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Providing clean energy and energy access through cooperatives

International Labour Office
Cooperatives Unit (COOP)
Green Jobs Programme

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FOREWORD

Access to clean, affordable energy remains a major challenge in the world today, with 1.3 billion people without access to electricity and 2.6 billion people without clean cooking facilities.

Not surprisingly, the poor are the most affected. It is mainly those living on less than a dollar a day who lack access to modern energy. At the same time, poor families spend a much higher proportion of their total income on 'poorer' energy sources than richer families spend on more modern energy because it is a basic need. The share of their income the poorest households spend on energy can be up to 20 times higher than for the richest.

Ironically, poor energy sources - such as kerosene for lighting - are also often more expensive than electricity or solar lighting. Contrary to widely held believes, the obstacle to ending energy poverty is not the ability or the willingness of the poor to pay for modern energy sources. Nor is it a question of affordable technology. Off-grid and mini-grid solutions powered by renewables are the least costly option in remote areas and widely available. Ending energy poverty hinges on how to enable the poor to access modern energy services in the places where they live.

In many countries and localities where government do not provide modern energy services to the poor, the poor themselves can breach the gap through the creation of enterprises. Energy cooperatives can provide access, generating and distributing affordable clean power. The cases studies assembled in this publication demonstrate how cooperatives not just provide access to affordable clean energy. They also create local jobs and allow people to decide on power generation and distribution. As value-driven, membership based organizations, cooperatives can empower and give voice to those who have previously been excluded from services and decision making.

The ILO's Enterprises Department presents this collection of case studies on cooperatives in energy production, distribution and consumption as a contribution to the on-going search for ways in which the goal of Sustainable Energy for All proclaimed by the Secretary General of the United Nations and endorsed by the international community can be turned into a reality. Energy cooperatives are a powerful way to achieve this goal. They should therefore be given due consideration in the discussions about a post-2015 development agenda and the means for implementing it.

Peter Poschen
Director, Enterprises Department

ABBREVIATIONS

BDH	Biomass district heating
CHP	Combined heat and power
ENSRC	Energy Self Supply in Rural Communities Project
EU	European Union
ICA	International Cooperative Alliance
IEA	International Energy Agency
IFC	International Finance Corporation
ILO	International Labour Organization
IYC	United Nations International Year of Cooperatives 2012
MDG	Millennium Development Goal
NGO	Non-governmental organization
NRECA	National Rural Electric Cooperative Association (USA)
OECD	Organization for Economic Cooperation and Development
PBS	*Palli Bidyut Samities* – rural energy cooperatives (Bangladesh)
PV	Photovoltaic
REA	Rural Electrification Administration (USA)
REB	Rural Electrification Board (Bangladesh)
SCPL	Sociedad Cooperativa Popular Limitada (Argentina)
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
USAID	United States Agency for International Development

INTRODUCTION

The year 2012 was both the United Nations International Year of Cooperatives and the United Nations International Year of Sustainable Energy for All. As a result, the attention paid to these two themes was increased. Accordingly, at the United Nations Conference on Sustainable Development ("Rio+20"), which took place in June 2012, both of these themes were highlighted: cooperatives as drivers of sustainable development, social inclusion and poverty reduction, and access to energy as a critical issue for development processes, including for eradicating poverty and helping to provide basic human needs.[1] This paper addresses some of the important issues related to the role of cooperatives as producers and providers of clean energy, and shows how cooperatives can both improve access to energy as well as increase production of sustainable, renewable energy.

Energy is a development issue, and ensuring that people have access to an adequate supply of high-quality energy is fundamental to achieving sustainable economic, social and environmental development. Energy is not included as a Millennium Development Goal (MDG) as such, however it is related to the achievement of several of the MDGs. For many people around the world the ability to earn a decent living is dependent on access to energy, and the connections between energy and economic activity are widely recognized.[2]

The ongoing and intensifying debate around the post-2015 development framework addresses energy in a more comprehensive way than the MDG framework. In their report the UN Secretary-General's High-Level Panel of Eminent Persons on the Post-2015 Development Agenda introduced a set of 12 illustrative goals to be included in the post-2015 framework; one of the proposed goals is to secure sustainable energy, to be achieved through increasing the share of renewable energy, ensuring universal access to modern energy services, improving the energy efficiency in different sectors and phasing out inefficient fossil fuel subsidies.[3]

The post-2015 discussions so far have not widely emphasized the cooperative model. The case studies included in this paper show that cooperatives have the capacity to contribute to achieving any goal related to clean energy production or energy access.

Through a selection of case studies and examples from around the world this paper aims to raise awareness on how energy can be made accessible and affordable through the promotion and support of energy cooperatives, particularly in relation to renewable energy. The paper both contributes to raising awareness on the cooperative model enterprise and provides insights into how the cooperative model is contributing to bringing sustainable energy to different areas of the world and its potential for further growth.

The contribution of cooperatives to sustainable development

Cooperatives are sustainable enterprises that work for the sustainable development of their local communities through policies approved by their members.[4] Cooperatives and the cooperative movement have been addressing these issues for over 150 years – since the first formal cooperative was established. Similarly, but driven by a global concern of the environmental limits of the planet, the World Commission on Environment and Development (the

1 United Nations: UN General Assembly Resolution 66/288: *The future we want* (11 September, 2012).
2 Practical Action: *Poor People's Energy Outlook 2012: Energy for earning a living* (Rugby, 2012), p. 7.
3 United Nations Secretary-General's High-Level Panel of Eminent Persons on the Post-2015 Development Agenda: *A new global partnership: Eradicate poverty and transform economies through sustainable development* (New York, 2013).
4 ILO: Promotion of Cooperatives Recommendation, 2002. Available at: http://www.ilo.org.

Brundtland Commission) famously defined the term sustainable development as *"meeting the needs of the present generation without compromising the ability of future generations to meet their own needs"*.[5]

Despite the fact that sustainable development and the cooperative movement were born out of different motivations, they address – although to different degrees and at different levels – a common ground: to reconcile economic, social and environmental needs, be it the needs of a local community or the needs of the whole world. Accordingly, cooperatives are ideally placed to promote sustainable development and foster a "Green Economy"* – which was adopted by Rio+20 as a practical concept and vehicle for achieving sustainability. As member-based organizations, cooperatives are designed to help their members meet their economic and social needs and aspirations, which often depend on the availability of natural resources and a healthy natural environment. As democratic and participatory organizations, they encourage equity and equality. As economic entities, cooperatives provide their members with commercial services, which in the context of the Green Economy and renewable energy could derive from opportunities in emerging green sectors. As locally rooted institutions, they reflect their communities' concerns about social justice and the environment. As enterprises operating under values and principles that include social responsibility and caring for their communities, they strive to serve members not solely in economic terms, but also in terms of the wider social, cultural and environmental benefits. Cooperatives therefore encourage people to take a longer-term view by creating common expectations and a basis for cooperation that goes beyond individual interests. While short-term economic thinking is often seen as the main driver of environmental destruction, cooperatives strive for longer-term benefits, making them best placed to harness the longer-term paybacks of a Green Economy.

Cooperatives bring together an estimated one billion people worldwide. Ranging from micro-scale community organizations to multi-billion dollar global enterprises, cooperatives are estimated to employ more than 100 million people. They therefore have enormous potential to mobilize their members and the general public through advocacy, information sharing, and education and training.

Cooperatives have also been found to be resilient to crisis, thus making them sustainable in terms of longevity. Many cooperatives have long histories, attesting to the fact that they are flexible and adapt to new realities in the marketplace and environment. Therefore, just as there is evidence that more people choose the cooperative form of enterprise as a way to respond to new economic realities, we also see that people are choosing cooperatives to respond to other exigent realities, such as climate change and environmental degradation.

The value of the cooperative business model for providing clean energy and energy access

A particular focus of the sustainable development debate has been energy. Energy is a main ingredient for meeting social needs and enabling economic growth. However, energy-related carbon dioxide emissions are at an historic high, causing the climate to change. The ever rising demand for energy and resultant concerns regarding national energy security cause market volatility, increasing energy prices and economic turmoil. Meanwhile, 1.3 billion people still nave no access to electricity and 2.7 billion are without modern cooking energy – a number

* UNEP defines a Green Economy as one that results in "improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities". In its simplest expression, a Green Economy is low carbon, resource efficient and socially inclusive (UNEP, 2011, Green Economy Report).

5 World Commission on Environment and Development: *Our common future* (1987) (Oxford, OUP). Available at: http://www.un-documents.net/wced-ocf.htm

that is projected to rise by 200 million by 2030, with increases in South Asia and Africa.[6] The situation is especially alarming in developing countries, where access to energy is much lower than in the developed countries and where over half of the population rely on solid fuels for cooking. As well as being a source of greenhouse gas emissions, these fuels create serious health problems – indoor pollution resulting from cooking with biomass fuels or coal is responsible for an estimated 2 million deaths every year.[7]

These current environmental and economic trends emphasize the need to rethink our global energy systems. A new energy approach is needed if we are to achieve the objectives of providing energy access to all and ensuring energy security and stable markets while addressing climate change and local pollution. While the accelerated transition towards renewable energy systems offers a technological solution to addressing these problems, a social and economic solution still need to be found.

Technologically, there is a unique opportunity for the developing countries to leapfrog conventional energy systems and directly build up renewable technologies. In contrast, developed countries need to adapt their energy infrastructure to accommodate modern renewable energies. While several developed and emerging economies are massively scaling up investments in renewable energy, providing this technology to economies and populations with no access to modern energy technology still remains a major social and economic challenge.

Regarding the economic challenge, critics say that renewable energy is not affordable to developing countries and the poor. But with costs of renewable energy technology decreasing and the prices of fossil fuels projected to continue to rise, it is estimated that 70 per cent of the electricity access needs are most affordably met through renewable energy. For 65 per cent of the non-electrified households the cheapest method of supplying power is though mini-grids, and in 45 per cent of households, by using off-grid technology.[8] Accordingly, providing the poor with access to energy requires rethinking energy investments, moving away from central grid infrastructure by large utilities and exploring locally available renewable energy opportunities.

The International Energy Agency (IEA) estimates that the annual cost of reaching the goal of universal energy access will be around US$48 billion between 2012 and 2030.[9] In comparison, the International Finance Corporation (IFC) indicates that those people without access to modern energy services spend US$37 billion per year globally on low-quality cooking and lighting energy.[10] The poor spend three to ten times more of their disposable income on energy than the rich. Indeed, the poor are already spending nearly as much on fuels as would be required in capital investment to provide accessible renewable energy (which has high upfront costs but very low operating costs). In addition, the energy services currently available to the poor are often unreliable and of poor quality.

In light of the above, it seems that households' access to modern energy is restricted not only because of its economic cost, but also due to lack of finance and political institutions, governance and policy, the lack of corporate organizations and enterprises, and the shortage of skilled entrepreneurs and technicians, education and human capacity.

Cooperatives offer an interesting socio-economic business model for helping to overcome the lack of institutions and policy, and the lack of enterprises, organization and human capacity. Cooperatives are enabling the poor to be able to afford modern renewable energy by actually organizing and paying for renewables themselves.

6 Practical Action: op. cit.
7 UNDP & WHO: *The energy access situation in developing countries: A review focusing on the least developed countries and sub-Saharan Africa* (New York, UNDP, 2009).
8 OECD/IEA: *Energy poverty: How to make modern energy access universal?* (Paris, IEA, 2011).
9 International Energy Agency (IEA). *World Energy Outlook.* (Paris. 2011).
10 International Finance Corporation (IFCI). *Advisory Services in Sustainable Business: 2012 Annual Review* (Washington, DC, 2012).

For example, in the United States in the nineteenth century, when the electric grid only covered major towns and rural households did not have access to the emerging central systems, it was energy cooperatives that made it possible for rural households to access electricity. Today in the United States, energy cooperatives serve 12 per cent of the population and own over 40 per cent of the energy distribution network. In addition, due to the decentralized nature of rural electrification, 80 per cent of electricity generation comes from renewables.

In most industrialized countries, accelerated industrialization in the early twentieth century and the development of large fossil fuel power plants led to expensive centralized grids. Recently, however, in response to increasingly volatile energy prices, the rising concern over climate change and the interest in energy security and energy access, the cooperative model of enterprise is experiencing a revival.

Although there is no one trigger to the growth of energy cooperatives, studies point to a number of reasons for their development, including new energy regulations, public interest in community-owned energy solutions, raised awareness on green issues – including renewable energy – and a resurgence of interest in the cooperative model of ownership, where members own and control their enterprises.

Energy cooperatives are increasingly being formed in countries as varied as Bangladesh, Bolivia, Cambodia and Germany, however the particular value of the cooperative business model for providing access to energy stands out. This paper demonstrates that the promotion of energy cooperatives is a powerful way to overcome key bottlenecks that are hindering poor people's access to clean and modern energy.

