

**DEVELOPMENT OF SOLAR ENERGY AND ENERGY POLITIK RENEWABLE  
ENERGY IN INDONESIA  
BY  
DIDIK NOTOSUDJONO  
PAKUAN UNIVESITY AND BPP.TEKNOLOGY**

**I. BACKGROUND**

Indonesia is the largest archipelago country in the world. It has more than 17,660 islands with more than 220 million populations which distributes in only 6000 islands. Due to this condition, Indonesia has been facing the difficulty to electrify the whole area, especially rural villages that located in the hilly area and even in separated and small islands. In the beginning of year 2000, over than 10 millions Indonesian rural families still can not take pleasure from the electricity, while in other places in the world; such developed countries; electricity is not luxury anymore. It is more than necessity that everyone can use it without exception.

With the comparisons analysis between energy potential of renewable energy in Indonesia, development technology of renewable energy, energy-institution and long term planning of renewable energy are the key factors of the development renewable energy in Indonesia.

Nowadays, development of the renewing energy in some villages in Indonesia only as transition energy. These renewable energy are developed and promoted by some institute or institutions without co-ordination, that make some of those project overlapping. The analyses of those potential and their development through a better co-ordination among institutions with professional teamwork are required to make a plan in using renewable energy in national level.

Investment, technology, maintenance, service, management and economic are still some problem prone areas of development of renewable energy in Indonesia. Detecting and addressing all those problems with harmony with the local technology -is the appropriate approach to the development of renewable energy in the villages of Indonesia.

Since 1979, Indonesia executed SHS installation. The strategy for implementing renewable energy systems especially photovoltaic in Indonesia is determined into three phases as follows: The first phase is a demonstration program, the second phase is a multiple demonstration program and then the third phase is the dissemination program. The significant steps of those phases of SHS implementation of in Indonesia use strategies as follows (Dasuki., A.S, et.al. Proceeding, 1999):

## **II. THE PROBLEM IMPLEMENTATION RENEWABLE ENERGY AND SOLAR ENERGY IN INDONESIA**

The development the regenerative energy in Indonesia so far still remains how a pilot project or research, furthermore the water-power and the sun-energy, The problems development of the regenerative energy is:

- a. Many institution of government became a research the regenerative energy like water-power, sun-energy, wind-energy and Biomes to do, no matter in the this institution of government there is an expert or no expert, therefore the results research didn't become so success. because no support is right expert
- b. The co-ordination between institution of government remains one of more symbols, because the is not each member committees.
- c. The expenses for The research Come of the government, and the government doesn't become many money to the support the research regenerative energy, that is no expenses support of private-businesses.
- d. The situation of energy-potential regenerative energy becomes in villages and normally the Infrastructure still not better.
- e. The ability of the villagers pays the Electric energy still low
- f. Technology solar energy or photovoltaic depend of foreign country
- g. It is very difficult to find development market in rural area due to high investment for Solar energy

## **III. POTENSI ENERGI TERBARUKAN SEBAGAI SALAH SATU ENERGI ALTERNATIF ENERGI DI INDONESIA**

Potential of renewable energy in Indonesia are : Biomass, Geothermal, Photovolataic, hydro power, wind energy and ocean energy until now is not yet to Using and optimizing, Table 4.1 saw that potential of renewable energy in Indonesia, Potential of hydro power is 75,67 GW, potential of Geothermal 27 GW, Potential of photovoltaic is 4,8 kWh/m<sup>2</sup>/day, Wind Energy potential majority in Nusa Tenggara Timur, Nusa Tenggara Barat, and separate in java Island (Jepara, Baron dll), Nusa Penida dan P. Selayar Sulawesi Selatan with wind speed average 3-6 m/sec, at high measurement 24 m, and Biomass potential in Indonesia is 49,81 GW.

**Tabel 4.1**

**POTENSI ENERGI TERBARUKAN TAHUN 2003**

<b>ENERGY TYPE</b>	<b>POTENTIAL</b>	<b>INSTALLED CAPACITY</b>
Hydro	75.67 GW	4200 MW
Geothermal	27 GW	807 MW
Mini/ Micro hydro	500 MW	84 MW
Biomass	49.81 GW	445 MW
Solar	4.8 kWh/m <sup>2</sup> /day	8 MW
Wind	3-6 m/sec	0.6 MW

Since Indonesia is located in equator, it is abundant of solar radiation. Solar energy, with an average irradiation of 4.5 kWh/m<sup>2</sup>, distributed almost all over the country. Therefore Photovoltaic Technology is the most feasible option to provide an alternative source of energy in areas where conventional grid electrification meets the difficulty. “Introduction of Solar Home System has started in a number of projects in the 1980s, funded by governments and bilateral donors. Projects continue to be dominant in most countries, while in a few others a commercial market as developed, completely driven by commercial interests. Projects were legitimated because new technology required demonstration how to overcome key barriers to prepare the way for large –scale commercial implementation. Furthermore, some governments have an interest in implementing rural electrification program” (Nieuwenhout,F.D.J., et.al., 1999, p.5).

