

THE ELECTRICITY CONSUMER GRID

An information bulletin of Consumer Advocacy Cell, AERC

Volume XI, FY 2011-12.

- *FPPPA*
- *Renewables – RPO, REC*
- *Consumer Awareness*
- *Green Buildings*
- *Global Warming.....*



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PREFACE

It has been quite some time now since the Consumer Advocacy Cell has come up with this eleventh edition of the ‘Consumer Grid’. The ten volumes of the *Consumer Grid* published earlier included articles on almost all aspects of the power sector that a consumer may be willing to know. However, there were many new developments in the power sector of the State over the last few months and it has become necessary to share these with our esteemed readers. And, thus, another volume of the Consumer Grid is being published.

We all know that today, climate change is a major challenge that calls for immediate global attention. All countries are now striving to come out with viable solutions to tackle this issue and this has generated a renewed interest in renewable energy sources globally. The relevance of renewable energy is more in the Indian context from the view point of providing an alternative solution to mitigate the gap between demand and supply of energy, besides helping to tackle the climate change issue. The strategies and policies of the Ministry for New and Renewable Energy (MNRE) for promotion of renewable energy are expected to result in cost reduction, open market developing business models, improve regulatory and policy initiatives, increase private sector participation, enhance monitoring and bring in new technologies through in house R&D and import. More funds are required to offset the higher initial cost and proper propagation of renewable energy in the country. In fact, renewable energy needs to be seen not as an alternative but a part of the energy solution in the country. Equal participation of all stakeholders, including users, is necessary and the task should not be left to the Government alone. This issue of the *Consumer Grid* is an effort to provide you information on latest developments in the renewable energy sector in India and Assam. Hope our readers find the articles informative and useful.

With best wishes,

P. Sharma
Consultant (Consumer Advocacy)

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"If you want happiness for an hour -- take a nap. If you want happiness for a day -- go fishing. If you want happiness for a month -- get married. If you want happiness for a year -- inherit a fortune. If you want happiness for a lifetime -- help someone else."

"Being the richest man in the cemetery doesn't matter to me. ... Going to bed at night saying we've done something wonderful ... that's what matters to me." - Steve Jobs- The Wall Street Journal, 1993

FROM THE CHAIRPERSON'S DESK

Economic growth, increasing prosperity and urbanization, rise in per capita consumption, and spread of energy access are the factors which are likely to substantially increase the total demand for electricity. In the last six decades, in spite of substantial increase in installed electricity capacity in India, demand has outstripped supply. Thus, there is an emerging energy supply-demand imbalance which makes it imperative to harness the renewable energy (RE) resources wherever and whenever possible and it is apparent that RE will increasingly become a key part of the solution to the nation's energy needs. Several new initiatives have been taken to make renewable energy affordable to the common masses and to meet their electricity and energy needs all over the country. One of these initiatives namely the Jawaharlal Nehru National Solar Mission was launched and operationalised, which aims at installation of 20000 MW solar power, 2000 MW off-grid solar applications, and 20 million sq m solar thermal collectors by 2022. 60 Solar cities and 50 new townships/campuses are being developed as green townships under Solar Cities Programme. Green buildings with Green Rating for Integrated Habitat Assessment (GRIHA) rating system are being promoted and so far over hundred projects have been registered for acquiring GRIHA rating. The mechanism of renewable purchase obligations and renewable energy certificates (RECs) has been operationalised by most State Electricity Regulatory Commissions which are likely to boost the renewable power installations.

The Assam Power Generating Corporation Limited commissioned the 1x 37.2 MW Lakwa Waste Heat Recovery Power Plant on 13th January, 2012. While any capacity addition is commendable, the utility should try to complete its ongoing and new projects within the target time to avoid cost overruns. APGCL should also make effort to explore setting up of RE projects in the state at least to meet its renewable purchase obligations. It is hoped that the Regulations and Orders of the Commission would work towards creating an environment which would attract private investments, promote competition, encourage efficiency and consumer choice, advance alternative energy solutions and facilitate sustainable development of the power sector in the state.

Sd/-

(J. Barakati)

ACTUAL POWER SUPPLY POSITION DURING 2011-12**All India**

During the year 2011-12, though the total ex-bus energy availability increased by 8.8% over the previous year and the peak met increased by 5.4%, the shortage conditions prevailed in the Country both in terms of energy and peaking availability as given below:

	Energy (MU)	Peak (MW)
Requirement	937,199	130,006
Availability	857,886	116,191
Shortage	79,313	13,815
(%)	8.5%	10.6%

The energy requirement registered a growth of 8.8% during the year against the projected growth of 8.3% and Peak demand registered a growth of 6.3% against the projected growth of 11.4%.