This paper is organized in four chapters. Chapter 1 introduces the model of sustainable energy cooperatives and shows the advantages that cooperatives can have over other forms of enterprise. To illustrate the diversity of size, scale and type of energy cooperatives, Chapter 2 provides a series of examples of energy cooperatives from different continents and developmental contexts. These include a cooperatively owned micro hydropower plant, which not only provides a small village with electricity, but also generates a surplus that it sells to the national grid and to small and medium-sized enterprises (SME). Other examples take the form of energy safety hubs; organized as cooperatives, these provide poor rural populations with access to cooking and transportation fuels while functioning as training and information centres. On a larger scale, the examples include self-sufficient bioenergy villages and rural electrification cooperatives, which aim to bring electricity into rural areas that for-profit investor-owned utilities are unable or unwilling to serve, believing there would be insufficient return on their investment.

Chapter 3 introduces policy and legislative frameworks that have created enabling conditions for the establishment of energy cooperatives. The examples included describe the supportive institutional framework conditions and measures, where such information was available. The final chapter provides some outlooks and recommendations for the promotion of energy cooperatives, so that their potential for production and distribution of cleaner energy around the world can be realised.

The paper focuses on energy provision and energy access. It does not include a review of measures taken by the cooperative movement at the international, regional or national levels to promote sustainable development practices in other sectors.

CHAPTER 1

ENERGY COOPERATIVES: THE MODEL AND ITS SIGNIFICANCE

1.1 What are energy cooperatives?

The International Labour Organization (ILO) Recommendation No. 193 on the Promotion of Cooperatives 2002[11] defines a cooperative as:

an autonomous association of persons united voluntarily to meet their common economic, social and cultural needs and aspirations through a jointly owned and democratically controlled enterprise.

ILO Recommendation 193, paragraph 2

This definition has been adopted from the International Cooperative Alliance (ICA) Statement on Cooperative Identity 1995, thus it represents not only the decision of the constituents of the ILO but also the 1 billion members of cooperatives worldwide.

In this paper, energy cooperatives are defined as cooperatives that are formed for the purpose of producing, selling, consuming or distributing energy or other services related to this area. Through energy cooperatives, members address their common need for affordable and reliable electricity and modern energy services as well as other related economic, social and cultural needs. Renewable energy in this paper is understood as "all forms of energy produced from renewable sources in a sustainable manner, in particular, but not limited to: bioenergy; geothermal energy; hydropower; ocean energy, including inter alia tidal, wave and ocean thermal energy; solar energy; and wind energy".[12]

1.2 The cooperative advantage in energy production and distribution

Cooperatives have a number of competitive advantages in producing, providing and distributing energy. They are often community-based enterprises, therefore they provide democratic local control over energy issues; they also offer a successful model for rural electrification and can effectively harness locally available decentralized renewable energy.

11 ILO: op. cit .

12 Article III of the Statute of the International Renewable Energy Agency. Available at: http://ec.europa.eu/world/agreements/prepareCreateTreatiesWorkspace/treatiesGeneralData.do?step=0&redirect=true&treatyId=8581

Catalyst for development including rural electrification

The United Nations estimates that nearly one in five people around the world do not have access to modern energy services,[13] and that approximately 22 per cent of the world's population do not have access to electricity. The IEA estimates that roughly 85 per cent of the people without electricity live in rural areas in developing countries, mostly in sub-Saharan Africa and South Asia.

Evidence confirms that energy cooperatives are effective in addressing the need for access to modern and affordable energy. A World Bank report in 2004 included energy cooperatives among the case studies of successful rural electrification programmes,[14] while a more recent United Nations Development Programme (UNDP) report found evidence that national decentralization policies – and the role cooperatives play in them – can facilitate the participation of local actors in development planning, and that they can help scale up energy service delivery for the poor through, among other things, energy cooperatives.[15]

Alternative to traditional energy providers

"Cooperatives can deliver a community, person owned energy network."
Keynote speaker Jeremy Rifkin at the ICA General Assembly in Geneva November 2009

Better prices

By definition, cooperatives should calculate the prices for transactions with their members to be close to the actual cost to the cooperative. [16] The provision of energy at a reasonable price is one of the issues of particular concern to most energy cooperatives.

Sustainable "investment"

Becoming a member of an energy cooperative is a way of "investing" socially and economically in sustainable development. This is an especially compelling argument for potential cooperative members in advanced economies. Some energy cooperatives, for example in Denmark and Germany, promote the idea in their advertisements with slogans such as: "Be active for the climate and earn with it!".[17] Others, such as cooperatives in the United Kingdom, attract new customers through campaigns based on rewarding ethics: sharing with customers the profits on energy from low-carbon and renewable sources – greener energy.

Adoption and promotion of the use of renewable energies

By casting their "consumer vote" in support of renewable energy cooperatives, consumers aim to reduce their environmental impact (by relying on greener sources of energy), strengthen the market for cleaner energy and encourage the building of more renewable energy generation facilities.

Leading by example and influencing energy policy

Many members of energy cooperatives also see the wider policy implications of their activities. They regard their involvement as a contribution to a better climate and energy future, one

13 Sustainable Energy for All. Available at: http://www.sustainableenergyforall.org/
14 World Bank: *Rural electrification in the developing world: A summary of lessons from success programs* (Washington, DC, 2004).
15 Havet, I., et al.: *Energy in national decentralization policies* (New York, UNDP, 2009), p. i.
16 Henrÿ, H.: *Guidelines for cooperative legislation,* 4th edn (Geneva, ILO, 2012), p. 94.
17 Bührle, B.: *Bürgerenergiegenossenschaften-Formen zukunftsträchtiger Energiewirtschaft?* (Nürtingen, Hoschule für Wirtschaft un Unwelt Nürtingen-Geislingen, 2010), p. 48.

that takes into account the needs and interests of future generations.[18] They are, therefore, often active participants in local and national energy policy discussions.

Promoting local development

As well as creating employment, including green jobs, at the local level, energy cooperatives can move from single-purpose to multipurpose approaches.[19] They might promote local development through offering additional services such as microfinance, improved infrastructure or technical training and assistance on innovative and productive end uses. Providing affordable and clean energy can lead to the establishment of micro and small enterprises, particularly in developing countries, which will both promote the local economy and increase the overall electricity demand, thereby contributing to improved performance of the energy provider.

Bringing energy production to the local level

Local energy cooperatives may be seen as an alternative to the more conventional set-up of a highly centralized energy infrastructure on the one side with "end-of-wire captive consumers" on the other. These cooperatives are spearheading different governance structures in the energy sector. Some experts claim that energy cooperatives are bringing about a transformation of the energy system from the bottom up.[20]

Initiatives in Germany, a country with a long history of cooperatives in the energy field, provide a number of examples. Recently, Germany has witnessed a marked increase in the number of newly created energy cooperatives, especially in photovoltaics, local heat and wind power.[21] In 2010, there were over 180 photovoltaic energy cooperatives in Germany.[22] These so-called "citizens' energy cooperatives" are founded on political, ecological and economic considerations. With strong bonds with the region and offering a way to implement new energy concepts from the grass roots, energy cooperatives are often equated with social engagement and solidarity.[23] Until recently, most grass-roots energy projects took the form of a partnership *(Gesellschaft des bürgerlichen Rechts)*. However, this legal form has the disadvantage that it can only be linked to one project, and so for a continuous extension of activities, further partnerships have to be created. Additionally, the purpose of cooperatives to promote their members' interests and the fact that profit does not form the core objective of cooperative businesses are cited as important factors in the considerations of the founding members.[24]

Source of innovation

Energy cooperatives have also proven to be supportive of technological innovation. Technologies developed from innovative pioneer communities can produce more design variants and forms of implementation than those developed in the context of large government programmes and business investments. For example, there is a suggestion that the small-scale, stepwise form of wind turbine development that emerged from the Danish cooperatives led to more successful design variants and diffusion patterns than wind turbine development driven by large-scale business investments and research and development programmes.[25] Cooperatives are also proactively investing in innovation, as shown by the example of the Cooperative

18 Ibid., p. 66
19 Henrÿ: op.cit., p. 18.
20 Schreuer, A. et al.: *Participatory technology development and assessment: In search of a sustainable use of fuel cell technology at the municipal level,* Paper presented at the 7th International Summer Academy on Technology Studies: 'Transforming the Energy System', Deutschlandsberg, 26-31 August 2007, p. 102f.
21 Schreuer, A.: "Energy cooperatives as social innovation processes in the energy sector: a conceptual framework for further research", in *Proceedings of the 9th Annual IAS-STS Conference "Critical Issues in Science and Technology Studies, 3rd–4th May 2010, Graz, Austria,* p. 107.
22 Holstenkamp, L. and Ulbrich, S.: "Citizens participation through photovoltaic cooperatives", in *Business & Law*, No. 8 (2010), p. 3.
23 Flieger. B.: "Energiewende mit Bürger-Energie", in *Contraste* , No. 306, S. 1, March 2010; Bührle, p. 54.
24 Rutschmann, I.: "Genossenschaften auf dem Vormarsch", in *Photon* (February 2009), p. 27.
25 Schreuer: op. cit. (2010), p. 102.

Research Network in the USA, which is supported by more than 600 cooperatives. Through the Network, these cooperatives invest in national research and product development programmes whose major focus is on end-use efficiency, improved utility system performance and approaches that ensure safety and reliability as new power sources become available.[26]

1.3 Size and prevalence of energy cooperatives

As with any type of cooperative, energy cooperatives vary in size. They range from small energy production cooperatives at the local level, producing only for their members' or their community's needs, to very successful large cooperatives, at regional and national levels.

Chapter 2 presents case studies on individual energy cooperatives. However, it is helpful to list here some salient facts about energy cooperatives, to provide an introduction to their current impact and to show that the cooperative model for energy production and distribution may be appropriate in many countries and regions.

- In Argentina, electricity cooperatives provide 10 per cent of the national energy production, and serve 17 per cent of customers at the national level and 58 per cent of rural customers.[27]
- In Brazil, there are 126 rural electricity cooperatives with a total of over one million members providing electricity to over three million customers.[28]
- In Canada, where renewable energy cooperatives are a recent phenomenon, there were 71 registered renewable energy cooperatives in 2011.[29]
- In Bolivia, an electricity cooperative is responsible for of 30 per cent of the electricity distribution market, providing a service to more than 1 million people.[30]
- In Denmark in 2004, 23 per cent of the country's wind capacity was owned by cooperatives. There were 20 centralized biogas plants, the majority of which were owned by farmer cooperatives, accounting for 80 per cent of Denmark's biogas production.
- In the Philippines, approximately half of households and the majority in rural areas rely upon electric cooperatives for power.[31]
- In the USA, there are 841 distribution and 65 generation and transmission cooperatives, which serve 42 million people in 47 states: 18 million businesses, homes, schools, churches, farms, irrigation systems and other establishments in 2,500 of 3,141 counties in the country. They serve 12 per cent of the US population.[32] With regard to renewable energy, in 2010, US cooperatives received 13 per cent of their power from renewable sources, which compared with a little more than 10 per cent for the nation's entire electric utility sector.

1.4 Types of energy cooperatives

There are a number of different types of cooperative active in the energy sector, and a variety of terms are used to describe them. Some cooperatives are described by their technological solutions, others are described by their aims or coverage.
The term "energy cooperative" is not used in a uniform way in the literature and different

26 NRECA: *Electric cooperatives and renewable energy: Our commitment to America.* A renewable energy brochure.
27 El cooperativismo en cifras. Available at: http://www.face.coop/
28 Brazilian Electricity Regulatory Agency (ANEEL). Available at: http://www.aneel.gov.br/
29 Canadian Cooperative Association: *Cooperatives helping fuel a green economy* (Ottawa, 2011), p.10.
30 Cooperativa Rural de Electrificación (CRE). Available at: http://www.cre.com.bo/
31 World Bank: "Assessing the corporate governance electric cooperatives in the Philippines". Available at: http://go.worldbank.org/NHLPLDSR10
32 NRECA: "Co-op facts and figures". Available at: http://www.nreca.coop/

classifications are suggested by different authors.[33] These attest to the diversity of the existing and emerging forms of energy cooperative.The following categorizations are the most commonly cited:

- Type of cooperative model – e.g. energy consumer cooperatives, energy producer cooperatives, energy producer and consumer cooperatives and energy service cooperatives.[34]
- Energy source – e.g. solar cooperatives, wind cooperatives, wood-fired power stations, cooperative bioenergy villages, renewable energy cooperatives.[35]
- Activities and position in the value chain – e.g. workers' cooperatives, innovation cooperatives, purchasing cooperatives, preproduction cooperatives, power station cooperatives, virtual networks.[36]
- Actors or owners and services provided – e.g. electricity cooperatives, rural electric cooperatives, community-led investment, consumer-owned utilities, farmer cooperatives, new ventures, trade associations.

Energy cooperatives may also differ according to the types of services or products offered:

- Energy cooperatives can **produce energy** and **supply energy** to their consumer-members and non-member clients or feed it into the national grid. For this purpose, they can either use fossil fuels or renewable energy sources. In some countries, whole villages (so-called bioenergy villages) are organized using the cooperative model.
- Consumers may group together into energy cooperatives to **purchase** energy, as means to obtain better prices.
- Cooperatives may organize the **distribution of energy**, for example by operating electricity distribution lines.
- Cooperatives may also **provide services** related to the provision of energy, such as advisory or training services.

