THE ELECTRICITY CONSUMER GRID

An Information Bulletin of the Consumer Advocacy Cell, AERC

Volume X, January 2009

- *Renewable Resources and Non-Conventional Energy.*
- *On Solar Power in India.*
- *Solar Water Heating System.*
- *Synopsis of Tariff Petitions for FY 2008-09 and 2009-10.*

And More……

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PREFACE

"Consumer Grid"- Volume: X, January 2009

The Assam State Electricity Board and its successor companies have submitted to the Commission multiyear tariff petitions for FY 2008-09 and 2009-2010 which were admitted by the Commission. An abstract of the petitions are incorporated in this issue of the Consumer Grid. As in earlier cases, the Commission will finalise the power tariff only after taking into account the views of cross sections of people including organisations representing the industries and individuals. Our esteemed readers may submit their views, if any, on these petitions to the Commission. The Guidelines for submitting response petition is given in the **Volume IX** of the Consumer Grid.

Electricity plays a very important role in our lives. The conventional sources of energy are depleting fast. With this impending scarcity, coupled with concerns of climate change and global warming, the relevance of renewable energy increases manifolds and their adoption and propagation have gained importance. The major demand for energy is from the domestic, commercial, Industry, and agriculture sectors. Renewable energy obtained from solar heat, wind, biomass, hydro or any other resource has tremendous potential of contributing to meet the energy demand for these sectors to a significant extent.

Many renewable energy systems and devices have been developed and are in the market. But, their adequate use by people in every day life is yet to take place. The Central and State Governments have announced several schemes and subsidies with an aim to increase the share of energy generation from non-conventional and renewable sources and to ensure their cost effectiveness.

Generally, information about availability of renewable energy systems and devices is less available to the common people. In this issue of Consumer Grid we focus on information about renewable sources of energy with emphasis on the abundant solar power to keep you abreast with the developments that are taking place within the country. In order to encourage use of energy from renewable sources in Assam, the Assam Electricity Regulatory Commission introduced rebate against use of Solar Water heaters in the Tariff Order 2005-06. It has continued to do so in the subsequent tariff orders. This issue also provides a short article on solar water heaters. A staff paper on using solar energy to charge inverter battery is also included in this edition of the Grid.

I hope that our readers will find the material presented in this issue informative and useful. Please continue to give your valuable suggestions.

Wish you all a very happy, peaceful and prosperous New Year 2009**.**

P. Sharma
Consultant,
Consumer Advocacy.

Inside……

InBox

Ever since we have started publication of the "Consumer Grid" from the Consumer Advocacy Cell three years back, we have been receiving views, suggestions and advice from our well wishers/members through email, post, telephone and personal visits to our office. Your valuable opinions continue to inspire and guide us. Thank You. Do keep sending them. A few written intimations are published in this issue. ---- The Consultant, Consumer Advocacy.

- ✓ We acknowledge with thanks the much awaited bulletin "Consumer Grid". We have gone through the Grid and think that it is taking an effective part in consumer education relating to power consumption and consumer's rights.

  We shall be glad if you introduce a space in the bulletin where power and function of CAC will be discussed and guide how to work in the locality. We also want to suggest publication of name and addresses of all CAC members in the state working for consumers. ……

Letter was received on 22.02.2008 from Shri Diganta Kumar Mishra, President of the Empanelled Consumer Protection Parishad, Morigaon. Keeping in mind the interests and

suggestions of this kind, the Special Issue, Volume IX of the Consumer Grid was published in July 2008.

- ✓ We congratulate the Consumer Advocacy Cell, AERC for bringing out an exhaustive document which is quite educative and useful to both consumers as well as Discoms.

  While this is appreciated, we would request the AERC to impress upon the Discoms to train their grass root level personnel, who directly come into contact with the consumers, for better communication, motivation and commitment to render efficient quality service. In the absence of the personal commitment all systems/ procedures seem to be imposed upon them and cannot substitute the attitude to render quality service. ……

Letter was received on 17.11.2008 from Shri B.P. Bakshi, Chairman of The All India Manufacturer's Organisation, Assam State Board, Tinsukia. (Member, Advisory Committee, AERC)

- ✓ Thank you for "The Electricity Consumer Grid" – Vol. VI and Vol. VII. In order to enable us to widely disseminate the volumes, we will appreciate if you could kindly send us three more copies of each volume. It is needless to mention that the information carried in the volumes are invaluable.

Letter was received on 8.08.2007 from Shri Dhiraj Kakati, Secretary, Assam Branch of Indian Tea Association (Member, Advisory Committee, AERC)

- ✓ Please send me the annual subscription note of "Consumer Grid", the journal of AERC.

Letter was received on 6.09.2007 from Shri Jayanta Deka from Mangaldoi, Darrang District, Assam.

All the previous issues of the "Consumer Grid" are available in our Consumer Advocacy webpage of our official website: www.aerc.gov.in. Only Volume IX of the "Consumer Grid" has been priced at Rs 10/- per copy and can be collected from our office.

FROM THE CHAIRPERSON'S DESK

Tariff petitions were received and admitted by the Commission from the ASEB and its five successor utilities for FY 2008-09 and FY 2009-10. Apparently, the petitioners have prayed for a raise in the range of ***20% to 40%*** *in tariff for different categories. The Commission will determine the tariff as per mandate of the Electricity Act 2003 keeping in mind the performance of the utilities over the previous years and interests of the consumers. While it is the duty of the utilities to supply quality, reliable power to its consumers, the consumers also have the responsibility to help prevent power theft and play an active role to ensure that the utilities carry out their duties effectively. The Commission desires that the consumers respond to the petitions and give constructive suggestions which will help in taking balanced / prudent decisions.*

Further, the application of non conventional energy for energy security of the country has earned wide importance. I believe that the contents of this issue of the "Consumer Grid" will inform our readers on its applications and importance in recent times.

Sd/-

(Jayanta Barkakati)

Latest R.E.News Briefs

(*Courtesy: Akshay Urja, Newsletter of the Ministry of New and Renewable Energy.)*

Nagpur to have Asia's biggest solar thermal power plant.

The plant will generate 10-MW (megawatt) electricity for the national grid. The unique 10 MW solar thermal generation facility will serve the purpose of demonstration for solar energy enthusiasts across the country. Nagpur has been selected because of high sun radiation and its central geographical location. The plant load factor will be between 80% and 90% of the installed capacity. Allotment of land from the Maharashtra Government is awaited.

Government targets 10,000 MW solar power by 2020.

The initiative is part of the solar energy mission of the NAPCC (National Action Plan on Climate Change). The MNRE is working on a comprehensive mission agenda to operationalize the plan to enhancing the contribution of solar energy in the total energy mix. The plan is likely to include a policy framework and details of subsidies required to boost solar power generation. The plan would also emphasize regulatory norms required for the industry and purchase preferences for generation of solar energy. The government is also considering diversion of subsidies from conventional fuels like kerosene and diesel to support solar energy. The idea to use 10% of kerosene subsidy to fund solar lanterns programme for poor people was mooted by the prime minister's energy coordination committee meeting recently.

NABARD to venture into solar power sector.

The state-run NABARD (National Bank for Agriculture and Rural Development), in a serious bid to give a much needed push for solar power projects, proposes to share 50% of the cost of installation up to a maximum of 20 demonstration solar power project units at important places. In addition, it will extend support to the regional rural banks and cooperative banks for conducting awareness campaigns and organizing credit camps at Rs 1000 per campaign for a maximum of 20 programmes. NABARD in its recent circular has asked regional rural banks and cooperative banks to replicate what the Aryavart Gramin Bank, Lucknow, UP has implemented a scheme on SHLS (solar home lighting system).

According to NABARD, the system is simple and has negligible operating cost. The energy generated can be used for domestic and business purposes. The expenditure on installation is a onetime affair, procedure is very simple, and the unit can be easily shifted from one place to another. Its maintenance cost is also low and it is free from noise and pollution. NABARD sources said that the scheme is successfully implemented by the

Aryavart Gramin Bank in the area of its operations and people are encouraged to install the facility in a big way. The bank has extended financial assistance to about 20,000 families for installation of SHLS.

(*The NGOs / consumer groups empanelled with the Consumer Advocacy Cell may take some initiatives in this regard and try to popularize use of solar lanterns and SHLS in rural areas)*

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Water-propelled cars may run on Indian roads.

It may not be long before the cars will be running on the Indian roads literally on water! Sounds amazing, but the senior researcher of the central government's ERDA (Energy Resources Development Agency), Vadodara, G S Grewal, believes that it could become a reality in a maximum of two decades or even earlier.

