the power supply deficit continues to grow while grid power prices rise, and it is estimated that 300 million Indians, or 25 per cent of the population, have no access to electricity at all.

1 United Nations Population Fund. n.d. "World population trends". <https://www.unfpa.org/world-population-trends> (accessed 1 March 2018).

2 United Nations Department of Economic and Social Affairs, Population Division. 2017. *World Population Prospects: The 2017 Revision*. https://esa.un.org/unpd/wpp/Publications/Files/WPP2017_KeyFindings.pdf (accessed 1 March 2018).

3 United States Energy Information Administration. 2017. *International Energy Outlook 2017*. [https://www.eia.gov/outlooks/ieo/pdf/0484\(2017\).pdf](https://www.eia.gov/outlooks/ieo/pdf/0484(2017).pdf) (accessed 1 March 2018).

4 IEA. 2017. "Key World Energy Statistics". <https://www.iea.org/publications/freepublications/publication/KeyWorld2017.pdf> (accessed 1 March 2018).

5 Nyquist, Scott. 2016. "Energy 2050: insights from the ground up". <https://www.mckinsey.com/industries/oil-and-gas/our-insights/energy-2050-insights-from-the-ground-up> (accessed 12 April 2018).

6 Stephens, Evan, Ian L. Ross, Jan H. Mussgnug, Liam D. Wagner, Michael A. Borowitzka, Clemens Posten, Olaf Kruse and Ben Hankamer. 2010. "Future prospects of microalgal biofuel production systems". *Trends in Plant Science* 15, 554-564.

In the past year, India and China each almost doubled their installed solar power capacities and, according to an IEA outlook report, while China is the undisputed leader in solar capacity, India could become one of the global solar power market leaders and is projected to surpass the European Union in renewable electricity capacity in the next five years.⁷

At the historic United Nations Climate Change Conference in Paris in 2015 (COP21), India boldly stated that the world must turn to the sun to power our future, and India and France spearheaded the International Solar Alliance, which brought together 121 countries with the goal of mobilizing investments of US\$1 trillion for solar energy projects. By 2030, India aims to derive 40 per cent of its energy needs from renewable sources. It has already been installing solar panels on rooftops and setting up sprawling solar parks with the goal of bringing electricity to everyone and mitigating the negative effects of climate change.

To reduce pressure on India's overburdened national electricity grid, in 2015 laws came into effect that allowed citizens and companies to generate their own solar power. These laws are complex and the parties involved must understand the regulatory framework and requirements of the local public utility. However, the laws are innovative as they allow participants to supply power to the grid and receive energy credits to allow them to reduce electricity bills. This approach ensures participation in the solar revolution by the average citizen and supports the creation of an ecosystem for the adoption of solar power in cities and villages across the country.

In past years, despite the power shortfalls, Indians did not invest heavily in solar panels, as the cost was prohibitive. However, with the sharp drop in the cost of solar power, investing in solar technology has become economically attractive. Since the 1980s, the cost of solar panels has become 10 per cent cheaper each year, and this trend is likely to continue according to Oxford University researchers.⁸ India is leading the way in providing some of the world's lowest prices in solar technology. In some Indian states, the cost is comparable to coal tariffs.

To pave the way for continued renewable energy capacity expansion, certain challenges need to be overcome, including improving the existing grid integration and infrastructure and reducing policy and regulatory uncertainties. This would allow India to surpass the United States by becoming the largest growth market after China.

To accelerate its ambitious solar energy expansion, in 2016 India launched a programme entitled Development of Solar Cities, accompanied by innovative solar power policies promulgated at the state level. India has identified 60 cities across the country that are prioritized to become "solar cities". This has not only replaced the various confusing, multi-policy and bureaucratic federal and state government policies on solar power, but it has also paved the way legally to promote vast investments in solar energy. The goal of the programme is to incentivize municipal governments, through financial support, to adopt renewable energy technologies.

In one example, a solar power policy approved in 2016 by Himachal Pradesh, one of the northern states of India situated in the Himalayas, is practical and aimed at collective ownership. One project under the policy identifies land for use by farmers and unemployed young people who set up small solar energy projects whereby the state electricity board purchases power from them.

Himachal Pradesh's capital city, Shimla, is one of the 60 solar cities eligible for investment by the federal and state governments, as well as through partnerships with United Nations entities and the private sector, which prioritizes solar energy projects, for example in lighting, heating, air conditioning, cooking and refrigeration. These projects span various sectors, including residential, commercial and government.⁹ Shimla has a population of 200,000. This is expected to double by 2040 and triple by the mid-2050s, with energy demand expected to increase at three times the rate of the population.¹⁰ As a popular tourist destination, thanks to its cool temperatures during the hot Indian summers, Shimla also receives 200,000 visitors per year, which effectively doubles energy demand¹¹ during the peak tourist season.

7 IEA. n.d. "Renewables 2017". <https://www.iea.org/publications/renewables2017/#section-4> (accessed 12 April 2018).

8 Farmer, J. Doyne and François Lafond. 2016. "How predictable is technological progress?" *Research Policy* 45, 647-665.

9 The government sector includes municipal governments, education, hospitals, and religious and heritage buildings.

10 The annual growth rate of energy demand is 9.09 per cent, while population growth using the compound annual growth rate methodology is 3.3 per cent annually.

11 Energy demand comprises electricity, liquefied petroleum gas, kerosene, diesel, petrol and coal. Electricity is dominant, accounting for 78 per cent of total consumption.

To meet projected demand, investment in rooftop solar panels in homes, office buildings, hotels and hospitals, as well as in solar street and lighting systems, is being planned for implementation under Shimla's new solar power policy. The projected benefits of rooftop solar panels are an up to 30 per cent reduction in energy consumption, reduced waste generation as a result of recycling, less consumption of water, and reduced pollution load and liability.

In the residential sector, which is the highest energy-consuming sector and accounts for almost 70 per cent of total annual energy consumption, significant energy wastage is mainly due to the current poor energy infrastructure. However, Shimla has a penchant for innovation over the years and it is notable that in 2008, while I was visiting my grandparents in Shimla, the state government launched an energy-saving programme whereby city residents were given, free of charge, four compact fluorescent lamp (CFL) bulbs, which gave the same amount of visible light as standard incandescent bulbs, but consumed 80 per cent less energy and lasted over 10 times longer. Despite this ambitious programme, overall penetration rates of energy-efficient lighting in 2017 still remain very low in the city, primarily because CFL bulbs cost more and people lack awareness about benefits. The new solar power policy, however, is targeting bulb usage in 50 per cent of the 40,000 households in Shimla, aiming to save a significant amount of electricity and result in a vast reduction in carbon dioxide emissions.¹² Further, expanding lighting efficiency to the 350 hotels, 68 restaurants, 450 commercial and 400 government, educational and hospital buildings, in addition to street lighting,¹³ would exponentially add to these savings.

The solar power policy calls for buildings in Shimla to be compliant with a new energy conservation building code, which includes an energy star rating for commercial buildings, installation of building energy management systems, initiating a green building ratings system and mandating an energy audit every two years for hotels rated three stars and above. All

these initiatives are a first in Shimla and enforcement of these requirements in a consistent and transparent manner is critical to their success. Shimla has already changed its city by-laws to effect these changes, and is aiming to implement the Energy Conservation Building Code, which estimates a reduction in electricity consumption by 60 per cent in newly constructed energy-efficient buildings.

Funding this combination of solar energy programmes in Shimla requires the government to invest US\$45 million over seven years through grants and other resources, or US\$6.4 million per year, which is a relatively modest investment for the significant potential savings and environmental benefits.

Implementing these changes would enable solar energy to reduce annual electricity cost by 10 per cent in comparison with the current energy utilization mix, and savings increase to 25 per cent in the seventh year of implementation, with a significant reduction in greenhouse gases over the same period.

The Shimla municipal government is also upgrading its computer systems and databases to support accurate data capture, compilation, analysis, monitoring and tracking of energy consumption patterns in the city, and of greenhouse gas emissions.

India has put in place the building blocks in the form of enabling legislation and innovative solar policies, infrastructure development plans in selected cities, and incentives in the form of funding and ownership of projects, which will help the sustainability of the measures, as well as tracking and monitoring systems intended to report transparently on progress. These measures aim to harness the direct market forces and innovation that will be required to support the significant increase in energy demand expected in the future, reduce dependence on fossil fuels and continue the impressive growth in renewable energy. This could be a model example of how we can "turn to the sun to power our future".¹⁴

¹² Over the next six to seven years it is projected to save approximately 1,700 MWh of electricity and 1,500 tCO₂e of emissions.

¹³ Savings in electricity usage of approximately 40 per cent could be realized for street lighting by replacing inefficient bulbs and introducing an astronomical time switch mechanism, which would allow streets lights to be switched on and off at any set time and set to any dimming level.

¹⁴ Modi, Narendra. 2015. In World Bank. 2016. "Solar energy to power India of the future". <http://www.worldbank.org/en/news/feature/2016/06/30/solar-energy-to-power-india-of-the-future> (accessed 1 March 2018).

Managing riparian issues in rural development projects

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Abstract

Rural development projects can raise complex issues during preparation, which need to be addressed up front. They may concern not only ensuring that the infrastructural prerequisites for improving living conditions in rural areas can be fulfilled and that existing and new potentials can be developed within the sphere of one country, but also integrating environmental and riparian concerns that transcend national borders.

Introduction

Although quite difficult to define with precision, “rural development”² continues to be a high priority in both developed and developing countries.³ A wide variety of projects and programmes are carried out in that context. Examples include projects related to hydropower, irrigation, flood control and water management (including allocation of water rights).

One of the most common political tools that countries use to facilitate and support rural development is decentralization, through which major efforts are made to gradually distribute responsibilities between the national and local levels of government. Simply put, decentralization is the transfer of part of the powers of the central government to local authorities. In that endeavour, the focus is on, among other things, (1) applying the subsidiarity principle; (2) ensuring equity among diverse stakeholders; (3) securing the participation of stakeholders in use and decision-making; and (4) using the areas’ natural resources in a sustainable manner.

This devolution, entailing the creation of subnational jurisdictions at local level, thus transfers authority to carry out devolved functions, and increases the involvement of local bodies (as well as civil society organizations) in the management of their affairs, with new forms of participation, consultation and decision-making.

Water and rural development

The global deployment of renewable energy has been expanding rapidly. The electricity sector alone, for instance, which grew by 26 per cent between 2005 and 2010 globally, currently provides about 20 per cent of the world’s total power. Equally importantly, rural areas attract a large proportion of investment in the deployment of renewable energy.⁴

1 The author served as a lawyer at the World Bank for 25 years. He is currently associated with the Asian Infrastructure Investment Bank. Views and opinions are personal.

2 “Rural development” is a vague term. It can easily mean what the user wants it to mean. Nevertheless, scholars have attempted to define it over the years, mostly for simplification purposes. According to one scholar, “rural development is a strategy to enable a specific group of people, poor rural women and men, to gain for themselves and their children more of what they want and need”. Another scholar notes that it is a “process leading to sustainable improvement in the quality of life of rural people, especially the poor”. Some others, asserting that definitions of rural development remain essentially contested, point out that “it is not possible to construct any comprehensive and generally accepted definition of rural development and that the notion of rural development (emerges) through socio-political struggle and debate”. For further discussions, see Phuhlisani. 2009. *International and Local Approaches to Rural Development. Key Issues and Questions: A Review of the Literature for the Drakenstein Municipality*, 9. Phuhlisani Solutions. <http://www.phuhlisani.com/oid%5Cdownloads%5C26082009%20RD%20literature%20review%2001.pdf> (accessed 19 March 2018).

3 Green, Gary Paul and John Aloysius Zinda. 2013. “Rural development theory” in *Handbook of Rural Development*, ed. Green, Gary Paul, 3. Cheltenham: Edward Elgar Publishing.

4 OECD. n.d. *Linking Renewable Energy to Rural Development: Executive Summary. Brief for Policy Makers*, 1. <http://www.oecd.org/regional/regional-policy/Renewable-rural-energy-summary.pdf> (accessed 7 July 2017).

Hydropower happens to be the cleanest and the most dominant renewable energy source.⁵ Construction of large dams and reservoirs to generate electricity remains a priority for many, mainly developing, countries. The Three Gorges Dam (2003) in China and the Itaipu Dam (1984) in Brazil and Paraguay are notable examples.