33 For an overview see Volz, R.: "Stand und Entwicklungsmöglichkeiten von Bürgerenergiegenossenschaften in Deutschland" (2010). Information available at: https://www.uni-hohenheim.de/publikation/stand-und-entwicklungsmoeglichkeiten-von-buergerenergiegenossenschaften-in-deutschland

34 Flieger: op. cit.

35 Herlinghaus, A., et al. "Erneuerbare Energien und Perspektiven für den Genossenschaftssektor", in *Konjunktur und Kapitalmarkt Special* (Frankfurt am Main, DZ Bank AG, 2008) 24 April, pp. 32 ff.

36 Theurl. T.: "Klimawandel. Herausforderungen und Tätigkeitsfelder für Genossenschaften", in I*nstitut für Genossenschaftswesen* (Münster, IfG Intern, 2008) S. 19–22, January, pp. 21 ff.

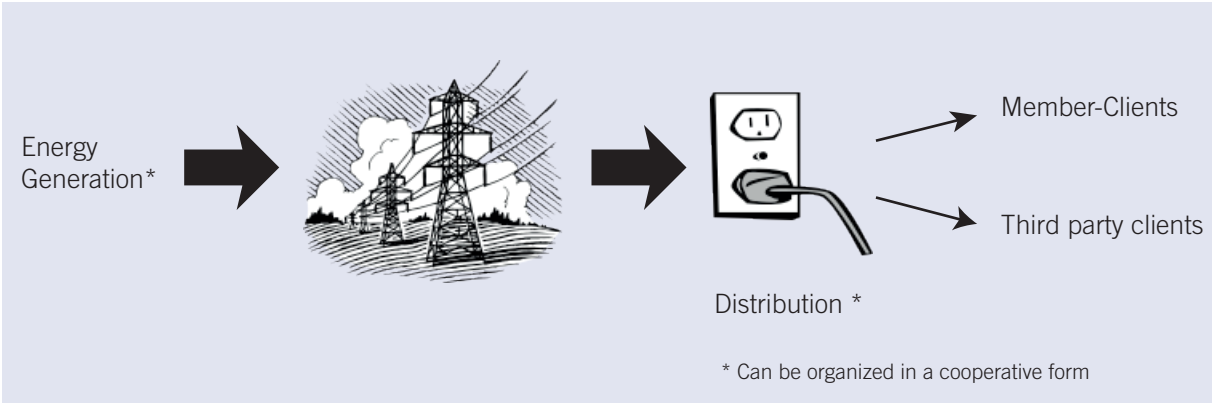
CHAPTER 2

THE DIVERSITY OF ENERGY COOPERATIVES: SELECTED CASE STUDIES

This chapter provides a series of examples of energy cooperatives to provide insights on the diversity of types, scale and implantation of energy cooperatives. It includes information both on individual cooperatives and on projects and programmes that support the development of energy cooperatives. However, it should be noted that the selection of case studies presented here is illustrative, and that different types of energy cooperatives are found in various forms in different countries around the world.

2.1 Rural electrification cooperatives

Figure 1. Installation, transmission and maintenance of electricity infrastructure *



Energy cooperatives established at the end of the nineteenth century and the first half of the twentieth century were formed principally to promote electrification in rural areas and/or to provide electricity at a more affordable price in these areas.

At that time, electrification of rural areas posed major challenges. Energy providers included municipalities or other public entities and private enterprise, often taking the cooperative business form. Given that for-profit companies generally found the investment too costly or the venture unprofitable, cooperatives were often the first and only providers of electricity services in rural areas. For example, in 1911, 453 out of 710 electricity generating plants in Austria were owned by cooperatives or other private entrepreneurs.[37]

In some countries, electricity cooperatives continue to play a pivotal role in the overall electricity supply. For instance, in 2005, 58 per cent of rural electricity in Argentina was provided

37 Schmidt, J.: *Die Elektrifizierung Niederösterreichs in der Zwischenkriegszeit: Baugeschichte und Netzentwicklung*, (Vienna, University of Vienna, 2008), p. 14.

by cooperatives, without which the agricultural sector, responsible for 6 per cent of the gross domestic product (GDP), would have been compromised and other jobs in rural communities would have been lost. The history of cooperatives providing electricity in the rural areas of Argentina dates back to 1926, when the *Cooperativa Eléctrica de Punta Alta* (Punta Alta Electric Cooperative) was formed out of dissatisfaction with pricing policies for rural electricity, which were set by a sole electricity company serving the community. Only in 1970 was the first national rural electrification plan developed, i.e. more than four decades after the cooperative had been established to respond to the needs of the rural population.[38]

Market incentives for for-profit enterprises in rural electrification are scarce.[39] Research carried out by the World Bank concluded that, in some scenarios, particularly those involving the most isolated and poorest of communities, rural electrification goes beyond the boundary of market efficiency and sustainability. In many cases, initial costs have to be subsidized, and there is a question as to whether communities can finance maintenance and operating costs without further support. These challenges are due in part to geographical remoteness, dispersed consumers, higher costs of supply and maintenance, low levels of demand and limited ability of the potential customers to pay.[40] The World Bank study also showed that rural electrification through cooperatives has been successful in countries where institutions are reported to be weak.[41] It is not so much a question of whether to extend the national electricity grid but rather to start thinking about alternative models of energy delivery.

Market failure has spurred the development of cooperatives of all types, including in the production and distribution of energy. This was the case in the United States, which many scholars and practitioners recognize as "the" example of successful rural electrification through cooperatives. In this case, progress was made possible through a public–private partnership programme, which provided subsidized credit and loan guarantees. However, this is not a prerequisite, and rural electricity cooperatives still require fewer subsidies than investor-owned or municipality-owned utilities.[42] In Argentina, energy cooperatives have grown to be successful without public subsidies or a well-developed electricity grid.

Clearly the challenges of today's world vary significantly from the challenges the first energy cooperatives had to face. However, in large parts of the developing world there is still an urgent need for rural electrification. The cooperative model can provide an effective, decentralized democratic and socially responsible alternative for rural electrification in developing countries, especially if financial and institutional support facilities are in place, leading to increased local participation and empowerment of local people.[43] As the examples below show, there is huge potential for rural electrification through cooperatives.

BANGLADESH: Rural electrification programme

Bangladesh is often cited as having "one of the most successful rural electrification programmes in developing countries".[44]

Before Bangladesh's rural electrification programme began in 1977, under the aegis of the Rural Electrification Board (REB), electrification was carried out by the Bangladesh Power Development Board and was mainly limited to urban centres. The REB was created in the

38 Federación Argentina de Cooperativas de Electricidad y Otros Servicios Públicos Limitada. "Historia y Recuerdos". Available at: http://www.face.coop/es/institucional/que-es-face/historia-y-recuerdos/
39 Haanyika, C.M.: "Rural electrification policy and institutional linkages", in *Energy Policy* (2006), Vol. 34, No. 17, p. 2977.
40 Reiche, K., et al. "Expanding electricity access to remote areas: off-grid rural electrification in developing countries" in G. Isherwood (ed.), *World Power* (London, Isherwood Production Ltd, 2000), pp. 52–60.
41 World Bank: op. cit. (2004), p. 12
42 Yadoo, A. and Cruickshank, H. "The value of cooperatives in rural electrification", *Energy Policy* (2010), Vol. 38, No. 6, pp. 2941–2947.
43 Ibid., p. 2946.
44 Havet et al.: op cit. p. 25

late 1970s, inspired by the example of rural electrification in the USA.[45] Today, there are approximately 70 rural energy cooperatives (*Palli Bidyut Samities* or PBSs).[46]

The REB works with rural communities to establish PBSs that generate and distribute electricity. In 2007, approximately 16,000 people were employed by PBSs.[47] The results of this electrification programme have been impressive: PBSs have installed over 219,000 kilometres of distribution lines that now connect about 47,650 villages to the electricity grid. Over 170,000 rural irrigation pumping stations also receive electricity.[48] About 30 million people in rural areas now have electricity as a result of this initiative. Total cumulative programme funding amounted to US$1.4 billion from 20 donors.[49]

Each PBS draw up an electrification master plan for their own operational area, and their members (the rural consumers) participate through representatives elected to the PBS governing body.[50] Distribution losses within PBS areas are low, at about 16 per cent, compared with 30–35 per cent for the national utility company.[51] The REB must approve the retail tariffs that each cooperative sets for its consumers, rates that should at least cover costs for operation, maintenance, depreciation and financing.[52]

REB assistance takes different forms: initial organizational activities, training of manpower, operational and management activities, procurement of funds, liaison with energy utilities, etc. The REB also offers the PBSs subsidized financing through low-interest loans with long repayment periods. During the start-up period (up to six years), cooperatives with losses receive direct subsidies, and a common fund allows them to benefit from cross-subsidies.[53]

There are also other examples of rural energy cooperatives in Bangladesh, apart from the PBSs: the Coastal Electrification and Women's Development Cooperative (CEWDC) – a women's cooperative on the island of Char Montaz, Golachipa Thana (Patuakhali District) – is one such example.[54] CEWDC was established in September 1999 with 35 women, under the project "Opportunity for Women in Renewable Energy Technology Utilization in Bangladesh". Technical assistance for the project was provided by Prokaushali Sangsad Ltd, with financial assistance from the Energy Sector Management Assistance Programme (ESMAP) and the World Bank. The German Embassy in Bangladesh provided solar home systems through its small grants programme. A non-governmental organization (NGO) from the Netherlands co-financed the construction of the facility, while UNDP recently provided support for a solar battery charging station.[55]

Since its establishment, CEWDC has been providing energy services to the non-electrified rural areas of Char Montaz and four neighbouring islands. The cooperative also manufactures high-quality lamps and charge controllers suitable for solar home systems. Other services include battery charging, selling electrical goods, and electrification (e.g. lighting) of markets.[56]

45 Rural Electrification Board of Bangladesh. Available at: http://www.reb.gov.bd/
46 CORE Inc International. Available at: http://www.coreintl.com/
47 Global Network on Energy for Sustainable Development: *Renewable energy technologies and poverty alleviation: Overcoming barriers and unlocking potentials. Summary for policy-makers* (GNESD, 2007) p. 19.
48 Havet et al.: op. cit., p. 25.
49 NRECA International. Available at: http://www.nrecainternational.coop
50 Havet et al.: op. cit., p. 25.
51 GNESD: op. cit., p. 19.
52 Havet et al.: op. cit., p. 25.
53 ibid.
54 Coastal Electrification and Women's Development Cooperative (CEWDC). Available at: http://youtu.be/bJDF0T8IpAA
55 Prokaushali Sangsad Limited. Available at: http://www.psldhaka.net/
56 Ibid.

BOLIVIA: Cooperativa Rural De Electrificación (CRE)

The Cooperativa Rural de Electrificación (CRE) is the third biggest electricity distribution company in Bolivia. Currently, it serves more than 300,000 consumer-members and is one of the largest rural electricity cooperatives in the world.[57]

The cooperative was started in 1965, with USAID providing support for the construction of the first plants and the regional development centres. NRECA International continued to electrify rural communities in Bolivia with funding from USAID and, more recently, through the US Department of Agriculture's Food for Progress programme.[58]

CAMBODIA: Community Energy Cooperative

The first rural energy cooperative in Cambodia was successfully established in 2005 and operates its own electrification and distribution system. The "Community Energy Cooperative expands Small Businesses and Livelihoods" project built on this experience and on community participation through the energy cooperative model. It adopted capacity development, to encourage income-generating activities, a focus on sustainable livelihoods and an innovative financial mechanism. The project ran from January 2006 to June 2007 in the village of Anlong Tamey, which had over 290 non-electrified households.[59]

Key factors in the project's success included its financial sustainability and its ability to provide cost-effective energy. The project increased the capacity of the existing energy cooperative to link improvements in access to electricity with income-generation activities. This was achieved by expanding the membership in the cooperative to 160 new households, installing a new biomass gasification system, offering a tariff comparable with the current provincial subsidized rate (and half the rate of diesel-powered generators) and setting up a tree nursery.[60]

The model continued to work effectively even after the end of the project. The project successfully removed the barriers of access to affordable and reliable electricity. It also reduced greenhouse gas emissions and relieved pressure on local forests by using renewable biomass energy. The approximate costs for electrifying a household was US$400. Based on the experience with the pilot project, it was recommended that the model be incorporated into Cambodia's rural energy strategy.

