



# REPORT

## Rural electrification policies and support mechanisms for off-grid communities



Hanoi, August - 2017

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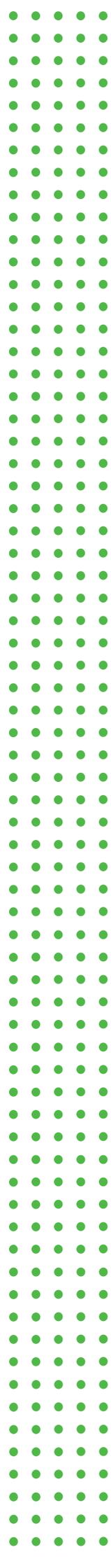
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## LIST OF ACRONYMS

EVN	: Electricity Vietnam
PC	: Power company
ODA	: Official development assistance
GDP	: Gross domestic product
NGO	: Non Governmental Organization
RE	: Renewable Energy
EVNNPC	: Northern Electricity Vietnam
EVNSPC	: Southern Electricity Vietnam
EVNCPC	: Central Electricity Vietnam
ADB	: Asian Development Bank
PDP	: Power development bank
PPP	: Public-private partnership

# CHAPTER 1: INTRODUCTION

## 1. General introduction.

Rural electrification is one of the top priorities of the Vietnamese government and plays a pivotal role in socio-economic development as well as the lives of people in the remote areas. Vietnam is considered one of the successful countries globally in efforts to provide electricity to citizens. It is noted that the proportion of households connected to the grid increasing from 2.5% in 1975 to 98.6% in 2016<sup>1</sup>.

The Government has set up the target programs for grid construction and expansion in each phase, from urban areas with high electricity demand to rural and mountainous areas with the low population density and the difficult terrain for installing. At present, there are two most optimal measures including the grid extension and the use of local renewable energy sources. Along with the achievements over the past 33 years, there are also many difficulties in implementing the program and the beneficiaries, especially for the rural people.

With the aim of reviewing the promotion policies and supporting mechanisms for the electricity supply for the off-grid areas, this report illustrates the Vietnam rural electrification aspects through each period including the promulgated policies to the actual implementation. Then, the remaining difficulties are acknowledged clearly to find solutions in a timely manner, strive to reach the target of supplying electricity for the entire 100% households nationwide as well as social security and poverty reduction.

The structure of the report consists 5 main parts. The first chapter introduces the context, form and methodology. The second chapter summarizes the electricity supply policies for rural areas and some living development programs for the off-grid communities. The third chapter presents the difficulties and barriers in the actual implementation of the rural electrification program. Then, the next chapter presents the results of the field study in An Giang province. Finally, the general assessments of providing electricity for off-grid communities as well as policy and support mechanisms recommendations are shown in the chapter 5.

## 2. Methodology

- Desk study
  - Review existing legal documents on rural electrification;
  - Analysis and assess the existing legal documents on power supply system for rural areas.
- Field study
  - In-depth interview with Department of Industry and Trade (DOIT), Department of Labour, Invalids and Social Affairs (DLISA) about rural electrification and poverty reduction policies in An Giang province;
  - Surveys with the various typical groups of households to understand about the status of electricity usage at off-grid communities in An Hao commune, Tinh Bien district, An Giang province.
- Organizing the consultant workshop
  - Consultation of experts according to each main content of the report.

Consultation, dialogue with local authorities, people and experts in the Mekong delta to complete the synthesis report.

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<sup>1</sup> Theo báo cáo tại hội nghị tổng kết tình hình thực hiện kế hoạch năm 2016, mục tiêu kế hoạch năm 2017 của công ty điện lực miền Bắc (EVNNPC)

## CHAPTER 2: RURAL ELECTRIFICATION PROGRAM

### 1. Overview of the program

#### a. Point of view

The policies to promote the rural electrification program were issued with the aim of attracting all investment resources for the power grid development to provide quality electricity in rural, mountainous and island areas. This will create conditions for people in these areas, ethnic minorities, areas with extremely difficult socio-economic conditions to use electricity for production and daily activities.

The rural electricity growth including the construction and upgrading of existing electricity systems in line with the planning combined with the redistribution of population in each locality developing with focus step by step in accordance with the financing ability. And prioritize the supply of electricity to communes without electricity, those with a lower proportion of rural households using national electricity shall be lower than the national average and those of national security and defense.

In addition, with the implementing guideline of cooperation among the State and people, the central and local levels in the rural electricity development towards the national target program on new rural development, all individuals and organizations or all social classes are called to contribute to development.

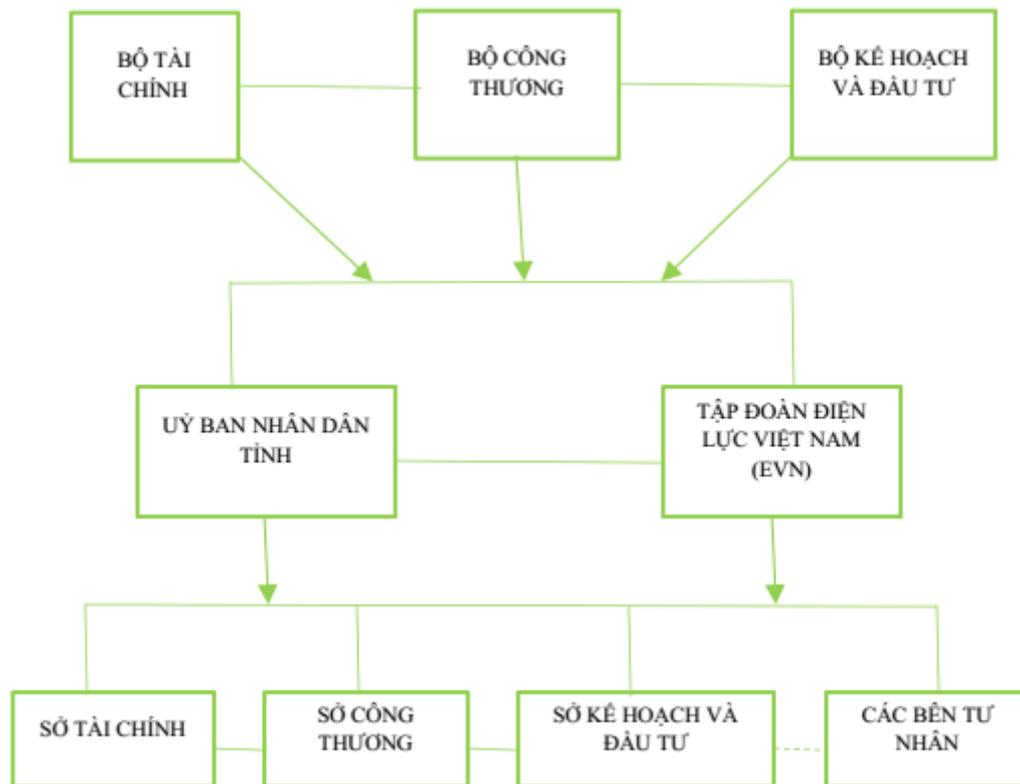
#### b. Target

Efforts to bring electricity to rural, remote and mountainous areas, islands and ethnic minorities are also aimed at creating incentives for poverty alleviation programs, material and spiritual, contributing to the implementation of social security justice, strengthening the solidarity among ethnic groups, maintaining political security and social order and safety, and facilitate the transformation of production structure of people in rural and mountainous areas, contributing to improving and narrowing the development gap in the region and between regions in a sustainable manner, to reduce poverty in deep-lying, remote, ethnic minority and socio-economic areas with exceptional difficulties.

### 2. Implementation organizations

The table below shows the hierarchy of the parties implementing rural electrification projects in Vietnam:

**Figure 1 : Stakeholders of the rural electrification program**



a. Ministry of Industry and Trade: To be responsible for preparing, appraising and approving investment projects, implementing and supervising the implementation of rural electricity projects, and agreeing on the list of rural electricity projects implemented by the provincial People's Committee before PPC approves the investment project. In addition, in coordination with the Ministry of Planning and Investment, the Ministry of Finance works with international financial institutions to provide ODA to Vietnam to supplement the program implementation capital.

b. Ministry of Planning and Investment (MPI): assumes the prime responsibility and coordinate with the Ministry of Finance (MoF) and the Ministry of Industry and Trade (MOIT) in synthesizing the central budget capital demands for the program and proposing donors and international financial organizations who provide additional ODA capital. Annually, MPI estimates the central budget support for projects, and report at fixed period to the Government for submission to the National Assembly.

c. Ministry of Finance (MoF): makes annual financial balance sheet to allocate capital for the program in accordance with approved divergences; coordinates with concerned parties in guiding the handover, receipt of capital and assets, and refund of capital for rural power supply projects. MoF works together with MOIT and MPI to set up a mobilizing capital mechanism to support investment in rural electricity network; and proposes donors and international financial organizations to fund additional ODA capital for the Vietnamese program.

c. Other ministries and branches: Depending on the functions and tasks of each ministry or branch have to coordinate with MOIT, the provincial People's Committees and the Vietnam Electricity (EVN) in handling related issues during implementing process.

d. The People's Committees of the provinces and municipalities:

- To set up provincial Steering Committees for rural electrification projects at the provinces where the rural power projects are carrying out. This Board includes a representative of the head provincial People's Committee (PPC) as a leader, members who are the heads of relevant departments, People's Committees of districts, provincial electricity companies. All member of this Board coordinate and direct the implementation and settlement of problems in the process of project implementation in the locality.