**IV. DEVELOPMENT SOLAR ENERGY IN INDONESIA**

Demonstration Program, the objectives of this program is implementing a photovoltaic system model, investigating the technical reliability of the system, exploring the economic visibility, getting the knowledge of researchers and investigating the social impact of the implementation. This demonstration program began in 1978 with 5 kWp photovoltaic water pumping system for irrigation under bilateral cooperation project between GOI and Germany.

Multiple Demonstration Plant; the objectives of this plant is understanding the problems in real condition, managing the distribution of the system and investigating after sales mechanism.

Dissemination program; objectives of this program are implementing the technology which is technically reliable, economically feasible and socially acceptable

The ongoing projects of the third program are as followed:

- a. AUSAID Project,
- b. World Bank
- c. BIG-SOL (Bavarian Indonesian Government Solar Project)

As one of demonstration program is the dissemination of 85 units of Solar Home System Indonesia in the year 1988 in Sukatani, West Java as the first research village. Following the research village, Government of Indonesia launched the Presidential Aid project, called Bantuan Presiden or BANPRES project, by installing 3545 units SHS in 15 provinces in. The BANPRES program start in 1990. The selection area of this program have to fulfil the requirement such the possibility of PLN to reach this area will take more than 15 years.

**Table 3.1. Number of installed SHS in 9 provinces of Ausaid Program**

No.	Province	Total Unit Installed	No. of Village	No.of KUD
1	Maluku	3,700	50	9
2	West Nusa Tenggara	1,500	9	4
3	East Nusa Tenggara	10,008	70	25
4	South East Sulawesi	7,710	70	25
5	Central Sulawesi	4,800	33	2
6	North Sulawesi	3,000	11	5
7	Central Kalimantan	2,000	10	7
8	Irian Jaya (Papua)	2,332	25	5
9	Timor Timur (now Timor Leste)	1,500	27	6
Total		36,600	305	88

(Source : Alyuswar, F. et.al., 2003,p.13)

Based on the previous SHS implementation, GOI inaugurated the ‘One Million Rural Electrification Program’ on 2 June 1997. The ultimate goal of the program is to electrify one million rural households, or 10% of those 10 millions rural families without electricity within 10 years with Solar Home Systems as energy alternative in the village and to reach Indonesian electrification ratio to 95%. Even the growth of SHS implementation ever been failed in 1998 due to macroeconomic crisis, however the Gross Domestic Product (GDP) is projected to be increase thereafter the economic recovery is expected to be smooth. Consequently the implementation of new technology such SHS will be increase as well. Next the GDP growth in Indonesia and the forecast until 2020.

Indonesia have already development 5 MWp energy from solar energy, the Solar energy Using for Solar home System, Refrigerator, Television, Water Pumping , Hybrid system, etc.

## V. REGULATION TO DEVELOPMENT RENEWABLE ENERGI IN INDONESIA

### 5.1 Regulation electrical energy with rule President PP NO 3 am year 2005

Some clausal of regulation which very support electrics energy development in Indonesia which PP NO 3 am year 2005 Section 6 with a few rule which :

