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FINANCING PATTERN OF RENEWABLE ENERGY IN WEST BENGAL: - DEVELOPMENT OF NEW FINANCING SCHEME FOR WEST BENGAL

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ABSTRACT

Financing is an important part for any Project. Specially for new and different kind of projects which are the sources of wellbeing as a whole for the community is very important . Renewable Energy sources are playing pivotal role for environmental up gradation of the whole Universe. Even in Space stations Scientists are trying repeatedly to produce different kinds of medicines, equipments etc with the help of reusable sources of energy like Solar energy , Bio energy etc. In case of our State West Bengal Renewable Energy has not achieved a path breaking success compare to its initial days except ground mounted Grid Connected Solar power . So, for overall development of Greener and emission free sources of energy financing in a proper and multidirectional way is urgently required for achieving net zero emission target within 2050 . This present paper focuses on various kind of financing schemes by comparing the existing financing options of four states of India including West Bengal and attempts to develop a new multidirectional financing schematic way for upgradation and generation of various alternative sources of Energy in our State including Roof –Top Solar power .

KEYWORDS: *Roof-top Solar Power, Multidirectional Financing , Net Zero Emission*

INTRODUCTION

Development of Renewable Energy Products & technologies on a large & sustainable scale is only possible if it is not solely dependent on development aid or government subsidy. Other financing options involving private sector finance , NGOs participation , Research Organization , Banks participation , end-users participation should play an increasing role. There are basically Govt. finance, International funding, Private sector finance, Banks funding support, Research Organizations funding support in new technologies , end users contribution for financing Renewable Energy & lastly Pension earning old age persons (who may not be direct user of Renewable energy) contribution for upliftment of Renewable Energy in lieu of accepting Green Energy Contributors support from Govt. The aim is to identify innovative mechanisms that :- **a).** bring down the high initial cost, **b).** increase renewable energy's competitiveness against traditional fossil fuels **, c).** reduce transaction costs of renewable energy products & technologies , **d).** ensure sustainability with one directional non-profit based funding support by national & international large & recognized bodies , **e).** encouraging the installation of Roof- Top Solar System (Grid connected) in a larger way in private buildings & individual housing premises , banking sector.

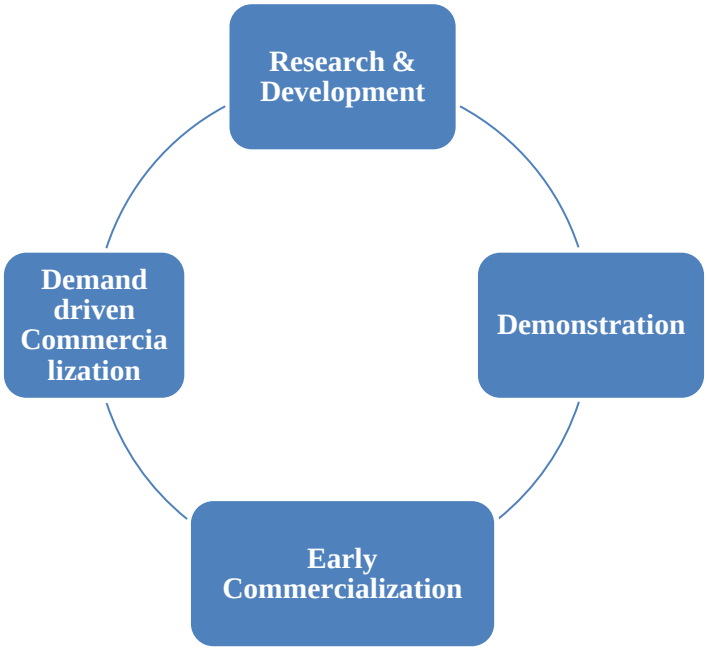
CASE STUDIES

"With regard to financing, there appears to be a relationship of interdependence between the deployment of renewable energy products and technologies and their market demand. The availability of financing for research and development as well as for manufacturing is crucial for reducing the high costs of the systems. Similarly, adequate consumer finance enhances affordability and stimulates further demand, which in turn leads to further development of the renewable energy industry."