- To be responsible for the implementation of compensation and site clearance; instruct the local authorities at all levels to inform the policy and mobilize the local people to take part in clearance of the tower and line corridor for deploying the project.

- To direct the arrangement and rearrangement of inhabitants in deep-lying and remote areas in order to facilitate the implementation of rural electricity supply projects; To direct the effective integration of the rural electricity supply program with other local programs and projects.

- The role of provincial departments (Department of Industry and Trade, Department of Finance, Department of Planning and Investment, and so on) is to set up the five-year and annual plans to submit to PPC and organize the implementation of approved program and decisions.

In terms of management, for provinces assigned as investors, the province has the following responsibilities:

- To organize the establishing, appraisal and approval of investment projects in rural electricity supply projects. To direct the functional agencies to organize the implementation of the project in accordance with current regulations.

- To arrange enough counterpart fund to implement the project

- To register the project capital and the requirement for central budget capital annually with MOIT for the aim of balancing and summing them up and send them to MPI and MoF to submit to the Prime Minister for decision.

- To coordinate with ministries and branches to arrange annual capital and implement investment projects according to current regulations ensuring timely progress.

- Regularly inspect and supervise the management of the implementation of rural electricity supply projects in localities and implement the reporting regime according to regulations. Every quarter, the management and use of investment capital from the central budget shall be reported to MPI, MoF and MOIT.

- Manage the operation and sale of electricity to households after the component projects are completed and under-operation, organize to receive capital and assets after the component projects are finalized.

e. Vietnam Electricity

For rural electricity projects in provinces implemented by EVN. EVN is responsible for:

- Organize the preparation and submission to competent authorities for appraisal and approval of projects

- To direct the electricity corporations to implement in quality and ensure progress projects

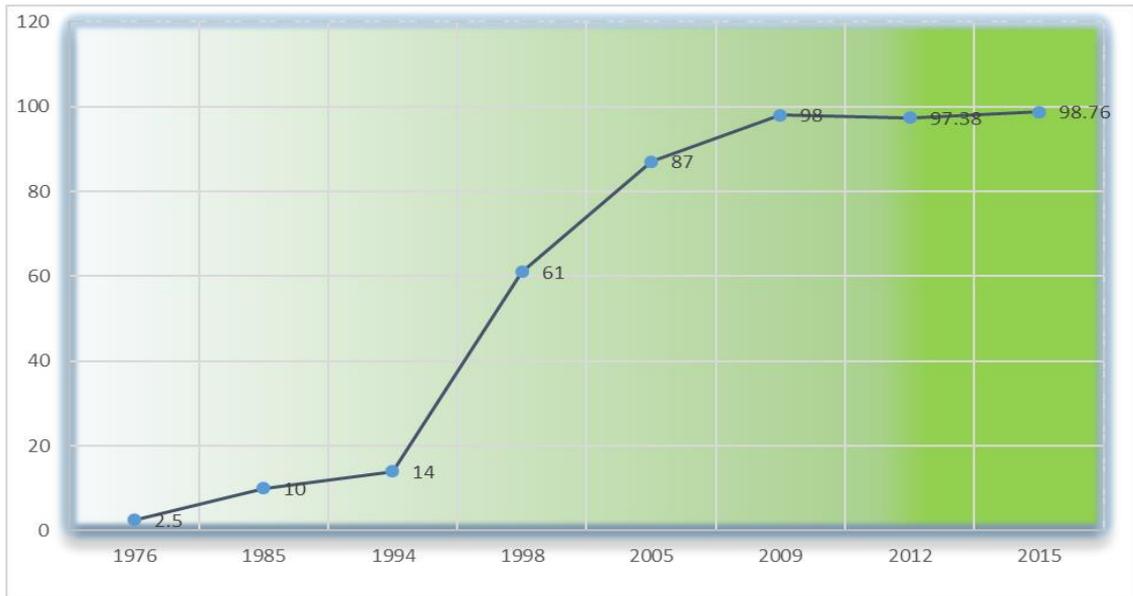
- To arrange enough counterpart funds and invest in rural electricity projects in accordance with current regulations, ensuring timely progress.

- 
- To report on the management and use of central budget investment capital and the registration of capital requirements from the central budget annually, as required, to MPI, MoF and MOIT quarterly.
  - To coordinate with PC at all levels and provincial departments and sectors to solve problems in the whole process of project implementation.

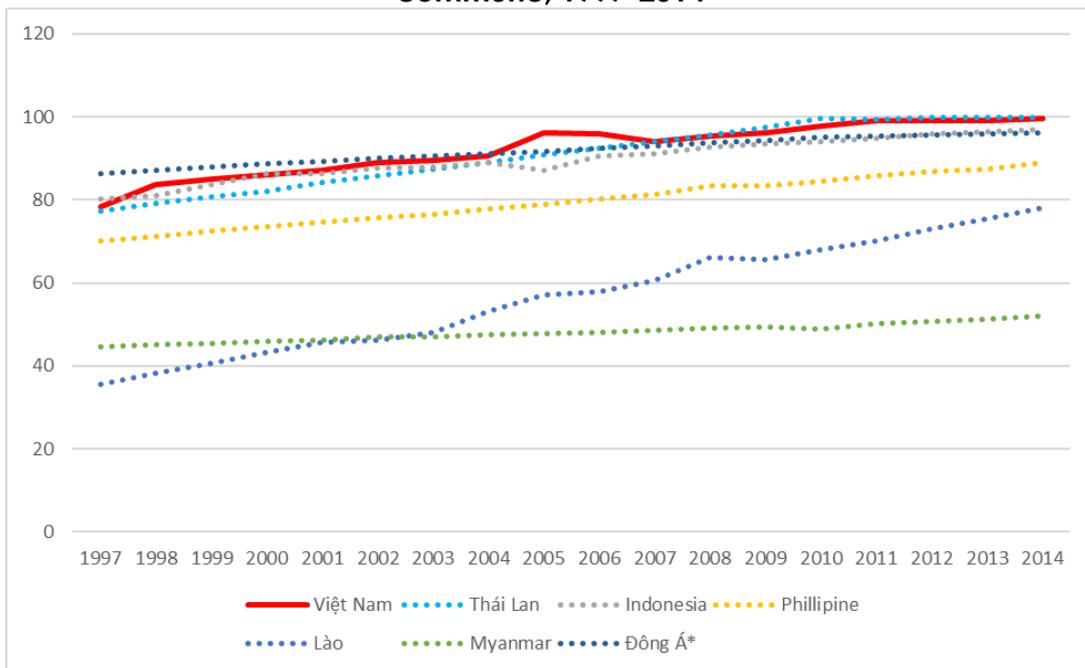
### **3. Rural electrification policies**

To be considered as a rare bright spot in the rural electrification effort, Vietnam has become a successful model for power transmission and distribution throughout the whole of country. Looking back on the past, since 1975, after the liberation, the proportion of rural households with electricity only 2.5%, so far this number has increased over 98.5%, increasing 96% over 40 years. Specially, the striking increase was seen at 82% in less than 20 years from 14% in 1993 to 96.8% in 2013 (Figure 2). To achieve this remarkable result, it is said that the direction and support of the Party, the State and the Government play the most crucial role at first. Then, the following contributions are the strong cooperation of multi-levels from central to local and the guideline "the State and the people work together and share the burden of finance". This effort is even more impressive when compared to the average rate of East Asian countries like Indonesia and the Philippines, which have the same per capita income as Vietnam, but the low proportion of rural households accessing electricity (Figure 3). Furthermore, the developing countries in Africa like Uganda and Tanzania have only 14% of rural electrification (2013) which is equal as Vietnam's rate in 1993, and Nepal is only 40% (2013).

**Figure 2: Rural electrification rate chart from 1976 to 2015 (%)**



**Figure 3: Rural electrification in Viet Nam and other countries in the region, by commune, 1997-2014**



**Source: World Bank Data Sources**

The 40-year rural electrification program in Vietnam can be divided into 7 stages with the different contexts and outcomes.

**a. Stage 1: From 1976 to 1985**

Since 1975, after 30-constant-years of war, Vietnam's economy suffered from the effects of wars, with a less than \$200 of GDP per capita. Electricity was provided to only large cities and industrial zones by the independent power systems. Electricity consumption per capita reached 45kWh in 1976 and increased to 65kWh in 1985. At this time, electricity was particularly important and most of the power lines were used for pumping irrigation water. In urban areas, electricity was provided by the national grid system and small hydropower plants in the mountainous areas.

According to calculations of the regional electricity distribution companies, the proportion of households accessing electricity increased from 2.5% in 1975 to 9.3% in 1986.

### **b. Stage 2: From 1986 to 1993**

In 1986, an important landmark year, the Doi Moi program<sup>2</sup> strongly affected all aspects of the Vietnamese economy. The growth of rural incomes in line with the government's correct tax exemption policies had enabled farmers to save savings to build rural electricity networks.

During this period, a number of power plants were put into operation, including Tri An hydropower plant (400MW) in the south, Pha Lai thermal power plant and Hoa Binh hydropower plant in the north with the largest installed capacity at 1,920MW. The more power output power plants generated, the more amount of electricity rural areas were supplied. In 1992, after careful consideration and estimation in terms of policy, technology, and energy security, the government started the construction of a 500KV power transmission line from the North to the South. The strong development of transmission and distribution systems at this time played an important role in the rural electrification process in Vietnam and facilitated the development of the program in the next periods.