1. As long as is harmless of importance of State, Permit of Effort system Electrical energy passed to other effort body and co-operation to conduct ready effort of electric power for the sake of ready effort or public of electric power for the sake by self..
2. other Body effort as referred at sentence (1) able to conduct ready effort of electric power for the sake of public cover Body of Effort Property of Area, private sector, self-supporting of individual ness and society.
3. other Body effort as referred to at sentence (1) able to conduct ready effort of electric power for the sake by self cover Body of[is Effort Publics Ownerships, Body of Effort Property of Area, private sector, self-supporting of society, individual or other state institute.
4. Ready Permit Effort of Electric Power for the sake of Public as referred at sentence (1) and sentence (2) released by :
  - a. Regent / District for ready effort of good electric power, its electrics energy and also medium stay in its area each which did not in circuit into Network Transmission National
  - b. Governor, for ready effort of electric power pass by quickly good town or sub-province of its electrics energy or medium which did not in circuit into Network Transmission National
  - c. Minister, for ready effort of good for five province, its electrics energy and also medium which did not in circuit into Network Transmission National or ready effort of electric power which in circuit into Network Transmission National.
5. Network Transmission National as referred to at sentence (4) a letter and b letter specified with Regulation of Minister.
6. Permit is Effort electrical energy for the sake by self as referred at sentence (1) and sentence (3) released by :
  - a. Regent / District, for ready effort of energy .for the sake by self which, its installation facility reside in sub-province area
  - b. Governor, for ready effort of electric power for the sake of by self which, its installation facility include; cover five sub-province in one province
  - c. Minister, for ready effort of electric power for the sake by self which, its installation facility include; cover five province

Beberapa klausul yang sangat mendukung pengembangan energi listrik di Indonesia pada PP NO 3 tahun 2005 adalah Pasal 6 dengan beberapa ketentuan sbb:

- (1) Sepanjang tidak merugikan kepentingan Negara, Izin Usaha Ketenagalistrikan diberikan kepada koperasi dan badan usaha lain untuk melakukan usaha

- penyediaan tenaga listrik untuk kepentingan umum atau usaha penyediaan tenaga listrik untuk kepentingan sendiri
- (2) Badan usaha lain sebagaimana dimaksud pada ayat (1) yang dapat melakukan usaha penyediaan tenaga listrik untuk kepentingan umum meliputi Badan Usaha Milik Daerah, swasta, swadaya masyarakat dan perorangan.
  - (3) Badan usaha lain sebagaimana dimaksud pada ayat (1) yang dapat melakukan usaha penyediaan tenaga listrik untuk kepentingan sendiri meliputi Badan Usaha Milik Negara, Badan Usaha Milik Daerah, swasta, swadaya masyarakat, perorangan atau lembaga negara lainnya.
  - (4) Izin Usaha Penyediaan Tenaga Listrik untuk Kepentingan Umum sebagaimana dimaksud pada ayat (1) dan ayat (2) dikeluarkan oleh:
    - a. Bupati/Walikota, untuk usaha penyediaan tenaga listrik baik sarana maupun energi listriknya berada dalam daerahnya masing-masing yang tidak terhubung ke dalam Jaringan Transmisi Nasional.
    - b. Gubernur, untuk usaha penyediaan tenaga listrik lintas kabupaten atau kota baik sarana maupun energi listriknya yang tidak terhubung ke dalam Jaringan Transmisi Nasional.
    - c. Menteri, untuk usaha penyediaan tenaga listrik lintas provinsi baik sarana maupun energi listriknya yang tidak terhubung ke dalam Jaringan Transmisi Nasional atau usaha penyediaan tenaga listrik yang terhubung ke dalam Jaringan Transmisi Nasional.
  - (5) Jaringan Transmisi Nasional sebagaimana dimaksud pada ayat (4) huruf a dan huruf b ditetapkan dengan Peraturan Menteri.
  - (6) Izin Usaha Ketenagalistrikan untuk Kepentingan Sendiri sebagaimana dimaksud pada ayat (1) dan ayat (3) dikeluarkan oleh:
    - a. Bupati/Walikota, untuk usaha penyediaan tenaga listrik untuk kepentingan sendiri yang fasilitas instalasinya berada di dalam daerah kabupaten/kota;
    - b. Gubernur, untuk usaha penyediaan tenaga listrik untuk kepentingan sendiri yang fasilitas instalasinya mencakup lima kabupaten/kota dalam satu provinsi;
    - c. Menteri, untuk usaha penyediaan tenaga listrik untuk kepentingan sendiri yang fasilitas instalasinya mencakup lima provinsi.