Small hydroprojects (or micro hydro) – the generation of electricity on a scale suitable for use by local community and industry or for distribution through a regional grid – are also quite common. These hydrosystems, typically producing small quantities of power, are often used on small rivers, or as a low-impact development on larger rivers. Similarly, run-of-the-river plants, not requiring large reservoirs, are also commonly included in rural development programmes. Many rivers in several mountainous countries (e.g. Nepal), falling steeply from high mountains, offer huge potential for hydropower, even under small or micro rural schemes.

Because of their significant role in national, subregional or regional development, hydropower and irrigation projects have always been important investment items for most international financial institutions (IFIs). However, financing these types of projects in countries also raises multiple challenges, revolving around the issue of water rights and duties (abstraction, diversion, impounding, storage and use), water allocation and governance (sharing and management), and ownership (access, withdrawal, exclusion, management and alienation), which call for detailed due diligence on their part.

Water issues in development projects

All irrigation or hydropower development projects involve the use of water, mostly from rivers. The rivers can be national (starting and ending within one single nation) or international (flowing into two or more countries). Depending on the status of the river, the preparation, processing and finalization of decisions by financing institutions vary, because the problems and issues may need to be addressed in different ways.

Broadly stated, these problems tend to relate to (1) difficulties in enforcing legislation and operating rules on water use and pollution control; (2) collecting water user charges; (3) facilitating the establishment of lower level water management organizations to unite users and stakeholders of the same source; (4) acting as centres for conflict resolution on a variety of issues; (5) institutionalizing relevant customary law and practices related to water management into statutes; and (6) adapting to international standards and best practices.

National rivers

When a development project is planned in one or multiple regions of a country, but involves the use of waters from only national rivers, the issues to be addressed may be relatively straightforward. They may pertain to water users' rights, allocation, priority use, environmental quality and flow, inter-basin water transfers, charges, integrated management, institutions and so forth.

A national river is generally governed by sets of laws that are designed within the framework of one constitution, understood and applied in a uniform manner. They may or may not be governed by the same legislation, but overall will have derived from the same legal tradition and practice and be subject to the same set of jurisprudence.

In federated states, however, where central, regional and provincial jurisdictions may be different, as an exception, additional issues that do not exist in a unitary type of state may also need to be tackled.

Issues that transcend more than one region or province, by virtue of their nature and scope, require clarity on jurisdictional coverage. Water from a river that flows through several provinces is a good example. In view of its highly sensitive nature and the fact that it is a basic need, managing the water rights of people (not only for drinking but also other uses) in different provinces will be a daunting challenge. While compartmentalizing jurisdictions will be impossible, clarifying the jurisdiction of a provincial or a federal court over the water from inter-province rivers will be no less difficult.

⁵ Zhou, Y., M. Hejazi, S. Smith, J. Edmonds, H. Li, L. Clarke, K. Calvin and A. Thomson. 2015. "A comprehensive view of global potential for hydro-generated electricity". *Energy and Environmental Science* 8, 2622-2633.

For example, in India, water is a state, not a union, matter.⁶ The main rivers therein are shared by two or more states. With the increasing demand for water which falls under the authority of the states, and with the states frequently asserting their legal and political power, the potential for inter-state water disputes increases and any major initiative becomes complex and contentious. The continual increase in competing needs for developing irrigation and power resources also intensifies the possibility of inter-state disputes, particularly on water sharing and environmental flows. Meanwhile, while the responsibility for development of inter-state rivers and river valley projects rests primarily on state governments, obtaining funds from multilateral financial institutions to finance such projects remains the responsibility of the central government.

The Indian Constitution empowers parliament to provide for mechanisms for the adjudication of any dispute (or complaint) with respect to the use, distribution or control of the waters of any inter-state river or river valleys.⁷ The Inter-State Water Disputes Act of 1956 envisages the resolution of such disputes through ad hoc tribunals. Such disputes are excluded from the purview of the federal courts. It is noteworthy that five tribunals, so far, have been set up to adjudicate disputes pertaining to the Krishna, Narmada, Godavari, Ravi-Beas and Cauvery Rivers. It is also noteworthy that it took 17 years for the Cauvery Water Dispute Tribunal (set up by the Union government for the *Karnataka vs Tamil Nadu* case) to pronounce its verdict, which was to allot approximately 60 per cent of the water flowing through the Cauvery to Tamil Nadu, which is downstream.

Similar situations of jurisdictional multiplicity exist in many other countries. In Malaysia, for example, state governments have exclusive jurisdiction over the management of water resources, such as water catchment areas and groundwater. Nevertheless, because the federal government retains some power over water-based projects in states, from time to time it has been able to formulate policies for implementation at the state level.⁸

In Brazil, a 1997 Federal Law⁹ formulated a National Water Resources Policy, created a National Water Resources Management System and, empowered by the provision of the Federal Constitution,¹⁰ provided an important set of legislation for land planning. Further ensuring decentralized actions, it stated that the basic principles of using the catchment basin as planning unit, multiple water uses and recognition of water as a finite and vulnerable commodity would be observed.

Examples where federal and provincial laws diverge abound, but even in such cases, because the federated states or provinces come within the purview of the same constitution, ensuring the proper governance of water¹¹ and dealing with riparians remain relatively easy.

International rivers

In contrast, complexities increase when a development project is planned in one or several regions of a country, but involves the waters of an international river. Issues that would have been non-existent in the context of a national river will then need to be addressed. An international river is subject to several national legal regimes, is governed by different sets of laws that are designed in the framework

6 Salman, Salman M.A. 2002. "Inter-states water disputes in India: an analysis of the settlement process". *Water Policy* 4, no. 3, 223-237.

7 Article 262.

8 Rahman, S.A. and R.M. Khalid. 2009. "Water resource management in Malaysia: legal issues and challenges". *International Journal of Sustainable Development and Planning* 4, no. 3, 258-264, 259.

9 No. 9,433 of 8 January 1997.

10 Article 21, paragraph XIX.

11 "Water governance" is broadly understood to refer to the way the institutions and agencies of the state dealing with water resources are constituted, how they execute their mandates and their relationship to society, as well as to particular constituencies such as the private sector, civil society, NGOs, water users' associations, community organizations and other stakeholders. It is also understood that good governance needs to be clear on at least two aspects. First, there should be a rule-based, open, transparent, efficient and accountable system. Second, the institutions and agencies should undertake their tasks in a participatory and consultative manner. Good governance refers both to the overall environment that is deemed conducive to both outcomes and to the degree to which each of the outcomes is formalized and routinely applied in the everyday water-related affairs of the government and the state, including those relating to transboundary waters.

of varied constitutional instruments, and is applied in a variety of manners often under diverging legal traditions and jurisprudential specificities. Situations may be further complicated where some areas practise customary law water rights and some practise common law rights. Adequately addressing the issues will, therefore, be critical not only to manage water governance for the success of any specific rural projects, but also to avoid conflicts between countries.¹² More than ever, unpredictable climatic conditions (temporal and spatial variability in rainfall and unpredictable drought and flood cycles) make the issue of transboundary waters increasingly complex. Dealing with the multitude of transboundary issues, duly considering the different sets of not only legal and constitutional but also political and diplomatic tools, will be an up-front challenge.

Because of their criticality, the international financial and development institutions pay special attention to dealing with issues triggered by transboundary rivers. For that, they rely on international law and best practices.

Considering international water law

The principal legal regime currently governing international waters derives from the United Nations Convention on the Law of Non-Navigational Uses of International Watercourses, adopted on 21 May 1997 (the United Nations Watercourse Convention). This framework Convention pertains to the uses and conservation of all waters that cross international boundaries (both surface and groundwater). The Convention came into force in 2014 and, although many countries (from both the developing and the developed world) have not yet ratified it, it is already regarded as an important instrument setting forth the international legal regime governing water.¹³

The Convention refers to several important customary and general principles of international law applicable to transboundary water resources management that are accepted globally and are now also incorporated in many modern international agreements. They are the principles of equitable and reasonable utilization, obligation not to cause significant harm, peaceful settlement of disputes, notification, consultation and negotiation, and cooperation and information exchange.¹⁴ Equally importantly, and as a norm, riparian countries must consult each other and give timely notification if they want to use the international watercourse in a new or different way that may have a significant adverse effect on other riparian states.

It is worth emphasizing that the duties to share and also to compensate for data are important international law principles directly deriving from the UN Watercourse Convention,¹⁵ which a noted authority considers to be within the realm of 'distributive justice'.¹⁶ Regular exchange of data and information, according to another scholar, is a duty closely linked with the effectiveness of cooperation on transboundary waters, essential for the administration and sustainable development of rivers,¹⁷ which the UN Watercourse Convention also regards as a general principle because of its importance for successful cooperation on effective management of transboundary waters.¹⁸

Indeed, the role of information in any development project involving international waters must not be undermined or underestimated. While transboundary water management is the result of interactions between different stakeholders (sovereigns, sub-sovereign governments or civil society), it is also a function of their perceptions concerning the issues at stake. Therefore, although always very politically dominated, transboundary water management needs to rely on information exchange and joint research,¹⁹ to help to identify joint development potentials which can result in a common factual basis for reaching agreement. Early

12 Many examples of transboundary water conflicts can be found. They have involved the Nile Basin in Africa, the Tigris and the Euphrates Basins in the Middle East, the Aral Sea Basin in Central Asia, the Parana Basin in South America, and the Ganges and Indus Basins in Asia. Petrella, R. 2001. *The Water Manifesto: Argument for a World Water Contract*. London: Zed Books Limited.

13 See, for discussions regarding the entry into force of the Convention, Salman, Salman M.A. and Gabriel Eckstein. 2015. "Concluding thoughts on the implication of the entry into force of the United Nations Watercourse Convention". *Water Policy* 17, no. 1.

14 For some detail, see Rahaman, M.M. 2009. "Principles of international water law: creating effective transboundary water resources management". *International Journal of Sustainable Society* 1, no. 3, 207-223, 209-213.

15 Article 9 (Regular exchange of data and information).

16 McCaffrey, Stephen C. 2013. "The codification of universal norms: a means to promote cooperation and equity" in *International Law and Freshwater: The Multiple Challenges*, ed. Boisson de Chazournes, Laurence, Christina Leb and Mara Tignino, 125-139, 135. Cheltenham: Edward Elgar.

17 Leb, Christina. 2013. *Cooperation in the Law of Transboundary Water Resources*, 115. Cambridge: Cambridge University Press.

18 See generally *ibid*.

19 See generally Mostert, Eric. 2006. "How can international donors promote transboundary water management?" in *Transboundary Water Management in Africa: Challenges for Development Cooperation*, ed. Scheumann, Waltina and Susanne Neubert, 241-267, 255. Bonn: German Development Institute.

notification of unilateral initiatives can also prevent the development of conflicts, and the reliability of information increases the likelihood of agreements that are technically and economically feasible, further allowing the riparians to reap the benefits without negative side effects. Joint research involving all relevant stakeholders helps to reduce technical controversies in comparison with research by only one of the stakeholders.²⁰ Admittedly, research is never completely value-free, and may involve biased selection, interpretation and uncertainty,²¹ but it always leads the parties to have meaningful discussions, based on technical data. If research is not transparent or fails to reflect the concerns of major stakeholders, it is unlikely to serve as a basis for agreement.²²

Practice of IFIs

For international institutions financing projects in their client countries, it is important to ensure that the above principles are observed. As a matter of fact, these institutions can ensure it, and many are doing so, through policy instruments supplemented by their operating procedures. Indeed, to facilitate their undertaking of development projects in situations involving transboundary rivers, and to mitigate the risks involved, international institutions dealing with, and financing, development activities in countries have adopted policy instruments which are consistent with the spirit of the UN Convention.

World Bank practices

The World Bank, for instance, has been a pioneer institution in establishing policy norms to make decisions regarding such projects.²³

It is not the intent of this article to delve into the World Bank's history of policy-making on the theme. However, two important elements need to be highlighted. The first element is the World Bank's recognition that the cooperation and goodwill of all riparians are essential for

the efficient utilization and protection of international waterways, supplemented by its offer to assist in such cooperative endeavours. The second element is the general conviction that transparency and prudence mean that all riparians should be notified of World Bank-financed projects on international waterways.²⁴

Notification rationale

A matter of grave concern to the World Bank is to ensure that projects involving international rivers that it finances should not be appreciably harmed by the other riparians' possible water use. Notification has been thought of as one of the ways of ascertaining that. A few examples below will help understand the concept and the approach.