### **c. Stage 3: From 1994 to 1997**

The period from 1994 to 1997 could be said to be the boom of electricity-led efforts to households with a significant increase in electricity production. Thanks to the 500KV transmission line system and a number of transformer stations starting to operate, the national power system was connected to become a separate unit to operate more efficiently. Electricity was transmitted from the North that was a favorable condition for the achievement of rural electrification goal, especially in the Central and South regions.

During this period, Government demonstrated a strong commitment to electricity supply when it set clear targets for 100% of districts, 80% of communes and 60% of rural households connected to the grid by 2000 (according to the 8th Party Congress, 1996), outlined the specific reform strategies and strategies in the "Report on Electricity Policy" issued by the Ministry of Industry in 1996. And those efforts had been realized by the number of 1.7 million households with electricity (equivalent to 14%) in early 1994 and an additional 615 households by the end of 1997. In other words, during this period, electricity was supplied to all 6.2 million households, with an average of 1.6 million households per year.

The wider the grid, the more management challenges the rural low voltage grid was. When the State was facing many difficulties, the guideline "The State and the people work together", the use of rural electricity in the provinces and cities all assigned to power, electricity service cooperatives, commune electricity management. These organizations focused only on profitability and limited financial capacity, technical management, cost accounting, human resources, etc. This leads to the situation where many places were not safe for the grid, large power

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<sup>2</sup> **Doi Moi** is an economic and social reform program initiated by the Communist Party of Vietnam in the 1980s. The Doi Moi policy was officially implemented by the Congress of the Communist Party of Vietnam VI, 1986 with the goal of Doi Moi in parallel with Doi Moi on other aspects such as administration, politics, culture and education.

**Doi Moi** in Vietnam is similar to the new Leninist economic policy of the Soviet Union (1921-1924), the Reformation in China and Doi Moi in Laos.



losses, low voltage, unstable, high electricity price, badly effect on the production and life of people. And this problem partially suppressed the connection speed of the grid at the next stage.

#### **d. Stage 4: From 1998 to 2004**

In this period, the pace of rural electrification had slowed, investment has gradually shifted. Additionally, the role of the state in policy development had strengthened, and Vietnam began to receive the support of international financial institutions.

By the end of 1997, the proportion of households connected to the grid was 61 percent and 30 million households had not yet been supplied with electricity. After the explosion of the previous period, when the rate of electrification was 12% per year, Vietnam entered a slower period from 1998 to 2004, and two main reasons for this feature were:

- All domestic financial resources to implement the program were gradually depleted.
- Some of the shortcomings that have been mentioned in previous phases in the management of the rural electricity system, planning to implement the extension of the line.

In this period, Government had made some important measures to promote rural electrification. Transmission extension and off-grid grid measures were highly encouraged. Rural people were targeted towards direct supports through poverty alleviation programs, infrastructure development such as electricity, roads and schools. In addition, the issuance of Decree 45 on electricity activities (2001) and the first Electricity Law in 2004 created a favorable legal corridor for organizations and economic sectors to invest in building infrastructure, developing rural electricity, marking a new development step for rural electrification.

**Decree No. 45 of the Government on electricity activity and main terms of use for rural electricity**

***Under Clause 50, Chapter IV of Decree No. 45-2001, investment and management of electricity networks in rural and mountainous areas and islands shall comply with the following principles:***

Investment in the rural electricity network will be implemented in accordance with the principle of "State and people, central and localities work together" under different investment and management models.

Units can borrow money to invest in rural networks in disadvantaged areas from development investment funds at lower interest rates.

The ceiling prices for rural electricity use will be set by the prime minister; Meanwhile, the chairmen of the People's Committees of provinces and municipalities will determine the specific price for each location.

Distributors of electricity from the national grid for retail to rural households will receive a tax reduction or exemption.

***Under Clause 51, chapter VII***

EVN will invest and operate medium-voltage power lines and substations, except in the case of changes by the Prime Minister.

Main lines at low voltage power supply will be funded by local funds.

The use of electricity services will be covered by the end user.

The Government will provide financial support for major arterial roads in remote and mountainous areas and services for poor households.

For areas that are not accessible to the national grid, or where the connection is uneconomical, the development of an off-grid grid system with local energy sources such as small hydropower, solar power, diesel generators or other things will receive government financial assistance and will be reduced or exempted.

## **Chapter VIII: ELECTRICITY FOR MOUNTAINOUS, RURAL AND ISLAND AREAS.**

### **Article 60: Development policies for rural, mountainous and island electricity**

To attract all resources to invest in the construction of electricity infrastructure, speed up the process of electrifying rural, mountainous and island areas.

To create favorable conditions for people in deep-lying, far-flung areas, ethnic minority areas and areas with exceptionally difficult socio-economic conditions to use electricity for production and daily life.

Organizations and individuals of all economic sectors engaged in electricity generation, distribution and trading in rural, mountainous and island areas meeting with socio-economic difficulties and special difficulties will receive the preferential policies on investment, finance and other incentives in accordance with the law and encourage investment.

Encourage organizations and individuals to invest in the construction of power grids or power stations using local energy, new energy and renewable energy to supply electricity to rural, mountainous and island areas.

Priority should be given to adequate and timely supply of irrigation pumping stations for irrigation, flood control and drought fighting.

### **Article 61: Investment in electricity development in rural, mountainous and island areas**

The State shall adopt policies to support electricity units operating in areas where investment and electricity activities are not economically effective.

The State shall adopt policies to support the investment in electricity lines from meters to electricity-using houses for households subject to social policies meeting with difficult circumstances as certified by the local People's Committees.

Government support policies include: investment capital support, interest rate support for investment loans, tax incentives. The Ministry of Finance shall assume the prime responsibility for, and coordinate with the Ministry of Industry in, guiding the implementation of support policies; The People's Committees at all levels shall have to create conditions for organizations and individuals to invest in, renovate and upgrade the rural, mountainous and island electricity grids.

The restructuring of the rural power grid management organizations into the company model and the cooperative business in electricity services had partly improved the situation of power supply in the local. However, due to the increasing demand for electricity, intermediaries were in financial difficulty that they could not repair, overhaul and upgrade their power grids. Therefore, these management models also did not meet the requirements that resulted in unimproved electricity supply, common grid insecurity, constantly-occurred "cutting up" electricity<sup>3</sup>. The management of power purchase is not tight enough so the electricity prices in many places were much higher<sup>4</sup> compared with the price when selling to electricity sector.. Thus, the privileges of the Party and Government did not reach the poor.

#### **e. Stage 5: From 2005 to 2008**

At the beginning of this period, the percentage of households with electricity in Vietnam was 87%. Through the rural electrification program, this figure increased to 90% by the end of 2005 and 94% in 2008.

This phase witnessed outstanding development cooperation and significant results between the Government of Vietnam and World Bank in the Rural Energy Project (REII) <sup>5</sup>. The objective of the project were to invest in expanding the power grid to meet the demand for electricity supply in rural areas, enhance the reliability and quality of low voltage grids, reduce power losses on the grid, lower electricity prices for rural consumption, improve business efficiency and power management capacity in rural areas where the commune had a project. The initial success of supplying electricity to 672 communes in 32 provinces and cities across the country had created a premise to attract investment capital from foreign-funded organization to Vietnam.

#### **f. Stage 6: From 2009 to 2012**

Since 2009, all 96% of households across the country, 95% of rural households had been using electricity and 1 million households had not been supplied with electricity. The rural electrification program was mainly focused on the remaining 5% that were not connected to the national electricity network, in parallel with the consolidation of distribution systems, rural electricity retail and the electricity taxes and fees.

In February 2009, the government issued Decree No. 21 on the electricity price in 2009 and the years 2010-2012, that applied a ladder mechanism based on the market price of electricity for rural areas. This decision had had a strong impact on local power business organizations, and created a strong incentive to strengthen the system.

Since 2005, electrical companies had begun to embrace the low voltage grid, but this process did not take place very well because the handover of assets were unclear and some electrical companies still wanted to manage some low voltage power lines. In addition, the capacity of power companies in this period did not meet the requirements and ensured the safety assessment of the grid, leading to an increasingly degraded electric quality in rural areas.

#### **g. Stage 7: From 2013 to now**

In 2013, the issuance of Decision No. 2081 of November 8, 2013, approving the rural and mountainous electricity program for the period 2013-2020, has made a

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<sup>3</sup> Thấy gì qua việc bàn giao lưới điện hạ áp nông thôn, tapchicongsan.org.vn

<sup>4</sup> <http://www.tapchicongsan.org.vn/Home/Nghiencuu-Traodoi/2010/2179/Thay-gi-qua-viec-ban-giao-luoi-ha-ap-nong-thon-cho.aspx>

<sup>5</sup> REII is a WB loan project with a large capital base. Total loan of the project is 420 million USD. Project implementation period of 9 years (2005-2014). The closing date is 30/6/2014 and the withdrawal date is 31/10/2014

significant progress and creates motivation for agencies and departments to try to bring electricity to people in deep-lying, remote, ethnic minority and ethnic areas throughout the country. This program will be implemented from 2013 to the end of 2020 through two phases. The first phase from 2013 to 2015, it gives priority to investment in on-going projects; communes without electricity; the villages, borders and areas where should be strengthened in terms of security, politics and society; communes and villages in the localities where the proportion of households using national grid electricity is lower than the national average. Phase 2 is from 2016 to 2020 to complete the electricity to almost rural households throughout the country; to invest in the development of electricity grids for supplying national electricity to ethnic minority people in communes and villages without electricity ; to invest in electricity from local power sources (renewable energy sources, battery charging stations ...) for extremely difficult villages that are unable to supply electricity from the national grid.