## **5.2 Regulation of Minister energy and Mineral resource number 10 in year 2005**

Regulation of Minister energy and mineral resource number 10 in year 2005 about Procedure permit of effort electrical energy to pass by quickly province or in circuit with national transmission network represent furthermore formulation from section 6 from PP No 3 year 2005, released by PP No 3 year 2005 and Regulation of Minister Energy and mineral resource number 10 year 2005 about Procedure permit effort electrical energy to pass by quickly province or in circuit with national transmission network, PT PLN non one the other one Monopolistic owner of electrical energy system in Indonesia, Compares and or private sector given by equal right in energy development in Indonesia, this matter to support system energy growth in Indonesia

Development Electrics in rural area, this matter relate at PP no 3 year 2005 about and system energy regulation of Minister Energy and Mineral resource number 10 year 2005, and governmental have specified 13 Province area, Priority to development in Indonesia are North Sumatra, Riau, Kalimantan South, Papua, NTT , Sulawesi North and Maluku. do step this taken to utilize to fulfill urgent electrics, despitefully will take a short cut negotiation time, and also clip licensing time from 810 day become 360 day to the project of electrical System energy.

## **5.2 Peraturan Menteri energi dan sumber daya mineral nomor 10 tahun 2005**

Sedangkan Peraturan Menteri energi dan sumber daya mineral nomor 0010 tahun 2005 tentang Tatacara perizinan usaha ketenagalistrikan untuk lintas provinsi atau terhubung dengan jaringan transmisi nasional merupakan penjabaran lebih lanjut dari pasal 6 dari PP No 3 tahun 2005

Jelas dengan dikeluarkan PP No 3 tahun 2005 dan Peraturan Menteri energi dan sumber daya mineral nomor 0010 tahun 2005 tentang Tatacara perizinan usaha ketenagalistrikan untuk lintas provinsi atau terhubung dengan jaringan transmisi nasional, PT PLN bukan satu satunya pemegang Monopoli sistem Ketenagalistrikan di Indonesia, Komperasi ataupun swasta diberikan hak yang sama dalam pengembangan energi listrik di Indonesia, hal ini kedepan akan memacu perkembangan sistem Kelistrikan di Indonesia.

Pengembangan Listrik diperdesaan ditunjuk langsung, hal ini mengacu pada PP no 3 tahun 2005 tentang ketenagalistrikan dan peraturan menteri ESDM no 10 tahun 2005, dan pemerintah telah menetapkan 13 daerah sedabai daerah krisis energi listrik, diantaranya adalah Sumatera Utara, Riau, Kalimantan Selatan, Papua, NTT , Sulawesi Utara dan Maluku dll. langkah ini diambil guna memenuhi listrik yang mendesak, disamping itu akan mempersingkat waktu negosiasi, serta memangkas waktu perijinan dari 810 hari menjadi 360 hari untuk proyek kelistrikan yang ditender.

## **5.3 Political Energy to development renewable energy in Indonesia**

Development renewable energy program up to year 2020 is 5% from totalizing National energy, though System Electric Power regulars have been raised but all that have to be supported by strong commitment, and only can be executed by if Political Energy in Indonesia have been created. Public Plan of electrical Energy National ( RUKN) specified by President have to get Political support from Parliament/DPR as well as Its institute in Indonesia and also Technology which is initiative by all stockholder. And if RUKN will be made by Political Energy Government of Indonesia to the fore hence at RUKN should be able to give broader motion room. Alternative energy development like renewable energy, it is of course the Political Energy have to have clarity support :

1. Prognoses and percentage of clear attainment goals
2. regulation of Invitation to support Political energy
3. Interesting and good Price Energy to support its development

4. Subsidy storey; level which must be passed to Investor, if/when [the] mentioned concerning renewable energy
5. Direct Directing for the area of which categorized by energy crisis
6. Duty-Free and Lease for renewable energy
7. Development diversified renewable energy by continual and peaceful energy.

### **5.3 Energi Politik untuk energi alternatif di Indonesia**

Program pengembangan energi terbarukan sampai dengan tahun 2020 adalah 5% dari total energi Nasional, meskipun regulasi Sistem Tenaga Listrik sudah digulirkan namun semua itu harus didukung komitmen yang kuat, dan ini hanya bisa terlaksana apabila Energi Politik di Indonesia sudah diciptakan. Rencana Umum Ketenagalistrikan Nasional (RUKN) yang ditetapkan oleh Presiden harus mendapat dukungan Politik dari DPR dan juga lembaga Yudikatifnya serta Teknologi yang diprakarsai oleh para stackholder. Dan apabila RUKN akan dijadikan Energi Politik Indonesia kedepan maka pada RUKN harus bisa memberikan ruang gerak yang lebih luas pada pengembangan energi Alternatif lainnya seperti energi Terbarukan dan energi Nuklir atau lainnya, tentunya Energi Politik tersebut harus mempunyai kejelasan dukungan pada:

1. Prognose dan prosentase target pencapaian yang jelas
2. Peraturan perundangan untuk mendukung energi Politik
3. Harga Energi yang baik dan menarik untuk mendukung pengembangannya
4. Tingkat subsidi yang harus diberikan pada Investor, bila hal tersebut menyangkut energi terbarukan
5. Penunjukan Langsung untuk daerah yang dikategorikan krisis energi
6. Bebas bea masuk dan Pajak untuk energi terbarukan
7. Pengembangan yang lebih luas pada diversifikasi energi yang aman dan berkesinambungan.