A project in Ethiopia, the Tana and Beles Integrated Water Resources Development Project (2008), included multiple small-scale investments for watershed and community-based flood management. The watershed activities covered an area of around 80,000 hectares in selected microcatchments of Lake Tana. Tana, it should be noted, is the largest lake in Ethiopia and is the source of the Blue Nile. Because of this, all the countries that are riparians of the Nile Basin were notified of the project, and no unfavourable response was received.²⁵

In Nepal, a power development project (2003) involved the design and construction of two medium-sized (under 30MW each) and one small (under 10MW) hydropower plants in rural areas on the Gandaki (central Nepal) and Kosi (eastern Nepal) rivers. These rivers are tributaries of the Ganges, an international river shared by Bangladesh, China, India and Nepal. India and Nepal had implemented two agreements regarding two separate projects on these rivers in the 1950s and the 1960s. After deliberating on whether or not, because of these two agreements, other new projects on the two rivers were exempt from notification, the World Bank concluded that the two agreements did not give blanket approval for the development of the new proposed

²⁰ Ibid.

²¹ Ibid.

²² Ibid.

²³ For a very thorough analysis of the World Bank Policy for projects involving international rivers, see Salman, Salman M.A. 2009. *The World Bank Policy for Projects on International Waterways: An Historical and Legal Analysis*. World Bank. It is also important to point out that the International Finance Corporation also has a similar policy, which it applies to projects and transactions that it finances.

²⁴ Salman, note 105. Above, note 23.

²⁵ Salman, note 103. Above, note 23.

power development project. Accordingly, it determined that riparians needed to be notified and, on behalf of Nepal, notified China (upstream riparian), and India and Bangladesh (downstream riparians) of the project. There was no unfavourable response.²⁶

In a similar vein, the West Delta Water Conservation and Irrigation Rehabilitation Project in Egypt aimed to develop and irrigate a large area located approximately 60 km north-west of Cairo. Because water was going to be conveyed to the project from the Nile, its nine riparians were all notified, and no unfavourable response was received.²⁷

Exception to notification

In some cases, an exception to the notification requirement can also be made. Such exceptions would be justified in cases where a project does not significantly and negatively affect the quantity and quality of water of the international river. Rehabilitation of existing schemes, surveys and feasibility studies, and projects in tributaries exclusively in the lowest downstream riparian are some examples.

One project in Kazakhstan (Second Irrigation and Drainage Improvement Project, 2009) aimed to rehabilitate an existing irrigation and drainage infrastructure system, improving management of water and reducing water losses. No new canals or structures triggering an increase in the abstraction and supply of water and no new irrigation areas were to be financed. Furthermore, the project was not to involve works or activities that would exceed the original scheme, change its nature, or alter or expand its scope.²⁸

It seems appropriate to note at this juncture that, in 1992, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan had already concluded an agreement on cooperation in the field of joint water resources management and conservation of inter-state water resources. After review, the World Bank concluded that the agreement did not impose any additional requirement to notify other riparian states while rehabilitating existing schemes. Accordingly, the Kazakhstan project went ahead without notifying other riparians.²⁹

Another project in China (the Tarim Basin Project) involved the financing of multiple subprojects that consisted of rehabilitating the main and some secondary systems of an existing project, through the lining of canals, and adding minor tertiary irrigation and drainage systems to reclaim additional dry lands. The subprojects were located along the Aksu River, which originates in Kyrgyzstan, and the Kashgar River, which originates in Kyrgyzstan and Tajikistan, both of which flow into China. Within the World Bank, there was consensus that the rehabilitation component, the bulk of the project activities, fell under the exception to the notification requirement under its policy (rehabilitation of existing schemes), but debate ensued on whether or not the addition of tertiary irrigation schemes would also be covered by the exception (and whether or not Kyrgyzstan and Tajikistan might need to be informed). Finally, after a series of technical reviews and hydrological data analysis, it was concluded that the additions were minor, they would not exceed the original scheme or change its nature, the additional water needs for the new components would come from the water savings generated by the rehabilitation of the existing scheme and, most importantly, there would be no adverse effects on any of the riparians of either river. The project, thus, was also considered to fall wholly under the exception to the notification requirement.

Dealing with objections

There are also situations where objections are raised by riparians, clearly indicating (and protesting) that a specific project prepared in another riparian country would adversely harm them. To deal with objections, the World Bank has developed an elaborate set of procedures, which, broadly stated, examines (a) the nature of the riparian issues; (b) the staff's assessment of the objection raised, including the reasons for such an objection, and any available supporting data; (c) the staff's assessment of whether or not the proposed project will cause appreciable harm to the interests of the other riparians, or be appreciably harmed by the other riparians' possible water use; (d) whether or not the circumstances of the case require that the World Bank, before taking any further action, urge the parties to resolve the issues through

26 Salman, note 402. Above, note 23. In this context, it may be added that only a few transboundary rivers and lakes are governed by agreements regulating their use and protection, and only a few of the agreements encompass all riparian states of the basin. Riparians excluded from treaties do not recognize the agreements, and downstream/upstream tensions grow within such basins.

27 Salman, note 103. Above, note 23.

28 The predecessor of this project abstracted water from a number of rivers (the Ili River, which Kazakhstan shares with China, the Chui and Talas Rivers, which are shared by Kyrgyzstan and Kazakhstan, and the Syr Darya and some of its major tributaries, which Kazakhstan shares with Kyrgyzstan, Tajikistan and Uzbekistan, and which flows into the Aral Sea).

29 Salman, note 156. Above, note 23.

amicable means, such as consultations, negotiations and good offices (normally resorted to when the riparians' objections are substantiated); and (e) whether or not the objections are of such a nature that an additional opinion from an independent expert is advisable.

If a decision is taken to seek expert opinion before proceeding further with the project, the World Bank selects independent experts from a roster it maintains; they cannot be nationals of any of the riparian countries in question, and should not have any conflict of interest in the matter. The experts are provided with all the background information and assistance needed to complete their work efficiently, but will not have any decision-making role in the project's processing. Their technical opinion will be for the World Bank's perusal only, and will not in any way be used to determine the rights and obligations of the riparians. Their conclusions will be reviewed by the World Bank and a decision will be made to proceed further or not.

Other IFIs' practice

Although not supported by any one specific policy instrument, other IFIs also, in their operational modalities, remain fully consistent with the international legal regime for water as articulated by the UN Watercourse Convention. For instance, the Asian Development Bank (ADB) deals with the riparian issue broadly through its 2001 Water Policy, which promotes the concept of water as a "socially vital economic good".³⁰ Among other things, the ADB policy emphasizes (1) fostering the integrated management of water resources and concentrating interlinked water investments in river basins; (2) promoting regional cooperation and increasing the mutually beneficial use of shared water resources

within and between countries, including the creation of hydrological and socio-environmental databases on transboundary water resources management; (3) promoting joint projects between riparian countries; and (4) facilitating the exchange of water sector information and experience.

For the African Development Bank (AfDB) too, the proper functioning of transboundary river basin organizations in the region is a key concern.³¹ It pays attention to promoting joint efforts by riparian countries to develop cost-effective strategies for integrated water resources management based on mutual agreement. The AfDB generally supports multinational organizations and river basin authorities, including through studies to identify the benefits of collaborative approaches in developing international shared water resources. The key approach is to promote regional cooperation and integration by helping to develop and strengthen institutions for managing shared waters, assisting in the development of appropriate legislation, and supporting infrastructures for generating and sharing data and information. The corollary of this is that the AfDB seeks the cooperation of all riparian countries in respect of project proposals from one country that involve the utilization of shared water resources,³² and constantly seeks broad agreement of riparian countries in respect of such proposals.³³

The newest arrival in the family of IFIs is the Asian Infrastructure Investment Bank (AIIB), established in 2016, and headquartered in Beijing, China. The AIIB has also issued, in 2017, a policy instrument to deal with projects involving transboundary rivers. Emulating the philosophical approach as well as the modus operandi of the World Bank, the AIIB policy is also fully consistent with the United Nations Watercourse Convention.³⁴

30 Dueñas, María Christina and Cezar Tigno. 2012. "Visions of Asia's water realities". *Knowledge Management* 41, 1. <https://www.adb.org/sites/default/files/publication/29691/asia-water-realities.pdf> (accessed 12 April 2018).

31 According to a report by the ADB, there are at least 54 water bodies that cross or form international borders in Africa, but only very few are managed jointly. In this context, the dependency of downstream countries on upstream ones for access to and development of water resources is a potential threat to regional stability and peace. See African Development Bank. 2000. *Policy for Integrated Water Resources Management* (26 April), Executive Summary, viii.

32 *Ibid.*, 23.

33 *Ibid.*, 25.

34 AIIB Operational Policy on International Relations, March 2017. As of January 2018, the AIIB has had to trigger this policy in five cases. However, because the projects it was financing were being administered by another cofinancing partner, the cofinancing partners' policies and practice were applied. The cofinancier also coordinated the process of notifying the riparians, a modus operandi permissible by AIIB policy.

Conclusion

It is clear from the above overview that special attention needs to be given to managing the issue of riparian rights and concerns in all projects, whether specifically focusing on rural development or not. Two specific observations are, furthermore, possible.

First, while projects dealing with only national rivers may be far less complicated in terms of process, those involving transboundary rivers require the IFIs to carry out a thorough due diligence exercise, which will also include an analysis of legal, institutional, hydrological and geo-topographical data, and to take, up front, all measures necessary to mitigate risks, all with due regard to international law.

Second, in most rural development projects, which do not necessarily use large amounts of water, an exception to the notification requirement appears more likely. However, this cannot be necessarily considered an established rule, as there may be cases where notification will still be required for a variety of other reasons.

Renewable energy development and justice in rural spaces

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Abstract

Sustainable Development Goal (SDG) 7 identifies access to affordable, reliable, sustainable and modern energy as a key factor for the post-2015 development agenda. The World Bank estimates that approximately 1 billion people do not have access to energy and about 3 billion still rely on traditional sources of energy for their basic needs. The energy sector has been traditionally guided by an economics-centred approach without taking into consideration environmental and social issues. In order to achieve SDG7, legislators and policymakers should focus on justice issues in addition to creating an enabling environment for attracting private sector investors. The decision-making process of rural electrification should take into account three dimensions of energy justice: distributional, procedural and recognition. *Distributional justice* addresses the issue of unequal distribution of externalities among stakeholders; *procedural justice* calls for non-discriminatory procedures that involve all stakeholders in decision-making processes; finally, *recognition justice* focuses on the equal participation of all communities within a country and representation of their needs. By placing energy justice issues at the centre of energy development policies, rural electrification programmes will be more transparent, fair and non-discriminatory.

Introduction

General background

Access to energy became a more prominent issue at the international level in 2012 with the launch of the Sustainable Energy for All (SE4ALL) initiative by the United Nations. The goal of the initiative is to provide universal access to modern energy services by 2030. As part of the 2030 development agenda, the United Nations passed 17 Sustainable Development Goals (SDGs) in 2015, including SDG7, “[to] ensure access to affordable,

reliable, sustainable and modern energy for all”.¹ A review of all SDG targets reveals that 125 out of 169 targets are interconnected with energy and therefore it can be put forward that energy is a key aspect of sustainable development and poverty alleviation.²

About 1.06 billion people in the world do not have access to electricity, and 3.04 billion people still relied on solid fuels and kerosene for cooking and heating in 2014.³ Nearly one third of these people live in sub-Saharan Africa and South Asia, where they form 62.5 per cent (609 million people) and 20 per cent (343 million people), respectively, of those regions’

1 UNGA Res 70/1 (25 September 2015) UN Doc A/RES/70/1.

2 World Bank. 2017. *State of Electricity Access Report 2017*, xii. <http://documents.worldbank.org/curated/en/364571494517675149/full-report> (accessed 13 December 2017).