The ERDA has already developed techniques for using hydrogen gas, available in abundance from water, as fuel to run cars and other uses to meet the world's energy crisis likely to arise from the diminishing fossil fuels. Based on the indigenous technology, the system developed by the ERDA for the generation of hydrogen gas would cost just about Rs 3 per kilowatt per hour as against Rs 9.3 required for the creation of same amount of energy from diesel. Dr Grewal was speaking at a seminar on 'Impact and Benefits of the Petroleum Products and Natural Gas Regulatory Board Act, 2006, on the Society,' organized by the Institute of Electrical and Electronic Engineers Power and Energy Society of India with the support of the Oil and Natural Gas Corporation, Gas Authority of India Ltd, and the Gujarat State Petroleum Corporation.

Dr Grewal said the technology to use hydrogen as fuel for static installations had been fully developed and the ERDA was ready for commercial production, but the technology for using it in moving vehicles could still take some time in developing suitable containers to store gas.

Ministry seeks more sops for solar power.

In order to tap India's solar power potential, the MNRE (Ministry of New and Renewable Energy) has sought an increase in the 50-MW cap imposed by the government for availing the benefits of the solar power incentive scheme. The government had earlier said it would give incentives of about Rs 12 per unit of solar power sold. Companies have, however, already lined up capacities to the tune of 3000 MW involving investments of about Rs 48,000 crore. This means that of the total planned solar power capacity, only 50 MW will be incentivized, while the rest will continue to be very expensive. Setting up a solar power plant costs about Rs 16 crore per MW, which is almost four times the cost of building a coal-based power plant. This high cost is one of the reasons the sector has not attracted too many players.

5400 small hydro power sites identified.

The MNRE has reportedly identified small hydropower sites that need to be exploited at the earliest to generate more power using renewable, natural, and pollution-free sources. The government has so far identified more than 5400 small hydropower sites in the country with combined capacity of potentially generating 15, 000 MW of power.

ATMs, mobile companies turn to solar energy.

Refusing to let the power shortage play a spoilsport, technology now gets powered with solar energy. As the acute power shortage and escalating cost of captive power generation threatens to take the zing out of the technology-driven banking sector and mobile telephony, solar energy is now being used to run ATMs, bank branches, and mobile phone towers. As financial inclusion becomes the new mantra for growth in the banking sector, and banks try to reach out to rural masses, they are increasingly turning to solar energy for powering their ATMs and branches in rural areas, especially in areas where there is no power supply. Mobile service providers, too, are now testing on how to run their towers on solar power, as the cost of captive power generation goes prohibitive because of high cost of diesel.

State Bank of India, PNB (Punjab National Bank), Bank of Maharashtra, Indian Bank, and, Jammu and Kashmir Bank are not just running their ATMs on solar power, but are also running a number of bank branches on solar energy (along with the electricity supply). Idea and Airtel, too, are trying out the use of solar power for running their mobile towers. The twin towers of both companies are now trying to operate their twin towers near Joshimath on solar energy.

Civic body wants solar power for parking lots.

The MCD (Municipal Corporation of Delhi) is going all out to encourage the use of solar energy. To start with, it will make it mandatory for all upcoming multi-level parking projects to use solar power. The civic body will include a clause on the use of solar energy in its terms and conditions of the parking projects. Also, the MCD will install solar water heaters and lighting free of cost in its colonies. However, conventional lights will be used as back up in all parking projects. Currently, the MCD is building 16 multi-level parking projects on a build-operate-transfer basis. The civic agency has identified 33 parking sites where underground parking will be created. Depending on the success of the project, the MCD plans to make the use of solar energy mandatory for all upcoming residential and commercial projects in the city. In fact, solar panels have already been installed at the Mayor's house.

Renewable Resources and Non-Conventional Energy

1. What are Renewable Resources?

A natural resource qualifies as a renewable resource if it is replenished by natural processes at a rate comparable or faster than its rate of consumption by humans or other users. Solar radiation, tides, winds and hydroelectricity are *perpetual resources* that are in no danger of long-term availability. Renewable resources may also mean commodities such as wood, paper, and leather.

Agricultural produce which allow for minimal or controlled environmental damage qualify as renewable resouces.

Similarly, forest products such as lumber, plywood, paper and chemicals, can be renewable resources when produced by sustainable forestry techniques.

Some natural renewable resources such as geothermal power, fresh water, timber, and biomass must be carefully managed to avoid exceeding the environment's capacity to replenish them. Gasoline, coal, natural gas, diesel, and other commodities derived from fossil fuels are non-renewable.

2. What are the different types of Renewable Resources?

1. Solar energy is the energy derived directly from the Sun.
It is the most abundant source of energy on Earth. The fastest growing type of alternative energy, increasing at 50 percent a year, is the photovoltaic cell, which converts sunlight directly into energy. The Sun yearly delivers more than 10,000 times the energy that humans currently use.

2. Wind power is derived from uneven heating of the Earth's surface from the Sun and the warm core. Most modern wind power is generated in the form of electricity by converting the rotation of turbine blades into electrical current by means of an electrical generator. In windmills (a much older technology) wind energy is used to turn mechanical machinery to do physical work, like crushing grain or pumping water.

3. Hydropower, energy derived from the movement of water in rivers and oceans (or other energy differentials), can likewise be used to generate electricity using turbines, or can be used mechanically to do useful work. It is a very common resource.

4. Geothermal power directly harnesses the natural flow of heat from the ground. The available energy from natural decay of radioactive elements in the earths, crust, and mantle is approximately equal to that of incoming solar energy, especially during the day.

5. Alcohol derived from corn, sugar cane, switchgrass, etc. is also a renewable source of energy. Similarly, oils from plants and seeds can be used as a substitute for non-renewable diesel. Methane is also considered as a renewable source of energy.

3. Policy Support For Grid Interactive Renewable Power, GOI.

I) Section 86. (1)(e) of the **Electricity Act 2003** mandates the State Commission promote cogeneration and generation of electricity from renewable sources of energy by pr suitable measures for connectivity with the grid and sale of electricity to any person, and also specify, for purchase of electricity from such sources, a percentage of the total consumption of electricity in the area of a distribution licensee;

II) The **National Electricity Policy 2005** stipulates that progressively the share of electricity from non-conventional sources would need to be increased; such purchase by distribution companies shall be through competitive bidding process; considering the fact that it will take some time before non-conventional technologies compete, in terms of cost, with conventional sources, the commission may determine an appropriate deferential in prices to promote these technologies.

III) **The Tariff Policy 2006** announced in January 2006 has the following provisions:

- Pursuant to provisions of section 86 (1) (e) of the Act, the Appropriate Commission shall fix a minimum percentage for purchase of energy from such sources taking into account availability of such resources in the region and its impact on retail tariffs. Such percentages for purchase of energy should be made applicable for the tariffs to be determined by the SERCs latest by April 01, 2006.
- It will take some time before non-conventional technologies can compete with conventional sources in terms of cost of electricity. Therefore, procurement by distribution companies shall be done at preferential tariffs determined by the Appropriate Commission.
- Such procurement by Distribution Licensees for future requirements shall be done, as far as possible, through competitive bidding process under Section 63 of the Act within suppliers offering energy from same type of non-conventional sources. In the long-term, these technologies would need to compete with other sources in terms of full costs.

- The Central Commission should lay down guidelines within three months for pricing non-firm power, especially from non-conventional sources, to be followed in cases where such procurement is not through competitive bidding.

IV) **National Rural Electrification Policies, 2006**

- Goals include provision of access to electricity to all households by the year 2009, quality and reliable power supply at reasonable rates, and minimum lifeline consumption of 1 unit / household/day as a merit good by year 2012.
- For villages/habitations where grid connectivity would not be feasible or not cost effective, off-grid solutions based on stand-alone systems may be taken up for supply of electricity. Where these also are not feasible and if only alternative is to use isolated lighting technologies like solar photovoltaic, these may be adopted. However, such remote villages may not be designated as electrified.
- State government should, within 6 months, prepare and notify a rural electrification plan, which should map and detail the electrification delivery mechanism. The plan may be linked to and integrated with district development plans. The plan should also be intimated to the appropriate commission.
- Gramapanchayat shall issue the first certificate at the time of the village becoming eligible for declaration as electrified. Subsequently, the Gram Panchayat shall certify and confirm the electrified status of the village as on 31st March each year.