**Table 1: List of rural and island electricity supply projects from 2015 to 2020**

No	Province	ĐZ medium voltage (km)	TBA (station)	ĐZ 0.4kV (km)	Households
Nationwide		7,236.5	8.512,0	13.640.3	262,689
I. EVNNPC:		778.2	216.0	973.6	11,890
1	Bac Kan	276.9	63	222.90	3,265
2	Lai Chau	220	69	142.00	4,109
3	Lang Son	281.331	84	608.69	4,348
4	Hai Phong (Bach Long Vy)	4x250kVA wind turbine; 500kWp solar battery; 2x2MVA diesel generator; storage batteries 7.48MWh			168
II. EVNCPC:		624.5	925.0	3,020.2	85,753
5	Thua Thien Hue	73.729	121	648.07	21,491
6	Binh Dinh	86.48	82	459.90	5,822
7	Phu Yen	86.48	109	459.90	9,771
8	Khanh Hoa	22.45	49	174.93	7,140
9	Gia Lai	355.34	564	1,277.40	41,529
III. EVNSPC:		5.833.8	7,371.0	9,646.5	165,046
10	Binh Thuan	604.97	739	1,508.08	14,762
11	Ben Tre	143.91	188	299.44	15,904
12	Ca Mau	857.67	1,207	1,847.83	31,095
13	Đong Thap	671.53	994	1,166.40	13,206
14	Hau Giang	400.00	427	302.41	7,287
15	Kien Giang	1,547.25	1,841	1,289.01	21,745
16	Kien Giang (island communes)	98.267 (42.93 km Underground cables)	38	31.30	3,838
17	Lam Dong	488.10	469	1,070.60	10,756

18	Long An	204.40	264	434.68	11,677
19	Soc Trang	400.00	491	575.00	12,603
20	Tay Ninh	160.25	145	235.54	5,391
21	Tien Giang	165.71	243	335.23	4,513
22	Tra Vinh	190.00	325	551.00	12,269

**Source: EVN Database**

Currently, the program is still in the implementation process and has achieved praiseworthy success, especially in the Mekong Delta which is considered as the granary of the country. In 2016, the Electricity Southern Power Corporation (EVNSPC) has successfully installed 619 power projects, with a total investment of 6,548 billion. Among them, many important national power grid investment projects in remote and mountainous areas and islands are completed. Some typical examples can be found in Table 3 below.

**Table 2: Power grid expansion for Mekong Delta according to Decision No. 8 2081/QĐ- TTg**

Bac Lieu	Electrification rate in 2014 was 97,93% (GSO, 2014). In 2015, Bac Lieu had deployed a project that upgraded the three-phase power grid for shrimp farmers with the total cost of 88 billion VND
Tien Giang	Electrification rate was 99, 83% in 2015
Kien Giang	EVNSPC has invested VND7,957 billion in rural electrification from the national grid for 12 provinces and island communes in Kien Giang.
Hau Giang	In 2016, the first phase of the project that supplied electricity to 1,807 off-grid households in five districts of Hau Giang province with an investment capital of more than 35 billion VND has brought the percentage of Hau Giang and rural households using electricity to 98.93% and 98.34%, respectively.
Can Tho	With the rural electricity project implemented by Can Tho city from 2016 to 2020, approximate 13,000 households in 4 districts will use electricity from the national grid.
Soc Trang	In 2013 October, Soc Trang province had an additional 525 households who could access to the grid, increasing the number of households using the national grid to 309,565 households, reaching 97.6%
Ca Mau	Phase one of the rural power project from the national grid of Ca Mau province with investment capital of 40.3 billion will supply electricity to 1,388 households without electricity in the area of 33 hamlets, 10 communes in 2 districts U Minh and Thoi Binh, bringing the percentage of electrification in Ca Mau to 98.4% and the proportion of rural electrification to 98.6%

The results of the rural electrification program have become even more pronounced as the REII project has come to an end. The project has achieved the objectives and initially brought practical effects. After electricity supply, the quality of electricity is always stable, the average annual power loss rate of the communes before and after the investment to improve the power grid has decreased markedly. The project has been exploited and used in the production and daily life of the communes, contributing significantly to the new rural development. Especially, people using electricity can buy electricity at the price regulated by the

State. This is significant advantage and social benefit that the project brings to rural people.

With the pressure of climate change, and the abundance of on-site energy resources, solar and wind power generation and biogas systems are given priority and economic appreciation as well technical appreciation. From the targets set out in the Renewable Energy Development Strategy (Decision 2068/QĐ-TTg dated 25 November 2015), the State and the electricity company actively have invested and developed models solar cells, wind turbines in remote communes and islands. However, due to many objective and subjective factors, the project is still experimental and has not achieved the expected success<sup>6</sup>.

The problems in the rural low voltage grid system management are still continue in some localities. Even though the electricity companies have been hand-over the low voltage grid and sold directly electricity to rural households for the period 2013-2015 according to the Government's decision<sup>7</sup>, the rates were 61.8% and 37.4% by June 2015, respectively. This problem leads to overlapping in management system and electricity price mechanism for rural people, creating difficulties for interested parties to invest, expand and renovate the power grid.

#### 4. Support mechanism for off-grid community:

It is recognized that the Government of Vietnam has made great efforts to achieve the goal of providing electricity to the entire population in the country, especially in conditions of limited funding. Therefore, it is necessary to diversify forms of investment to attract more economic sectors to participate and contribute greatly to the investment in electricity networks, transmission and expansion of the network infrastructure to create incentives and favorable conditions for the form of "the State and the people work together" to promote rural electrification.

The following are some of the financial mechanisms for the off-grid rural areas in Viet Nam including private funding, EVN finance, State budget, Public-Private Partnership (PPP).

**1. Private capital:** used for feasible commercial project. Private companies use their own equity and preferential loans to invest in rural off-grid projects that do not use state funding. The advantage of this investment is that the project progress is guaranteed to proceed quickly. Besides, since this is a private project, it is necessary to have a reasonable electricity price to return the investment.

**2. EVN capital:** used for grid extension project with equity, local and international loans. Project revenues are often used to cover operation and maintenance costs but not enough to reinvest in a new project.

**3. State budget:** used for unprofitable commercial projects with local loans and ODA. These projects were bided and implemented by private organizations or NGO. The party is responsible for developing and constructing the off grid system, and then secures and transfers ownership, operation and maintenance responsibilities to the community such as the Commune People's Committee, people's representatives, etc.

**4. PPP (public-private partner):** To be invested in the form of public-private partnerships, which are implemented on the basis of contracts between state agencies and investors - private companies.

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<sup>6</sup> Institute of Energy, (2014), Research, Investigation, Survey and Assessment of Combined Power Generation Systems for Renewable Energy Sources in the Off-grid Areas <http://www.ievn.com.vn/UserFile/Files/News/2014/VanTT2/l217.pdf>

<sup>7</sup> Directives 854 / QĐ-TTg of the Prime Minister, Resolution No. 397 / NQ-HĐTV of EVN

The cost of investing in construction equipment may come from both parties, but operation and maintenance are often held by the private sector. Most PPP projects for rural off-grid access have direct or indirect subsidies.

### **5. The efforts of private sector**

In recent years, apart from the national power grid development programs and projects invested by government, there is still a form of socialization in investment in expanding the electricity distribution network. For example, in some residential areas, the length of the residential area is quite short (about a few hundred meters), therefore, instead of looking for the investment of electricity sectors, the local people have contributed their own capital (50% of the value of the project) along with 50% stake from electricity companies to invest in electricity system.

In the context of the low-initial grid investment capital, especially at difficult terrain areas causing difficulties in expanding the grid and not bringing economic efficiency, local governments all over the country are very supportive and create favorable conditions for donors, and investors in rural areas to implement electricity supply project, especially renewable energy sources and green energy projects, to help rural people improve their material and spiritual life. For example, the GreenID's installation a solar power project for a population cluster in Dak Lak Province has been supported and actively supported by the People's Committees, departments, branches in the province during the implementation. There are also other projects such as Red River wind power project, clean water supply project that uses solar power for the people in Mekong Delta, was sponsored by the Danish government.

Although there is no specific mechanism for organizations interested in helping people with their use of electricity, the reality is that local authorities always welcome and create favorable conditions for interested parties to implement the support program in the off-grid areas. In particular, in the Construction Law<sup>8</sup>, private parties may choose the following methods:

i. In case of supporting individual households, the donor agencies can directly contact the local authorities (Commune People's Committees) for facilitating the process.

If the donor unit does not report the local government, there are likely to be many unwanted issues (such as conflicts between parties, psychological human fear of being cheated, political issues, security - order ...). At that time, the authorities will not be able to intervene or resolve conflicts, or when the government finds the funding having politically-security issues, the government will follow the law.

In case of large-scale and foreign assistance, the donor can prepare a project or propose a support scheme and submit it to PPC asking for permission of implementing at province. At that time, PPC will direct the departments and sectors to appraise and advise PPC to approve or disapprove the implementation.