COSTA RICA: Rural electrification cooperatives

Energy cooperatives in Costa Rica mainly focus on rural electrification. Rural electrification in the country is well advanced, with over 98 per cent of the nation's population having access to electric power, making Costa Rica an exceptional case in Central America. This development is due in particular to the cooperatives which have been active since the 1960s. Four cooperatives (Coopelesca, Coope Alfaro Ruiz, Coope Guanacaste and Coopesantos) operate in the rural regions. The primary objective of these cooperatives is to achieve levels of rural electrification in accordance with the requirements of the law on the participation of rural electrification cooperatives *(Ley de Participación de las Cooperativas de Electrificación Rural y de las Empresas de Servicios Públicos Municipales en el Desarrollo Nacional Ley No. 8345)* enacted in 2003.[61] The four cooperatives are completely self-sustaining and create a surplus

57 NRECA International. Available at: http://www.nrecainternational.coop
58 Ibid.
59 UNDP: Community Energy Cooperative Expands Small Businesses and Livelihoods (UNDP Regional Centre in Bangkok, 2008). Available at http://content.undp.org/go/cms-service/stream/asset/?asset_id=2095739
60 Ibid.
61 Ley de Participación de las Cooperativas de Electrificación Rural y de las Empresas de Servicios Públicos Municipales en el Desarrollo Nacional. Nº 8345. Available at: http://www.pgr.go.cr/

on their operations. They are also continually expanding their scope and range of consumer services, for example into telecommunications.[62]

Three of the country's electricity cooperatives – Coopelesca, Coope Guanacaste and Coopesantos – jointly own a wind farm. A federation of energy cooperatives, *Coneléctricas R.L.*, was established in 1989 and is involved on behalf of its members in power generation investment and operations, strategic services and policy advocacy and various technical services.[63] *Coneléctricas* owns and operates two small hydro plants, totalling 43MW of installed capacity, selling the energy output to the four distribution centres.

The Coopelesca, Coope Alfaro Ruiz, Coope Guanacaste and Coopesantos were established for the express purpose of providing rural electrification. They are responsible for a distribution grid over 7,000 kilometres long and supplying some 150,000 customers. The supply area of the four cooperatives stretches across 22 per cent of the nation's territory. However, they can only meet 34 per cent of the collective demand. This is because they only have a few power generating facilities, which are based exclusively on hydropower. Thus the remaining electricity needs have to be met by public power providers. Plans had originally been developed to expand self-generation to meet 80 per cent of demand by 2010 by building additional hydropower plants.[64]

INDIA: Electrifying 100 villages

In India, the first rural energy cooperatives started to appear in the 1950s.[65] Today, there are several examples of rural electrification initiatives that have closely involved local communities, often organized as cooperatives.

In villages where electricity is provided by energy cooperatives, the household connection rates are four times higher than in villages served by the state electricity board.[66] Reform of India's power sector still concentrates on conventional measures, such as unbundling of electricity distribution and privatization. Some of the rural cooperatives have made significant social and economic impacts on their respective regions, especially by encouraging commercial activities and by linking the electrification project to the pumping of water. Integrating energy and water services in this way greatly enhances the benefits of electrification by meeting two basic needs instead of just one.

There is also an initiative to electrify 100 Indian villages over a period of five years (started in 2007), particularly in the northern province of Bihar, one of the poorest regions of India. Small biomass power plants are being erected to produce energy to be distributed to the inhabitants of the villages and to power micro and small enterprises. The project not only teaches people how to run the biomass plants, but also facilitates the creation of enterprises and, therefore, self-employment. The initiative is being implemented by DESI Power, an Indian company, whereas the funding is partly provided by the fairPla.net cooperative, a cooperative for climate, energy and development registered under German law which was set up by 31 men and women from Germany, South Korea and Afghanistan to support this kind of initiative.[67]

62 NRECA International. Available at: http://www.nrecainternational.coop
63 Ibid.
64 Drillisch, J. (ed): *Energy-policy framework conditions for electricity markets and renewable energies – 23 country analyses* (Eschborn, GTZ, 2007), p. 65.
65 GNESD: op. cit., p. 19.
66 Ibid.
67 More information is available at: http://fairpla.net/index.php?article_id=30&clang=0

SOUTH SUDAN: Yei Electric Cooperative

South Sudan's first electricity cooperative, a pilot electrification project in Yei, was initiated as part of USAID's Southern Sudan Rural Electrification Program, implemented by NRECA International. The village electrification programme continues under the Sudan Infrastructure Services Project. Before the intervention, electricity was available in only three towns in southern Sudan. As well as installing a power plant, the project installed a street lighting circuit and provided locals with training on the skills needed to build and operate an electricity distribution utility.[68]

The Yei Electric Cooperative now serves more than 325 accounts, and benefits more than 16,000 people. The change the Yei Electric Cooperative has brought about in the town is considerable: according to one Yei boutique owner, the establishment of the YECO utility has expanded business opportunities and facilitated innovation and creativity. Many Yei residents have established new homes, businesses and organizations. Twenty-two people are directly employed by the cooperative.[69]

UGANDA: Energy cooperatives

The Rural Electrification Agency (REA) is a government institution established by the Ministry of Energy and Mineral Development. Its aim is to achieve the Government's targets for rural electrification access as stipulated in the Rural Electrification Strategy and Plan. The primary objectives of this strategy are to reduce inequalities in access to electricity and to implement associated activities for social welfare, education, health and income-generating opportunities. According to the REA Strategic Plan, the target was to achieve 10 per cent rural electrification by 2012 (in 2010 it was at 6 per cent). The REA has introduced the energy cooperative model to rural areas that other investors would not or have not served and where a large number of farmers, small industries, businesses and other rural dwellers had been left without access to electricity at a reasonable cost.[70]

Pilots projects began in Uganda in the districts of Bundibugyo, Pader and Abim (Bundibugyo Electric Cooperative Society; Becs) and Pader-Abim Community (Multi-purpose Electricity Cooperative Society; Pacmecs). A total of 36 load centres are planned for the initial phase: 17 in Bundibugyo and 19 in Pader and Abim. Extensions are planned for a later date, to be implemented either by the cooperatives or through REA as community schemes, with the help of the Swedish International Development Cooperation (SIDA).[71]

A cooperative has been set up in each of the districts. These cooperatives operate under an interim board, whose responsibilities include mobilizing people to buy shares in the cooperative and to pay for connection.[72] Both cooperatives are adopting a prepaid meter system, which will enable each user to better manage their power usage. This releases them from the current metering system, which simply estimates usage and then bills people later. The 3,900 connections and the construction works have been subsidized by SIDA by almost 90 per cent.

The assistance given to the cooperatives included: developing a draft business plan; setting up interim boards, to give policy guidelines to the electricity cooperative management; providing training in financial and accountability management; establishing by-laws for the energy cooperatives; and providing training in governance. The recruitment of members has,

68 NRECA. Available at: http://www.nreca.coop/what-we-do/international-programs/country-projects/south-sudan-2/
69 Sudan Infrastructure Services Project. Available at: https://sisp-sudan.com/
70 Information from the Embassy of Sweden, Kampala.
71 Ministry of Energy and Mineral Development: *Energy and mineral sector performance report 2008/09–2010/11*. Available at: http://www.energyprogramme.or.ug/wp-content/files/JSRREPORT.pdf
72 Rural Electrification Agency (Uganda). *Rural Energy* (2009) Vol. 2, Issue 1, May, p. 8.

however, been slow, for several reasons: for example, people have had poor experiences with similar projects, which did not produce tangible results and lost money.

UNITED STATES: Touchstone Energy

The National Rural Electric Cooperative Association (NRECA) is the national service organization for more than 900 not-for-profit rural electric cooperatives and public power districts. One of its programmes is Touchstone Energy, a brand name for more than 700 local consumer-owned electric cooperatives in 46 states. Other programmes include cooperative research, an association of electric cooperative lawyers, and lobby activities. NRECA International, a wholly owned subsidiary of the NRECA, offers international programmes for the development of energy cooperatives in developing countries. The rural electrification programmes that NRECA International has managed and is managing in Latin America, Africa and Asia are claimed to provide over 100 million people in over 40 developing countries with access to safe, reliable and affordable electricity. The Touchstone Energy Cooperatives brand offers energy cooperatives the strength of a national network, helping them enhance their unique relationships with their local member-owners. Touchstone prides itself on having four values as its foundation: innovation, accountability, integrity and commitment to community.[73] The competitive edge that energy cooperatives have over the other providers in the United States is mostly related to financial considerations, ethical issues and client orientation.

The importance of energy cooperatives in the United States, especially in rural areas, needs to be emphasized. The 841 distribution and 68 generation and transmission cooperatives serve 42 million people in 47 states, i.e. 12 per cent of the nation's population, and 18 million businesses, homes, schools, churches, farms, irrigation systems and other establishments in 2,500 of 3,141 counties in the country. Ninety four per cent of these cooperatives offer options for renewable energy. According to NRECA figures, in order to perform their mission, electric cooperatives own assets worth US$112 billion (distribution and generation and transmission cooperatives combined); own and maintain 2.5 million miles, or 42 per cent, of the United States' electric distribution lines, covering three-quarters of the nation's landmass; deliver 10 per cent of the total kilowatt-hours sold in the United States each year; generate nearly 5 per cent of the total electricity produced in the United States each year; employ 70,000 people in the United States; retire (i.e. return to members) US$545 million in capital credits annually; and pay US$1.4 billion in state and local taxes.[74] In addition, more than 80 per cent of all local electric cooperatives offer electricity generated from renewable sources.[75]

Figure 2. Advantages of energy cooperatives

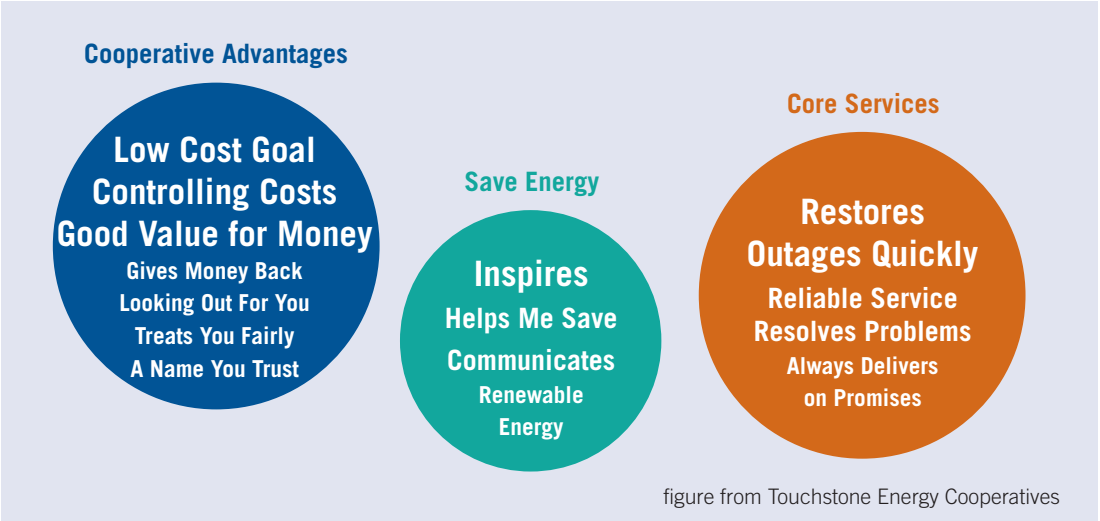


figure from Touchstone Energy Cooperatives

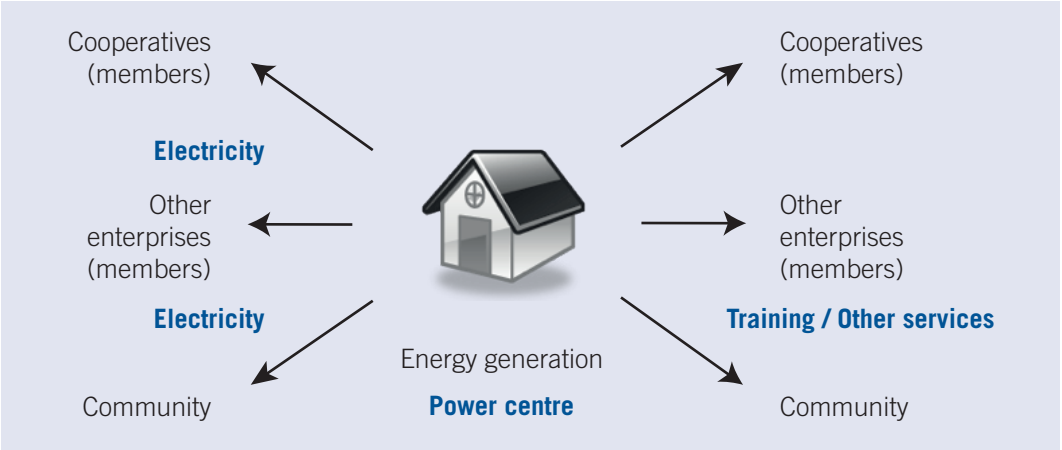
73 NRECA. Available at: http://www.nreca.coop/programs/touchstone/
74 NRECA. Available http://www.nreca.coop
75 Touchstone Energy Cooperatives. Available at: http://www.touchstoneenergy.com

Energy cooperatives are increasingly developing an interest in renewable energy (mainly wind, solar, hydro, biomass, geothermal and waste heat recovery). More than 80 per cent of all local electric cooperatives offer electricity generated from renewable sources. In 2010, 13 per cent of electric cooperative power sales came from renewable energy. Some electric cooperatives work closely with and support local renewable energy projects: there are 38 current and planned bio-diesel plants, with a total capacity of 244 million gallons; cooperative wind power projects are the leading source of renewable power for the industry; landfill gas, bio-waste generation and anaerobic digesters are being used to take advantage of rural renewable fuels. Solar power is being used for remote applications requiring electricity.[76]

2.2 Power centres or energy hubs

Power centres or energy hubs produce and/or sell electricity, which is generated mainly from renewable energy sources. They address the electricity needs of local clients, including cooperatives and other forms of business. If organized as cooperatives, the beneficiaries are typically also the members of the power centre or energy hub.