There is an inter-linkage between industry and market growth on the one hand and price reduction on the other. In this study the challenge of financing is addressed under a life-cycle approach, which looks at financing mechanisms for the stages of: (1) research and development, (2) demonstration, (3) early commercialization and (4) demand-driven commercialization. Under this approach, the respective roles of the different financial instruments are examined, as well as their interaction at each stage of the cycle is analyzed. Transaction cost indicate all the costs, besides the cost of the technology itself, that are required for taking technology and or products to the user, including marketing, advertising, and awareness creation.

This is done by reviewing selected past and ongoing projects and programs and other financing initiatives in the four categories of financing selected. Case studies are examined from India, which is one of the leading developing countries in the area of renewable energy. Though there are many renewable energy technologies that have potential in developing countries and are currently in use, this study focuses on the financing of grid-connected wind power and off-grid solar photovoltaic (PV) power projects. For grid-connected wind power, detailed case studies were undertaken in the states of Tamil Nadu and Karnataka. Studies of the off-grid solar power sector covering decentralized applications (comprising solar home lighting systems (SHS) and photovoltaic based mini-grids) were undertaken in the states of Rajasthan and West Bengal respectively.

A). Characteristics of existing Financial Model:-



Renewable Energy Life-Cycle Flow Chart

There are 4 Financing Components in existing Financing model. These are :- **1).** Government Finance **, 2).** International Funding Mechanism, **3).** Private Sector Financing , **4).** Micro Credit and Community based Finance . Renewable energy policy in India is driven by the need for energy security; diversified and growing energy needs; the presence of large unserved and poorly-served populations; abundant renewable resources; and opportunities under clean climate initiatives. The Ministry of Non-conventional Energy Sources (MNES), set up in 1992 is the Government's nodal agency for all matters concerning the promotion of non-conventional/renewable energy. Complementing the efforts of the MNES at the central level, state governments add manpower and financial resources to promote the renewable energy programs in their respective states through state nodal agencies (SNAs); these are involved in designing,
implementing, and supporting renewable energy programs. The MNES co-ordinates with the SNAs

by providing policy guidelines as well as finance, either allocated as subsidies or given under other programs. These programs are often implemented with the involvement of the Department of Rural Development, state electricity boards, community-based organizations, non-governmental organizations (NGOs), and others.