3 International Energy Agency (IEA) and World Bank. 2017. *Sustainable Energy for All 2017: Progress toward Sustainable Energy*. Washington, D.C.: World Bank, 6. http://gtf.esmap.org/data/files/download-documents/eegp17-01_gtf_full_report_for_web_0516.pdf (accessed 19 December 2017).

populations.⁴ Although between 2000 and 2014 the electrification deficit declined from 1.3 billion to 1.06 billion, annual progress in access slowed sharply from 0.69 percentage points annually in 2010-2012 to 0.19 percentage points in 2012-2014.⁵ Because of the fall, to reach universal access by 2030, efforts for 2015-2030 need to be stepped up to 0.92 percentage points a year, more than four times the growth figure between 2012 and 2014.⁶

It is estimated that, in order to achieve universal access by 2030, 135 million people have to be provided with access every year.⁷ Sixty per cent of this electrification effort will be off-grid solutions for rural areas, as normal electricity grid extensions will not be feasible for more than 40 per cent of the population.⁸ Therefore, enabling off-grid rural electrification will not only provide quick access to rural communities but also be economically sensible for countries.

Why renewable energy development is the solution

There are several reasons why renewable energy is the best solution for developing energy access through rural electrification. Firstly, renewables are tailored solutions for the needs of rural communities because not all rural communities need more than basic household access. Secondly, unlike fossil fuel-based generation options, the nature of most renewable energy does not require regular fuel supply to rural areas where road conditions are inadequate and distances are long. Therefore, rural communities will not only save the fuel transportation costs but also avoid the risk of fuel supply interruptions

caused by environmental events, changes in fuel prices, etc. Thirdly, by relying on renewables, rural communities will avoid the risks from fossil fuels that result in fuel spills, generation noise, air pollution and water pollution.⁹

Advancing rural access can no longer rely on the classical paradigm of the centralized electrical system which began as a state-owned vertical integrated regulated monopoly.¹⁰ Both developed and developing countries followed this approach but only developed countries have been able to extend their grids to rural areas. Developing countries are facing challenges in terms of power production and electrification in both urban and rural areas. Since developing countries have paid more attention to cities on account of their economic activities, rural areas have been somewhat forgotten. Supplying rural areas with electricity is expensive using the centralized approach and this has made utilities reluctant to extend their services to rural areas.

In order to address this problem, many governments have established separate organizations: rural electrification agencies.¹¹ This has coincided with the introduction of competition in the electricity sector, and the dominance of the centralized approach has gradually decreased in developing countries. This has led developing countries to reform their policies to attract foreign private investments to update existing power systems and to continue the electrification process.¹² In the developing countries, mini-grids are regarded as a means of supplying grid-quality power to rural communities quickly and cost-effectively without having to wait decades for the grid network to reach them. However, there are some risks to be mitigated in order to ensure that off-grid solutions are cost-effective and feasible for private sector financing.¹³

4 World Bank. 2017, 17. Above, note 2.

5 IEA and World Bank. 2017, 39. Above, note 3.

6 Ibid., 39.

7 IEA and World Bank. 2015. *Sustainable Energy for All 2015: Progress toward Sustainable Energy*, 282. <https://openknowledge.worldbank.org/handle/10986/22148> (accessed 20 December 2017).

8 Bhattacharyya, Subhes C. and Debajit Palit. 2016. "Mini-grid based off-grid electrification to enhance electricity access in developing countries: what policies may be required?". *Energy Policy* 94, 166-178, 166.

9 Urmee, Tania, David Harries and Hans-Gerhard Holtorf. 2016. *Photovoltaics for Rural Electrification in Developing Countries: A Road Map*. Springer, 10.

10 Mandelli, Stefano et al. 2016. "Off-grid systems for rural electrification in developing countries: definitions, classification and a comprehensive literature review". *Renewable & Sustainable Energy Reviews* 58, 1621, 1622.

11 Mostert, Wolfgang. 2008. "Review of experiences with rural electrification agencies: lessons for Africa", 15. <http://www.mostert.dk/pdf/Experiences%20with%20Rural%20Electrification%20Agencies.pdf> (accessed 10 January 2018).

12 Ibid., 15-16.

13 United Nations Conference on Trade and Development (UNCTAD). 2016. *World Investment Report 2016 – Investor Nationality: Policy Challenges*, 38-42.

Overview of this paper

This short paper will look at the development of renewable electricity for rural spaces and will focus on the justice issues that result from this development. Historically, the energy sector has been dominated by an economics-centred approach. Countries when setting energy policies have prioritized what is economically feasible and cheap to build. Complete ignorance of environmental and social aspects of the energy sector have led to the current situation, which is creating both environmental and social problems.

In this article, energy justice is used as a guide that is urging policymakers at local, national and international levels to realize justice concerns in decision-making processes about rural electrification in order to prevent the creation of new injustices. It is underlined that creating an enabling environment is a prerequisite for receiving private sector investment; however, it should not be the only objective of off-grid electrification programmes. In addition to creating an investor-friendly environment, those programmes must distribute benefits and disadvantages of energy projects evenly, recognize each stakeholder's needs in a non-discriminatory way and respect due process in every phase of energy sector activities.

The second section of this paper looks at challenges of developing off-grid electrification schemes including establishing an enabling policy and regulatory environment and integration of rural electrification and development programmes. The third section focuses on energy justice in renewable energy development. It investigates injustices within the three aspects of energy justice: distributional justice, procedural justice and recognition justice. The final section not only draws conclusions but also calls attention to future issues that policymakers should consider. Throughout the article, examples are given from sub-Saharan Africa and South Asia.

Challenges of developing off-grid electrification schemes

Introduction

Since the adoption of poverty alleviation and climate change mitigation policies at the international level, renewable-based off-grids have received enormous interest as a means of supplying grid-quality power to rural communities. They are regarded as quick and cost-effective solutions in contrast to building grid connections to the rural areas. However, there are some challenges to be addressed to ensure that off-grid solutions are cost-effective and fast solutions, and these are discussed in this section.

One of the challenges is access to finance. While Africa is home to nearly 15 per cent of the world's population, in 2016 the continent received only 3 per cent of global foreign direct investment (FDI). However, a significant portion of FDI in sub-Saharan Africa went into primary extractive industries, from which banks expect better returns.¹⁴

In essence, those challenges are no different from any other type of energy investment, but some aspects of the challenges are specific to off-grid renewable solutions in rural areas of sub-Saharan Africa and South Asia, such as the scale of the projects, low demand and the need for specific regulatory and policy measures. Studies have shown that two main areas are key for developing off-grid electrification schemes: establishing an enabling policy and regulatory environment, and integrating electrification with productive use.¹⁵ These are focused on in greater detail below.

Establishing an enabling policy and regulatory environment

Since the electricity markets have been developed within the centralized approach, developing countries that are willing to expand access to electricity services may need to adopt enabling policies that are suitable for off-grid technologies and business

14 Analyse Africa. 2016. *The Africa Investment Report 2016*, 2. <https://www.camara.es/sites/default/files/publicaciones/the-africa-investment-report-2016.pdf> (accessed 10 January 2018).

15 Walters, Terri et al. 2015. *Policies to Spur Energy Access: Executive Summary. Volume 1, Engaging the Private Sector in Expanding Access to Electricity*. Golden, CO: National Renewable Energy Laboratory (NREL); GVEP International. 2011. "The history of mini-grid development in developing countries". Policy briefing. https://www.reep.org/sites/default/files/Mini_Grid_Development_in_Africa.pdf (accessed 12 December 2017).

models.¹⁶ Furthermore, as rural energy delivery is a new phenomenon, off-grid based supply businesses face many challenges, including a risky business environment due to unknown consumer characteristics, unfriendly regulatory and policy frameworks, and weak institutional arrangements.¹⁷ Therefore, the role of establishing an enabling policy and regulatory environment is essential for not only attracting investment but also the sustainability of those businesses in rural areas.

Off-grid electrification has limited use in South Asia, since there is a lower level of financial support. Incentives in the region tend to be provided for grid expansion projects to increase electricity access. Although the central grid may have reached many villages, household electrification rates have remained low. While 97.4 per cent and 62 per cent of the villages in India and Bangladesh, respectively, are supplied through the grid, only 74 per cent and 48 per cent of rural households are connected to it.¹⁸

Establishing an enabling energy policy and regulatory environment encompasses plans, goals, strategies and regulatory frameworks that can help achieve the necessary economic, social and institutional settings to improve access to reliable, affordable, economically viable, socially acceptable and environmentally friendly energy services in rural areas.¹⁹ If a government is willing to provide energy access to rural people, it should include decentralized electricity options in its national electrification plans and implement the necessary regulatory measures.²⁰

Strategic electrification plans

International initiatives such as SE4ALL and the SDGs are setting agendas for national and international players in order to meet the global energy access goal by 2030. However, neither of those initiatives has detailed electrification plans for specific areas or countries. National governments, in this regard, will need to work proactively on their strategic rural electrification plans in harmony with international initiatives. Planning is essential, as it will set the objectives and the roadmap of the rural electrification programme.

One of the most important aspects of the electrification plan for both investors and rural communities is the possibility of grid extension. Lack of clarity about the extension plans could endanger financing of the project. In Sri Lanka, assurance is given that there will be no grid extension in the next five years²¹ and, in Argentina, concession and exclusive rights are given to investors to secure off-grid electrification.²² Rural electrification is likely to contribute to economic goals when embedded with the rural development programme. Therefore, electrification planning should consider coordination between electrification and other development goals.²³

Regulatory and administrative environment

Some scholars consider that an active role for the private sector is the key for solving access problems.²⁴ However, neither additional financing nor better management and technical capacity of the private sector will be achieved in rural electrification projects unless there is a clear regulatory environment.²⁵ Therefore, strengthening the regulatory framework is one of the prerequisites for an investor-friendly environment in the

16 Walters et al. 2015, 15. Above, note 15.

17 Bhattacharyya and Palit. 2016, 167. Above, note 8.

18 Palit, Debajit and Kaushik Ranjan Bandyopadhyay. 2016. "Rural electricity access in South Asia: is grid extension the remedy? A critical review". *Renewable & Sustainable Energy Reviews* 60, 1505-1515, 1506.

19 Ottinger, Richard L., Nicholas Robinson and Victor Tafur. 2005. *Compendium of Sustainable Energy Laws*. Cambridge University Press, 113.

20 Walters et al. 2015, 16. Above, note 15.

21 Bhattacharyya and Palit. 2016, 169. Above, note 8.

22 Best, Sarah. 2011. *Remote Access: Expanding Energy Provision in Rural Argentina through Public-Private Partnerships and Renewable Energy*. <http://pubs.iied.org/pdfs/16025IIED.pdf> (accessed 11 January 2018).

23 Bardouille, Pepukaye. 2012. *From Gap to Opportunity: Business Models for Scaling Up Energy Access*. <http://www.ifc.org/wps/wcm/connect/ca9c22004b5d0f098d82cfbbd578891b/EnergyAccessReport.pdf?MOD=AJPERES> (accessed 11 January 2018).

24 Sovacool, Benjamin K. 2013. "Expanding renewable energy access with pro-poor public private partnerships in the developing world". *Energy Strategy Reviews* 1, 181-192; Chaurey, Akanksha et al. 2012. "New partnerships and business models for facilitating energy access". *Energy Policy* 47, 48, 48.

25 Eberhard, Anton and Maria Shkaratan. 2012. "Powering Africa: meeting the financing and reform challenges". *Energy Policy* 42, 9-18, 13.