Figure 3. Energy generation



The energy provided is used for a range of applications, such as running small agro-processing plants and other enterprises. The idea behind these centres is to promote the use of electricity for productive use as well as for consumptive uses. The energy provided by the centre can also be used to promote other income-generating activities that will, in the long run, improve the quality of life in rural areas. It might further increase opportunities for gainful employment where electricity is used to add value to local produce. The United Nations Industrial Development Organization (UNIDO) is piloting community power centres in Kenya.

Energy hubs can also be used for educational purposes, offering training in the safe use of energy or in the generation of electricity from renewable energy sources.

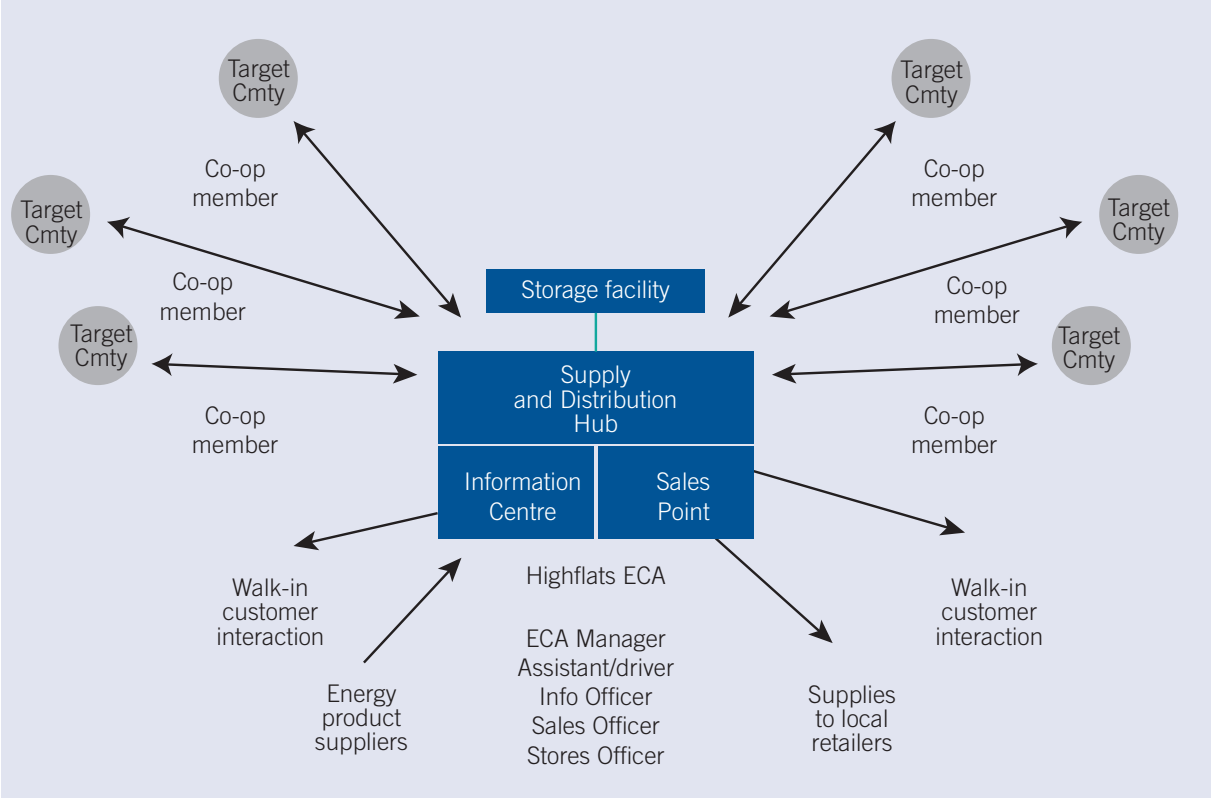
76 Ibid.

SOUTH AFRICA: Highflats Energy Centre

The idea behind the Highflats Energy Centre, based on a plan by the Department of Minerals and Energy, is to establish a network of self-sustaining energy centres with the purpose of facilitating and extending access to modern energy services to poor populations in rural areas. The overall goal of the project is to find sustainable solutions for the effective delivery of local energy resources to poor communities, thereby assisting in alleviating poverty and contributing to sustainable development.[77] Strengthening the capacity of end-users, entrepreneurs and local decision-makers to access and finance energy services was seen as important to the successful outcome of the project. The supply of energy products in the area was found to be restricted and inefficient and there were several middlemen in the selling process, leading to high final product prices.

The centre is currently owned and run as a cooperative by 13 local cooperatives. The aim is to ensure the most efficient way of delivering products to residents within Ubuhlebezwe, South Africa. This is to be achieved by a "hub and spoke model" of distribution.

Figure 4. Hub and spoke model of distribution



Source: uMnyango wezeZindlu (Department of Housing) 2009, p. 3

The centre currently serves as the main distribution point for products offered by the centre and members of the cooperatives; as a sales point or direct retail outlet; and as an information centre accommodating awareness raising programmes, training, etc. Members of the cooperatives can, in turn, supply the surrounding community and establish local community outlets to operate both as sales points and as centres for energy information and advice.[78] The information and education service is intended to increase people's knowledge on issues such as energy safety and different energy supply options.[79]

77 uMnyango wezeZindlu/Departement of Housing. *Report on visit to Highflats Energy Centre, Ubuhlebezwe Municipality* (2009), p. 2.
78 ibid. p. 4.
79 ibid. p. 13.

INDIA: Pravaranagar Sugar Co-operative

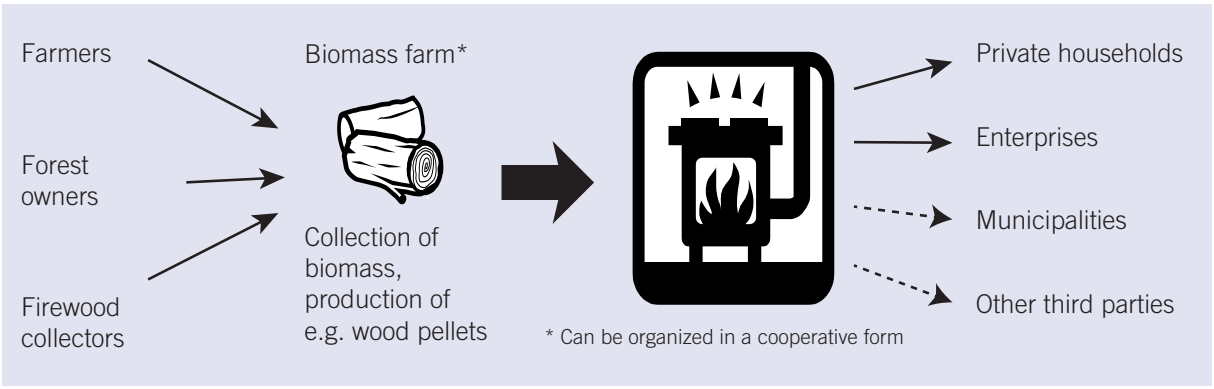
An example of a cooperative that produces energy as a by-product is the Pravaranagar Sugar Co-operative in India.[80] The cooperative was organized in the 1950s and covers 44 villages in an area of approximately 12,000 square kilometres in Maharashtra State. The cooperative produces not only sugar but also many by-products, such as ethanol from sugar molasses and biogas. These ancillary products are used as energy sources for the cooperative's factory and some are also delivered to the rural population; for example, biogas is pumped to some 200 farmers, and the cooperative sells residue from the biogas plant as compost. The cooperative has become an important source of livelihood opportunities for about 80,000 local people, by providing not only direct employment but also health services, technical advice and loans to farmers, and improved water facilities, both for agricultural and household use.

2.3 Biomass

Biomass farms

Biomass farms are farms that serve as a centre for collecting, processing and selling firewood, wood products and other biomass. They can be owned and operated in a cooperative way, for example by farmers and forest owners, and serve as suppliers of fuel for biomass heating/power plants.

Figure 5. Biomass



AUSTRIA: Waldstein Biomass Farm

The Waldstein Biomass Farm in Austria is part of the EU Biomass Trade Centre II project.[81] This project addresses the common problem of fragmentation and lack of organization in local biomass markets. Centres such as the Waldstein Biomass Farm are considered an innovative way to develop and organize local biomass supply. They are conceived as regional centres with optimized logistics and trading organization, where different biomass fuels (firewood, wood chips, pellets, energy crops etc.) are marketed at guaranteed quality and prices. The Waldstein Biomass Farm is run by a cooperative whose members are forest farmers. The cooperative has invested in facilities that enhance the quality of the products offered.

80 Bogdanski, A. et al.: Making integrated food-energy systems work for people and climate: An overview. (Rome, Food and Agriculture Organization, 2011), p. 54.
81 For more information, see http://www.biomasstradecentre2.eu

BRAZIL: COOPERBIO

Another example of a biomass farm is COOPERBIO, in the state of Rio Grande do Sul in Brazil. This cooperative not only collects biomass, it also produces new energy products – biodiesel and ethanol. COOPERBIO, Brazil's first biodiesel cooperative, was launched in 2005 by a movement of small farmers and landless workers.[82] The cooperative uses castor bean, jatropha, sunflower and other plants in the production of biodiesel, and involves about 25,000 families.[83]

The cooperative is organized and run mainly by small- and medium-sized farmers and medium-sized land owners, who also grow the raw materials. COOPERBIO emphasizes the participation of its members in the entire biofuel production chain, thereby increasing their income and improving their livelihoods. Thus, the cooperative generates jobs and income in a decentralized way and positively influences regional development. At the same time, the cooperative has stated its concern for the environment, in particular for the protection of water resources and biodiversity, and also facilitates healthy and balanced diets for rural families.

Biomass heating/power plant

Biomass heating plants are usually small-scale heating plants that use wood chips, industrial wood waste or straw as fuel.[84] Processing biomass locally can provide enough energy to meet the demands of entire communities. These systems burn biomass to provide heat and/or electricity for buildings in the local community. In Austria, for example, cooperatives operating biomass plants are one of the most common types of energy cooperative, and they typically have farmers as members. In 2010, 66 per cent of such plants were run by farmers' cooperatives.[85]

Biomass heating plants are normally associated with high capital costs at the time of construction or acquisition of the facilities. Therefore, subsidies or special support measures, such as loan facilities, are often necessary to facilitate the acquisition of the necessary investment capital. Furthermore, the plants are normally established as long-term undertakings. They lend themselves in particular to providing energy to public buildings and institutions, and also to enterprises and private households that are willing to enter into longer-term supply contracts.

Biomass heating systems do not only provide reliable and affordable heat and energy; they may also boost the local economy, as shown by the Finnish example described below, and thus may reduce unemployment rates in the community. They also lend themselves to being combined with sustainable woodlot and forest management initiatives.

FINLAND: Eno Energy Cooperative

The Eno Energy Cooperative owns and operates three biomass heating plants.[86] It also produces the woodchips used as to fuel the plants. Sixty per cent of the wood materials are produced by 52 members of the cooperative, mostly forest owners. They provide forest thinning and logging residuals to the cooperative's biomass heating plants. The heat is sold on

82 Noronha S., Ortiz, L. and Schlesinger S. (eds): *Agribusiness and biofuels: An explosive mixture – Impacts of monoculture expansion on the production of bioenergy* (Rio de Janeiro, Núcleo Amigos da Terra, 2006).
83 UN-Energy: *Sustainable bioenergy: A framework for decision-makers* (2007).
84 Rakos, C.: "Dissemination of biomass district heating systems in Austria: Lessons learned", in S. Silveira (ed.), *Bioenergy – Realizing the potential* (Oxford, Elsevier, 2005), pp. 47–57.
85 Kristöfel, C.: "Betreibermodelle Biomasseheizwerke", presentation at the AFO workshop Activating Private Forest Owners to Increase Forest Fuel Supply on 3 November 2011.
86 Eno Energy Cooperative. Available at: http://enonenergia.fi

the basis of 15-year agreements with, for example, public authorities, for buildings such as schools and libraries, as well as businesses and private households. The ash from the biomass plants is returned to the forest as fertilizer.

Members of the cooperative point to the advantages of the model, which include the fact that capital investment stays within the municipality, employment has been created and is maintained, and consumers benefit from lower prices for heat compared with fuel oil. These are coupled with the positive effects on local forestry and landscape and the fact that fuel oil consumption is reduced by approximately 1.8 million litres per year and so carbon dioxide emissions are also reduced. Furthermore, members emphasize their independence in terms of energy provision, which provides security against a possible energy crisis.

Biomass district heating/power systems

Where there is a biomass district heating (BDH)/power system, customers can group together in a biomass energy cooperative to buy their heat/power from the BDH/power plant. In this case, it is not the production but rather the distribution of the heat/energy that is organized using the cooperative model. For example, in Denmark, 300 of the 400 district heating networks are organized as consumer cooperatives.