### **6. The international community support**

Vietnam, from a poor and underdeveloped country, has started receiving ODA since the year 1993 after opening up the economy and stepping into the integration economy. Thanks to that, in recent years, Vietnam has been receiving enthusiastic support from the national community to step up the goal of 100% rural electrification by 2020. By 2015, according to the European Union statistics, Vietnam has a cooperative relationship with 25 donors bilateral and 15 multilateral donors. The large organizations such as the World Bank, ADB, etc. still support the

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<sup>8</sup> 50/2014/QH13

government through various financial support mechanisms (such as investment general, loan, aids, financial guarantee or a combination of all the above).

**Table 3: Typical international support programs for rural electrification in Vietnam**

Program	Sponsor	Time	Content
UNDP/ESMAP (Energy Sector Support Program)	UNDP World bank	From 2001	The program focuses on potential renewable energy markets and gives priority to providing electricity to disadvantaged populations in isolated areas.
Vietnam – Sweden Rural Energy - VSRE	SIDA	2004	Promote the supply of electricity to rural areas and mountainous areas of Vietnam by off grid renewable energy systems, such as solar power, solar cells, biogas plants.
Solar power projects in Vietnam	Finland Government-NAPS system Oy- Finland	2005	The Government of Finland grants EUR 1 million to the project for solar energy application in rural and ethnic areas in Vietnam.
Renewable energy development project, expanding network and improving living conditions in remote areas	ADB	2009	ADB expands its loan up to US \$ 151 million to help Vietnam expand and improve its electricity supply services to poor and remote areas.
Electricity sector reforms project	World Bank	Since 1994	<ul style="list-style-type: none"> <li>• Upgrading and expanding the grid;</li> <li>• Power Development Project</li> <li>• Rural power supply projects</li> </ul>
Sustainable business model to supply energy for rural areas	Co- funding World vision Australia and REEEP	2013-2014	The total budget of EUR 293,090 is funded by REEEP and World Vision Australia to create business models for off-grid rural areas.
Project "Upgrading and upgrading the power distribution network in small and medium cities"	Kfw	2011-2018	The project is divided into two phases 2011-2015 and 2016-2018, borrowing 5400 billion VND to supply electricity to rural areas, minimize power losses on the grid, improve the ability to supply electricity continuously and stable, minimize power grid overload.

**Source: Winrock International Institute (2014)**

## CHAPTER 3: BARRIERS AND CHALLENGES WHEN IMPLEMENTING THE RURAL ELECTRIFICATION PROGRAM

Although there are many interests and supports of domestic and international partners in rural electrification program, the fact is that Vietnam still faces several difficulties, challenges causing the delaying of international projects due to the barriers of policies, supporting mechanisms, finance or technologies when implementing the project to provide electricity for rural areas. The detail is presented as follow.

### 1. Financing barrier

The financial sources of most of existing electrification projects for off-grid communities come from national budget/international organizations or EVN in the form of grid extension. However, the expanding grid to many places still is delayed for long time due to limited national budget causing the inconstant and slow payment to localities.

Even though the international organizations have paid more attentions on the groups who live in remote areas and have difficult circumstances in term of daily lives, production and accessing with renewable energy models. The process of project implementing is complicated and facing with many problems such as getting permission licenses, conducting feasible study or consulting with local people. There are lack of the number of bridge organizations who have enough capacity to connect between international organizations and local people so that the foreign financing supports are not taken advantages fully.

It is clear that individuals or private sectors are wondering to invest into renewable energy projects because the target groups are the poor households and the economic attraction of project is low due to the high investment cost. In order to encourage the participation and mobilize capital from many different sources especially private investors in RE project, the Government should consider how to support the RE project by national budget. In addition, the State also should provide the detail mechanisms and manuals to individuals, private enterprises who invest and develop the power projects supplying electricity in rural off-grid areas.

### 2. Geographical condition

The deep-lying and far-flung areas, mountainous area and islands where the infrastructure conditions are limited have many difficulties in transportation, vehicles and lower population density that leads to high construction and installation costs. The electricity demand of people who are living in these areas is unworthy compared to the national average. Hence, these areas are not put priority when planning the grid extension because they do not meet the requirement of economic aspects.

### 3. Challenges with current policies

Even though Government took significant efforts to bring electricity to the whole of citizens through issuing a series of policies and objectives for each separated period, it is general that these policies still are overall and not have strong effects on each target group.

Providing electricity to existing off-grid household costs an arm and a leg for Vietnam government and EVN as well. Actually, the national budget does not cover all provinces so that the target of 100% rural electrification seem to be unfeasible. With the current legal framework, it is unattractive to encourage the investment of EVN or local authorities in grid extension to remote areas. Thus, the promotion policies for developing the independent power systems for people in difficult circumstance without electricity are essential.

The main barrier to off-grid renewable energy businesses is the lack of incentive policies, reliable legal frameworks and subsidies to encourage the development of projects for rural and mountainous households, islands. Currently policies lack specified and comprehensive regulation for investment, management and operation of the renewable energy projects.

Not only in the form of FIT [1], to develop RE sector in rural areas, government can further develop tax incentives, facilitate access to clean energy loans, preferential interest rates or clear guidelines on how to raise funds through ODA or foreign loans.

#### 4. Human resources and capacity

Most of the surveys on rural electrification in Vietnam (IE, 2009; GIZ, 2012; General Bank, 2011) show the need for training and capacity building for people on different electricity generation solutions. At the local level, different sources of information and knowledge about the use of RE systems utilizing on-site energy sources, particularly the easiest to use is the solar PV, are still limited. For remote areas, people often prefer using temporary battery systems and waiting for national power grid extension instead of harvesting electricity from solar panels.

At present, the efforts in studying and developing RE in Vietnam are ebullient nationwide. Many institutions and universities present the RE solutions, but, there are lack of the cooperation among them to exchange outputs for common growth. For Vietnamese RE businesses at present, resources for RE training are limited, creating major obstacles to the development of this sector. Businesses, who are interested in developing RE projects, often face different constrains with the lack of experience on attracting investments (through loans / or financing). Local businesses have limited access to advanced technologies in the world, leading to the use of low quality facilities and difficulty in finding spare parts.

Access to information and knowledge on renewable energy in rural areas is also limited. In particular, many local authorities have different misconceptions about renewable energy limiting support and recognition on the advantages of this form of power supply. Most people still believe that this is a form of electricity requires huge investment costs with high intermittency. Therefore, when considering local budget allocations for electrification, renewable energy projects are prioritized and largely ignored.

O&M also plays a huge role in life cycle of RE projects. Domestic firms have acknowledged post-installation stage of renewable energy projects as a major challenge since human resources for operating and maintaining these systems are not available locally. Therefore, domestic ODA funded renewable energy projects after 3-5 years of installation often fail to meet their goals (Table 6).

**Table 4: List of electricity project for off-grid areas by RE sources**

No	Name	Capacity	Users	Status	Management and operation
1	The hybrid system combined solar PV and diesel	Station 1: PV 6.48kWp+ diesel 8.5kVA	30 households, 1 school	The system was under operation from September 1 <sup>st</sup> , 2011 to 2012. After the battery was	05 local people were trained to manage and operate the

	generation in Mung village (Hoa Binh province)	Station 2: PV 2.16kWp+ 2.0kVA	1 palace of culture, 11 households	broken, the Inverter also did not work anymore. In March, 2013, the whole of system stopped.	system
2	Solar system in Thuong Trach (Quang Binh province)	PV 11.07kWp + Diesel 11kVA	35 households, 1 school and 1 border security units, 1 Cà- Ròng custom branch	Until December 16 <sup>th</sup> 2010, the system still has been under operation, but the battery capacity is enough for 1 hours.	593 border security unit (Cà Ròng)
3	The hybrid system including PV solar and mini hydropower in Trang commune, Dak Doa district, Gia Lai province	PV 100kWp+ mini hydropower 25kW	446 households of 6 villages in Trang commune, Dăk Doa district including Gret, Plei Bot, H'Lang, Sơn Trang, Tung, Sơ	- 1999-2004, the system was under operation - Since 2009, the system connected to grid but the Inverter did not work. - The system was closed at present.	05 staffs of Gia Lai Power Company
4	The hybrid system including PV solar + wind turbine in Kongu 2 commune (Kon Tum province)	PV 6.75kWp+ wind turbine 1.8kW	40 households	Since 2000, the system had operated for 3 year, but the output was inefficient. In 2011, the system was removed and handed over to Da Nang university for study purpose	The system operate automatically

5	The hybrid system including wind turbine and diesel generator at Bach Long Vi island district (Hai Phong province)	Wind turbine 800kW+ diesel generator 800kW	People in Bach Long Vi island	The system operated from December 2004 and June 2004, the controller did not work and the wind turbine stopped working. In September 2009, wind turbine was broken by a storm. Currently, the system stopped working.	The voluntary youth of Hai Phong province
6	The hybrid system including PV and diesel generator at Bai Huong village, Tan Hiep commune, Hoi An city (Quang Nam province)	PV 28.8kW+ diesel generator 5.5kW and 15kW	People in Bai Huong village	In January 2010, after 3-month-working, battery had problem and then fully broke. Thus the PV only operated in the daytime and diesel operated only in the nighttime. In August 2012, the system stopped working.	05 local people were trained in 3 months.
7	The hybrid system including PV+ wind turbine+ Biogas digester at Me island, Tinh Gia district (Thanh Hoa province)	PV 4.9kW+ wind turbine 1kW+ 20m <sup>3</sup> biogas digester and	Army and officer staffs	In September, 2012, only solar PV and wind turbine operated. Biogas generator could not work due to some problems with equipment and water	Army in Me island

		biogas generator 2kW			
8	The hybrid system including PV+ wind turbine Bai Lang village, Tan Hiep commune, Hoi An city (Quang Nam province)	PV 1.16kW+ wind turbine 1.5kW	4 offices: - Office of tourist company - Office of Power station - Office of Tan Hiep commune - Office of national conservati on	In the early of 2012, the system has been operating.	The system operate automatically
9	The hybrid system including wind turbine + diesel generator at Phu Quy island (Binh Thuan province)	Wind turbine 6MW+ diesel generator 3MW Load demand: $P_{max}$ : 2MW, $P_{min}$ : 0.76MW	People at Phu Quy island	The system operated in August 8, 2012. In the early of 2013, there are some problems.	Phu Quy Power Limited Liability Company and Vietnam Oil and Renewable Energy Limited Liability Company.