Structure of Existing Financing Model :-

Diagram 1

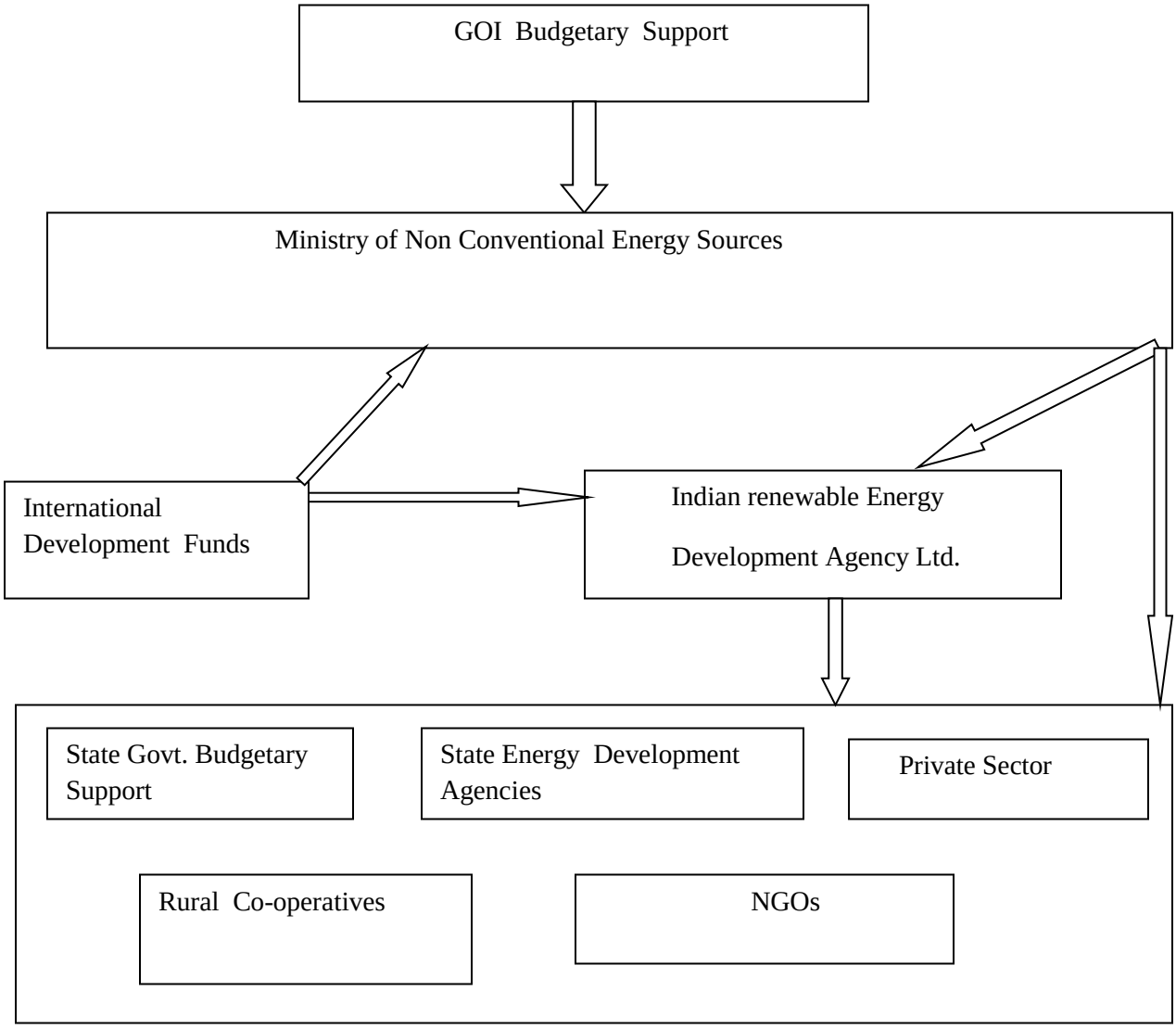


Diagram -2

Diagram 2 indicates Financing Institutions & mechanisms in India's Renewable Energy Sector.

The Govt. has been pursuing a multilayer strategy components of which are:-

1). Provision of Budgetary resources demonstration Projects,

2). Encouraging the involvement of Industry & the scientific establishment in indigenous research & development for new & emerging technologies & improvement of available technologies.

3). Extending institutional Financing through IREDA & other financial institutions & external assistance from international & bilateral agencies.

4). Promoting private investment through fiscal incentives , tax holidays, depreciation allowances , wheeling facilities & banking of power for the Grid & also allowing one hundred percent foreign direct investment in manufacturing as well as setting of power projects.

India's Power market offers Renewable Energy generators a wide range of options for sale of powers, feed-in-tariffs, renewable energy certificates, captive & open access sales. This implies that a wide range of investors can be pursued who then can structure sale contracts that are best suited to their risk-return profile.

Existing financing Schemes of different States of India including West Bengal:-

a). Solar PV Minigrids, a combination of Govt. and Community Financing – Sundarbans , West Bengal :-

This Case study of Solar PV based Minigrids in Sundarbans describes a model of combining Govt. & community financing to promote renewable energy in India . Since village electrification is primarily considered to be a social responsibility of the Govt., funding for such projects mainly comes in the form of Govt. subsidies ; The combination of the Central subsidy for renewables, state subsidy & local area development funds was in the ratio of 70:20:10 ; The financing arrangement was completed by a unique institutional structure involving the technology provider , local entrepreneurs , community for operation & maintenance , sale of electricity, billing and revenue collection.