4. Policy Support of the Government of Assam: GoA's Policy for development of Small Hydropower (SHP) 2007

- ***Scope For Small Hydro Power Development In Assam***
  - Assam has a Hydro power potential of the order of 541 MW against which only about 2.00 MW has been harnessed so far from the Bordikharu Small Hydro Project (that remains inoperative since April'l99l due to Technical snag). The Government of Assam (GOA)

has decided to encourage generation of power through small hydropower (SHP) sources of energy and has framed a policy so that the development of this sector serves as an engine to achieve the objective of promoting the all.-round development of the region by including private participation.

- All Hydropower projects/stations with an installed capacity of up to 25 MW are eligible under this policy. The identified potential at present for development of Small Hydro Power (SHP) Projects is about 148.90 M at about 90 identified locations. The policy further allows the development of any other new SHP sites identified by Independent Power Producer (IPP)/ Agencies/ Users societies.

❖ ***Facilitation To Be Provided By The Government***

- For efficient interaction with other Government department, the State Government shall declare ASEB/Successor Company as the Nodal agency and subsequently ASEB/GENCO shall constitute a technical body & a nodal officer for clearing of project proposals after detail scrutiny of technical aspects.
- Application shall be disposed of within a period of 60 days from the date of application.
- The matter of concerns for the projects/ clearances etc., will be put up by the Nodal Officer before the steering committee and high powered committee regularly, who will be empowered by the GOA to resolve all project related matters.
- Nodal Agency shall also monitor the progress of the work, including investment vis-a-vis the state of work regularly.
- A Steering Committee comprising of Secretary (Power), Secretary (Forest) or his representative, Secretary (Irrigation) or his representative, Secretary (Revenue) or his representative, CMD-ASEB/ Successor company shall be constitute by GOA to provide single window clearance for the projects under this policy. Nodal Officer will be convener of the committee.
- High Powered Committee under the Chairmanship of chief Secretary and Secretary (Forest), Secretary (PWD), Secretary (Industry),

Secretary (Revenue), Secretary (Irrigation), Secretary (Water Resources), CMD (ASEB/Successor company) and Secretary {Power) as members shall be constituted by GOA for redressal of problems and policy matters for the projects under this policy. Secretary (Power) shall be convener of the committee.

❖ ***Royalty/Duty/Taxes***

- On all projects governed under this policy.

(a) For project up to 5 MW, there will be no royalty, provided entire energy generated is sold within the state of Assam.

(b) For above 5 MW, a royalty @Rs. 0.25 per unit of net energy generated will be paid to GOA by IPPs/users society. It may be reviewed after 5 years.

(c) For power project on irrigation canal fall/barrages/dams, a water cess @ Rs. 0.05 per kwh per year shall be payable by IPPs/ users society to the irrigation department or otherwise as specified by the GOA for maintenance of the existing irrigation structures/facilities owned and operated bybthe irrigation department.

- Electricity duty as per law will apply.
- No further levies, taxes, charges other than those stipulated in this policy would be levied by the state Government and its IPPs/users society or the Regulator on the IPPs/users society governed by this policy, for a period of 10 (ten) years from the date of this policy.

❖ ***Incentive By The Central/State Government***

- No entry tax will be levied by the state government on the power generation, transmission equipments, except on building materials for projects.
- The financial/ fiscal incentives for the small hydropower development available from the Ministry of Non-Conventional Energy Sources, Govt. of India shall be facilitated/extended to IPPs/Users society.

5. The pricing policy of energy derived from renewable resources in different States across the country are as follows:

Buy-back rate: Rs. /unit
Source: Ministry of New & Renewable Resources, GOI

S.No.	State / UT	Wind Power	Small Hydro Power	Biomass Power
1.	Andhra Pradesh	3.37 fixed for 5 yrs	2.69 (04-05)	2.63 (05-06) Esc @ 1% for 5 yrs
2.	Arunachal Pradesh	-	-	-
3.	Assam	-	-	-
4.	Bihar	-	-	-
	Chhatisgarh	-	-	2.71 (05-06)
5	Gujarat	3.37 fixed for 20 yrs	-	3.00 No escalation.
6.	Haryana	-	2.25 (94-95)	4.00 –biomass 3.74 - cogen. Esc. @ 2% (base 2007-08)
7.	Himachal Pradesh	-	2.50	-
8.	J & K	-	-	-
9	Jharkhand	-	-	-
10.	Karnataka	3.40 fixed for 10 yrs	2.90	2.74-cogen. 2.88 - biomass Esc @1% for 10 yrs (base04-05)
11.	Kerala	3.14 fixed for 20 yrs	-	2.80 (2000-01) Esc @ 5% for 5 yrs
12.	Madhya Pradesh	3.97 – 3.30	2.25	3.33-5.14 Esc. @ 0.03-0.08 for 20 yr
13.	Maharashtra	3.50 Esc @ 0.15 per yr	2.25 (99-00)	3.05- cogen. 3.04-3.43-biomass Esc @ 1% for 13 yrs
14.	Manipur	-	-	-
15.	Meghalaya	-	-	-
16.	Mizoram	-	-	-
17.	Nagaland	-	-	-

S.No.	State / UT	Wind Power	Small Hydro Power	Biomass Power
18.	Orissa	-	-	-
19.	Punjab	-	2.73 (98-99)	3.01 (01-02) Esc @ 3% for 5 yrs limited to 3.48
20.	Rajasthan	2.91 Esc@0.05 for 10 yrs	2.75 (98-99)	3.60-3.96 water-air cooled
21.	Sikkim	-	-	-
22.	Tamil Nadu	2.70 (fixed)	-	2.73 (2000-01)* Esc @ 5 % for 9 yrs
23.	Tripura	-	-	-
24.	Uttar Pradesh	-	2.25	2.86 –existing plants 2.98 –new plants Esc @ 0.04/ year

* Rs.2.48 per unit at 5 % escalation for 9 years (2000-01) for off-season power generation using coal/lignite (subject to ceiling of 90% of HT tariff).

* Policies for wheeling/ banking/ third part sale vary from state to state

**** The Assam Electricity Regulatory Commission is in the process of finalizing the regulations regarding tariff and other conditions for power procurement from renewable/non-conventional sources. However, Tariff Orders for Non Conventional Energy projects have been issued for:***

1. **2.25 MW Champamati Mini Hydel Power Project** constructed with the Champamati Irrigation Project as a Run on River Project at Chirang District and Promoted by M/s Bodoland Infrastructure Development Company Limited – a JV between the Infrastructure Leasing and Financial Services Limited (ILFS), New Delhi and Bodoland Territorial Council (BTC), Kokrajhar. The project cost is Rs 17.24 Cr and sale of power will be to LAEDCL at 11 KV. The Tariff Order of the Commission was issued on 12.07.2007 and AERC granted levelised Tariff @ Rs 3.19 / unit for 35 years.

2. **10 MW Amrit Biomass (Rice Husk) Based Power Projec**t at Morigaon district. It is being promoted by M/s Amrit Bio Energy & Industries Limited and project cost is Rs 47.38 Cr. The power generated from this project will be sold to CAEDCL at 33 KV in Baghjap 132/33 substation of AEGCL. The Tariff Order of the Commission was issued on 4.03.2008 and tariff granted is for five years @ Rs 3.01, Rs 3.02, Rs 3.04, Rs 3.06 and Rs 3.08 per unit.

6. Renewable energy at a glance in India

Source: Ministry of New & Renewable Resources, GOI

S. No	Source/System	Estimated Potential	Achievement as on 30th September 2008
I	Power from renewables		
A	Grid-interactive renewable power	(MW)	(MW)
1.	**Wind power**	**45 195**	**9521.80**
2.	**Bio power (agro residues and plantations)**	**16 881**	**656.60**
3.	**Bagasse cogeneration**	**5 000**	**993.83**
4.	**Small hydro power (up to 25 MW)**	**15 000**	**2220.99**
5.	**Energy recovery from waste (MW)**	**2 700**	**55.25**
6.	**Solar photovoltaic power**	—	**2.12**
	Sub total (A)	84 776	13 450.59
B	Captive/combined heat and power/distributed renewable power		(MW)
7.	**Biomass/cogeneration (non-bagasse)**	—	**136.70**
8.	**Biomass gasifier**	—	**102.21**
9.	**Energy recovery from waste**	—	**31.07**
	Sub total (B)	—	269.98
	Total (A+B)	—	13 720.57
II	Remote village electrification	—	5 379 villages/hamlets
III	Decentralized energy systems		
10.	**Family –type biogas plants**	**120 lakh**	**40.32 lakh**
11.	**Solar photovoltaic systems**	**50**	**120 MWp**
	i. Solar street lighting system	**MW/km2**	**70 474 nos**
	ii. Home lighting system	—	**434 692 nos**
	iii. Solar lantern	—	**697 419 nos**
	iv. Solar power plants	—	**8.01 MWp**
	v. Solar photovoltaic pumps	—	**7148 nos**
12.	**Solar thermal systems**	—	
	i. Solar water heating systems		**2.45 million m2**

MW – megawatt; kW – kilowatt; MWp – megawatt peak; m2 – square metre; km2 – kilometre square

Compiled by: Consultant,
Consumer Advocacy.