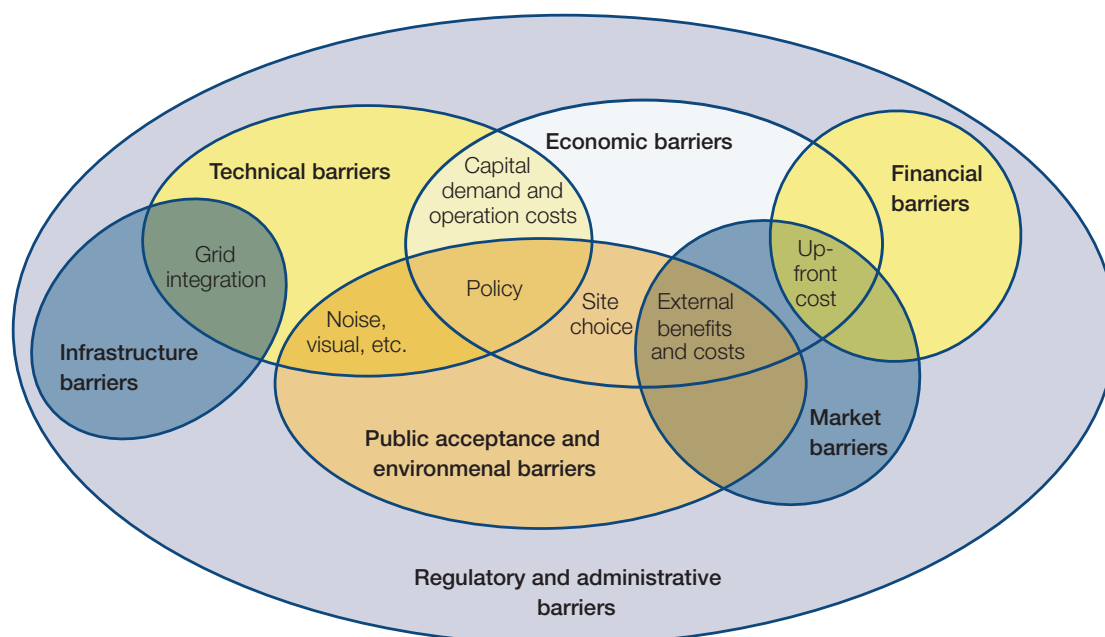
off-grid sector. Since off-grid electrification involves a natural monopoly factor, control is required to ensure investor and consumer protection, and to monitor service quality. According to Bhattacharyya, regulations regarding off-grid electrification must avoid confusion about the service area; protect the investor against the threat of grid extension; ensure quality and reliability of service; promote health and safety; ensure transparency and flow of relevant information; and ensure financial sustainability through tariff and support systems.²⁶

Additionally, greater private sector participation in South Asia and sub-Saharan African countries will allow national governments to devote more resources to other essential sectors such as education, health and farming. Therefore, reducing regulatory and administrative barriers will not only help to facilitate rural electrification but also promote sustainable rural development in other vital sectors.²⁷ Since regulatory and administrative barriers

are interlinked, addressing one or more issues could have a positive or a negative impact on other barriers. For instance, failing to address economic barriers could mean failing to address technical, environmental, market and financial barriers as well, as demonstrated in Figure 1.

Electricity and corporate regulations that are not specifically designed for off-grid electricity projects can often hinder or stop these projects. Enabling off-grid projects to expand energy access to rural areas requires a flexible regulatory framework that allows different technologies, projects and business models. In the past, the centralized approach led governments to create regulatory frameworks for large-scale power generation projects. However, off-grid projects are often small-scale projects that cannot afford to face the same technical and legal hurdles. Therefore, the one-size-fits-all approach could hinder small-scale project development or could block the market for small systems.²⁸

Figure 1 Interlinked barriers to renewable energy development.



Source: Simon Müller, Adam Brown and Samantha Ölz. *Policy Considerations for Deploying Renewables*. International Energy Agency (Paris, France), 2011 (Nov), 33. https://www.iea.org/publications/freepublications/publication/Renew_Policies.pdf

²⁶ Bhattacharyya, Subhes C. 2013. "To regulate or not to regulate off-grid electricity access in developing countries". *Energy Policy* 63, 494-503, 500-501.

²⁷ Chirambo, Dumisani. 2016. "Addressing the renewable energy financing gap in Africa to promote universal energy access: integrated renewable energy financing in Malawi". *Renewable & Sustainable Energy Reviews* 62, 793-803, 796.

²⁸ Bhattacharyya and Palit. 2016, 175. Above, note 8.

Countries in sub-Saharan Africa and South Asia have realized the necessity of tailor-made policies and regulations to address off-grid electrification. India has released a draft national policy for mini- and micro-grids which creates a framework and environment for 500 MW capacity over the coming decade.²⁹ Kenya has licensed Powerhive, the first private company receiving a utility concession, to generate, distribute and sell the electricity.³⁰ The company will build and operate 1 MW solar mini-grids to power 100 villages.³¹ So that energy access services can flourish, some countries prefer not to regulate energy projects below a certain size; for instance, Tanzania deregulated small-scale projects below 100 kW.³²

For off-grid investments, tariffs are crucial but pose challenges stemming from several factors: the limited paying capacity of rural communities; expectation of a subsidy created by subsidized grid electricity; higher capital costs and high cost of supply due to low demand; and a high occurrence of peak demand and limited capacity use due to low demand.³³ Higher off-grid tariffs create a disparity between grid-connected and off-grid consumers. This cannot be solved unless there is a significant subsidy provided to mini-grids.³⁴

Integration of electrification and rural development

There is no doubt that the overall benefits of rural electrification could outweigh the possible negative impacts in total. However, waiting for rural electrification programmes to generate spontaneous positive effects in rural areas is a passive attitude. It is suggested that a proactive approach is needed in order to enhance benefits of rural electrification through productive use. As set out in the World Bank report, identification and promotion of productive use of electricity should follow five steps:

- 1 Identify the type of productive activities taking place in each sector and subsector of the targeted rural areas.
- 2 Analyze the production process for each commodity and identify the areas of improvement.
- 3 Assess when electricity can contribute to potential gains, identifying the required equipment.
- 4 Establish the economic viability of a new production process and of the conditions for its implementation.
- 5 Design and implement promotion campaigns tailored to each type of end users.³⁵

For most South Asian and sub-Saharan African countries, agriculture is not only the primary income source but also a critical element of food security. Thus, increasing the use of modern energy services in the agriculture sector could improve the welfare of rural communities. Energy is needed in rural areas for such activities as irrigation, weeding, processing, tobacco curing and pottery making. Additionally, improving the welfare of rural communities through energy access will mitigate rural-urban migration.³⁶

Off-grid electrification provides energy for three different types of use in rural areas: basic household needs, community services and productive uses. Households are the biggest consumers in rural areas. They use energy mainly for cooking, water and space heating, and lighting. Nearly 80 per cent of the energy is used for cooking and heating, especially in the cold seasons.³⁷ Community services such as education and health services require energy to deliver sufficient services to rural communities. Productive use is the one that contributes to rural development but requires a predictable quantity and quality of energy. Unless off-grid solutions cater for productive activities in rural areas with reliable electricity supply, traditional energy uses will continue to exist there.³⁸

29 World Bank. 2017, xvii. Above, note 2.

30 Powerhive. 2017. "Story". <http://www.powerhive.com/> (accessed 11 January 2018).

31 World Bank. 2017, xvii. Above, note 2.

32 Walters et al. 2015, 17. Above, note 15

33 Bhattacharyya and Palit. 2016, 169. Above, note 8.

34 World Bank. 2017, 36. Above, note 2.

35 De Gouvello, Christophe and Laurent Durix. 2008. *Maximizing the Productive Uses of Electricity to Increase the Impact of Rural Electrification Programs*. <https://openknowledge.worldbank.org/bitstream/handle/10986/17538/486430ESMAP0pa10Box338920B01PUBLIC1.pdf?sequence=1&isAllowed=y> (accessed 11 January 2018).

36 Mead, Donald C. and Carl Liedholm. 1998. "The dynamics of micro and small enterprises in developing countries". *World Development* 26, 61-74.

37 Kaygusuz, K. 2011. "Energy services and energy poverty for sustainable rural development". *Renewable & Sustainable Energy Reviews* 15, 936-947, 940.

38 Bhattacharyya and Palit. 2016, 167. Above, note 8.

Because of limited generation capacity and hours of use, off-grid electrification acts as a pre-electrification option, serving limited needs of rural communities such as lighting and TV connections. Lack of productive use capacity and transient appearance of off-grid solutions create the aspiration for grid connection.³⁹ Failing to meet this aspiration creates a sense of discrimination and isolation in the minds of users, therefore leading to the failure of such programmes.⁴⁰ This has led, for example, South Asian rural communities to prefer grid-based electrification to off-grid solutions.⁴¹

Quality and quantity are important for the productive use of electricity. For example, in Kenya, a study finds that access to electricity extends operating hours and increases productivity,⁴² while, in India, a study finds that electricity access increased the number of micro-enterprises that generate employment and income generation activities for rural people.⁴³

Rural electrification programmes are often part of a larger rural economic development programme that aims at poverty alleviation through productive use of electricity.⁴⁴ Two examples from South Asia confirm this fact. The Rural Electrification and Renewable Energy Development Project in Bangladesh and budgetary support for rural electrification in India had larger budgets but allocated only US\$30 million out of US\$230 million and US\$150 million out of US\$5,908 million, respectively, for off-grid rural electrification.⁴⁵ However, this may not always be the end users' objective.⁴⁶ A study of Tanzanian solar home systems found that from the end user's perspective

the main drivers were not productive use but good lighting for children to study and improving indoor air quality.⁴⁷ Bangladesh is often cited as a successful application of solar home systems; however, a study found that either the impact of rural electrification on economic development was not clear or it had a moderate impact on income-generating activities.⁴⁸ Although some argue that sooner or later economic development is going to follow rural electrification,⁴⁹ the present authors' view is that rural electrification and economic development can occur simultaneously if the five steps above are followed when planning rural development.

Rwanda's Girinka programme can be a great example of comprehensive rural development planning combined with rural electrification. The programme entails giving pregnant dairy cows to the poorest rural dwellers for free.⁵⁰ Under the programme, recipients are financially and materially encouraged and helped to install domestic biogas plants that use dung and urine to generate energy. This programme has not only helped generate income for rural Rwandans but also increased their quality of life, as they no longer needed to rely on firewood for cooking or heating.⁵¹

39 Bhattacharyya, Subhes C. and Stephen Dow. 2013. "Regulatory issues related to off-grid electricity access" in *Rural Electrification through Decentralised Off-Grid Systems in Developing Countries*, ed. Bhattacharyya, Subhes C., 151. Springer.

40 Bhattacharyya and Palit. 2016, 168. Above, note 8.

41 Palit and Bandyopadhyay. 2016, 1507. Above, note 18.

42 Kirubi, Charles et al. 2009. "Community-based electric micro-grids can contribute to rural development: evidence from Kenya". *World Development* 37, 1208-1221, 1215.

43 Quoted in World Bank. 2017, 42. Above, note 2.

44 World Bank. 2008. *The Welfare Impact of Rural Electrification: A Reassessment of the Costs and Benefits*, 14. https://siteresources.worldbank.org/EXTRURELECT/Resources/full_doc.pdf (accessed 20 December 2017).

45 Palit and Bandyopadhyay. 2016, 1507. Above, note 18.

46 Urmee et al. 2016, 4. Above, note 9.

47 Liljefors, Pontus and Jakob Sahlin. 2014. "Drivers and barriers for solar home systems (SHS) in rural communities: a case study in Kyerwa, Tanzania". Thesis, University of Stockholm, 40.

48 Mondal, Alam Hossain and Dieter Klein. 2011. "Impacts of solar home systems on social development in rural Bangladesh". *Energy for Sustainable Development* 15, 17-20, 20.

49 Niez, Alexandra. 2010. *Comparative Study on Rural Electrification Policies in Emerging Economies*. International Energy Agency, 10. https://www.iea.org/publications/freepublications/publication/rural_elect.pdf (accessed 19 December 2017).

50 Mudingu, Joseph. "Girinka programme transforms livelihoods, reconciles communities", 1. http://www.minagri.gov.rw/fileadmin/user_upload/SUCCESS_STORY/article_about_Girinka.pdf (accessed 28 December 2017).

51 Ezeanya, Chika and Abel Kennedy. 2017. "Integrating clean energy use in national poverty reduction strategies: opportunities and challenges in Rwanda's Girinka programme" in *The Political Economy of Clean Energy Transitions*, 453. Oxford University Press.

Energy justice in renewable energy development

There is no doubt that the current condition of rural electrification in sub-Saharan Africa and South Asia is unjust and a problem in many ways. Lack of access to modern energy sources has been the primary reason for many problems in rural areas, such as indoor air pollution, poverty and lack of community services (schools, post offices, hospitals). Therefore, removing barriers for rural electrification will not only provide electricity to rural communities but also improve their quality of life and promote sustainable development in those areas. While addressing injustices of energy poverty by creating an enabling environment for off-grid rural electrification is a positive step, building energy infrastructure at any cost could create other injustices that affect the environmental and socioeconomic condition of rural people. The concept of energy justice needs to be employed to eradicate the unjust and problem patterns of energy development in rural areas in sub-Saharan Africa and South Asia.