**Sources: IE, 2014**

With the challenges above, the target of 100% rural electrification in 2020 seems to be too ambitious and may not achieve. Thus, to achieving the obsolete success, these difficulties need to be solved timely to both ensure the socio-economic development of off-grid households and utilize the local clean energy to fossil fuel replacement which are running out with an aim to reduce the pressure on national grid.

## CHAPTER 4: CASE STUDY

Within the framework of the research project, the team conducted a field trip to An Giang with the purpose of meeting, interviewing and exchanging with representatives of provincial and local stakeholders such as: Department of Industry and Trade (DOIT), The Department of Labor, Invalids and Social Affairs (DLISA), leaders of commune committees, and some residents of the area that are not connected to the grid, to survey and have a real view in the story of rural electrification in a particular area. The trip aims to find out how the policies are being implemented, how local people get benefits from rural electrification program, and the disadvantages of the implementation of the program for the people in rural off-grid areas. In addition, the research team also wants to find out how the situation of using renewable energy sources in the local areas in remote areas, not economically feasible when pulling the grid.

### 1. Study area

We selected the survey site based on the following criteria:

- It is located in the Mekong Delta;
- Many households are not connected to the grid;
- It is part of the national rural electrification program for 2020;
- There is a successful program or model of electricity supply to people not connected to the grid.

Based on the above criteria, we have selected An Giang province as a typical area for conducting field surveys. An Giang is a province in the Mekong Delta region, where socio-economic life is difficult and strongly influenced by the effects of climate change. Up to now, the rural electrification rate has been low at 98.135% compared to regional average, and in rural areas the rate is about 97.5%. In addition, An Giang is a very typical province when there are 02 power companies, including An Giang Power Company under the Provincial People's Committee and An Giang Power Company - directly under EVN. As part of the national program for rural, mountainous and island electricity supply in the period of 2013-2020 under Decision No. 2081/ QD-TTg dated November 8, 2013, An Giang is one of provinces who gets the State budget to expand the line and supply electricity to local people.

### 2. Research Methodology

The fieldwork was conducted in two methods: (i) household interviews; and, (ii) interviews and information collection from DOIT and DLISA of An Giang province.

Interviews with local people: a number of households in Vo Ba hamlet, An Hao commune, Tinh Bien district, An Giang province were selected to conduct interviews. This is a hamlet located deeply on Cam mountain, which has not been pulled the grid. Households selected for interviews belonged to 3 groups: households using solar PV system, households without electricity and households using electricity in the form of electric traction from other households connected nearby.

Interview with DOIT and DLISA: working with these two departments is to find out information on the implementation of RWSS policies along with local social security policies. Then, the opinions of the staff of the department as the direct

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<sup>9</sup> <http://pcangiang.evnspsc.vn/ViewArticle/ArticleID/ARTICLE17020001>

implementation of the policy on the advantages and disadvantages in the implementation process were collected.

Local interviews are included in Appendix 1

### 3. Research results

#### a. Rural electricity supply schemes in An Giang province

At present, electricity in An Giang province comes predominantly from medium voltage grid from the national grid, mainly based on the operation of two electricity retailers, which are An Giang Power Company and An Giang Water and Power Company. This option partly met the need for access to energy, contributing to the achievement of local rural development goals. However, there are still some parts that are being overlooked, most of which are households living in areas located far from the low voltage line (dyke floodplains), difficult terrain to pull electricity (mountainous areas), sparse population density leading to inefficient investment ... most of the people living in these areas are farmers with poor living standard and low level of qualification. One part comes to the solution of spontaneous power supply from local sources such as solar power, biomass energy ... or battery charging, mainly for indoor lighting.

Table 7 below provides an overview of power supply alternatives including advantages, disadvantages, difficulties and inadequacies in the implementation.

**Table 7: Pros / Cons and shortcomings of rural power supply alternatives**

	<b>Electricity supply from the national grid</b>	<b>Using independent electric system (on-site power supply)</b>
<b>Advantages</b>	<ul style="list-style-type: none"> <li>- Power quality is stable.</li> <li>- No load limit for home use.</li> <li>- Power supply expectancy is very high.</li> <li>- Electricity users do not have to pay for upgrading or repairing power supplies, as this is done by the electricity supplier.</li> </ul>	<ul style="list-style-type: none"> <li>- Be proactive in providing electricity supply, which is the optimal solution for remote areas, areas where are not connected to the grid.</li> <li>- Electricity users only need to invest in electricity generation, not monthly electricity bills.</li> <li>- Utilize renewable energy to generate electricity, thus minimizing greenhouse gas emissions, helping to protect the environment.</li> <li>- Be high safety, easy to adjust the installation capacity depending on the needs of each household.</li> </ul>
<b>Disadvantages</b>	<ul style="list-style-type: none"> <li>- Investment cost for electricity supply is quite high (medium and low voltage transmission line).</li> <li>- Electricity users must pay monthly electricity bills to the</li> </ul>	<ul style="list-style-type: none"> <li>- The initial investment cost is high, so people only have the ability to invest in small capacity systems which do not meet the demand of living and production.</li> </ul>

	electricity supplier.	<ul style="list-style-type: none"> <li>- The quality of the power supply is intermittent, depending on the weather and the quality of the components.</li> <li>- The system lifetime is short due to lack of knowledge in operation and maintenance.</li> </ul>
<b>Difficulties and inadequacies</b>	<ul style="list-style-type: none"> <li>- It is difficult to pull electricity to areas with difficult terrain and sparsely populated areas.</li> <li>- People do not have enough money to pull the electricity from the grid to home. Some households use electricity by pulling from other households so that they face with several problems such as weak power, unsafe, high cost ...</li> </ul>	<ul style="list-style-type: none"> <li>- Due to limited knowledge and lack of guidance, the efficiency of the process is not high, thus reducing the life expectancy of the system. Most of the current systems are spontaneous and low quality, leading to the unstable electricity supply, which has not met the demand for electricity in the locality. Currently, this is only considered as a Band-Aid solution if rural households cannot draw national power from grid.</li> <li>- The distribution system of local solar cell systems is limited with a series of widespread brands, no brand as well as reputation.</li> </ul>

## **b. Support policies for rural electricity supply**

At present, An Giang has three main support mechanisms for the off-grid community:

### **i / Rural electricity supply project from the national grid of An Giang province in the period of 2016-2020**

This is a project under the "Rural, Mountainous and Island Power Program for the period of 2013-2020" with the specific objective of investing and expanding the electricity network to cover the areas where people have not yet have a stable power source to use. This project has been approved by the Ministry of Industry and Trade with the investment budget of VND 573.9 billion from the state budget, of which the central budget is VND 487.8 billion and the provincial budget is VND 86 billion. The project owner is the Department of Industry and Trade of An Giang province. However, due to the unbalanced central funding source (waiting for the government to borrow ODA), the central government then directs the implementation of the first phase of VND 106 billion (central budget of VND 90 billion and provincial budget of VND16 billion). An Giang province gets a budget of VND16 billion to prioritize investment in power grid lists for border communes and new rural communes. Up to now, the project is in the selection of contractors stage to survey and make its economic and technical reports.

## **ii / National target program on building new rural areas in the period of 2016-2020**

The People's Committee of An Giang province issued Decision No. 3310 / QD-UBND dated 21/11/2016 regarding the National Targeted Program on Rural New Rural Development 2016-2020. An Giang province strives to reach 61 new rural communes by 2020, and the specific divergence of communes every year. Of the 19 new rural standards set by the government, rural electricity is an important target. Specifically, rural electricity criteria require communes to have at least 98% or more of access to regular and safe electricity sources (including grid electricity and renewable energy sources). And this criteria, PPC has assigned DOIT to monitor, urge and support the communes in the implementation process. Every year, DOIT reviews and makes a list of areas where households have no electricity or pulling electricity (not connected with electricity meters) that is not safe. Accordingly, DOIT suggest the district People's Committee find the source of social mobilization (including budget + capital of the electricity supply unit + capital mobilized from the households who will be supplied electricity) to invest in power grid in this area.