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On Solar Power in India

Solar power in India

India is both densely populated and has high solar insolation, providing an ideal combination for solar power in India. Much of the country does not have an electric grid, so one of the first applications of solar power has been for water pumping, to begin replacing India's four to five million diesel powered water pumps, each consuming about 3.5 kilowatts, and off-grid lighting. Some large projects have been proposed, and a 35,000 sq. km area of the Thar Desert has been set aside for solar power projects, sufficient to generate 700 to 2,100 gigawatts.

Installed capacity

The amount of solar energy produced in India is merely 0.5% compared to other energy resources. The Grid-interactive solar power as of June 2007 was merely 2.12 MW. There is growing optimism on the fact that solar power may well attain the much-needed grid parity within the next few years or so. In all, about 33 such power plants have been put up solely with government assistance. These plants have a cumulative capacity of 2.12 MW and are expected to produce about 2.55 million units of electricity per annum. Compare this with an off-grid use of PV (Photo Voltaic Cells – These cells converts sunlight directly into electricity), where about 14.5-lakh decentralized systems (that is, for lighting, water pumping, and battery charging) installed across the country have a potential of producing about 150 million units annually. The capacity of the largest PV power plant in the country is just 225 kWp, which is definitely lower in comparison to the installed capacities of wind and small hydro power plants. Large-scale PV manufacturing facilities are now being planned by many big names in the PV industry. These may subsequently provide the oft spoken benefit of economies of scale.

Government policy

The Ministry of New and Renewable Energy (MNRE) have initiated schemes and incentives — like subsidy, soft loan, confessional duty on raw material imports, excise duty exemption on certain devices/systems etc. — to boost the production and use of solar energy systems. The Indian Renewable Energy Development Agency (IREDA) provides revolving fund to financing and leasing companies offering

affordable credit for the purchase of PV systems. The state of West Bengal has intitiated to make the use of solar power mandatory in new multi-storeyed buildings.

Solar Funds and Investments

The private sector investment of about 97% has been the mainstay of power generation through the RE route so far. It has mainly been possible through the nearly favourable policies of both the central and state governments over the last decade or so. Of late, solar power investments in the country are registering a fast increase. In fact, India is becoming a chosen destination for many national and international bigwigs for setting up large-scale PV manufacturing facilities.

Foreign Direct Investment up to 100 percent is permitted in non-conventional energy sector through the automatic route. The Multilateral Development Banks like World Bank and Asian Development Bank are also helping India but, the funding from MDBs on solar energy enhancement is negligible compared to other clean energy support in India. Investment by private companies is a trend that has just started. (Examples include Signet Solar, U.S.-based Cypress Semiconductor, SunTechnics Energy, etc.)

PV manufacture in India

Current PV manufacturing in India includes:

- BP-Tata joint venture.
- Moser-Baer signed up for a thin film Si plant provided by Applied Materials.
- Solar Semiconductor Pvt in Hyderabad, AP.

Applications

❖ **Rural electrification**

Lack of electricity infrastructure is one of the main hurdles in the development of rural India. India's grid system is considerably under-developed, with major sections of its populace still surviving off-grid. As of 2004 there are about 80,000 unelectrified villages in the country. Of these villages, 18,000 could not be electrified through extension of the conventional grid. A target for electrifying 5,000 such villages was fixed for the Tenth National Five Year Plan (2002–2007). As on 2004, more than 2,700 villages and hamlets had been electrified mainly using SPV systems.

Developments on cheap solar technology is considered as a potential alternative that allows an electricity infrastructure comprising of a network of local-grid clusters with distributed electricity generation. That could allow bypassing, or at least relieving the need of installing expensive, and lossy, long-distance centralised power delivery systems and yet bring cheap electricity to the masses.

❖ **Agricultural support**

➢ **Water pumping**

Solar PV water pumping systems are used for irrigation and drinking water. The majority of the pumps are fitted with a 200–3,000 watt motor that are powered with 1,800 Wp PV array which can deliver about 140,000 liters of water/day from a total head of 10 meters. By 30 September, 2006, a total of 7,068 solar PV water pumping systems have been installed.

➢ **Harvest processing**

Solar driers are used to dry harvests before storage.

➢ **Cooling**

The cost of energy expended on temperature control is high. With cooling load demands being roughly in phase with the sun's intensity, cooling from intense solar radiation could be an attractive energy-economic option in the subcontinent.

Challenges and Constraints

❖ **Land scarcity**

Per capita land availabiity is a scarce resource in India. Dedication of land area for exclusive installation of solar cells might have to compete with other necessities that require land. The amount of land required for utility-scale solar power plants — currently approximately 1 km² for every 20–60 megawatts (MW) generated — could pose a strain on India's available land resource. The architecture more suitable for most of India would be a highly distributed, individual rooftop power generation systems, all connected via a local grid. However, erecting such an infrastructure which doesn't enjoy the economies of scale even in mass utility-scale solar panel

deployment. The market price of solar technology deployment requires to substantially decline so that it attracts the individual and average family size household consumer. That might be possible in the future, since PV technology is projected to continue its current cost reductions for the next decades and be able to compete with fossil fuel.

❖ **Still unaffordable**

Solar power is currently prohibitive due to high initial costs of deployment. To spawn a thriving solar market, the technology needs to be competitively cheaper — i.e. attaining cost parity with fossil or nuclear energy. India is heavily dependent on coal and foreign oil — a phenomenon likely to continue until non-fossil / renewable energy technology become economically viable in the country. The cost of production ranges from Rs 15 to Rs 30 per unit compared to around Rs 2 to Rs 6 per unit for conventional thermal energy.

❖ **Slow progress**

While the world has progressed substantially in production of basic silicon mono-crystalline photovoltaic cells, India has fallen short to achieve the worldwide momentum. India is now in 7th place worldwide in Solar Photovoltaic (PV) Cell production and 9th place in Solar Thermal Systems with nations like Japan, Europe, China, and the US currently ranked far ahead. Globally, solar is the fastest growing source of energy (though from a very small base) with an annual average growth of 35%, as seen during the past few years

Compiled by: Consultant,
Consumer Advocacy

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Solar Water Heating System.

A solar water heating system is a device that uses solar energy to heat water for domestic, commercial, and industrial needs. Heating of water is the most common application of solar energy in the world. A typical solar water heating system can save up to 1500 units of electricity every year, for every 100 litres per day of solar water heating capacity.

History

Flat-plate collectors for solar water heating were popular in Florida and Southern California in the 1920s. Levi Yissar built the first prototype Israeli solar water heater and in 1953 he started NerYah Company, Israel's first commercial manufacturer of solar water heaters. Due to the abundance of sunlight in Israel, solar water heaters were used by some 20% of the population by 1967. Following the energy crisis in the 1970s, the Israeli Knesset passed a law requiring the installation of solar water heaters in all new homes (except high towers with insufficient roof area). As a result, Israel is now the world leader in the use of solar energy *per capita* (3% of the primary national energy consumption).

During this time, there was some resurgence of interest in solar heating in North America. Technical innovation has improved performance, life expectancy and ease of use of these systems. Installation of solar hot water heating has become the norm in countries with an abundance of solar radiation, like Cyprus, Israel and Greece, as well as in Japan and Austria, where there is less.

Solar hot water systems have become popular in China, where basic models start at around 1,500 yuan (US$190), much cheaper than in Western countries (around 80% cheaper for a given size of collector). It is said that at least 30 million Chinese households now have one, and that the popularity is due to the efficient evacuated tubes which allow the heaters to function even under gray skies and at temperatures well below freezing.

In 2005, Spain became the first country in the world to require the installation of photovoltaic electricity generation in new buildings, and the second (after Israel) to require the installation of solar hot water systems.