b). Developing a market-oriented institutional and financial model for decentralized solar systems—Rajasthan, Uttaranchal This case study addresses the limitations of delivery mechanisms currently practiced in conventional government subsidy-driven programs. A unique institution called the Energy Service Network (ESN) had been the focus of Uttam Urja, a project for implementation of renewable energy technology systems in rural areas through NGOs. The ESN is an entrepreneurial model conceived by The Energy and Resources Institute (TERI) and funded by the India-Canada Environment Facility. The project focuses on developing a grassroots ESN comprising local NGOs, dealers, and retailers of commonly used electronic gadgets. These local enterprises offer custom-made products and services in remote rural areas. The ESN is being facilitated and co-ordinated by TERI, which is focusing on enhancing the capacity of the network's members. Once the ESN has been established, it will consolidate its network with existing financial intermediaries and manufacturers of solar home lighting systems. The project addresses the limitations of the subsidy regime, particularly with respect to technology customization and innovative delivery mechanisms. It presents a package of energy products and services to rural people rather than providing just the technology, as has been the case in various other initiatives undertaken by the Government.

c). Financing solar PV systems through rural finance institutions—Karnataka, Kerala, and Andhra Pradesh:- The business model of SELCO-India, a solar energy service company (ESCO) operating in southern India since 1995, aims to develop an innovative consumer finance scheme through rural credit institutions, with loans available from local banks and co-operatives, along with a sales, installation, and maintenance network in the villages. Since most end-users in rural areas cannot afford to buy a solar PV system up-front, this business model allows staggered payments over a three to five-year period, with loans provided by rural financial institutions. SELCO offers a lease-to-own scheme wherein the consumer pays one-quarter of the system cost up-front, while the rest is given to him or her by the financial institution as a loan at 12.5 percent interest per annum. An important and effective part of SELCO's strategy has been to form tie-ups with financial institutions like the Syndicate Bank to provide loans for solar PV systems. One such partner is the Malaprabha Grameen Bank (MGB), a rural development bank with 200 branches in Dharwad and Belgaum districts of Karnataka, known for its innovative micro-credit schemes. Where no other type of financing is available, SELCO has set up its own financing arm offering loans at a low interest rate, with IREDA re-financing 2.5 percent per annum using low-cost World Bank funds available through the photovoltaic lending program of IREDA. As rural customers are at the lowest level of the financing ladder, doorstep financing through rural financial institutions (registered farmers' cooperative societies or cooperative banks) contributes to reducing the borrowing transaction costs, thus increasing affordability for rural customers.

d). Consumer financing for solar PV systems through low-interest bank lending— UNEP Solar Power Initiative This $7.6 million initiative was launched in March 2003 between the United Nations Environment Programme (UNEP) and two of India's largest banking groups to help 18,000 southern Indian households finance clean and reliable electricity from solar power. The UNEP program was possible with support from the United Nations Foundation (UNF) and the Shell Foundation. Under the UNEP program, households were able to purchase SHS at an interest rate of approximately 5 percent per annum, compared with the normal

consumer lending rates of 11–12 percent. The Syndicate Bank and Canara Bank offered new low-interest loans under the program, which was aimed at buying down the financing cost of SHS. These two banks were credited with introducing many of the most innovative rural financial products through an extensive network of rural branches and though linkages with self-help groups in Karnataka and Kerala.

Existing financial roadmap of Decentralized Solar Energy (Residential/ Community) :-

Life Cycle Phase	Financial Instruments			
	Govt. Finance	International Funding Mechanism	Private Sector Finance including ESCOs	Micro-Credit & Community based financing
Research & Development	Required			
Demonstration	Required	Required		
Early Commercialization	Required	Required	Required	
Demand Driven Commercialization	Required	Required	Required	Required

Source :- (*International Review for Environmental Strategies Vol. 4, No. 2, pp. 249 – 263, 2003)*

e). Public-sector financing (through IREDA) for Wind power development—Tamil Nadu India had witnessed an exponential growth in its Wind Power sector. Synergy between various factors—viz., promotional policies of the Government, a conducive environment for private sector involvement, supportive financing instruments, access to technology, and institution and capacity building—have been the critical instruments fuelling this growth. Among the states where wind energy could be viable, Tamil Nadu had taken the lead in exploiting this potential. Since 1985–86, the Tamil Nadu State Electricity Board (TNEB), the state utility, has successfully implemented grid-connected wind farms under demonstration projects with MNES support. The success of these demonstration projects has attracted record private investment in the wind sector. The TNEB has further facilitated investment by identifying potential sites, developing infrastructure (grid evacuation, grid connection, sub-station facilities, and so on) for implementation of GWEGs (grid-connected wind electric generators), and announcing attractive state-level policies for wheeling and banking of power, thirdparty sales, and so on. Fiscal and financial incentives from the MNES, coupled with financing from IREDA, had further boosted the progress of installation of GWEGs in Tamil Nadu. IREDA's achievement in financing wind power projects is remarkable. IREDA had financed 210 grid-connected Wind Power projects aggregating to 475 MW in Tamil Nadu alone, which was 22 percent of the wind power projects it had financed in all of India in that time.