Energy justice scholarship provides guidance for all stakeholders to take into account when creating, applying and changing energy laws and policies. Energy justice “aims to provide all individuals across all areas with safe, affordable and sustainable energy,”⁵² and has three core tenets, which emphasize distributional, procedural and recognition justice. Energy justice goes beyond merely targeting which energy infrastructure to build but also aims to ensure that justice happens throughout the energy system and life cycle.⁵³

The need for energy justice is evident. Recent reports show that, while 1 billion people do not have access to electricity, 3 billion people lack access to clean cooking.⁵⁴ An injustice within this figure is revealing: 2 billion people across the world have access to electricity but still do not have access to clean cooking. This situation implies that supplying electricity to 2 billion people is either not capable of meeting their needs or not affordable

for people to use for cooking. Both scenarios show that merely building infrastructure does not mean that it will end injustices. Since energy justice aims for more than distributional justice, it urges policymakers to tailor infrastructure to socioeconomic needs and to maintain a certain quality of service.

The rest of this section will briefly discuss the three central tenets of energy justice in the light of renewable energy development in rural areas.

Distributional justice

Distributional justice recognizes the inherently spatial nature of the concept and includes both the physically unequal allocation of environmental benefits and disadvantages and the uneven distribution of their associated responsibilities.⁵⁵ It encourages researchers to investigate where energy injustices emerge across the world.⁵⁶ In sub-Saharan Africa and South Asia, energy poverty is a violation of distributive justice. While billions of people lack access to modern energy services in the regions, especially electricity and clean cooking, the 20 million people of the state of New York, USA, consume the same amount of electricity as the nearly 800 million people of sub-Saharan and Western Africa.⁵⁷

According to energy justice scholars, “if physical security is a basic right, then so are the conditions that create it, such as employment, food, shelter and also unpolluted air, water, and other environmental goods.”⁵⁸ Rural people, therefore, have a right to the minimum level of energy services that will enable them to enjoy a healthy, safe and happy life.⁵⁹ That minimum level depends on the needs and potential of a rural community. While lighting and clean cooking could meet the criteria for some rural communities, productive use of electricity could be necessary to meet the minimum criteria for

52 McCauley, D., R.J. Heffron, H. Stephan and K. Jenkins. 2013. “Advancing energy justice: the triumvirate of tenets”. *International Energy Law Review* 32, 107-110.

53 Heffron, Raphael J. and Darren McCauley. 2017. “The concept of energy justice across the disciplines”. *Energy Policy* 105, 658-667, 659.

54 IEA. 2017. “Energy access outlook 2017”, 11; IEA and World Bank. 2017, 4-6. Above, note 3.

55 Jenkins, Kirsten et al. 2016. “Energy justice: a conceptual review”. *Energy Research & Social Science* 11, 174-182, 176.

56 Ibid., 175.

57 Sovacool, Benjamin K. et al. 2016. “Energy decisions reframed as justice and ethical concerns”. *Nature Energy* 1, 3.

58 Sovacool, Benjamin. 2013. *Energy and Ethics: Justice and the Global Energy Challenge*. Palgrave Macmillan, 165.

59 Ibid., 3.

another community. Therefore, when planning off-grid electrification programmes, it is necessary to recognize the needs of rural communities, whether electricity is required only for basic household needs, for community services or for productive uses.

Distributional justice requires even distribution of benefits and disadvantages to all members of society regardless of income, residence or population density. Therefore, ignoring energy needs of rural communities because of low demand, inadequate population density or poverty is a violation of distributive justice. In addition, since injustices related to distributional justice are more visible, policies at national and international levels have concentrated on solving those injustices. However, “distributive justice is only one piece of the justice puzzle”; there are two other aspects of energy justice that ensure just energy policies.⁶⁰

Procedural justice

Procedural justice, the second tenet, manifests a call for equitable procedures that engage all stakeholders in a non-discriminatory way.⁶¹ Procedural justice concerns all groups being able to take part in the decision-making process and having their voice taken seriously. In addition, full disclosure of information by government and industry is required in procedural justice.⁶²

Procedural justice requires the involvement of rural communities in deciding about projects that will affect them; environmental and social impact assessments must involve genuine community consultation.⁶³

While components of procedural justice, such as environmental impact assessment and public acceptance, are often regarded as barriers to the development of energy projects in the developed countries, these are not a barrier in rural electrification programmes in sub-Saharan Africa and South Asia. Neither international development programmes (e.g. SDG7) nor international reports focusing on rural electrification have focused on procedural justice issues.

Recognition justice

Recognition justice focuses more on equal and effective participation and requires that individuals must be represented fairly and free from all threats.

Recognition justice requires considering which sections of society are ignored or misrecognized.⁶⁴ Non-recognition of the needs of rural communities has been evident in the energy policies of countries in these regions. While most South Asian countries have prioritized extending national grids to reach rural areas, sub-Saharan African countries have focused on urban electrification.

There is a complete lack of attention to recognition justice at the international energy policy level. For instance, recent research on Sierra Leone has found that SDGs were developed by a group of experts in international organizations and are being implemented by governments at the national level without engaging with the energy poor.⁶⁵

Since the intended beneficiaries of the initiative were marginalized in the creation process, this has limited the range of knowledges and perspectives on which SDG7 is based.⁶⁶ Lack of recognition of intended beneficiaries has led to inaccuracy in the figures. For instance, in some

60 Jones, Benjamin R., Benjamin K. Sovacool and Roman V. Sidortsov. 2015. “Making the ethical and philosophical case for ‘energy justice’”. *Environmental Ethics* 37, 145-168, 146.

61 Bullard, Robert. 2005. “Environmental justice in the 21st century” in *Debating the Earth: The Environmental Politics Reader*, ed. Dryzek, John S. and David Schlosberg. Oxford: Oxford University Press.

62 McCauley et al. 2013, 2. Above, note 52.

63 Sovacool et al. 2016, 2. Above, note 57.

64 Jenkins et al. 2016, 177. Above, note 55.

65 Munro, Paul, Greg van der Horst and Stephen Healy. 2017. “Energy justice for all? Rethinking Sustainable Development Goal 7 through struggles over traditional energy practices in Sierra Leone”. *Energy Policy* 105, 635-641, 636.

66 Ibid.

countries, because one government building has access to electricity, a village is counted as having access,⁶⁷ and, in some South Asian countries, because of the village-centric measure of the electrification rate, a whole village is regarded as electrified if one household has access.⁶⁸

Conclusion and future issues

Electrification and access to modern energy sources is one of the main prerequisites of economic and social development for developing countries. It not only provides clean cooking, heating and lighting for individuals but also sets the stage for social services such as hospitals, schools and postal services for rural communities. However, some characteristic features of rural areas (remoteness, low population density) have hindered their connection to the electricity grid. In this article, renewable energy development is examined in terms of its being a solution for such rural areas.

Energy is a capital-intensive sector and developing an off-grid rural electrification programme is no exception. Governments are often willing to receive private sector involvement, as it brings not only private financing but also technical expertise to the projects. However, attracting the private sector requires establishing an enabling policy and regulatory environment. Developing countries need to go beyond a centralized approach and adopt enabling policies that are suitable for off-grid technologies and business models. In addition, clarity in rural electrification plans is needed, as grid connection could undermine the existing off-grid projects.

Off-grid projects are often small-scale projects. Regulations that are not specifically designed for off-grid electricity projects can hinder these projects. Abandoning the one-size-fits-all approach and adopting tailored solutions will provide flexibility to the regulatory framework of a country. Clean cooking, heating and lighting are not the only objectives of rural electrification programmes. One of the main desired results is poverty alleviation through productive use of electricity. Therefore, integration of electrification and rural development is a challenge for policymakers to address. It will not only save rural people

from fuel poverty but also allow them to contribute to the economy. In addition, recent research highlights that less carbon dioxide production (i.e. by encouraging the use of renewable energy) will result in increased societal equality.⁶⁹

This article urges policymakers to include the issue of energy justice concerns in the decision-making process on rural electrification. This will assist in creating an enabling policy and regulatory environment and integrating rural electrification and development programmes. This energy justice thinking will ensure that rural electrification programmes distribute benefits and disadvantages of energy projects evenly, recognize each stakeholders' needs in a non-discriminatory way and respect due process in every phase of energy sector activities.

Economics-centred approaches have encouraged countries to build fossil-based generation capacity leading to global environmental problems.⁷⁰ Countries have continued to invest in fossil fuels even when renewables have significantly fallen in price, as they do not count the social and financial costs of investing in fossil fuel in the long run.

However, there are some initiatives to change the status quo in the energy sector. Recently, the World Bank has announced that it will no longer finance upstream oil and gas after 2019.⁷¹ This implies a shift in thinking about the energy investment paradigm globally, as it could lead banks, lenders and other institutions to adopt a similar attitude against fossil fuels. This presents a chance for developing countries to adopt enabling policies and regulations for renewable energy development, as financing should be rechannelled to renewables. Nevertheless, perhaps the real battle for many countries is to shift their views in relation to their economic thinking and the economic thinking that is imposed on them, but that is an issue worthy of future research on its own. Finally, another issue worthy of further research exploration is that these countries need to think how to achieve a just transition to a low-carbon economy which fits with their Paris COP21 obligation.⁷²

67 Urmee et al. 2016, 2. Above, note 9.

68 Palit and Bandyopadhyay. 2016, 1506. Above, note 18.

69 Chancel, L. and T. Piketty. 2015. *Carbon and Inequality: From Kyoto to Paris*. Paris: Paris School of Economics.

70 For a critique of the role of economics in assisting the building of energy economics, see Heffron, R.J. and D. McCauley. 2017. "The concept of energy justice across the disciplines". *Energy Policy* 105, 658-667.

71 World Bank. 2017. "World Bank Group announcements at One Planet Summit". <http://www.worldbank.org/en/news/press-release/2017/12/12/world-bank-group-announcements-at-one-planet-summit> (accessed 12 January 2018).

72 See the following for more information: Heffron, R.J. and McCauley, D. 2018. "What is the 'just transition'?". *Geoforum* 88, 74-77.

Translated abstracts: Arabic

التزام الأمم المتحدة بتعزيز مصادر الطاقة المتجددة وضرورة مساعدة البلدان النامية على دمج مصادر الطاقة المتجددة في أطرها التشريعية

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ملخص

يُشكل تعزيز مصادر الطاقة المتجددة استراتيجية ضرورية لتحقيق التنمية المستدامة. وتؤدي الطاقة المتجددة دوراً رئيسياً في تمكين البلدان النامية من ضمان أمن الطاقة دون المساس بالبيئة واحتياجات الأجيال المقبلة. وأقرت الأمم المتحدة تدريجياً بأهمية تعزيز استخدام الطاقة الخضراء وإنتاجها. وعقد في عام ٢٧٩١ مؤتمر الأمم المتحدة المعني بالبيئة في استكهولم، وارتبط استخدام الطاقة المتجددة بالتنمية المستدامة لأول مرة. وباتت الحماية البيئية والطاقة المتجددة تُشكلان منذ ذلك الحين جزءاً لا يتجزأ من جدول أعمال المجتمع الدولي. وأكدت أهداف التنمية المستدامة لما بعد عام ٢٠١٥ من جديد أهمية تيسير الانتقال من أنواع الوقود الأحفوري إلى مصادر متجددة. وعلى الصعيد الوطني، يعتمد نجاح التحول إلى الطاقة المتجددة على وجود مؤسسات قوية وأطر قانونية وسياسية محدّدة. ونفذت البلدان بمرور الوقت أدوات داعمة من السياسات واللوائح، مثل الحوافز الضريبية ونُظم السداد المخصصة. ويهدف المقال إلى تأكيد أهمية تعزيز مصادر الطاقة المتجددة ودمجها في الأطر القانونية للبلدان النامية وتشجيع المستثمرين والمستهلكين على زيادة مستوياتهم من إنتاج الطاقة المتجددة واستهلاكها.

التنمية الريفية من خلال الطاقة المتجددة: دراسة حالة في بوليفيا

آدرينا جوريجوي زابالغا

ملخص

تتعرض التنمية الريفية في بوليفيا للخطر بدون مصادر طاقة بديلة متجددة. وتُستكشف هذه الورقة إمكانات الطاقة المتجددة في بوليفيا في تعزيز التنمية في المناطق الريفية. وتُحلل الورقة الإطار القانوني لهذا القطاع وتتناول بالوصف مواءمة سياسات الطاقة المتجددة في بوليفيا مع الهدف ٧ للتنمية المستدامة، وتُستكشف إمكانات بوليفيا في مجال توليد الكهرباء من خلال المصادر المتجددة في المناطق الريفية. وإذا تغلبت بوليفيا على تحديات تغيير مصفوفة الطاقة لديها، وذلك عن طريق تعزيز الطاقة المتجددة المناسبة للخصائص الجغرافية والاقتصادية والاجتماعية للبلد، فسوف تنجح في تحقيق نقلة نوعية والدفع بعجلة التنمية الريفية.