Technique

A solar water heating system consists of a flatplate solar collector, a storage tank kept at a height behind the collector, and connecting pipes. The system is generally installed on the roof or open ground, with the collector facing the sun and connected to a continuous water supply. The collector usually comprises copper tubes welded to copper sheets (both coated with a highly absorbing black coating) with a toughened glass sheet on top and insulating material at the back. The entire assembly is placed in a flat box. In certain models, evacuated glass tubes are used instead of copper; a separate cover sheet and insulating box are not required in this case. Water flows through the tubes, absorbs solar heat, and us stored in a tank. The hot water stored can be used for various applications at homes such as bathing, cleaning, and washing. It can also be used for a variety of industrial applications. The water stored in the tank remains hot overnight as the storage tank is insulated and heat losses are small.

Domestic solar water heating system.

Most domestic solar water heaters are provided with electrical back-up. Electrical heating elements are usually placed in the storage tank and can be switched on during cloudy days. In some cases, the solar-heated water is led into an existing electrical geyser; the geyser needs to be switched on only in cloudy conditions.

Cost

The smallest solar water heater available has a capacity of 100 litres per day, which is sufficient for a family of four to five members. It costs Rs 15, 000 to Rs 18, 000, and can save about 1500 units of electricity per year.

Availability and repair/servicing

Solar water heating systems can be obtained and installed through manufacturers, their dealers, and MNRE approved Solar Shops. Repair and servicing facilities are also available with them. The state nodal agencies also provide information on their availability. Assam Energy development Agency (AEDA) located at Bigyan Bhawan, G.S. Road, Guwahati can be contacted for the financing schemes and soft loans.

Major Benefits

1. Return of Investment in 3 years.
2. Uninterrupted Supply of hot water
3. No requirement of electricity/gas
4. Safe and simple to use

5. Long term span (about 20 years)
6. Near zero maintenance
7. Saves about 1500 units of electricity in a year.
8. Ideal for domestic, commercial and industrial applications.
9. Available in with easy finance options at very low effective interests rates.

Rebates in AERC Tariff Orders :

The Commission in tariff order 2005-06 noted *"In Assam, during winter months very high consumption of electricity is observed during the morning hours resulting in peaking of demand in morning in addition to normal peak hours. One of the reason for this peaking of demand in the morning during winter months is use of water heating appliances like geysers, immersion rods etc. These heating appliances consume high amounts of electricity…… In order to encourage consumers to switch over to solar water heating system, the Commission proposes to introduce a monthly rebate of Rs.30 for all consumers who have installed such solar water heating systems for meeting their hot water requirements and these are actually used."*

The Commission did not have detailed information as to the number of consumers actually using solar water heating appliances and getting benefit from this arrangement. Even then, the Commission decided to continue with the arrangement of granting rebate for use of solar water heating system at Rs 40/- per month in Tariff Order 2007-08.

Compiled by: Consultant,
Consumer Advocacy

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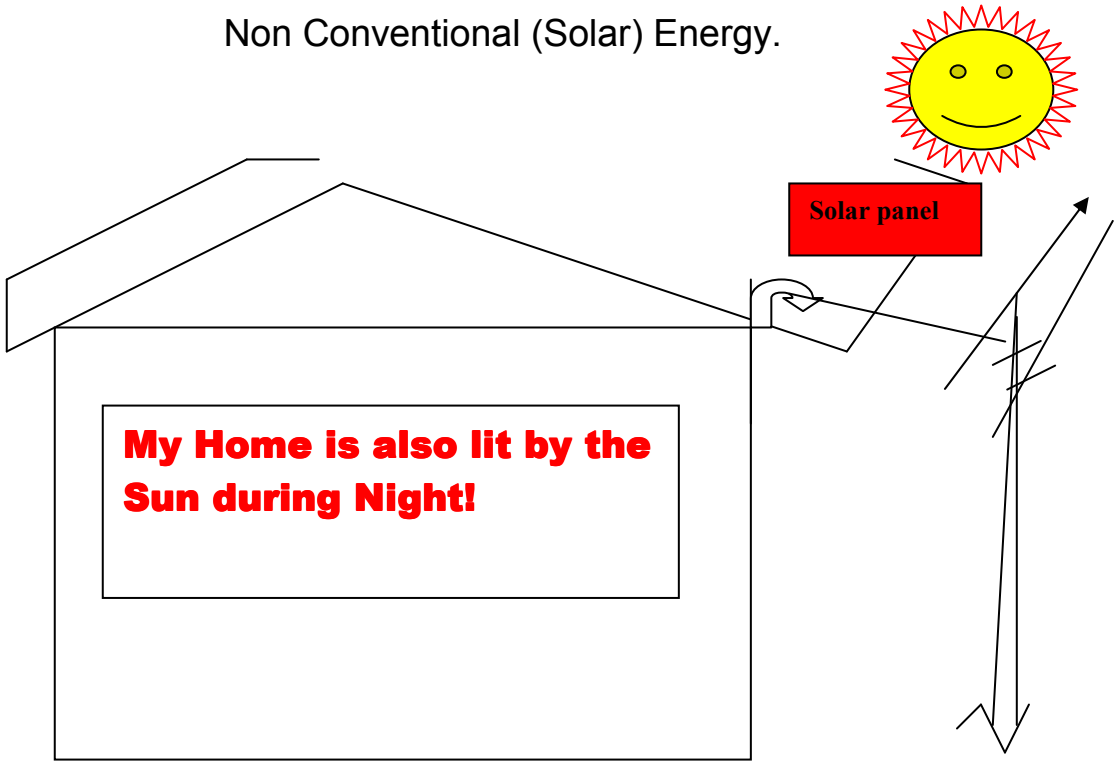
Battery (Inverter) Charging System Using Solar Energy

An Integrated Approach to Supplement Conventional Energy by Non Conventional (Solar) Energy.



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&

P. Sharma, Consultant, AERC

(This paper has been presented and discussed in the AERC Advisory Committee and Co-ordination Committee Meetings)

A most common household name for standby energy is "inverter". The inverter is an apparatus which is most commonly used for small power requirements, although now higher capacity inverters are available in the market to cater to the need of higher load (to run ACs, refrigerators, etc). When the entire country is experiencing approx. 15% peak energy shortage, use of inverter is likely to be further increased during the coming days.

Theoretical Background:

The inverter system normally used, have two different circuits – one for the battery charger and another for the inverter.

The battery charger unit converts the 230/415 volts AC supply to 12 volts DC and charge the battery to its maximum capacity (VA) during the time when the supplier AC supply is available.

The inverter unit remains in standby and convert the 12 V DC battery volts to 230 V AC sources which in turn takes over the portion of load designated for the inverter.

Depending on the time and load connected the battery storage (VA) goes down which is again recharged by the charging unit after restoration of main supply.

Due to higher capital cost involved with the inverter and battery most of the consumer selects the capacity of the inverter in the order of 100VA to 300 VA to cover the emergency appliances. The storage battery usually used for inverter is of 100 AH capacity for normal household appliances.

Present Position of Use

Out of the categories of consumers who use grid power mostly during peak hours, approx 50% consumers belong to the domestic A category. 80% consumers under Domestic B category are presently having home inverter system. Further at least 50% consumers under LT Commercial Category have used this appliance for standby power.

Other categories of LT consumers also equipped with inverter system that mostly use maximum demand during off peak hours and not considered in the study.

Most of the HT consumers use standby diesel generator for standby power.

As such the energy required for the inverter is wholly received from the main supply by most of the LT consumers that contribute maximum to the system loss of supplier.

The Solar Photovoltaic (PV) technology converts sunlight directly into electricity. This Lighting System presently available in the market in the MNRE approved shops consist of a solar photovoltaic panel of different capacity ($37W_e$), one storage lead acid storage battery of 12 V(40VA) capacity and a set of lamp 12 V (CFL) of approx 10W.

The operating principle is that during the day hours say for 7 hours of the day the solar photovoltaic panel will charge the storage battery.

During night hours the charged battery supplies power to the CFL lantern to illuminate the premises for hours depending on the VA storage available in the battery. Approx 4 hour lighting is possible with a full charged battery.