f). Wind-power development by the private sector, a combination of the CDM and public sector financing—Karnataka The Clean Development Mechanism, a recent international financing tool for additional revenue from climate-friendly projects that was one of the flexible mechanisms of the Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC), had drawn attention from the private sector for leveraging the financial viability of wind energy projects. Enercon (India) Ltd. had proposed implementing a 15 MW grid-connected Wind power project in the state of Karnataka, based on the CDM. Enercon participated in the Royal Dutch Government's public procurement tender, CERUPT, and its project had been selected for supplying certified emissions reductions (CERs). The project was located in Vanivilas, falling within the Jogimatti Wind zone. The projected revenue from CERs was US$1.2 million for 6 to 10 years, with total CERs generation of 0.24 million over 10 years.

Existing Financing Roadmap of Grid Connected Wind Power (Industrial Sector) :-

Life Cycle Phase	Financial Instruments			
	Govt. Finance	International Funding Mechanism	Private Sector Finance including ESCOs	Micro-Credit & Community based finnacing
Research & Development	Required			

Demonstration	Required			
Early Commercialization	Required	Required	Required	
Demand Driven Commercialozation		Required	Required	

Source :- *(International Review for Environmental Strategies Vol. 4, No. 2, pp. 249 – 263, 2003)*

Limitations of the Existing Financial Model of Renewable Energies in West Bengal:-

1. Comparing the financing strategies of different states of India including our state West Bengal in case of Solar Energy and Wind Energy it can be seen that in the earlier financing models of Renewable energy in India and more precisely in West Bengal there were not any particular or prominent strategy exists for Grid Connected Solar Power , most of the strategies were introduced to disseminate the use of Renewable energy sources in West Bengal were centered around off-Grid Solar PV.
2. No Other Renewable Energy Sector except Solar was given priority previously in West Bengal. In case of Wind Energy Projects, projects which exists previously in our State and still prevails are basically demonstration projects. Some Project proposals for Grid connected Wind Energy Projects have been sanctioned , but not materialized uptill . There exists long coastal areas in West Bengal and therefore also exists scope for Off-shore and On-shore Wind Energy Projects , but no such effective financing strategy has been implemented till now for the upliftment of Wind energy projects in West Bengal .
3. From the Renewable Energy Servicing models , there is no clear indication of amount of tax benefits .
4. Existing Lease – contract clauses need some clarifications specially financing share pattern .
5. In the above mentioned Models specially in ESCO model, how the burden of high cost can be removed by various incentives , is not mentioned .
6. What percentage of financing will be shared for Research Developmental activity or improving the generation or efficiency of a system is not mentioned in the financing models.
7. There is not a single mathematical model or equation given for understanding the financing pattern better .
8. Risk analysis models need to incorporated for each financing model.
9. In these Financing models , where dipartite or tripartite or multiparty involvement exists , in those cases a accidental death clause or sudden death clause for any reason must be incorporated, because if any of the contract signing authority died in between the agreement period, then it will be difficult to understand the fate of the financial contract.