قضايا يواجهها تطوير الطاقة المتجددة في البلدان النامية

وليد لبادي

ملخص

شهدت السنوات منذ عام ٢٠٠٢ تغييرات كبيرة في سوق الطاقة العالمية، خاصة في ميدان مصادر الطاقة المتجددة. وباتت الطاقة الشمسية وطاقة الرياح أكثر كفاءة وأقل تكلفة، وأتاحت بالتالي للبلدان النامية فرصاً غير مسبوقة لتوفير الطاقة المستدامة لمواطنيها. وأجرت مصر، بمساعدة من البنك الدولي، إصلاحات هامة من أجل وضع الأطر الاقتصادية والقانونية والتعاقدية اللازمة لاجتذاب الاستثمارات المباشرة الأجنبية في مشاريع الطاقة الشمسية. ومكّنت تلك الإصلاحات توزيع المخاطر توزيعاً واضحاً وشفافاً اجتذب المستثمرين في نهاية المطاف.

ويضطلع مقررو السياسات في البلدان النامية بدور رئيسي في زيادة مقومات استدامة برامج الطاقة المتجددة. وركزت الإصلاحات التي أُجريت في مصر على خمسة مجالات رئيسية: (١) تحقيق الاستقرار في بيئة الاقتصاد الكلي؛ (٢) توضيح ترتيبات التنظيم ومنح التراخيص؛ (٣) وضع ترتيبات تعاقدية محكمة الصياغة ومنصفة؛ (٤) تقديم تعهدات من الحكومة إلى المقرضين؛ (٥) توفير نُظم فعالة لإنفاذ ضمانات المقرضين. ويثبت نجاح تجربة مصر أن التزام الحكومات بإصلاح السياسات واللوائح التنظيمية يمكن أن يكون السبيل نحو نجاح تنفيذ برامج الطاقة المتجددة في البلدان النامية.

تطبيقات مختلفة لسياسات الطاقة المتجددة في القطاع الزراعي: مقارنة بين البلدان النامية والبلدان المتقدمة النمو

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ملخص

توضح هذه المقالة مدى الحاجة الملحة إلى التحول نحو نظام للموارد المتجددة، وتشرح كيف أن هذا التحول بات نقطة رئيسية مشتركة بين البلدان النامية والمتقدمة النمو. وبالتالي فإن التحول الإيكولوجي، أو بعبارة أدق، التحول نحو نموذج إنتاج أكثر نظافة، يعتمد على مصادر الطاقة المستدامة، أي المصادر المتجددة ذات الأثر الكربوني الأقل.

وتُحلل هذه المقالة مختلف تطبيقات سياسات الطاقة المتجددة في القطاع الزراعي بين نوعين من البلدان: البلدان المتقدمة النمو في نصف الكرة الشمالي والبلدان النامية في نصف الكرة الجنوبي. وسوف تُركز على سياسة الطاقة المتجددة المنفذة في إيطاليا كجزء من استراتيجية الاتحاد الأوروبي لتعزيز وزيادة إنتاج الكهرباء من مصادر الطاقة المتجددة.

المدن المزودة بالطاقة الشمسية في الهند، حالة الطاقة المتجددة في شمالا هيماشال براديش

اديفيت ناث

ملخص

في ظل توقع ازدياد عدد سكان العالم إلى ٠١ مليارات نسمة بحلول عام ٠٥٠٢، لا بد أن يواكب استهلاك الطاقة تلك الزيادة. وتشير التوقعات إلى أن أنواع الوقود الأحفوري الضارة بالبيئة التي تُلبى معظم احتياجاتنا الحالية من الطاقة، ستستنفد تماماً في غضون ٠٥ عاماً، وفقاً للتنبؤات فإن الطاقة المتجددة والقوى الشمسية على وجه الخصوص، ستكون أهم مصدر للطاقة. وتتصدّر الهند والصين سوق الطاقة الشمسية في العالم، وتهدف الهند إلى توفير ٠٤ في المائة من احتياجاتها من الطاقة من مصادر متجددة بحلول عام ٠٣٠٢ من خلال المجمعات والتكنولوجيات الشمسية المبتكرة التي لا تزال تكاليفها آخذة في الانخفاض. وسنّت الهند مجموعة من القوانين لتحفيز استخدام الطاقة المتجددة وإعطاء الأولوية إلى ٠٦ مدينة في أنحاء البلاد كي تصبح مدناً شمسية. وأثبتت مدينة شيملا في ولاية هيماشال براديش في الأنحاء الشمالية من الهند أن مشاريع الطاقة الشمسية البسيطة نسبياً يمكن باستثمارات متواضعة نسبياً أن تعود بفوائد جمة في شكل تخفيضات في انبعاثات غازات الدفيئة وزيادة في الكهرباء الخضراء، وهي مثال للطريقة التي يمكن أن نتجه بها نحو الشمس لتوفير الطاقة لمستقبلنا.

معالجة مسائل المشاطأة في مشاريع التنمية الريفية

كيشور أويرتي

ملخص

يمكن لمشاريع التنمية الريفية أن تثير قضايا معقدة أثناء إعدادها، ويحتاج ذلك إلى معالجة مباشرة. ويمكن أن تتعلق ليس فقط بضمان الوفاء بالشروط الأساسية المسبقة للبنية الأساسية من أجل تحسين ظروف المعيشة في المناطق الريفية وتطوير الإمكانيات القائمة والجديدة ضمن نطاق بلد واحد، بل وكذلك دمج الشواغل البيئية والشاغل الوطنية التي تتجاوز الحدود الوطنية.

تنمية الطاقة المتجددة والعدالة في الحيز الريفي

رالف هيفرون، عثمان زينغين

ملخص

يُحدّد الهدف ٧ للتنمية المستدامة الوصول إلى الطاقة الميسورة التكلفة والموثوقة والمستدامة والحديثة باعتباره عاملاً رئيسياً في خطة التنمية لما بعد عام ٢٠١٥. وتشير تقديرات البنك الدولي إلى أن حوالي مليار نسمة لا يمكنهم الحصول على الطاقة وأن نحو ٣ مليارات نسمة لا يزالون معتمدين على مصادر الطاقة التقليدية لتلبية احتياجاتهم الأساسية. ودأب قطاع الطاقة على الاسترشاد بنهج محوره الاقتصاد دونما أي مراعاة للقضايا البيئية والاجتماعية. ولا بد لتحقيق الهدف ٧ للتنمية المستدامة أن يركز المشرعون ومقررو السياسات على قضايا العدالة بالإضافة إلى تهيئة بيئة تمكّن من اجتذاب المستثمرين من القطاع الخاص. وينبغي أن تراعي عملية صنع القرارات المتعلقة بكهربة الريف أبعاد عدالة الطاقة: التوزيع والإجراءات والاعتراف. وتتعلق عدالة التوزيع بمسألة التوزيع غير المتكافئ للعوامل الخارجية بين أصحاب المصلحة؛ وتتطلب العدالة الإجرائية إجراءات غير تمييزية تتيح لجميع أصحاب المصلحة المشاركة في عمليات صنع القرار؛ وأخيراً، تُركز عدالة الاعتراف على مشاركة جميع المجتمعات المحلية داخل البلد وتمثيل احتياجاتها على قدم المساواة. وعندما توضع قضايا عدالة الطاقة في صميم سياسات تنمية الطاقة، ستصبح برامج كهربة الريف أكثر شفافية، وعادلة، وغير تمييزية.

Translated abstracts: French

Actions des Nations Unies concernant la promotion des énergies renouvelables et la nécessité d'aider les pays en développement à intégrer cette question dans leurs cadres juridiques

Davide Di Marcantonio, Luca Nardini, Giulia Rizzo et Liu Siqi

Résumé

Le développement durable passe par la promotion des énergies renouvelables. Celles-ci jouent un rôle essentiel en permettant aux pays en développement de garantir leur sécurité énergétique sans compromettre l'environnement ni la satisfaction des besoins des générations futures. L'Organisation des Nations Unies a progressivement reconnu combien il était important de promouvoir l'utilisation et la production d'énergies vertes. En 1972, elle a organisé la Conférence des Nations Unies sur l'environnement humain à Stockholm, pendant laquelle, pour la première fois, le recours à des sources d'énergies renouvelables a été rattaché au développement durable. Depuis lors, la protection de l'environnement et les énergies renouvelables font partie intégrante du programme d'action de la communauté internationale. Récemment, les objectifs de développement durable pour l'après-2015 ont permis de réaffirmer qu'il fallait faciliter la transition entre carburants fossiles et sources d'énergies renouvelables. Au niveau des pays, le succès du passage aux énergies renouvelables dépend de l'existence d'institutions solides et de cadres juridiques et politiques spécifiques. Au fil du temps, les pays ont mis en place des politiques et des instruments de réglementation porteurs, notamment des incitations fiscales et des régimes de paiement ad hoc. L'article vise à souligner combien il est important de promouvoir et d'intégrer la question des énergies renouvelables dans les cadres juridiques des pays en développement et d'encourager à la fois les investisseurs et les consommateurs à produire et à consommer davantage d'énergies renouvelables.

Développement durable fondé sur les énergies renouvelables: étude de cas en Bolivie

Adriana Jáuregui Zabalaga

Résumé

S'il ne peut s'appuyer sur de nouvelles sources d'énergies renouvelables, le développement rural en Bolivie est compromis. Dans le document, l'auteure examine la mesure dans laquelle les énergies renouvelables sont susceptibles de favoriser le développement rural en Bolivie. Elle analyse le cadre juridique du secteur, évalue la cohérence des politiques menées par la Bolivie en matière d'énergies renouvelables avec l'Objectif de développement durable 7, et se penche sur les possibilités de production d'électricité à partir de sources d'énergies renouvelables dans les zones rurales. Si la Bolivie surmonte les difficultés de la transition énergétique, en privilégiant les énergies renouvelables adaptées aux caractéristiques géographiques, économiques et sociales du pays, elle réussira à faire évoluer les modèles et à donner un coup de fouet au développement rural.

Enjeux associés à l'essor des énergies renouvelables dans les pays en développement

Walid Labadi

Résumé

Depuis 2008, d'importants changements ont eu lieu sur le marché mondial de l'énergie, en particulier dans le secteur des énergies renouvelables. Les énergies solaire et éolienne sont devenues plus efficaces et moins coûteuses, ouvrant ainsi aux pays en développement des perspectives sans précédent s'agissant de fournir durablement de l'énergie à leurs citoyens. Avec l'aide de la Banque mondiale, l'Égypte a engagé d'importantes réformes visant la mise en place des conditions économiques, juridiques et contractuelles propres à attirer les investissements étrangers directs en faveur des projets relatifs à l'énergie solaire. Ces réformes ont permis de répartir les risques d'une manière précise et transparente, ce qui a fini par séduire les investisseurs.

Les responsables politiques des pays en développement jouent un rôle essentiel en améliorant la viabilité des programmes relatifs aux énergies renouvelables. Les réformes menées par l'Égypte ont été articulées autour de cinq grands axes, à savoir: 1) stabiliser l'environnement macroéconomique; 2) définir précisément les mécanismes réglementaires et les procédures d'agrément; 3) élaborer des accords contractuels bien conçus et équitables; 4) assurer l'engagement de l'État auprès des prêteurs; et 5) mettre en place des systèmes de sécurité efficaces à l'intention des prêteurs. Le succès de l'expérience égyptienne montre que la détermination des gouvernements à conduire des réformes politiques et réglementaires peut aboutir à la mise en œuvre de programmes relatifs aux énergies renouvelables dans les pays en développement.

Différentes applications des politiques relatives aux énergies renouvelables dans le secteur agricole: comparaison entre pays en développement et pays développés

Celeste Mellone, Andrea Gentili et Sara Bakli

Résumé

L'article illustre combien il est urgent de passer à un système durable d'énergies renouvelables et explique comment cette transition est devenue un enjeu essentiel tant pour les pays développés que pour les pays en développement. C'est pourquoi, la transition écologique, ou plus précisément la conversion à un modèle de production plus propre, repose sur les énergies durables, c'est-à-dire les énergies renouvelables à empreinte carbone réduite.