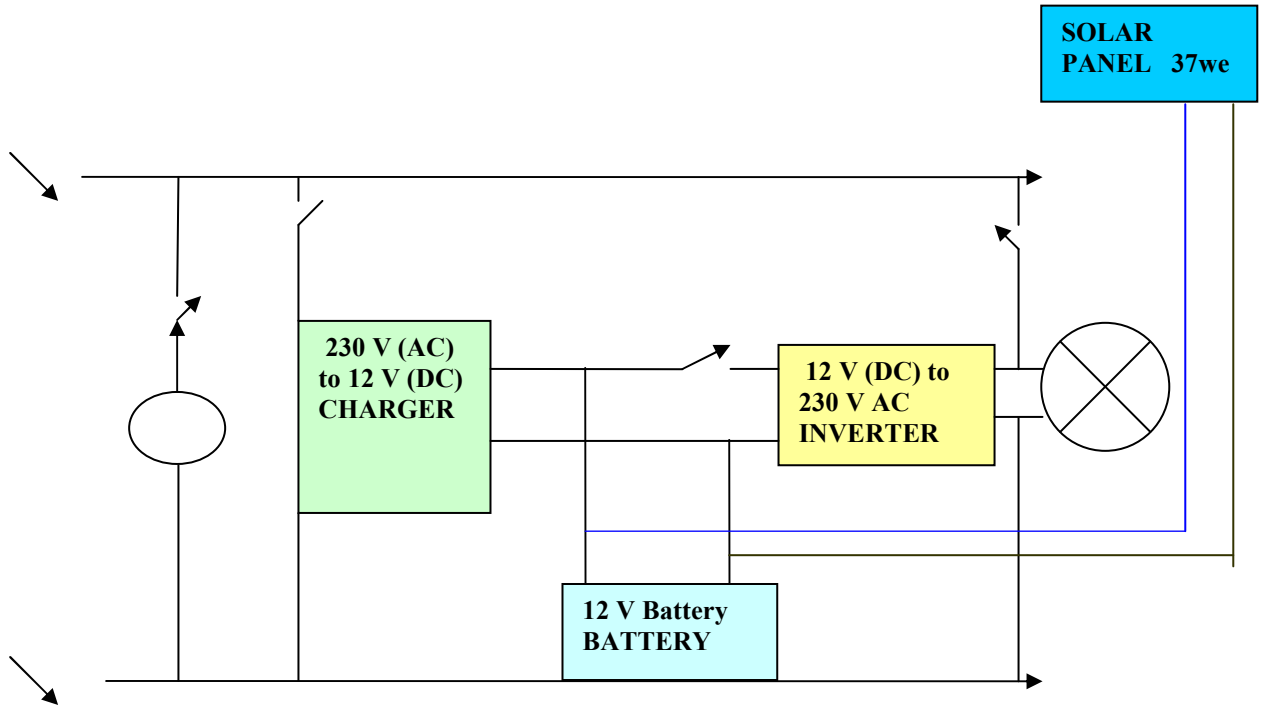
Present Utilizations:

These solar photovoltaic units are supplied to the users who have no grid supply connection at some subsidized rate under different GOI/GOA schemes.

Proposed Integration:

An arrangement is proposed where the available inverter system will be integrated with the solar photovoltaic panel to charge the inverter system battery instead of being charged from supplier mains during the day hours. The charger unit of the inverter system will be normally inoperative (off). The charged battery from the solar panel will supply the power to the designated load during night (peak) hours depending on the needs.

SCHEMATIC DIAGRAM OF INVERTER WITH SOLAR PANEL INTEGRATION



Estimation of Capacity of the Solar Photovoltaic Panel:

1. Considering an average requirements of 200 w load for a period of one hour.
2. Assuming that required sunlight will be available for 7 hours of a day.
3. Capacity of Solar Panel will be 200 /7 e = 35.71 w, considering e as the conversion factor at 0.8.
4. As such standard 37 w panel will be optimum for the scheme.
5. However, higher capacity solar panel can be used to get more energy.

Assumptive Calculations:

(For Domestic A, Domestic B & LT Commercial Consumers)

(a) Total Number of Domestic A Consumer: 1083362

(b) Total Number of Domestic B Consumer : 14895

(c) Total Number of LT Commercial Consumer: 142583

Load to inverter	watts	200
Daily requirements time	hr	1
Annual energy	kwh	0.2x1x365 = 73
Cost of saving from discoms @ Rs 3.50/ kwh	Rs	73x3.50=256
Total Number of Domestic A consumer using inverter (50% of total number in category)	No	1083362 x 0.5 = 541681
Total Number of Domestic B consumer using inverter (80 % of total number in category)	No	14895 x 0.8 = 11916
Total Number of LT Commercial consumer using inverter (50 % of total number in category)	No	142583 x 0.5 = 71292
Total Number of consumers utilizing the inverter system	No	541681+11916+71292 = 624889
Annual saving of grid energy at the consumer end considering annual utilization of 73 units	kwh	624889x73= 45616897
Annual Savings at the supply Peak (Grid) source considering at least 30% T&D loss	kwh	45616897x1.3= 59301966 59.30 MU
Considering Average peak power rate @ Rs 6 per unit, the annual savings of the utility	Rs Cr	59.30/10 x 6 = 35.58 Cr Say 36 Cr

Cost of Solar Energy:

1. Cost of 37 W_e solar panel (market rate without any subsidy) Rs 9000.00
2. Estimated life span of the panel (with guarantee) 10 years
3. Annual capital cost without residual value Rs 900.00
   (Considering no interest cost)
4. Annual generation per panel 73 Kwh
5. Cost of energy Rs 12.33 /Kwh

6.	Saving of consumer at present tariff (for Domestic A)	Rs 3.50 /Kwh
7.	Marginal Cost for subsidy (12.33-3.5)	Rs 8.83 /Kwh
8.	Saving of consumer at present tariff (for Domestic B)	Rs 4.15 /Kwh
9.	Marginal cost for subsidy (12.33-4.15)	Rs 8.18 /kwh
10.	Saving of consumer at present tariff (for LT commercial)	Rs 4.55 /Kwh
11.	Marginal Cost for subsidy (12.33-4.55)	Rs 7.78 /kwh
12.	Subsidy/ Assistance per Domestic A Consumer (8.83x73)	Rs 645 per year
13.	Subsidy/ Assistance per Domestic B Consumer (8.18x73)	Rs 597 per year
14.	Subsidy/Assistance per LT Commercial Consumer(7.78x73)	Rs568 per year
15.	Total Subsidy/assistance to Domestic A	Rs 34.93 Cr
16.	Total Subsidy/assistance to Domestic B	Rs 0.71 Cr
17.	Total Subsidy/assistance to LT commercial	Rs 4.05 Cr
18.	Total Subsidy/ assistance/year	Rs 39.69 Cr
19.	Estimated Saving of Discoms	Rs 35.58 Cr
20.	Uncovered Subsidy/assistance (39.69-35.58)	Rs 4.11 Cr
21.	Uncovered Subsidy/assistance per consumer	Rs 65.77

Summary:

The total estimated cost of the project will be Rs 562.40 Cr for an integrated capacity of (37 x 624889) 23.12 MW to provide the solar generator to estimated 6.25 lakh consumers. The scheme can be implemented by different modes as discussed below:

A. The Discoms may provide monthly incentive rebate to the three categories of consumers who prefer to install the panel as (645/12) Rs53.75 for Domestic A consumer, (597/12) Rs 49.75 for Domestic B consumers and (568/12) Rs47.33 for LT commercial consumer who may prefer to install the panel at the market rate. This is in line with the existing provision of rebate @ Rs 40/ installation for Solar Water Heater in the Tariff of Discoms. The uncovered subsidy of Rs 65.77 per consumer per year may be provided by GOA to the Discoms or may be adjusted with the rebate.

B. The IREDA has proposed a scheme for grid interactive PV scheme of minimum one MW capacity. This scheme may be considered as grid interactive and direct subsidy as calculated may be claimed against the eligible consumers. The consumers may be provided with 0% interest capital for the cost of panel.

Possibilities Way Ahead:

1. Higher capacity inverter to run higher order load such as AC, heater etc are now available in market. Such equipments if integrated with higher capacity solar panel, substantial grid energy can be saved.

2. The inverted AC power can be fed back to the grid with availability of a synchronizing system. In California City of the United States of America, consumers can feed its surplus solar power to the supplier grid and billing is done through a system of "Net Metering". This arrangement eliminates the requirements of storage battery, as the disposal of battery is considered as a big polluter. However, direct feeding to the grid may not help the Indian situation of peak deficit.

3. The project may also become eligible for CDM related benefits.

Synopsis of Tariff Petitions for FY 2008-09 and FY 2009-10

1. Assam Power Generation Company Ltd for FY 2008-09 & 2009-10

The Assam Power Generation Company Limited (APGCL), a state generating company has filed petition before the Assam Electricity Regulatory Commission for approval of Annual Revenue Requirements for the Financial Years 2008-09 and 2009-10 and Tariff for FY 2008-09 for energy proposed to be generated and supplied to the ASEB as per provision of The Electricity Act, 2003 and regulations made under the Act..