GERMANY: WeilerWärme Cooperative

One example of a BDH system is the WeilerWärme Cooperative in Germany.[87] The aims of the cooperative are to secure energy at affordable prices and to provide independence from fossil fuels and energy corporations. The cooperative model was chosen by the 12 founders because the community would trust a local enterprise more than a national energy corporation and thus would choose to be serviced by it, and because a cooperative would provide them with the strongest negotiating position in terms of pricing. One of the cooperative's successes was its ability to secure a ten-year contract to supply energy to the municipality.

During the feasibility phase, technical support was provided by local government (state level) and by municipal utilities. The cooperative was able to access credit in the form of subordinated loans and programme credits, and the construction of the local heat line was supported through extra amortization by the federally owned Reconstruction Loan Corporation (Kreditanstalt für Wiederaufbau).

Bioenergy villages

Bioenergy villages, whose electricity is produced within the community and used by the community, can also be organized in the cooperative way. This is an integrated energy solution for the whole community. The cooperative bioenergy village Jühnde in Germany is one of the first established.

GERMANY: Jühnde Bioenergy Village

Jühnde is located in the southern part of Lower Saxony, Germany. The central idea of the model is for an entire village to move completely away from conventional (fossil) energy sources, to renewable and carbon dioxide-neutral biomass. It is the first of its kind in Germany, and aims to completely replace its fossil fuel use for heating and electricity with bioenergy.

87 WeilerWärme eG. Available at: http://www.weilerwaerme.de

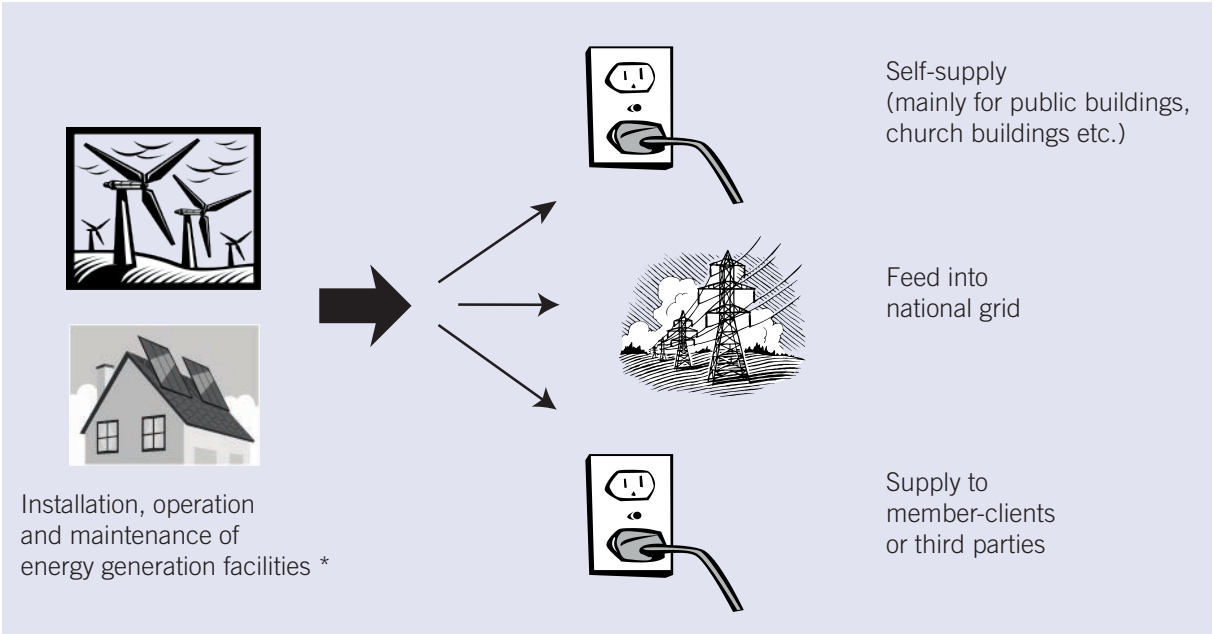
In Jühnde, biomass is converted to energy by a combined heat and power (CHP) plant, run on biogas. For additional heating during winter, a woodchip heating system has also been installed. The biggest achievement for Jühnde is its energy independence. With the CHP plant and the woodchip heating, the village needs only to harvest its own energy crops and purchase the shortfall of supply in the region around the village (25 per cent). During summer, the excess heat from the CHP plant is used for the drying of woodchips and logwood.

Between 2000 and 2004, the project partners applied for authorizations, secured investment subsidies and planned the bioenergy system and the district heating grid. The village established an operating cooperative in 2004 to take care of the business aspects of the endeavour. The local population opted for the cooperative model as a suitable way to run the bioenergy system.

In the Jühnde model, the energy system is operated exclusively by the local cooperative. All inhabitants were invited to participate from the planning stage. Working groups developed the concrete visions of the energy future of their own community. The collective decision-making and problem-solving required in the process of converting to renewable energy sources generated a new sense of direction, shared purpose and connectedness within the community. Today, more than 70 per cent of the adult inhabitants of the village are members of the cooperative, having paid a minimum fee of €1,500 as share capital.[88]

2.4 Wind power and photovoltaic (PV) cooperatives

Figure 6. Windpower and photovoltaic energy supply



88 Based on summary in Brohmann, B., et al.: "Case 6: Bioenergy Village Jühnde" (2006), pp. 7 ff. Available at: http://www.esteem-tool.eu/fileadmin/esteem-tool/docs/CASE_6_def.pdf

Installation, operation and maintenance of energy generation facilities: Wind power

Wind power and PV generation facilities normally require a high level of initial investment, therefore an important factor for their success is the availability of specific credit lines from financial institutions and/or support from or partnership with the state.

In the case of wind power, however, investment is only one of the challenges. It is important that local communities are part of the planning process in order to secure their acceptance for the siting and operation of wind turbines. The cooperative model is thus particularly appropriate. Denmark, a pioneer in wind power, is living proof that community-owned power has a big potential for creating a renewable energy future, with wind power cooperatives now established nationwide.

DENMARK: Middelgrunden

One of the most frequently cited examples of a wind cooperative is Middelgrunden in Denmark.[89] Once the world's largest offshore wind farm, it is now the world's largest cooperatively owned wind farm. Ten turbines are owned by Middelgrunden Wind Turbine Cooperative and ten by the local utility company, which in turn is owned by the municipality of Copenhagen. The farm delivers about 4 per cent of the power used in Copenhagen.

The cooperative was formed in a particular context, where enabling conditions existed for the formation of wind cooperatives. Previously, at the end of the 1970s, it was rather simple to connect privately (individually) owned turbines to the grid, but this was not case for cooperatively owned turbines.

This problem was resolved in 1981, paving the way for the growth of wind cooperatives.[90] The Danish Government provided support mechanisms for wind energy, including spatial planning, technical issues, tax incentives and feed-in regulation.[91] The high Danish feed-in tariff, which was fixed for ten years, and the City of Copenhagen's 8 per cent target for renewable energy were important in encouraging investment in wind energy.[92] In addition, wind cooperatives can take advantage of tax incentives, which allow tax-free income from renewable energy systems up to a certain limit. Revenues above the set limit are taxed a lower rate than normal income tax.

It was within this context that the idea of the Middelgrunden Wind Turbine Cooperative emerged. In 1996, the Copenhagen Environment and Energy Office identified wind power potential at Middelgrunden. A study was carried out to investigate the feasibility of an offshore wind farm, and a working group involving citizens interested in wind energy was formed. This led to the formation of the cooperative in 1997. After two years of negotiations between the cooperative and the utility company, a contract was concluded. After final approval in 1999, construction started in 2000.

Approximately 40,500 shares were sold to the more than 8,000 members of the cooperative, with most members holding the five shares required to qualify for a simplified tax return and a tax break of 3,000 Danish krone per year. The only direct government support to the Middelgrunden cooperative project was in the form of a loan granted by the Danish Energy Authority to finance the extensive feasibility study.

89 Middelgrunden Wind Turbine Cooperative. Available at: http://www.middelgrunden.dk

90 Boon, M.: *Why did Danish entrepreneurs take the lead in the wind turbine industry and not the Dutch? A study on the interaction between evolution and strategy of two communities in an emerging industry.* Erasmus University master's thesis. Entrepreneurship and New Business Venturing (2008), p. 47.

91 Schreuer, A. and Weismeier-Sammer, D.: *Energy cooperatives and local ownership in the field of renewable energy technologies: A literature review.* Research Reports/RICC, 4 (Vienna, Vienna University of Economics and Business, 2010), p. 5.

92 Tampier, M. et al.: *Renewable energy financing case studies: Lessons to be learned from successful initiatives* (Montreal, Commission for Environmental Cooperation, 2006), p. 46

The 2009 Danish Act on renewable energy imposed an obligation on all new wind energy projects to offer a minimum of 20 per cent ownership to local people in order to stimulate local involvement and ownership in new wind energy projects. Establishing cooperatives has therefore become as an attractive option. Local policies have also had significant impact on the viability of community initiatives.[93] Additionally, financing for the purchase of cooperative shares is easy to obtain, with some local banks almost automatically providing loans, taking the shares as security.[94] However, strongest driver for the development of wind cooperatives has been the general and strong support for wind energy in the Danish population.

GERMANY: Greenpeace Energy

In Germany, community-owned wind turbines are widespread. The owning bodies usually take the form of a limited liability company or a cooperative,[95] with the cooperative form considered a way to "invest" in the local community. Buying a share in a wind energy cooperative is thus equated to financial support for local and ecofriendly energy generation.

Greenpeace Energy (Germany)[96] is the largest energy cooperative in Germany with 20,000 members and more than 100,000 clients (both private customers and businesses) – and the numbers are rising. It is independent from the civil society organization of the same name, although Greenpeace does hold five membership shares (each share worth €55).

The idea for establishing Greenpeace Energy was typical of the reasons for establishing any other cooperative – to provide access to a service that the market does not offer. In this case, Greenpeace found that more than 10,000 citizens were willing to change their electricity provider to be able to purchase their energy from renewable energy sources, yet none of the larger providers was willing to produce 100 per cent renewable energy.

The cooperative thus provides 100 per cent renewable energy by means of wind farms/wind turbines, PV plants and hydropower. For more than ten years, the cooperative has generated and supplied its members and clients with green energy at affordable prices. It is likely that initiatives of this type will see growth given the recent decision of the German Government to phase out nuclear energy production. Organizing a renewable energy supply is therefore likely to become more important.

ARGENTINA: Sociedad Cooperativa Popular Limitada (SCPL)

Argentina is one of the two countries with the most wind farms in South America – the other being Brazil. Small wind energy farms were installed in Argentina in the late 1990s by electricity cooperatives and private investors, mainly in the Buenos Aires and Chubut regions.[97] The *Sociedad Cooperativa Popular Limitada* (SCPL) owns one of the five largest wind parks in Argentina. Mostly financed with foreign development aid (e.g. from Denmark and Germany), these wind parks are operated by local cooperatives.[98]

SCPL was founded in 1933 to respond to dissatisfaction with the existing electricity services, provided by a monopoly utility. An initial group of 87 entrepreneurs and socially active citizens bought the concession to distribute electricity and formed a cooperative. It later added power generation and built the distribution grid, which played a part in the development of

93 Rebelgroup: *Benefit sharing mechanisms for renewable energy sources (RESHARE).* Final Report 2011.
94 Schreuer and Weismeier-Sammer: op. cit., p. 5.
95 Toke, D. et al.: "Wind power deployment outcomes: How can we account for the differences?", in *Renewable and Sustainable Energy Reviews* (2008) Vol. 12, No. 4, May, pp. 1129 ff.
96 Greenpeace Energy. Available at: http://www.greenpeace-energy.de
97 Bravo, V., et al.: *RETs I Final Report on Renewable Energy Technologies in Argentina.* (Mendoza, Fundacion Bariloche, 2005).
98 Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ): *Producing electricity from renewable energy sources: Energy sector framework in 15 countries in Asia, Africa and Latin America* (Eschborn, 2002), p. 10

the Chubut region. Between 1974 and 1980, the cooperative extended its activities to cover telephone services and installed 4,600 new telephone lines. In 1982, the supply of drinking water was added to the portfolio, followed by sanitation services and, later, internet access. Today, SCPL has over 600 employees and it owns the largest wind park in Argentina. Clean energy generation represents 17 per cent of its total energy production.[99]

Energy cooperatives in Argentina are organized within the *Federación Argentina de Cooperativas de Electricidad y Otros Servicios Públicos Limitada* (FACE), a national federation founded in 1938 to bring together energy cooperatives and other utilities. Today, FACE has 375 energy cooperatives as members and promotes the formation of cooperatives in the energy and other public services sectors. FACE has introduced a service called *Sistema Autónomo de Generación de Energía Renovable* (SAER) for member cooperatives interested in providing renewable energy. The service aims to provide alternative methods of generating electricity for residential usage in rural areas, through hybrid solar, wind and hydropower solutions.[100]

UNITED KINGDOM: Baywind Energy Cooperative [101]

Most wind farms in the United Kingdom are owned and operated by corporations. However, energy cooperatives are one of the fastest-growing part of the United Kingdom's cooperative sector, having grown by 24 per cent in the past four years. Currently there are over 40 energy cooperatives in the country.[102] Baywind Energy Cooperative was the first community-owned wind farm in the United Kingdom. It was set up in 1996 in Cumbria when community members had an opportunity to own a part of what was then a medium-sized wind farm.