## **VI. CONCLUSION**

To support renewable energy development in Indonesia, required by clear political energy, so that big enough new energy potency can be exploited in an optimal fashion, Energy Regulation which have there is in the reality not yet can support renewable energy development, referring to Political Energy the mentioned to support renewable energy development in Indonesia very is needed. Regulation which is just is released of year 2005 require to get strong support from Parliament of energy Politic, so that energy development goals up to 5% can reach better and is realistic. Renewable energy is friendly future energy of environment.

## **VI PENUTUP**

Untuk mendukung pengembangan energi terbarukan di Indonesia, dibutuhkan energi politik yang jelas, sehingga potensi energi terbarukan yang cukup besar bisa dimanfaatkan secara optimal, Regulasi energi yang telah ada ternyata belum mampu mendukung pengembangan energi terbarukan, sehubungan dengan hal tersebut Penggunaan energi Politik untuk mendukung pengembangan energi terbarukan di



Indonesia sangat diperlukan. Regulasi yang baru dikeluarkan tahun 2005 perlu mendapatkan dukungan yang kuat dari DPR melalui energi Poltik , sehingga target pengembangan energi sampai dengan 5% dapat dicapai dengan baik dan realistis. Energi terbarukan adalah energi masa depan yang ramah lingkungan.

## VII REFERENSI

1. Notosudjono Didik, dkk, Date Base Renewable Energy in Indonesia, BPP. Teknologi-UNESCO, Jakarta, 1999.
2. Notosudjono Didik, Ländliche Entwicklung durch erneuerbare Energie - Energiepotentiale, Entwicklungs- und Marketingkonzepte in Indonesien, Universitaet Flensburg, Germany, 2000.
3. Notosudjono Didik, Ir,Msc.,Strategi Pengembangan Penyediaan Energie Terbaharukan di Daerah Pedesaan dan Kemungkinan untuk kegiatan Produksi, Lokakarya Energie 1993,KNIWEC, Jakarta Indonesia.
4. Notosudjono Didik,Ir,Msc., Rencana Terpadu untuk Adaptasi teknologi di Pedesaan Indonesia, Prosiding Presentasi Ilmiah, Direktorat Teknologi Energie, BPPT, Desember 1992, Jakarta Indonesia.
5. Notosudjono Didik, Ir.Msc, dan Abubakar Lubis, Drs, MSc, Hybrid System ( small Wind Energy and DC Diesel Generator Sets ) for Electricity in the village Ciparanti, Western Java, Windpower'93 san Francisco, CA, July 12-16, 1993.
6. Notosudjono Didik, Ir. Msc. Selbstbau Wasserkraftanlagen auf Bali und Kecamatan Doko sowie Möglichkeiten ihrer Optimierung für Produktive Nutzung, Universität Flensburg, Flensburg, 1991
7. KNIWEC, Penyediaan Tenaga Listrik secara berkesinambungan, Jakarta, September 1993.
8. KNIWEC, Penerapan Teknologi Tepat guna dalam Penyediaan dan Penggunaan Energie yang berwawasan lingkungan, Jakarta, Oktober , 1994
9. Sulisty Atmadi, Ir Wind Energy Research and Development in Indonesia, Presented LAPAN-DLR workshop on Wind Energy Utilization and Commercialization Prospect in Indonesia, Jakarta dec.5,1995.
10. Harijono Djojodihardjo, Prof,Dr.Ir, Energi Angin di Indonesia,Potensi, Perpektif dan Tantangan, KNIWIC, Jakarta, 24-25.04.1979.
11. Ramani, K.V. ; Islam, Mohammad N.; Reddy, Amulya K.N.: Rural Energy System in the Asia – Pacific. A Survey of their Status, Planning and Management, Kuala Lumpur.,1993.
12. Sheperd, Dennis G.: Wind Power, Chapter 19 – Handbook of Energy Technology and Economics, John Wiley & Sons, Inc.,New York, 1983.