A. Annual Revenue Requirements (ARR) of APGCL

(Rs. Crore)

Particulars	Approved FY 2007-08	FY 2008-09	FY 2009-10
Gross Generation (MU)	1379.97	1603.77	1752.00
Aux. Power Consumption (MU)	50.45	62.18	65.00
Net Generation (MU)	1329.52	1541.81	1687.00
Fixed Charges			
Operation & Maintenance			
Employee Cost	48.40	61.25	66.19
Repairs & Maintenance	7.30	17.00	20.37
Administrative & General Expenses	2.02	3.84	4.20
Interest & Finance Charge	37.86	49.10	43.92
Taxes on income	0.00	8.00	8.50
Depreciation	21.71	51.14	75.06
Provision for Bad & Doubtful Debts	0.00	0.00	0.00
Return on Equity	16.89	46.65	46.65
Less: Other Income	5.20	-5.22	-5.44
(A) Total Fixed Charges	135.00	231.77	259.44
(B) Fuel Cost	106.38	153.43	174.05
ARR (A) + (B)	241.38	385.20	433.49
Fixed Cost Paise / Kwh (sent out)	**101.54**	**150.32**	**153.79**
Fuel Cost Paise / Kwh (sent out)	**80.01**	**99.51**	**103.17**
Tariff Paise / Kwh (sent out)	**181.55**	**249.84**	**256.96**

B. Salient Features of Tariff Petitions for FY 2008-09 & 2009-10

		2008-09	2009-10
(a)	Anticipated Gross Generation MU	1603.77	1752.00
(b)	Anticipated net generation MU	1541.81	1687.00
(c)	Annual Fixed Cost Rs. Cr	231.77	259.44
	Annual Variable Charge Rs. Cr	153.43	174.04
	Average Tariff Rs. / Kwh	2.50	2.57

2. The Assam Electricity Grid Corporation Ltd (AEGCL)

The Assam Electricity Grid Corporation Ltd (AEGCL), a state transmission utility (STU) has filed petition before the Assam Electricity Regulatory Commission for approval of Annual Revenue Requirements (ARR) and wheeling charges for the Financial Years 2008-09 and 2009-10 for the energy to be transmitted and wheeled to the Distribution companies of the State from different power stations under Assam Power Generation Corporation Limited, Central Sector Generating Stations & other sources as per provision of The Electricity Act, 2003 and regulations made under the Act.

The Commission after receipt of the petitions directed the petitioner to publish the ARR and the salient features of the Tariff Petitions filed by the petitioner before the Commission as below.

A. Annual Revenue Requirements (ARR) of AEGCL (Rs Crore)

Particulars	Approved FY 2007-08	Proposed FY 2008-09	Proposed FY 2009-10
Energy available at interface Point (MU)	3559.37	4501.00	5481.00
Sale of Power (Sale to Discom) (MU)	3328.01	4253.00	5180.00
Loss (MU)	231.36	248.00	301.00
Loss (%)	6.50%	5.82%	5.81%
Expenditure			
PGCIL Transmission & NERLDC Charges	98.13	113.90	113.90
Repairs & Maintenance	6.64	16.15	23.32
Employees Cost	49.84	48.79	103.83
Administration & Gen. Expenses	2.01	2.30	2.56
Depreciation	16.07	6.54	14.98
Advance Against depreciation	0.00	67.71	0.00
Int. & Fin Charges	4.44	38.26	38.65
Less: Interest & Other Expenses Capitalised	0.00	0.00	0.00
Other Debits & Extra Ordinary Payments	0.00	0.40	0.40
Provision for taxes	0.00	0.11	0.11
Special Charge on BST - Terminal Benefits	38.76	140.16	167.39
Net Prior Period Credits/Charges	0.00	0.00	0.00
Total Expenditure	**215.89**	**434.33**	**465.16**
Add: Return on Equity	13.99	13.99	13.99
Less Other Income	20.47	2.88	2.88
True Up		59.05	67.17
Total ARR	**209.41**	**504.50**	**543.44**

B. Annual Revenue Requirements (ARR) of SLDC

SLDC Particulars (Rs Cr)	Approved FY 2007-08	FY 2008-09	FY 2009-10
Repairs & Maintenance	0.1	0.99	0.99
Employees Cost	1.27	0.49	1.04
Administration & Gen. Expenses	0.02	0.04	0.04
Depreciation	0.16	0.75	0.15
Int. & Fin Charges	0	0.39	0.39
Total Expenditure	**1.55**	**2.65**	**2.61**
Taxes On Income	0.16	0	0
NERURLDC Charges	5.19	0	0
Less: Other Income	0.15	0	0
ARR	**6.75**	**2.65**	**2.61**

C. Salient Features of AEGCL for FY 2008-09 & 2009-10

		2008-09	2009-10
(a)	Total Annual Revenue requirements	Rs. 504.50 Cr	Rs. 543.44 Cr
(b)	Anticipated transmission of energy	4253 MU	5180 MU
(c)	Transmission loss	5.82 %	5.81 %
(d)	Average transmission charge	Rs. 1.19/kwh	Rs. 1.05/kwh
(e)	Transmission Charges for Long Term Open Access Consumer (Rs/kw/month)	Rs. 483.85/kw/month	Rs. 521.20/kw/month
(f)	Transmission Charges for Short Term Open Access Consumer (Rs/MW/day)	Rs. 15907.30/MW/day	Rs. 17135.19.30/MW/day

3. Assam State Electricity Board

The Assam State Electricity Board (ASEB), a trading licensee carrying out the function of Bulk Purchaser and Bulk Supplier of electricity in the State has filed petition before the Assam Electricity Regulatory Commission for approval of Annual Revenue Requirements and Bulk Supply Tariffs (BST) charged to the Distribution Companies for the Financial Years 2008-09 and 2009-10 as per provision of The Electricity Act, 2003 and regulations made under the Act.

The Commission after receipt of the petitions directed the petitioner to publish the ARR and the salient features of the Tariff Petitions filed by the petitioner before the Commission as below.

A. Annual Revenue Requirements (ARR) of ASEB as Trader

Rs. in Crore

ARR Element	Approved for FY 2007-08	FY 2008-09	FY 2009-10
Total Power Purchase Cost	840.88	1065.42	1511.90
Repair and Maintenance	-	0.0107	0.0107
Employee Cost	0.53	0.40	0.52
Admin & General	1.07	1.96	2.08
Interest on Term Loan	0.01	1.86	1.86
Interest on Working Capital	0.03	0.046	0.058
Past period Fuel & Power Purchase cost adjustment (Allowed by AERC)	72.07	79.83	79.83
Depreciation	0.01	0.03	0.03
Statutory Fee	-	-	-
ROE	-	-	-
Taxes on Income	-	-	-
Bad Debt 1% of Sales	-	11.50	15.35
Deficit of past year B/F	-	48.62	-
Total	**914.61**	**1209.67**	**1611.64**
Less: Miscellaneous receipt	0.47	14.16	13.96
Total ARR	914.14	1195.51	1597.64
Net Available (MU) at Grid	**4392.35**	**4708.74**	**5366.02**
Average Bulk Supply Rate (BST) Rs/Kwh	**2.08**	**2.54**	**2.98**

4. Lower Assam Electricity Distribution Company (LAEDCL), Upper Assam Distribution Company (UAEDCL) and Central Assam Electricity distribution Company (CAEDCL)

The Electricity Distribution Companies namely Lower Assam Electricity Distribution Company (LAEDCL), Upper Assam Distribution Company (UAEDCL) and Central Assam Electricity distribution Company (CAEDCL) submitted petitions for Annual Revenue Requirements (ARR) and Tariff for Financial Years 2008-09 and 2009-10 to meet the additional revenue requirements before the Assam Electricity Regulatory Commission (AERC) as per provision of The Electricity Act, 2003 and regulations made under the Act.

The Commission after receipt of the petitions directed to the petitioners to publish the ARR, the Tariff Proposal with existing Tariff and salient features of the Tariff Petitions filed by all distribution companies before the Commission as below.