L'article présente une analyse des différentes applications des politiques relatives aux énergies renouvelables dans le secteur agricole de deux types de pays: les pays développés de l'hémisphère nord et les pays en développement de l'hémisphère sud. Il aborde ensuite la politique relative aux énergies renouvelables menée par l'Italie dans le cadre de la stratégie de l'Union européenne visant à promouvoir et à accroître la production d'électricité à partir de sources d'énergies renouvelables.

Villes solaires indiennes: les avantages de l'utilisation de l'énergie durable à Shimla, dans l'État du Himachal Pradesh

Advit Nath

Résumé

Étant donné que, selon les prévisions, la population mondiale s'élèvera à 10 milliards de personnes d'ici à 2050, la consommation énergétique devra suivre cette évolution. Les carburants fossiles néfastes pour l'environnement qui nous permettent de satisfaire la plupart de nos besoins énergétiques devraient être totalement épuisés d'ici 50 ans, et les énergies renouvelables, l'énergie solaire en particulier, deviendront probablement nos principales sources d'énergie. Pays classés en tête sur le marché mondial de l'énergie solaire, l'Inde et la Chine montrent la voie. L'Inde espère que les énergies renouvelables couvriront 40% de ses besoins énergétiques d'ici à 2030, grâce à des technologies et à des centrales solaires innovantes désormais moins coûteuses. Elle a institué une série de lois incitant à recourir aux énergies renouvelables et a choisi 60 villes prioritaires à travers le pays vouées à devenir des villes solaires. Avec un investissement relativement modeste, Shimla, une ville de l'État de l'Himachal Pradesh située dans le nord de l'Inde, montre que des projets relatifs à l'énergie solaire assez simples peuvent apporter des avantages importants en termes de réduction des gaz à effet de serre et de production d'électricité verte, illustrant la façon dont nous pouvons faire du soleil la source d'énergie de notre avenir.

Gestion des problématiques riveraines dans les projets de développement rural

Kishor Uprety

Résumé

Au stade préparatoire, les projets de développement rural peuvent soulever des problèmes complexes auxquels il faut s'attaquer d'emblée. Il s'agit non seulement de veiller à ce que les conditions préalables concernant les infrastructures indispensables à l'amélioration des conditions de vie dans les zones rurales puissent être satisfaites et à ce que le potentiel existant et nouveau puisse être valorisé au sein d'un pays, mais aussi d'intégrer les problématiques environnementales et riveraines qui dépassent les frontières nationales.

Développement des énergies renouvelables et justice dans les zones rurales

Osman Zengin et Raphael Heffron

Résumé

L'Objectif de développement durable (ODD) 7 définit l'accès à des services énergétiques fiables, durables, modernes et à un coût abordable comme un facteur clé du programme de développement pour l'après-2015. Selon les estimations de la Banque mondiale, environ un milliard de personnes n'a pas accès aux services énergétiques et près de trois milliards dépendent encore de sources d'énergies traditionnelles pour satisfaire leurs besoins fondamentaux. Le secteur de l'énergie a toujours été axé sur des considérations économiques au détriment des considérations environnementales et sociales. Pour atteindre l'ODD 7, les régulateurs et les décideurs doivent se pencher sur les questions de justice et ne pas se limiter à créer un environnement visant à attirer les investisseurs privés. Il faut que la prise de décision relative à l'électrification des zones rurales prenne en compte trois dimensions de la justice énergétique: la justice distributive, la justice procédurale, et la justice comme reconnaissance. *La justice distributive*

aborde la question de la distribution inégale des externalités entre les acteurs; *la justice procédurale* suppose des procédures non discriminatoires qui associent tous les acteurs à la prise de décision; enfin, *la justice comme reconnaissance* met l'accent sur la participation de toutes les communautés d'un pays sur un pied d'égalité et la représentation de leurs différents besoins. En plaçant la justice énergétique au cœur des politiques de développement énergétique, les programmes d'électrification dans les zones rurales seront plus transparents, plus justes et non discriminatoires.

Translated abstracts: Spanish

El compromiso de las Naciones Unidas de fomentar las energías renovables y la necesidad de ayudar a los países en desarrollo a integrar las energías renovables en sus marcos legislativos

Davide Di Marcantonio, Luca Nardini, Giulia Rizzo y Liu Siqi

Resumen

El fomento de las energías renovables es una estrategia necesaria para lograr el desarrollo sostenible. La energía renovable resulta fundamental para garantizar la seguridad energética de los países en desarrollo sin afectar el medio ambiente ni las necesidades de las generaciones futuras. Las Naciones Unidas han dado cada vez más importancia a la promoción del uso y la producción de energía verde. En 1972, se celebró en Estocolmo la Conferencia de las Naciones Unidas sobre el Medio Humano y, por primera vez, se vinculó el uso de fuentes de energía renovables con el desarrollo sostenible. Desde entonces, la protección del medio ambiente y la energía renovable han sido parte integrante de la agenda de la comunidad internacional. La importancia de facilitar la transición de los combustibles fósiles a las fuentes renovables se ha reafirmado recientemente en los Objetivos de Desarrollo Sostenible para después de 2015. A escala nacional, el éxito del cambio hacia la energía renovable depende de la existencia de instituciones sólidas y de políticas y marcos jurídicos específicos. Con el tiempo, los países han ido adoptando políticas e instrumentos normativos en esta esfera, como incentivos fiscales y mecanismos de pagos especiales. El artículo tiene por objeto subrayar la importancia de fomentar e integrar las energías renovables en los marcos jurídicos de los países en desarrollo y alentar tanto a los inversores como a los consumidores a aumentar la producción y el consumo de energías renovables.

Desarrollo rural por medio de la energía renovable: el caso de Bolivia

Adriana Jáuregui Zabalaga

Resumen

Sin fuentes alternativas de energía renovable, el desarrollo rural de Bolivia está en peligro. En este documento se examina el potencial de la energía renovable en Bolivia para fomentar el desarrollo de las zonas rurales. En él se analiza el marco jurídico del sector, se describe en qué medida las políticas bolivianas en materia de energía renovable están en consonancia con el Objetivo de Desarrollo Sostenible 7 y se examina el potencial del país para la generación de electricidad en las zonas rurales a partir de fuentes renovables. Si Bolivia supera los desafíos que implica el cambio de su matriz energética, mediante la promoción de energías renovables adecuadas a las características geográficas, económicas y sociales del país, hará realidad un cambio de paradigma e impulsará el desarrollo rural.

Cuestiones relativas al desarrollo de la energía renovable en los países en desarrollo

Walid Labadi

Resumen

Desde el año 2008 se han producido cambios significativos en el mercado energético mundial, sobre todo en el ámbito de las energías renovables. La energía solar y la energía eólica son ahora más eficientes y económicas, por lo que los países en desarrollo tienen una oportunidad sin precedentes de proporcionar energía sostenible a sus ciudadanos. Con la ayuda del Banco Mundial, Egipto ha realizado reformas importantes con el objeto de crear los marcos económico, jurídico y contractual necesarios para atraer inversiones extranjeras directas en proyectos de energía solar. Estas reformas han permitido determinar los riesgos de forma clara y transparente, lo que, en última instancia, ha atraído a los inversores.

En los países en desarrollo, los encargados de formular políticas desempeñan un papel fundamental en lo que respecta a la viabilidad de los programas de energía renovable. Las reformas llevadas a cabo en Egipto se han centrado en cinco ámbitos: 1) la estabilización del entorno macroeconómico; 2) la aclaración de las disposiciones contenidas en la normativa y en las licencias; 3) la elaboración de acuerdos contractuales bien redactados y equitativos; 4) el establecimiento de compromisos gubernamentales en relación con los prestamistas, y 5) el establecimiento de regímenes eficaces para ofrecer garantías a los prestamistas. El éxito de la experiencia de Egipto demuestra cómo la adopción de políticas y las reformas legislativas por parte de los gobiernos pueden facilitar la ejecución de programas de energía renovable en los países en desarrollo.

Diferentes aplicaciones de las políticas relativas a la energía renovable en el sector agrícola: comparación entre los países en desarrollo y los países desarrollados

Celeste Mellone, Andrea Gentili y Sara Bakli

Resumen

En este artículo se ilustra la urgencia de avanzar hacia un sistema sostenible de recursos renovables, y se explica cómo esa transición se ha convertido en un punto importante que los países en desarrollo y los países desarrollados tienen en común. En consecuencia, la transición ecológica o, más exactamente, la conversión hacia un modelo de producción más limpio, depende de las energías sostenibles, es decir, energías renovables con menor huella de carbono.

En el presente trabajo se analizan las diferentes aplicaciones de las políticas sobre energía renovable en el sector agrícola de dos tipos de países: los países desarrollados del hemisferio norte y los países en desarrollo del hemisferio sur. A continuación, el artículo se centra en la política relativa a la energía renovable aplicada por Italia en el marco de la estrategia de la Unión Europea para fomentar e incrementar la producción de electricidad a partir de fuentes de energía renovables.

Ciudades solares de la India: el uso de la energía renovable en Shimla, Himachal Pradesh

Advit Nath

Resumen

Se estima que la población mundial alcanzará los 10 000 millones de personas en 2050 y que el consumo de energía seguirá el mismo ritmo. Se calcula que los combustibles fósiles, que son perjudiciales para el medio ambiente y satisfacen la mayor parte de nuestras necesidades energéticas actuales, se agotarán por completo dentro de 50 años, y que la energía renovable, en particular la energía solar, será la principal fuente de energía. La India y China están a la cabeza del mercado mundial de energía solar, y para 2030 la India se propone satisfacer el 40 % de sus necesidades de energía a partir de fuentes renovables, invirtiendo en parques solares y tecnologías innovadoras, cuyo costo se ha reducido paulatinamente. La India ha aprobado diversas leyes para incentivar el uso de energía renovable y ha seleccionado 60 ciudades de todo el país para que se conviertan en ciudades solares. Con una inversión relativamente modesta, la ciudad de Shimla, en el estado septentrional de Himachal Pradesh, está demostrando que los proyectos de energía solar relativamente sencillos pueden reportar beneficios considerables al reducir la emisión de gases de efecto invernadero y aumentar la electricidad verde, como ejemplo del modo en que podemos utilizar el sol como motor de nuestro futuro.

Gestión de las cuestiones ribereñas en los proyectos de desarrollo rural

Kishor Uprety

Resumen

Los proyectos de desarrollo rural pueden plantear cuestiones complejas durante su preparación, que deben abordarse desde el principio. Entre ellas, cabe mencionar el cumplimiento de los requisitos previos en materia de infraestructura para mejorar las condiciones de vida en las zonas rurales y el desarrollo de potenciales nuevos y existentes en el ámbito de un país, así como la integración de los aspectos medioambientales y ribereños que trascienden las fronteras nacionales.

Desarrollo de la energía renovable y justicia en los espacios rurales

Osman Zengin y Raphael Heffron

Resumen

El Objetivo de Desarrollo Sostenible (ODS) 7 señala el acceso a una energía asequible, segura, sostenible y moderna como factor clave de la agenda de desarrollo para después de 2015. Según estimaciones del Banco Mundial, aproximadamente 1 000 millones de personas carecen de acceso a la energía y unos 3 000 millones siguen dependiendo de las fuentes tradicionales de energía para satisfacer sus necesidades básicas. Tradicionalmente, el sector energético se ha regido por criterios económicos sin tener en cuenta las cuestiones ambientales y sociales. A fin de lograr el ODS 7, los legisladores y los encargados de formular políticas deberían centrarse en las cuestiones de justicia, además de crear un entorno propicio para atraer a los inversores del sector privado. El proceso de toma de decisiones sobre la electrificación rural debería tener en cuenta tres dimensiones de la justicia energética: la distribución, los procedimientos y el reconocimiento. La *justicia en la distribución* se ocupa de la desigual distribución

de los factores externos entre las partes interesadas; la *justicia en los procedimientos* prevé el establecimiento de procedimientos no discriminatorios en los que participen todas las partes interesadas en los procesos de toma de decisiones; por último, la *justicia en el reconocimiento* se centra en la participación equitativa de todas las comunidades de un país y en la representación de sus necesidades. Al hacer que las cuestiones de justicia energética ocupen un lugar central en las políticas de desarrollo energético, los programas de electrificación rural serán más transparentes, justos y menos discriminatorios.

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