The cooperative raised the capital required for the purchase of the turbines through share offerings. It raised £1.2 million to buy two turbines in 1996–97, and in 1998 raised £670,000 to allow the purchase of an additional turbine. The cooperative gives preference to local investors, so that the community can profit from some of the economic benefits from a local wind farm.

The cooperative currently has over 1,300 shareholders. Since 1996, members have received return of between 7 and 8.2 per cent. Owning shares in a local wind energy project has also improved the local population's understanding and appreciation of wind energy production in general.

Installation, operation and maintenance of energy generation facilities: PV

Most PV energy cooperatives are organized as consumer-owned cooperatives that not only provide their members with electricity, but also sell electricity to the grid.

GERMANY: Öecumenical Energy Cooperative [103]

The Öecumenical Energy Cooperative is a cooperative whose members are current or former employees of the ecumenical community in Baden-Württemberg. The objective of the cooperative is to promote the creation and use of sustainable energy, particularly in church properties. It aims to promote the use of roofs of church properties for PV installations.

99 Sociedad Cooperativa Popular Limitada de Comodoro Rivadavia. Available at: http://www.scpl.coop/
100 Federación Argentina de Cooperativas de Electricidad y Otros Servicios Públicos Limitada: *Memoria Anual* 2011 (72o Ejercicio), p. 25.
101 Baywind Energy Cooperative. Available at: http://www.baywind.co.uk/baywind_aboutus.asp
102 Birch, S.: "Is cooperative energy the solution to climate change", in *The Guardian* (London), 30 Oct. 2012. Available at: http://socialenterprise.guardian.co.uk/social-enterprise-network/2012/oct/30/co-operative-energy-solution-climate-change
103 Ökumenische Energie-Genossenschaft Baden-Württemberg. Available at: http://www.oekumenische-energiegenossenschaft.de/

Founded by 34 members in 2009, it had 110 members in 2010. Membership is limited to residence status in Baden-Württemberg. Equity capital was raised among members, with each share costing €100. Members can hold a maximum of 100 shares. As of March 2010, member shares amounting to €181,000 had been raised. In addition to the equity capital of the cooperative, the cooperative was able to access an additional €41,500 loan through the Renewable Energy Development Loan Fund *(Förderkredit)* from the state-owned Reconstruction Loan Corporation *(Kreditanstalt für Wiederaufbau)*.

In Germany, the PV energy cooperatives are the most common type of energy cooperative found at the local level. There is broad support for such cooperatives, not only by the legal and policy environment, but also by the cooperative movement itself; for example, the local cooperative federation Weser-Ems (Genossenschaftsverband Weser-Ems e.V.) is actively promoting the creation of PV energy cooperatives. The cooperative federations give advice on the creation of a cooperative but, above all, by having worked out a concept on citizen PV cooperatives, including a model statute, they also supply software for calculating the economic efficiency of photovoltaic installations, model contracts for renting roof space and a model brochure for canvassing clients. At least 20 new energy cooperatives have been formed as a result of these initiatives (data for February 2009).[104] In addition, cooperative banks *(Volksbank)*, EnBW Energie Baden Württemberg AG (one of the largest energy providers in the form of a stock company) and church and civic movements have been instrumental in the promotion of these initiatives.[105]

104 Rutschmann: op. cit., pp. 80 ff.
105 Bührle: op. cit., p. 46.

CHAPTER 3

PROMOTING ENERGY COOPERATIVES: ENABLING CONDITIONS

What is required to promote energy cooperatives? Are they only viable in countries where the government provides big subsidies for the model? Do they only have a chance of success in areas where there already good electricity infrastructure already exists, given that initial investment costs tend to be high?

3.1 Promotion of energy cooperatives by the state

It is difficult to summarize evidence about particular enabling environments. Some studies consider this aspect in depth and from a specific perspective, for example with a focus on community wind power projects.[106] In this case, they tend to consider a range of enabling factors for wind energy cooperatives: e.g. systems of financial support, traditions of "ecological activism" (especially the anti-nuclear movement), planning systems, land-use policies, feed-in laws, taxation schemes, legal forms available for cooperative-like enterprises and gradual institutional capacity-building.[107] For energy-consumer cooperatives, the literature often discusses questions surrounding national electricity grids and the opening-up of the energy distribution market to various private entities.

There is no blueprint for successful policy in this regard. A flexible and conducive regulatory environment is essential to promote any business activity and cooperatives are no exception to this imperative.

In general, state-led promotional measures can be divided into direct promotion of energy cooperatives and a more general promotion of renewable energy, which may indirectly encourage and support the establishment of cooperatives. In both cases, cooperatives should not be seen as tools in the hands of government, to be used to impose a particular solution to energy access. Promotional measures must aim at providing the conditions under which potential members of cooperatives will be able to form genuine cooperatives, whose autonomy and democratic nature will be respected according to the cooperative principles and values.

Direct promotional measures

An example of a direct promotional measure is a specific loan or guarantee scheme for energy cooperatives. Often, this type of scheme is overseen by an agency that has been set up specifically for this purpose, as in Bangladesh, Costa Rica, the Philippines and the United States, for example.

The United States offers a good historical example of this. While urban households and businesses in the country were connected to the electricity grid in large numbers after 1910,

106 Toke et al.: op. cit.
107 Schreuer: op. cit. (2010), p. 103.

the rural areas were generally left without electricity. In the mid-1930s, this applied to 90 per cent of all rural homes.[108] Utility companies ignored the rural market because homes, farms and businesses were too distant from each other and offered too little demand relative to the cost of investment. High network construction costs and the prospect of meagre near-term profits rendered rural markets uninteresting.[109] The Rural Electrification Administration (REA) of the United States was created in 1935 to implement a federal rural electrification programme based on cooperatives, and the US Congress authorized US$410 million for a ten-year programme to electrify American farms.[110] The REA provided subsidized loans to private companies, public agencies or cooperatives for the construction of electrical supply infrastructure in rural areas. The loans were guaranteed by the federal government and had a very low interest rate and a generous repayment schedule.[111] By the end of 1938, just two years after the inception of the REA programme, 350 cooperative projects in 45 states were delivering electricity to 1.5 million farms.[112] By the mid-1950s nearly all American farms received electrical services, provided through the REA or by other means.[113] Most US rural electrification is the product of locally owned rural electric cooperatives that got their start by borrowing funds from the REA to build lines and provide services on a non-profit basis. The programme not only brought electricity to rural households, but also new communication media, such as radio and television, telephone and, more recently, the internet. Rural municipal water and waste disposal systems also relied on electric power.[114]

Indirect promotional measures

Germany provides an example where indirect measures have resulted in an enhanced enabling environment for energy cooperatives.

In particular, the enactment of the Act on the Sale of Electricity to the Grid *(Stromeinspeisungsgesetz)*, subsequently updated by the Renewable Energy Sources Act *(Erneuerbare-Energien-Gesetz)* (RESA), has been cited as an important step in this regard.[115] What proved particularly effective was the feed-in tariff, which has since been replicated in a large number of countries. This is considered to have been important not only for the development of energy cooperatives in the field of photovoltaics, but also for cooperatives based on wind energy.[116]

There is no standard definition of "feed-in tariff"; the term was derived from a literal translation of a German Act. According to the US Department of Energy, a feed-in tariff is:

a publicly available, legal document, promulgated by a state utility regulatory commission or through legislation, which obligates an electric distribution utility to purchase electricity from an eligible renewable energy seller at specified prices (set sufficiently high to attract to the state the types and quantities of renewable energy desired by the state) for a specified duration; and which, conversely, entitles the seller to sell to the utility, at those prices for that duration, without the seller needing to obtain additional regulatory permission.[117]

108 NRECA. Available at : http://www.nreca.coop
109 Malone, L.: "Rural Electrification Administration", in R. Whaples (ed.), *EH.Net Encyclopedia* (2008),16 March. Available at: http://eh.net/encyclopedia/article/malone.electrification.administration.rural
110 Brown, D. C.: *Electricity for rural America: The fight for the REA* (Westport, CT, Greenwood Press, 1980), p. 68.
111 Joskow, J., et al.: *Markets for power: An analysis of electric utility deregulation* (Cambridge, MA, MIT Press, 1983), p. 17.
112 Schurr, S., et al.: *Electricity in the American economy* (Westport, CT, Greenwood Press, 1990), p. 234.
113 Brown: op. cit., p. 114.
114 Malone: op. cit. However, this programme has not been undisputed. Some critics call for a closer look at the costs of the subsidies balanced against the benefits. Until 2000, the programme had given out federally guaranteed low-interest loans worth approximately US$57 billion for the development of cooperatives.
115 Kemfert, C. and Diekmann, J.: "Erneuerbare Energien: weitere Förderung aus Klima-schutzgründen unverzichtbar". in *Wochenbericht des DIW*, Berlin (2005).
Toby D. Couture et al. *A Policymaker's Guide to Feed-in Tariff Policy Design.* Technical Report NREL/TP-6A2-44849, National Renewable Energy Laboratory. 2010.
116 Bührle: op. cit, p. 67.
117 Hempling, S. et al.: *Renewable energy prices in state-level feed-in tariffs: Federal law constraints and possible solutions.* NREL Report TP-6A2-47408 (Golden, CO, National Renewable Energy Laboratory, 2010), p. iv.

A feed-in tariff typically includes three key provisions: guaranteed grid access, long-term contracts for the electricity produced, and purchase prices that not only take into account the cost of renewable energy generation, but also tend towards grid parity.[118]

Box 1 Renewable Energy Sources Act, Germany

Germany first instituted "feed-in" financial incentives in 1990 through the Act on the Sale of Electricity to the Grid *(Stromeinspeisungsgesetz)*. This Act was subsequently improved and replaced by the Renewable Energy Sources Act *(Erneuerbare-Energien-Gesetz)* (RESA), which came into effect on 1 April 2000.

The core elements of the RESA include:

- the priority connection of installations for electricity generation from renewable energies and from mine gas to the general electricity supply grids;
- the priority purchase and transmission of this electricity; and
- a consistent fee for this electricity paid by the grid operators, generally for a 20-year period, for commissioned installations.

In terms of achieving expansion targets for renewable energies in the electricity sector, the RESA has been a very effective funding instrument and is often cited as exemplary by international observers. The dynamic development of the German electricity sector can, for the most part, be attributed to the RESA.
The Act can be consulted in its English translation at: http://www.erneuerbare-energien.de/inhalt/42934/40508/.

Source: German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, *The main features of the Act on granting priority to renewable energy sources.*

The feed-in tariff enables small energy producers to access the electric-utility network and also guarantees a minimum price for a considerable period of time. In Germany, by not requiring a high minimum input level the RESA made it possible for energy cooperatives to feed into the national grid.

This enabling legal framework at the federal level is complemented by laws enacted at state level. The parliament of Baden-Württemberg, for example, passed an Act on Renewable Heat *(Erneuerbare-Wärme-Gesetz)* in 2008, making it the first German state to stipulate, inter alia, that new residential buildings must use renewable energies to a certain extent. Since January 2010, this Act also applies to existing residential buildings.

This legal framework promoting renewable energy cross-fertilized with the reform of the Cooperatives Act in 2006 to encourage greater interest in forming enterprises of this type.[119] Most of the resulting "citizens' energy cooperatives"[120] have around 130 members and thus fall into the category of "small cooperatives", with which have fewer requirements concerning annual audits.[121] There are still audit costs, but the legal requirements are reduced. Additionally, the Law on the Prospectus for Securities Offered for Sale *(Wertpapier-Verkaufsprospektgesetz)* exempts cooperative members' shares from legal liability arising from sales prospectuses for publicly advertised shares in corporations.[122] This targeted legislative framework was backed by a broadly supportive policy environment. The liberalization of the energy market opened

118 Mendonça, M.: *Feed-in tariffs: Accelerating the deployment of renewable energy* (London, Earthscan, 2007), pp. 8 ff.
119 Flieger: op. cit, pp. 7 ff.
120 Cooperatives Act, paragraph 53, subparagraph 2.
121 GenoPortal. Available at http://www.genoportal.de
122 Flieger: op. cit., p. 7 ff.; Bührle: op. cit., p. 55.

up opportunities for grassroots initiatives in the energy sector and led to the partial "remunicipalization" of the energy market. The population's engagement in the protection of the environment has also proved to be an important factor. The option of organizing as a cooperative aligns with these interests and values, while also helping to ensure the economic viability of the undertaking.

The growth of the German renewable energy sector overall has led to a significant growth in employment – the number of people employed in the sector doubled between 2004 and 2009, from 160,000 to 340,000.[123]

3.2 Promotion by the cooperative movement

Strengthening the vertical structure of the national cooperative movement is also pivotal in enabling cooperatives to realize their full potential in producing sustainable energy and creating decent employment. This is important with regard not only to capacity-building and knowledge transfer, but also to strengthening representation of cooperatives' interests at the national or regional level. The experiences of energy cooperatives confirms that the existence of a federation or a higher body of like-minded cooperatives has often been a prerequisite for their successful formation and operation.