A. Annual Revenue Requirements (ARR) of the Distribution Companies

ARR Elements	Approved FY 2007-08			FY 2008-09			FY 2009-10		
	LAEDCL	CAEDCL	UAEDCL	LAEDCL	CAEDCL	UAEDCL	LAEDCL	CAEDCL	UAEDCL
Power Purchase MU	1614.01	1060.01	1201.63	1789	1116	1182	1938	1217	1314
Power Sales MU	1265.38	778.58	860.97	1359	781	875	1511	876	999
% Loss	21.60%	26.55%	28.35%	24.00%	30.00%	26%	22.00%	28.00%	24%
Differential BST	2.55	2.12	2.32	3.08	2.12	3.42	3.41	3.02	3.86
Power Purchase Cost @ diff BST	411.38	224.42	278.33	668	287	492	830	462	638
Repair & Maintenance	6.44	7.18	4.61	13	8	9	16	10	11
Employee Cost	113.54	88.3	77.39	163	106	113	172	112	120
Administration &	4.76	3.47	3.67	5	6	4	6	6	5
Depreciation	5.75	10.2	6.88	12	11	8	20	19	12
Interest on Term Loan		1.59		43	23	20	46	25	23
Interest on working Capital	10.36	6.77	7.04	16	10	11	19	11	13
Other Finance Charges				0	0	0	0	0	0
Interst on security Deposit	3.36	1.55	2.63	6	3	2	6	3	3
Provision for Doubtful Debts	5.6	3.44	3.81	5	4	7	7	4	8
Total Expenditure	561.19	346.92	384.36	246	169	175	272	191	195
Less Income from trading	95.79	65.12	73.4	164	144	113	225	102	155
Net Expenditure	465.4	281.8	310.96	82	67	62	47	49	41
RoE	4.11	3.36	2.73	8	7	8	8	7	8
Provision for Taxes	0	0	0	0	0	0	0	0	0
Truing up cost for 2006-07				19	33	31	0	0	0
Truing up cost for 2007-08				19	68	10	0	0	0
Transmission Charge	87.2	57.27	64.92	-	-	-	-	-	-
SLDC Charge	2.81	1.85	2.09	-	-	-	-	-	-
Total ARR excluding Power Purchase	148.14	119.86	102.37	129	176	111	56	56	49
Total ARR Differential BST	**559.52**	**344.28**	**380.7**	**797**	**462**	**602**	**885**	**518**	**687**

B. Tariff Proposals with existing Tariffs

	Form D: 20				
Tariff Category	Type of installation	Current Tariff		Proposed Tariff	
		Fixed Charges	Energy Charges	Fixed Charges	Energy Charges
LT I *	Jeevan Dhara / LT Domestic A	Rs 15 per connection/mth	Rs 2.15 /kWh	Rs 15 per connection/mth	Rs 2.15 /kWh
LT II	Domestic A				
	0-120 kWh	Rs 30 per kW/mth	Rs 2.80 /kWh	Rs 40 per kW/mth	Rs 3.60 /kWh
	120-240 kWh	Rs 30 per kW/mth	Rs 3.85 /kWh	Rs 40 per kW/mth	Rs 4.85 /kWh
	Balance Units	Rs 30 per kW/mth	Rs 4.55 /kWh	Rs 40 per kW/mth	Rs 5.85 /kWh
LT III	Domestic B	Rs 30 per kW/mth	Rs 4.15 /kWh	Rs 40 per kW/mth	Rs 5.25 /kWh
LT IV	Commercial	Rs 110 per kW/mth	Rs 4.55 /kWh	Rs 145 per kW/mth	Rs 5.85 /kWh
LT V	General Purpose Supply	Rs 125 per kW/mth	Rs 4.00 /kWh	Rs 165 per kW/mth	Rs 5.20 /kWh
LT VI	Public Lighting	Rs 120 per kW/mth	Rs 4.25 /kWh	Rs 150 per kW/mth	Rs 5.30 /kWh
LT VII	Agriculture	Rs 30 per kW/mth	Rs 2.30 /kWh	Rs 40 per kW/mth	Rs 2.60 /kWh
LT VIII(i)	Rural Industries	Rs 30 per kW/mth	Rs 2.35 /kWh	Rs 40 per kW/mth	Rs 3.00 /kWh
LT VIII(ii)	Urban Industries	Rs 40 per kW/mth	Rs 2.60 /kWh	Rs 55 per kW/mth	Rs 3.35 /kWh
LT IX	Temporary Supply				
	Domestic	Rs 80 per kW/mth	Rs 6.00 /kWh	Rs 120 per Kw per day or Rs, 6 per unit , which ever is higher	
	Irrigation			Rs 40 per Kw per day or Rs, 2.60 per unit , which ever is higher	
	Other -Non Domestic & Non Irrigation	Rs 125 per kW/mth	Rs 7.00 /kWh	Rs 190 per Kw per day or Rs,7.5 per unit , which ever is higher	
HT I	HT Domestic	Rs 30 per kVA/mth	Rs 3.95 /kWh	Rs 45 per kW/mth	Rs 5.10 /kWh
HT II	HT Commercial	Rs 115 per kVA/mth	Rs 4.25 /kWh	Rs 150 per kW/mth	Rs 5.60 /kWh
HT III	Public Water Works	Rs 125 per kVA/mth	Rs 4.10 /kWh	Rs 165 per kW/mth	Rs 5.35 /kWh
HT IV(i)	Bulk Supply - Educational	Rs 110 per kVA/mth	Rs 3.80 /kWh	Rs 140 per kW/mth	Rs 4.80 /kWh
HT IV(ii)	Bulk Supply - Others	Rs 145 per kVA/mth	Rs 4.10 /kWh	Rs 200 per kW/mth	Rs 5.45 /kWh
HT V	HT Small Industries	Rs 40 per kVA/mth	Rs 2.80 /kWh	Rs 55 per kW/mth	Rs 3.60 /kWh
HT V(B)	HT-I Industries	Rs 100 per kVA/mth	Rs 3.55 /kWh	Rs 135 per kW/mth	Rs 4.60 /kWh
HT V (C)	HT-II Industries	Rs 140 per kVA/mth	Rs 3.65 /kWh	Rs 190 per kW/mth	Rs 4.85 /kWh
HT VI	Tea, Coffee and Rubber	Rs 230 per kVA/mth	Rs 4.00 /kWh	Rs 325 per kW/mth	Rs 5.50 /kWh
HT VII	Oil and Coal	Rs 270 per kVA/mth	Rs 4.05 /kWh	Rs 385 per kW/mth	Rs 5.55 /kWh
HT VIII	HT Irrigation	Rs 40 per kVA/mth	Rs 3.25 /kWh	Rs 55 per kW/mth	Rs 4.10 /kWh

C. Salient Features of Tariff Petitions for FY 2008-09 & 2009-10

2008-09

	LAEDCL	CAEDCL	UAEDCL	Total
MU Purchase	1789	1116	1182	4087
MU Sales	1359	781	875	3015
% Loss	24%	30%	26%	26.22%
BST rate per unit (Differential)-Rs./per unit	3.08	2.12	3.42	2.87

Revenue at proposed Tariff (Rs. in Crores)	797	462	602	1861
Average Tariff (Rs / kwh)	**6.17**	**6.17**	**6.17**	**6.17**

2009-10

	LAEDCL	CAEDCL	UAEDCL	Total
MU Purchase	1938	1217	1314	**4469**
MU Sales	1511	876	999	**3386**
% Loss	**22%**	**28%**	**24%**	**24.23%**
BST rate per unit (Differential)-Rs./per unit	**3.41**	**3.02**	**3.86**	**3.43**
Revenue at proposed Tariff (Rs. in Crores)	885	518	687	**2090**
Average Tariff (Rs / kwh)	**6.17**	**6.17**	**6.17**	**6.17**

Further, the Commission directed that copies of tariff petitions and other relevant documents be made available to consumers and other interested parties at the offices of the Superintending Engineer / Chief Executive Officers of each distribution circle office of all Distribution Companies and at other offices as may be arranged. A consolidated handout on tariff petitions may also be collected from the respective offices by the consumers and other interested parties, who are not willing to purchase the documents above.

The Commission further directed that any person intending to file objection or comments in regard to proposed Annual Revenue Requirements (ARR) of the Companies may do so by filing statement of objections or comments before the Secretary, Assam Electricity Regulatory Commission with copies of relevant documents and evidences in support thereof along with the affidavit as in Form-2 of Assam Electricity Regulatory Commission (Conduct of Business) Regulations, 2004. Such objections or comments shall be submitted in 5 (five) copies by registered post or in person which should reach the Secretary, Assam Electricity Regulatory Commission, ASEB Complex, Sixth Mile, Dwarandhar, Guwahati-22.

The Commission may hear the persons filing objections or comments at the venue and date as may be determined by the Commission. The date and place shall be notified later. Person filing objections or comments on the ARR may also indicate whether they would like to be heard by the Commission in person.

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