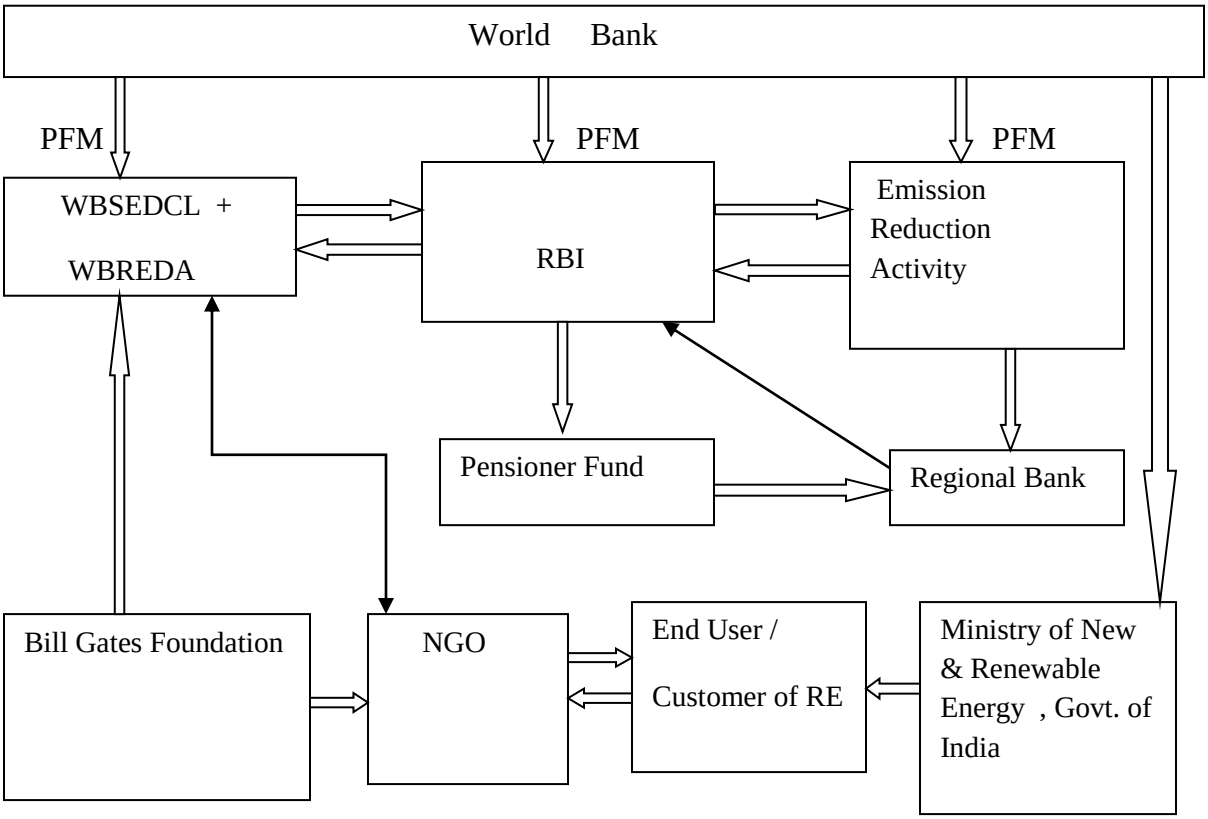
Suggestion of a New financing Pattern in West Bengal :-

Investments in low-carbon may be financial, structural or technical. Financial barriers include fossil fuel subsidies, and the unpriced carbon externality which discourage local businesses, project developers, vendors, technology providers from offering low carbon solutions to the market, and hamper institutional and market financing mechanisms enabling such businesses to grow where Structural barriers include network effects (need for flexible and sufficient grid capacity), fragmentation and transactional costs due to smaller scale of low carbon technologies which affect the viability and economic attractiveness of low carbon options. Finally, neither policy nor financing will achieve much if there are technology and technical capacity barriers that impede technological and business model innovation. Many green projects are currently often not viable on a stand-alone basis due to mispricing in the markets which makes traditional projects more attractive due to climate change externalities not being priced into these projects or mispricing due to government policies, such as fossil fuel subsidies. The investors, who are ready to invest in clean energy companies and projects, have questions over the policy environment in which they operate. If governments wish to encourage investors to finance climate change and green growth projects in future, clear and consistent policies over a long period of time are needed for successful implementation of these projects.