## **iii / Plan to expand the power network of An Giang Power Company and An Giang Water Power Company**

Every year, the investment plans to expand the power network of An Giang Water Power Company and An Giang Power Company are mainly based on the financial status. Based on the list of electricity works to be invested by the local authorities, the district electricity utilities will report to the two companies. If the project is considered to be essential and economically viable (with a relatively high number of clients) and the company's budget is capable of balancing, then the investment will be approved. However, with the An Giang power company, after the completion of the list of works needing investment, they must ask for approval of the Southern Electricity Corporation (SPC). Normally, at the end of the year, An Giang Power Company will submit to SPC the list of investment demand for power grid development next year. Currently, due to the orientation of enterprises, which is only interested in profit, the investment of power grid extension to supply electricity to rural areas does not meet the requirements, especially areas with difficult terrain.

### **c. Involvement of the An Giang community in electricity supply**

In recent years, apart from the programs and projects on investment in the development of the national power grid, there is still a form of socialization in investment in expanding the electricity distribution network. For example, in some residential areas, the residential area is quite short (about a few hundred meters), while waiting for the electricity sector paying for investment, people contribute 50% of the value of project to construction.

In addition, in the recent context of difficult and uneconomic investment in power grid, the project provides electricity to people in rural areas, especially the local renewable energy projects are encouraged and facilitated by local authorities.

In the case of individual households with small scale, the donor agencies can directly contact the local authorities (Commune People's Committee) to consider and avoid unexpected situations (such as conflicts between parties, psychological fear of being cheated, political issues, security and order ...). In case of large-scale and foreign-funded support, the donor should prepare a project or propose a support plan and send it to PPC of An Giang province for permission to implement it

in An Giang province. At that time, An Giang PPC will direct the departments and sectors to appraise and advise the provincial People's Committee to decide whether to approve or not.

#### **d. Difficulties and shortcomings in implementing the program**

One difficulty that is hindering the implementation of the current rural electrification program is the issue of expense and funding. With the limited local budget resources, the slow allocation of central budget, and the financial difficulties of power supply companies in the province, many of electrification projects have been approved but have not been implemented yet.

Current solutions do not cover all groups of the population, especially households in remote and mountainous areas inhabited by ethnic minority people, sparsely populated and difficult electric traction terrain. On-the-spot solutions are not considered by the government. This also means that people's knowledge on renewable energy solutions is limited, and investment is small and spontaneous. The standards and methods of using energy sources safely and economically effectively are still only mouth to mouth and non-effective, leading to learning disruption, low equipment costs and unexpected accidents.

There are also overlapping policies to support areas without electricity grids. Typically, there are now many power supply programs for households in rural off-grid areas have been approved by the provincial People's Committee, but funding sources have not been arranged specifically. Therefore, the psychology of local authorities is to register all electricity supply programs. For example, in Group 1, Village A of commune B has about 20 households not connected to the grid, the People's Committee of commune B have registered both the Rural Electricity Supply Project and the new National Targeted Rural Development Program or any grant funded project<sup>10</sup>. In addition, some localities lack responsibility to select and propose some households that are not the right beneficiaries (already supplied electricity by the electricity sector but still propose to receive additional support policies, thus the cost of living of this household will decrease due to adding power generation from renewable energy), while many households in other places still have no electricity to use.

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<sup>10</sup> Luong An Tra village, Tri Ton district has a residential area of about 2 km with about 50 households living. Due to the relatively small number of households, the cost of electricity transmission to this area is quite high (estimated at over VND1 billion), so electricity is not economically. However, the task of local authorities is to take care of people's lives so the CPC has many times petitioned the district to invest but there is no funding to implement. Therefore, to receive information from any departments, projects on rural electricity projects, the district also proposed pulling power to the residential line. For example, the project on the supply of solar energy (presided by the Department of Science and Technology), the rural electricity supply project (chaired by the Department of Trade and Industry), the National Target Program In the new rural areas all proposed, the power sector is considering the investment of the local authority in order to develop the investment plan.....

## CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

Electricity is a vital element in promoting economic development for the people. The power gives people the opportunity to carry out a wide range of production activities, improve the quality of life from lighting to accessing information through televisions and telephones. Although the government has recently issued policies to support access to electricity for all people and these policies are actively implemented by local authorities, the distance from text to reality is still in place. It is quite distant due to the difficulties and inadequacies in the implementation process related to utilizing the systems using renewable energy sources, limiting mobilizing capital and not directing to specific households in difficult conditions in remote areas.

From the above analyzes, in order to implement the projects and support programs for people without electricity in rural areas, the following recommendations is proposed

### ***Perfecting the policy***

If uneconomically when pulling the grid, the Government should issue a number of specific policies on the installation of independent power supply systems, utilizing renewable energy sources in place.

1. Promulgate laws that prohibits the passing of electricity to endanger the users and the surrounding households.

2. Propose the government to issue prices and mechanisms (orders and procedures) to sell electricity from renewable energy sources to encourage people to widely use these sources. This will help to reduce the cost of electricity generation in the national grid, decrease greenhouse gas emissions and protect the environment.

3. Promulgate policies directly targeting people outside the national grid and identify specific support mechanisms for these specific populations to avoid the situation when people have to wait for long-term priority.

4. Issue clear decisions on the role of parties in managing the rural low voltage grid to stabilize the electricity selling price and avoid the overlapping and favorable situation for investors to expand the low voltage power network.

### ***How to implement the project or support program***

In order to support the investment and implementation of rural power supply projects, competent authorities should develop a guidelines for investment registration and implementation of rural power supply projects. In addition, the following project partners need to be involved in the project implementation:

1. At the stage before submitting to competent authorities for approval, the local authorities should be consulted. At the same time, it should coordinate with functional agencies and local authorities to survey specific areas in order to identify the right beneficiaries. From there, it helps to improve the efficiency of the project, the program.

2. During project implementation: To build rights and responsibilities very specific to each project stakeholders and supporting program. It should cooperate closely with the Department of Trade and Industry in the locality when implementing projects and programs to supply electricity to households that are not connected to the grid so that DOIT provides the supports of state management as well as



professional comments to increase the efficiency of projects. At the same time, it should consider to integrate renewable energy solutions and rural electrification programs (The households who have received investment support for power supply cannot receive support from other projects and programs and to give priority to other off-grid areas in the province).

3. After completion of the project, the program (maybe after 1-2 years), needs to evaluate the effectiveness of the project. Moreover, publishing the results of implementation contribute to replicate and draw lessons to implement the next project effectively.

### ***Mobilize capital***

There should be specific support mechanisms for private parties such as businesses and organizations who would like to invest in independent power generation systems using renewable energy sources for one or a group of households in the area without grid. Encouraging interested parties and joint efforts with the state in the story of rural electrification, improve the quality of life for people with difficult conditions.

1. Encouraging investors to participate in targeting rural people by reducing taxes, providing loans, and supporting land use issues during project implementation.

2. Identify ways to combine the state with hands-on enterprises with the formation of discount programs, funds to support people who need to install independent power system. This approach has brought about the motivation for the private sector in trying to provide electricity to the people who are not connected to the grid and to help attract prestigious electrical appliance distributors to rural people.

### ***Training for local people***

Allowing local renewable energy systems to operate efficiently and maintaining long life, it requires a staff of qualified operation and maintenance staff to handle problems arising in the use process.

1. In combination with vocational training policies for rural workers, open training courses for local people to broaden their knowledge and provide a basic technical foundation for the installation and operation of renewable energy systems. This is an option both to help people use renewable energy systems with longer life expectancy and create more employment opportunities for local labor.

2. Call on reputable suppliers of equipment and components to open distribution channels to households, such as opening agents, shops, representative offices, etc... To help people buy qualified equipment, which can be easily be repaired in case of damage during the use of renewable energy system.

## APPENDIX 1: Policies on rural electrification are issued in stages

Stages	Rural electrification rate – first year and last year (%)	Promulgated rural electrification policies		
		Year	Decision/Program Name	Content
1976 – 1985	2.5 – 9.3	Prioritize power supply for production activities		
1986 – 1993	10 – 14	1986	Innovation Program	<ul style="list-style-type: none"> <li>- To shift from a single-component policy to a multi-component economy with the existence of multiple forms of ownership to develop production and improve the efficiency of the economy;</li> <li>- To shift from the state-controlled direct mechanism of the economy by the ordinance linked to the subsidy mechanism to the market economy mechanism with the state management at the macro level and ensuring business autonomy of each enterprise;</li> <li>- To move from a self-sufficient economy to an open economy to the outside world.</li> </ul>
1994 – 1997	14 – 61	1996	8th Party Congress	Targeted 100% of districts with electricity until 2000
		1997	Ministry of Industry issued a "Report on electricity policy"	
1998 – 2004	61 – 87	1998	Approve poverty reduction program, subsidized electricity prices for rural areas	<p>There were 135 programs for 1,870 disadvantaged communes in remote and mountainous areas with the following objectives:</p> <ul style="list-style-type: none"> <li>- Developing infrastructure such as electricity, roads, schools and stations.</li> <li>- Selecting some communes to receive funding from the program to upgrade and build a low voltage electrical system.</li> <li>- Providing a 360 VND/kWh subsidy from national budget and setting a ceiling price of VND 700/ kWh for rural electricity prices.</li> </ul>