Capacity-building measures from within the cooperative movement are likewise important, both at national level and international level. In Germany, the United States and other countries, brochures and guides exist on how to set up energy cooperatives. Other services that may be provided by the movement include the creation and maintenance of a register of business consultants specialized in cooperatives and possibly with specific expertise in (renewable) energy; information on how to set up a cooperative; and assistance in drawing up business plans for new energy cooperatives.

Financing for energy initiatives is also provided by the movement. Many savings and credit cooperatives in OECD countries provide specific loans to improve energy efficiency; in others, credit is provided to small and medium-sized enterprises involved in the energy sector, including cooperatives, or to enable access to energy. Given the high penetration rate of savings and credit cooperatives, these can be a source of credit. This is an important role, as energy generation or distribution can require considerable amounts of investment, and access to finance is often a major challenge for energy cooperatives. Some studies indicate that these cooperative financial institutions have also developed energy loan portfolios that provide credit for access to energy – including for energy cooperatives – and/or provide credit to improve energy efficiency of residential and commercial customers.[124]

123 Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit: *Erneuerbar beschäftigt. Kurz- und langfristige Arbeitsplatzwirkungen des Ausbaus der erneuerbaren Energien in Deutschland* (2010).

124 Krause, M. and Nordström, S. (eds): *Solar photovoltaics in Africa: Experiences with financing and delivery models.* (New York, United Nations Development Programme and Global Environment Facility, 2004), p. 24.

Box 2 Kenyan savings and credit cooperatives support energy access

Two tea growers' savings and credit cooperatives in Kenya – Kiegoi and Michimikuru – developed loan programmes with their members for buying PV systems. Kiegoi has financed and installed over 50 systems (as well as a number of biogas systems). Michimikuru, which received over US$30,000 from the Global Environment Facility's Small Grants Programme, has installed over 100 PV systems. Quality control was carried out by a local NGO. In both programmes, systems were fully designed and inspected, and maintenance contracts were issued.

National networks of (renewable) energy cooperatives have proved to be another element of success for individual energy cooperatives. These organizations not only support and promote all such initiatives, but also engage in policy and legislative dialogue and conduct public awareness campaigns. The National Rural Electric Cooperative Association (NRECA) in the United States is an example of such a structure, a national service organization dedicated to representing the national interests of cooperative electric utilities and their consumers. Another is the *Federación Argentina de Cooperativas de Electricidad* (Federation of Electricity Cooperatives; FACE) in Argentina, which has similar functions. At the micro level, this assistance should be tailored to the needs of individual cases. For example, it might take the form of financing, training or advice on issues such as electricity end uses, effective accounting procedures and micro-financing.[125]

Forming national networks can also help in resolving the problem that individual production outputs may be too small to be useful. For biofuels, for example, this issue can be addressed by forming cooperatives of smallholder suppliers and, from a logistics point of view, by establishing collection points and stockpiling the feedstock at the production plant. However, a prerequisite for that is a good transport and infrastructure network, which does not exist in many developing countries.[126]

3.3 Promotion by international organizations

Energy cooperatives in general, and renewable energy cooperatives in particular, have great potential for contributing to development and poverty alleviation – not only because by making energy accessible and affordable they can improve productivity and living conditions, but also because they create jobs, including green jobs, particularly in rural areas. In addition, new cooperatives centred on energy generation and distribution could be development hubs for other entrepreneurial activities.

The UN International Year of Cooperatives (IYC) and the International Year for Sustainable Energy for All were both celebrated in 2012. This coincided with the tenth anniversary of the adoption of ILO Recommendation 193 on the Promotion of Cooperatives and the twentieth anniversary of the 1992 Rio Declaration on Environment and Development, which anchored sustainability to development agendas. Thus, the IYC lent itself to strengthening efforts to enhance the ability of cooperative businesses to incorporate the sustainability paradigm, in particular by promoting energy cooperatives.

125 Yadoo and Cruickshank: op. cit.
126 Niez, A.: *Comparative study on rural electrification policies in emerging economies: Keys to successful policies* (Paris, OECD/IEA, 2010), p. 79.

An example of promotion at the regional level comes from the European Union (EU), which noted that energy cooperatives offer an opportunity for achieving a more sustainable energy industry. The Intelligent Energy – Europe programme, which looks to a more energy intelligent Europe, funded the Energy Self Supply in Rural Communities (ENSRC) project. One of the main objectives of this project was to produce a guide that would support farmers, farmer groups, local government, rural development agencies and developers to form rural energy cooperatives. Among other things, this publication contains guidelines on establishing a cooperative, a short overview of renewable energy technologies and case studies.[127]

Other promotional programmes at the EU level include providing energy cooperatives with access to EU development programmes, such as the European Regional Development Fund (ERDF).[128] Other support by the EU is provided for renewable energy-based electrification plans, such as that of the Renewable Energy Project (REP), a joint project by the EU and the Government of Nepal. The project's aim is to create renewable energy infrastructure and services for the benefit of rural people in remote districts. It focuses on the provision of solar energy systems for public buildings, such as schools and hospitals, and also safe water and communications infrastructure for remote areas, as well as income-generation opportunities.[129] The United Nations Development Programme Global Environment Facility (UNDP-GEF) Small Grants Programme has also provided energy cooperatives with access to development support. For example, financing and training was provided to the Polocón People's Power Cooperative in the Philippines, which owns and operates a hydropower plant, to support its community-based watershed management project. The success of the project led to local government becoming interested in micro-hydro and to the Department of Energy in the Philippines (with the support of USAID) producing a guide for communities seeking to establish small-scale power cooperatives.[130]

127 Intelligent Energy Europe: *Guide on the formation of self-supply cooperatives*. Available at: http://eaci-projects.eu/iee/page/Page.jsp?op=project_detail&prid=1555&side=downloadablefiles
128 Bührle: op. cit., p. 64.
129 Renewable Energy Project. Available at: http://www.rep.com.np/index.php
130 GEF Small Grants Programme. *Project Sheet: Micro Hydro Power and Watershed Protection, The Philippines.* Available at: http://www.docstoc.com/docs/17175304/Micro-Hydro-Power-and-Watershed-Protection_The-Philippines

CHAPTER 4

OUTLOOK AND RECOMMENDATIONS

Cooperatives are based on the values of self-help, self-responsibility, democracy, equality, equity and solidarity. In the tradition of their founders, cooperative members believe in the ethical values of honesty, openness, social responsibility and caring for others.[131]

This paper has demonstrated that the cooperative model of enterprise, with its values and principles, has the potential to provide an organizational and economic structure that effectively delivers accessible and affordable energy for all.

Energy cooperatives are operating in a diversity of forms and are involved in all facets of energy provision and distribution in countries around the world – and they are growing in number, particularly in the renewable energy sector.

One of the reasons why the cooperative model of enterprise has been effective is that it responds to the increasing demand for democratization of energy. In cooperatives, decisions are taken democratically, at the community level, and often by end users, thus empowering people and promoting equal participation.[132] This contrasts with often ineffective public sector management and the profit-motivated involvement of the private sector.[133] Cooperatives strive to serve their members and the communities they work in, and in the case of energy cooperatives, they respond to the need for effective and affordable service delivery. Therefore, cooperatives can contribute to reliability, quality, affordability and adequacy of energy.

The growth of energy cooperatives, particularly in the renewable energy sector, suggests that cooperatives – as enterprises with a triple bottom line: people, planet and profit – are increasingly being chosen by people around the world to respond to their needs. However, this growth is also attributable to increasing public interest in community-owned and locally based energy solutions, new energy regulations and support measures for renewable energy, and raised awareness on green issues and climate change, in addition to the general resurgence of interest in the cooperative model of ownership. In fact, in recent years there has been a push by the cooperative movement and other cooperative stakeholders to seek to participate in renewable energy policy discussions at regional and international levels. They have also shown an interest in sharing knowledge among those interested in energy cooperatives, both in countries where cooperatives do not yet exist and in countries where they are already implanted. As energy is likely to be included as one of the development goals in the post-2015 development agenda, these discussions are set to become more intensive.

131 Co-operative identity, values and principles, see http://ica.coop/en/what-co-op/co-operative-identity-values-principles
132 Lowery, M.: "Towards a sustainable energy economy", presentation at the International Cooperative Alliance General Assembly, Geneva (2009).
133 Yadoo and Cruickshank: op. cit., p. 2943.

Recommendations for an enabling environment

If energy cooperatives are to continue to play a part in bringing energy to people and their potential is to be realized, they will require an appropriate legislative framework, policy environment and enabling conditions, including support measures. A number of examples of measures that provide financial and technical support for cooperative rural electrification, as well as for the development of renewable energy production and distribution through cooperatives, have been presented in this paper to highlight some successful initiatives. These include loan, grant and subsidy programmes (including special feed-in tariff rates that encourage community-based or cooperatively owned energy development), technical assistance and capacity-building, including partnership programmes with government agencies that help public authorities at all levels to work towards their commitment to "energy for all". If successful, this process has the capacity to create employment, including green jobs, at various levels, both in renewable energy production and distribution and in related services.

Effective public–private (cooperative) partnerships are also expected to be particularly important drivers of progress toward these objectives. Energy cooperatives and other types of cooperatives are active in providing utilities that complement the services provided by the state. They should not replace the state in its obligation to make energy and other utilities available; however, they have proved to be effective in extending access and services, especially in areas where for-profit enterprises see insufficient returns on their investments, including in remote rural areas. Given this close partnership, energy cooperatives often see their services subjected to regulations set by public authorities in accordance with the terms defined in the concession, licence or permit with regard to conditions and prices – although self-provision energy cooperatives often implement effective self-regulation.[134]

A major challenge arising from growth in cooperatives will be continued provision of access to support measures. The IEA foresees that support measures will continue to be needed to promote universal access to energy, increased energy efficiency and, in particular, further development of renewable energy. Thus sustained support by government to providing adequate resources and maintaining clear and stable energy policies are key elements of the enabling environment. An important conclusion is that cooperatives and the cooperative movement should be consulted and included in drafting new energy policies or implementing existing ones to ensure that cooperatives have access to support measures, including financial and technical support, that are consistent with the nature and function of cooperatives, and on terms no less favourable than given to other forms of enterprise. This is in line with the ILO Recommendation concerning the promotion of cooperatives, 2002 (No. 193), which specifically notes:

Cooperatives should be treated in accordance with national law and practice and on terms no less favourable than those accorded to other forms of enterprise and social organization. Governments should introduce support measures, where appropriate, for the activities of cooperatives that meet specific social and public policy outcomes, such as employment promotion or the development of activities benefiting disadvantaged groups or regions. Such measures could include, among others and in so far as possible, tax benefits, loans, grants, access to public works programmes, and special procurement provisions.

ILO Recommendation 193, paragraph 7

ILO Recommendation 193 and the United Nations' guidelines aimed at creating a supportive environment for the development of cooperatives[135] provide additional policy guidance. Both point to a number of basic caveats that should respected in all cooperative promotional measures, which include, but are not limited to, the following.

134 ILO. *Promotion of Cooperatives.* Report V (1). International Labour Conference, 89th Session, Geneva, 2002.
135 United Nations. *Cooperatives in social development. Report of the Secretary-General.* A/56/73–E/2001/68 (New York, 2001).

There must be:

- appropriate legal and policy environments – to enable the development and growth of cooperative;
- respect of cooperative autonomy – cooperatives are not tools for development in the hands of promoters, and they will only be effective if they are owned and controlled by heir members;
- regulation commensurate with the nature, scope and scale of activity of cooperatives – energy cooperatives in a number of countries point to the fact that regulations on energy production and distribution favour large enterprises, which have the capacity and resources to fulfil complicated and sometimes time-consuming registration and reporting requirements, thus acting as a hindrance for the establishment of energy cooperatives; and
- access to support services – in order to strengthen cooperatives' business viability and their capacity to create employment and income.

There is also a need to promote the cooperative model itself, so that people and communities will choose to form cooperatives in general and energy cooperatives in particular. The two international instruments on cooperatives mentioned above also provide recommendations on the need to promote education and training systems, and in the wider society. They also highlight the need to provide access to entrepreneurship training and other support for members of cooperatives, to ensure they can contribute effectively to the development of their organizations.

Finally, knowledge sharing, including promoting good practice and lessons learned about cooperatives, both among cooperatives and to wider audience, can be a useful way to introduce cooperative action and encourage scaling up of successful examples. The case studies in this paper partially respond to this need. There are numerous renewable energy cooperatives and national and international networks of cooperatives that can provide technical support to those who wish to start energy cooperatives or to those who wish to include cooperatives as partners in rural electrification initiatives, among others. Cooperation with savings and credit cooperatives can secure financial support for renewable energy cooperatives, whether to improve energy efficiency or to enable access to energy. The cooperative movement can be an effective partner in promoting an energy cooperative solution to accessible and affordable energy.

There is no one model for promoting energy cooperatives that responds to all needs and situations. This paper, however, concludes that in all countries and continents, irrespective of the type of energy cooperative, people are choosing the cooperative way of generating and distributing energy. The trend is likely to be upward, given increasing environmental concerns, the competitive advantage of decentralized renewable energy technologies, a growing interest in community ownership and control, and the need to promote rural development and reduce poverty. Policy-makers should therefore consider the energy cooperative option, as this has the potential to make energy accessible for all.

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