For financing in a Project, Financers are not looking for a risk-free environment, but rather one in which risks can be understood, anticipated and managed. Public Financing Mechanism (PFM) is strong mechanisms which encourage involvement of Private Sector in order to mitigate the risk and also encourages Pvt. Sector Sources of Capital in Green Projects particularly in developing Countries. Specialty of PFM based projects are - reducing actual and perceived risks of investing in Low Carbon funds & major projects, improves the return of Emission reducing activities by which demand for more finance in these projects increases.

By understanding the various RE based financing Projects, and their drawbacks, this new model of Financing incorporated here tries to develop a model of Alternative Energy financing for our State West Bengal which is not introduced in our State uptill . In the new Financing model for development of RE based Project in West Bengal , there are 9 parties who are linked with each other directly or indirectly for developing the Renewable energy projects in West Bengal in a broader way. The participants in this Finance model are – World Bank, (WBSEDCL+WBREDA – jointly) , Reserve Bank of India (RBI) , Bill Gates Foundation, NGOs in West Bengal , Ministry of New & Renewable Energy , Govt. of India, End users or Customers who will be the users of Renewable Energy technologies (young people aged between 18-40 years) , Regional Banks , Pension earners (above 60 / 65 years age) of our State.

New Model :-



Flow Diagram of New RE based Financing pattern in our State

Working Principle of the Financing Model: - This kind of model of upliftment of Renewable Energy Projects in West Bengal has not introduced in our State before . If this model can be introduced in our State West Bengal for broader level implementation of Renewable Energy Projects , then within next 50 years West Bengal can be able to play a pivotal role in Renewable energy expansion in our Country . In this model World Bank will take the leading role for efficiently introducing Renewable Energy Projects in our State through its Public Financing Mechanisms (PFM) Package in Emission reducing activities. The participation of World Bank through PFM will mitigate the project financing risk to a greater extent. In this model , the specialty is => the flow will not be two directional , instead some service flow will be one directional or purely social service . After successful completion of the project , the monetary return will be shared between two nodal Govt institutions of our State WBSEDCL[1] & WBREDA through RBI financing

[1] The Government of West Bengal unbundled the erstwhile West Bengal State Electricity Board (WBSEB) into two companies viz., West Bengal State Electricity Distribution Company Limited (WBSEDCL) and West Bengal State Electricity Transmission Company Limited (WBSETCL). The main business of WBSEDCL is distribution and hydro

mechanism. In this West Bengal Specific model, other important player is Bill Gates Foundation which will give special financing support to special project of Renewable Energy based investment project to the nodal institutions of our State (WBSEDCL+WBREDA) . In this context , I want to mention one thing that , The Bill & Melinda Gates Foundation lead by Gates & his wife is the worlds largest charitable foundation . Bill Gates in 2015 announced that , there is a urgent need for " high risk" investments in breakthrough technologies . Gates in an interview in Financial Times announced that he would double his current investments in Renewable over the next five years . . Bill Gates Foundation will also give financing support to local NGOs of our State for spreading mass awareness activity within 2050 . This model is constructed keep in mind the Policy paper of Montek Ahluwalia, Himanshu Gupta and Nicholas Stern, "A more sustainable energy strategy for India" , July 2016 where they have analyses what is possible as a low carbon scenario for India using India Energy Security Scenarios-2047 tool . On the other hand, NGOS and State Nodal Institutions of RE based projects , are both way connected. Nodal institutes give responsibility of proper monitoring of the project to Renowned State based NGOs for proper monitoring the project and collecting user feedbacks , and NGOs will collect feedbacks and reports and submit timely to the Nodal institutions. Beneficiaries or users of the RE based Energy Systems will place there written quaries to NGOs and as a result NGOs will give written or verbal response for solving the queries of the beneficiary . Again World Bank will give funding support to Ministry of New & Renewable Energy , Govt. of India for supporting the Research & Development activities in case of Renewable Energy projects . With the funding support from Ministry of New & Renewable Energy ,Govt of India , a pool of Scientist in India will develop new and innovative Renewable energy solutions for the needy people of the cities , slums , remote areas and deliver the systems or its related services directly to the beneficiaries . Now comes the important and new concept of Pension earners contribution introduction to the RE Projects of our State. According to this new scheme , RBI will release a mandate to invest Pension earners 10% money investment for the upliftment and development of Renewable Energy based projects in West Bengal . Pensioners have to give their funding support through their States Regional Banks to RBI in exchange of which RBI will give the Pensioners a Green Energy Contribution Certificate . By getting the certificate as Green Energy contributor from RBI , the old age pensioner can be able to get up to 50% reduction of treatment expenditure in any nurshinghome of West Bengal as well as India & after the Pensioner death this benefit will be transferred to one of the dependable family member of his/her family with at least 30 % reduction in treatment expenditure bill in any parts of our State as well as India. Regional Banks will also be benefitted by this procedure i.e. 20 %- 30% of the return from successful emission reducing projects will come to the Regional banks for RE based electrification system into the Roof –tops of the Bank , so that , banks electricity bills will reduce to a greater extent per annum & by which they can contribute to the wellbeing of society as a whole . This model is not fully profit oriented, but tax savings by investing in social welfare projects because not every participating members are gaining financial benefits from this project . Some participants are investing not keeping in mind the future return from the project i.e., their investment or support is completely one directional , still they are investing for the success of RE projects and helping the developing nations in achieving the goal of reducing emissions within next 50 years in a broader extent .