		Resolution "Promulgating the regulation on electricity sector to directly manage rural electricity networks" at the 10th National Assembly session	<ul style="list-style-type: none"> <li>- EVN managed the whole rural medium voltage network; grid of farms; electricity network in the field of state-owned irrigation; the grid of military units, etc.</li> <li>- EVN reimbursed the medium voltage electric network to the former grid management boards (cooperatives, mobilized capital of people, bank loans, etc.)</li> </ul>
	1999	Approval of the program "Proposed Rural Electrification Program to 2000"  The Power Development Plan V (2000-2010) targets 90% of households in rural areas with electricity	<ul style="list-style-type: none"> <li>- The program was implemented gradually in accordance with the available financial resources</li> <li>- Electricity supply was prioritized to areas where had the potential of agricultural production expansion, industrialization and strategic economic restructuring. Local authorities, citizens and investors played a key role in investment, management and operation of the grid.</li> <li>- EVN, PCs and grid operators took responsible for the operation, maintenance and depreciation cost of rural grid infrastructure. In the case of not commercially effective, the state can provide subsidies.</li> <li>- Electricity supply must be considered commercial aspects except for areas eligible for state subsidy.</li> </ul>
	2001	Decree No. 45 on electrical activities and use	<ul style="list-style-type: none"> <li>- To set principles for investment and management of electricity networks in rural, mountainous and island areas;</li> <li>- To decentralize management responsibility according to voltage levels;</li> <li>- To introduce electricity pricing mechanism;</li> <li>- To give priority of renewable energy sources for areas inaccessible to the national grid.</li> </ul>
	2002	Decision No. 27/2002/QĐ-BCN on June 18, 2002 promulgating the Regulation, conditions, order	Requesting rural electricity purchasing and sale organizations to transform their operations into electricity joint-stock companies, electricity service cooperatives, limited liability companies, managing electricity sale private

			and procedures for electricity business licenses	enterprises, electricity management groups
		2004	Issue the first Electricity Law	- The policy on development of rural, mountainous and island electricity was issued;  - Policies to support the investment in electricity development in rural, mountainous and island areas was issued.
2005 – 2008	87 - 94	2006	Decision No. 27/2002/QD-BCN on June 18, 2002 of the Ministry of Industry	To stipulate the conditions, order and procedures for licensing the units engaged in electrical sectors.
			Decision No. 32/2006/QD-BCN dated September 6, 2006 of the Minister of Industry	Conditions, order and procedures for granting, amending, supplementing, retrieving capital and managing the use of electricity activity licenses
		2007	The Master Plan of Electricity Planning VI (2006- 2015)	- Set target of 95% households to be supplied electricity by 2010
2009 – 2012	96 – 97.38	2009	Circular 97 specifies policies to support the investment in electricity development in areas where electricity activities are not economically effective.	To guide the State's support policies for investment in electricity development in areas where investment and electricity activities are not economically efficient; support the electricity lines cost from the meters to houses whose households are under social policies in special difficulties in rural, mountainous and island areas, specific: <ul style="list-style-type: none"> <li>• Investment capital support: Providing support of investment capital;</li> <li>• Loan interest rate support: Providing loan for investment, support after investment;</li> <li>• Tax incentives: Scope of application-electricity projects in geographical areas with difficult or extremely difficult socio-economic conditions include: <ol style="list-style-type: none"> <li>(i) Power stations, power plants and independent power grids are provided to rural areas</li> <li>(ii) New investment projects to</li> </ol> </li> </ul>

				<p>renovate medium voltage grid, transformer station and low voltage line to meter and from meter to houses.</p> <p>Supporting procedures: Investors of projects who eligible under this Circular send application files for investment loans to the Vietnam Development Bank and the Social Policy Bank for appraisals, reviewing and determining the loan amount.</p>
			Decision 21 on electricity prices in 2009 and the years 2010-2012	The electricity price change started since January 2010. Electricity price was made on the basis of market prices and electricity tariffs were applied in rural areas.
2013 ~	98	2013	Decision 2081 approving rural and mountainous rural electricity supply for the period 2013-2020	<ul style="list-style-type: none"> <li>- The program's objective is to provide electricity from the national grid to rural, mountainous and island areas. Along with renewable electricity supply, the target is that by 2015, basically all communes nationwide was delivered electricity to the commune center and by 2020, most rural households will have access to electricity. The program was planned to implement electrification in 48 provinces with the total number of 57 communes and about 12,140 villages with about 1.3 million households.</li> <li>- The total investment capital was around VND 28,809 billion, of which VND 27,238 billion is invested in the national power grid and VND 1,481 billion is invested in the outside national grid.</li> <li>- The following capital sources: central budget and local budgets, official development assistance (ODA), capital of Vietnam Electricity (EVN), mobilized capital contribution of community and other legal capitals.</li> <li>- Investment mechanism: For rural electricity supply projects, the implementation shall be continued according to the mechanism approved by the competent authority. For power supply projects from the national grid, the central budget of the ODA budget accounts for 85% of the investment and the investor himself balances 15%. For electricity projects outside of grid, the national budget source and ODA accounts for 100% of the construction and installation</li> </ul>

				capital, investors shall balance the remaining capital portions themselves.
		2016	Power Development Plan VII revised (Decision 428/QD-TTg)	Targeting by 2020, almost of households have electricity.
		2015	Decision No. 2068/ QD-TTg on strategy for renewable energy development	<ul style="list-style-type: none"> <li>Towards the goal of increasing the access to clean energy and electricity in rural, mountainous, remote, border and island areas. "By 2020, almost households have electricity. By 2030, almost households will have access to reliable, sustainable, modern energy services at reasonable electricity and energy prices by encouraging and promoting the use of renewable energy to address the problem of lack of primary energy and renewable energy supply in rural areas. The specific directions in each stage are as follows: <ul style="list-style-type: none"> <li>(i) By 2030: formulate programs on the development of independent electricity systems from renewable energy and family-size electricity for difficult and extremely difficult areas, deep-lying, remote and mountainous areas and islands with the purpose to reduce poverty.</li> <li>(ii) To develop solar power to supply electricity to the national grid and border areas, islands, deep-lying and remote areas, which cannot be supplied with electricity from national grid.</li> </ul> </li> </ul>
			Decision No. 935/ QD-TTg on supplementing budget in 2015 for localities to support poor households and social policy beneficiaries	Since March 16, 2015, the electricity allowance for poor households and social policy households <sup>11</sup> is set at 49,000 VND/ household/ month. When the current level of electricity is changed, the monthly electricity subsidy equivalent to 30kWh/ household/ month will change accordingly.

<sup>11</sup> Households entitled to social allowances in the above categories are eligible for one of the following three criteria: 1. Households with monthly social allowance members not being poor households as prescribed by law, and no more than 50 kilowatt-hours in electricity-consuming areas; 2 - Households whose members receive social allowances as prescribed by law live in areas without electricity networks; 3 - Ethnic minority households live in areas where electricity is not available

## APPENDIX 2 – Questionnaires

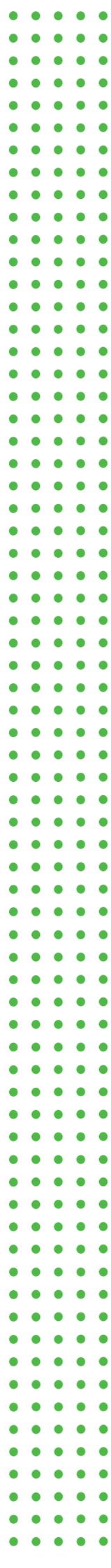
Object		No	Questions
<b>Industrial and commercial facilities</b>		1	The current rate of electricity supply of the locality. Conditions (terrain, life) of the off-grid households.
		2	What support programs will be available to these households?
		3	In the past few years, what programs have been available to supply electricity to the off-grid? And which programs were particularly successful?
		4	Comment on the state policies for the rural electrification program
		5	What is the role of renewable energy systems in this regard? What limits the application of RE models?
		6	What about the involvement of private parties, businesses/ organizations in rural electrification? And, how to provide support?
		7	What are the shortcomings in the process of implementing electricity supply for off-grid households?
		8	What are the difficulties in implementing the electrification program?
		9	In your opinion, will the target of 100% of households using power nationwide be achieved by 2020? What do you propose to accomplish that goal?
<b>Department of Labor, Invalids and Social Affairs</b>		1	The living, economic and social situation of off-grid households in your province?
		2	Are there any the state or local government's policy or program to support the off-grid households? Do these policies directly affect the people?
		3	Are there any programs that achieve outstanding success?
		4	What programs will be implemented in the coming time?
		5	Do you think that the current support policies overlap? (the overlap between the content of the policies, the role of the stakeholders, etc.)
		6	What are the gaps in policies? Please give your recommendations to solve?
<b>Local people</b>	Commune leaders	1	How many households do not have electricity? How many households will be supplied electricity in the coming time?
		2	What's about the attention of higher levels to rural electrification program?
		3	What's about local attention and support to off-grid households?
		4	Do you know how to make a power supply proposal?
	People do not have electricity	1	What is the role of electricity in people's lives?
		2	What are the support policies that people are enjoying?
		3	Do you know about the current policies for the off-grid areas?

		4	What are your problems in accessing support resources?
		5	Desire of the people
	The people have been granted electricity	1	What changes in your life before and after electricity?
		2	Can you describe about the process and method of electricity supply? <ul style="list-style-type: none"> <li>- If using the method of pulling the grid: are they entitled to electricity price incentives?</li> <li>- If using independent system: Did you get any supports during the installation process? How is quality of system when using?</li> </ul>
		3	What's about changes in support policies before and after electricity.
		4	The desire of the people



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