Superiority of this proposed Financing Scheme for West Bengal Compare to the previous financing schemes :-

A). In this specific new financing Scheme of West Bengal all sections of people of our community including old pension earning section of our State is also involved . Investing in Green energy funds , risk of their health hazards can be mitigated to a larger extent by a secured mediclaim benefit for the old person and his/ her family members which is not introduced in our State . This may be a very effective strategy for Uplifrment of Renewable energy in all parts of our State . Contribution for the growth of Renewable Energy sources will make the old citizens future more secure as a whole because their participation in this chain of Renewable Energy based financing will ensure their long and healthy living in a greener and pollution free environment .

generation of electricity. It is also the nodal Agency of the Government of West Bengal for undertaking Rural Electrification task in the State with objective of providing access of electricity to all rural households in the state in line with the National Rural Electrification Policy.

Retrived from - https://www.wbsedcl.in/irj/go/km/docs/internet/new_website/profile.html , accessed on 27th August, 2017) .

B). In this specific Financing scheme, Bill Gates Foundation is directly giving funding support to States nodal Bodies of Renewable Energy for overall growth of Renewable energy in West Bengal by which State can be able to achieve a higher performance level in future through the Local NGOs active bidirectional involvement .

C). Micro-Credit & Community based financing is not suggested in this new financing scheme of West Bengal for Grid connected Ground mounted Solar PV Power Plant , because it has already reached at the point of sustainability in case of our state West Bengal compare to Wind power and Roof Top Solar PV.

D). Apex Banking Institution RBI and all other bank branches are involved in this financing schedule for actively taking part in emission reduction activities which is very much required for the overall growth of the economy .

LIMITATIONS OF THIS FINANCING MODEL

A). This kind of project may not get success within next 10-15 years , but if properly implemented the Project can definitely contribute in a greater way within 2050 in our States Renewable energy future . This kind of Financing Scheme can also be replicated for Non – Solar projects like Wind , Municipal Solid Waste Management because in these two cases West Bengal has huge potential but not achieved the success accordingly.

B). In this specific financial model percentage of Tax deduction and for the green energy contributors are not calculated and also percentage of different segment of investment are not suggested here except pension earners contribution percentage.

CONCLUSION

There exists some loophole in every sort of new project beside opportunities. This specific financing scheme has also drawbacks , but definitely it is an improved and better financing way compare to the other Renewable Energy financing scheme of other states . There is a concept of Co-ordination failure in case of Multiparty involvement in any model or project . In this specific financing scheme , there exists multiparty involvement , but still there will be any chance of Co-ordination failure because , it is, not a individual Share market investment project , where beneficiary may face loss or financial hazards rather it is a societal benefit project , where so many stakeholders are involved and if any loss of specific party of financial chain occurs, it may not hamper the overall societal gain. Since Renewable Energy projects specially the Grid-connected Solar Energy projects reached into a stage of viability and all around acceptance level in West Bengal, so chances of coordination failure is less for Solar energy financing projects specifically.

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