Region wise Power Supply Position

All the Regions in the Country namely Northern, Western, Southern, Eastern and North-Eastern Regions continued to experience energy as well as peak power shortage of varying magnitude on an overall basis, although there were short-term surpluses depending on the season or time of day. The surplus power was sold to deficit states or consumers either through bilateral contracts, Power Exchanges or traders. The energy shortage varied from 4.7% in the Eastern Region to 11.4% in the Western Region. Region-wise picture in regard to actual power supply position in the country during the year 2011-12 in energy and peak terms is given below:

Region	Energy				Peak			
	Requirement	Availability	Surplus / Deficit (-)		Demand	Met	Surplus / Deficit (-)	
	(MU)	(MU)	(MU)	(%)	(MW)	(MW)	(MW)	(%)
Northern	2,76,121	2,58,382	-17,739	-6.4	40,248	37,117	-3,131	-7.8
Western	2,90,421	2,57,403	-33,018	-11.4	42,352	36,509	-5,843	-13.8
Southern	2,60,302	2,37,480	-22,822	8.8	37,599	32,188	-5,411	-14.4
Eastern	99,344	94,657	-4,687	-4.7	14,707	13,999	-7,08	-4.8
North-Eastern	11,011	9,964	-1,047	-9.5	1,920	1,782	-138	-7.2

Actual power supply position in terms of energy requirement vis-à-vis energy availability of various States during the year 2011-12

State	Requirement	Availability	Surplus/Deficit (-)	
	(MU)	(MU)	(MU)	(%)
Arunachal Pradesh	600	553	-47	-7.8
Assam	6034	5696	-338	-5.6
Manipur	544	499	-45	-8.3
Meghalaya	1927	1450	-477	-24.8
Mizoram	397	355	-42	-10.6
Nagaland	560	511	-49	-8.8
Tripura	949	900	-49	-5.2
North Eastern	11,011	9964	-1047	-9.5

It may be seen that in the North-Eastern Region, Assam, Manipur, Tripura and Nagaland faced energy shortages in the range of 5-9%. The energy shortages witnessed in Mizoram was 10.6%. The maximum energy shortage in North-Eastern Region was in Meghalaya at 24.8%. The shortages witnessed were partly on account of constraints in transmission, sub-transmission & distribution system and/ or financial constraints.

From the Load Generation Balance Report of CEA, the status of power availability in other states of India in the year 2011-12 is discussed below:

In the Northern Region, Chandigarh, Delhi and Himachal Pradesh faced negligible energy shortage. Rajasthan, Haryana, Punjab and Uttarakhand experienced energy shortages in the range of 3-4% whereas the shortage in Uttar Pradesh was 11.3%. The maximum energy shortage in Northern Region was in Jammu & Kashmir and was 23.6%.

In the Western Region, Dadra & Nagar Haveli and Gujarat were faced negligible energy shortage. Chhattisgarh and Goa were faced energy shortage in the range of 1-3%. Daman & Diu faced energy shortages of 10.6%. Maharashtra faced energy shortage of 16.7% whereas the maximum energy shortage in Western Region was in Madhya Pradesh and was 16.9%.

In the Southern Region, Kerala, Andhra Pradesh and Puducherry faced energy shortages in the range of 1-7% whereas the shortage in Tamil Nadu was 10.5%. The maximum energy shortage in Southern Region was in Karnataka and was 11.2%.

In Eastern Region, Sikkim, West Bengal and Orissa faced negligible energy shortage. DVC and Jharkhand faced energy shortages in the range of 3-4%. The maximum energy shortage of 21.3% was faced by Bihar. (Source: CEA LGB Report 2011-12)

Table showing actual power supply position in terms of peak demand vis-à-vis peak met of various States in North East Region during the year 2011-12

State	Peak Demand	Peak Met	Surplus/Deficit (-)	
	(MW)	(MW)	(MW)	(%)
Arunachal Pradesh	121	118	-3	-2.5
Assam	1112	1053	-59	-5.3
Manipur	116	115	-1	-0.9
Meghalaya	319	267	-52	-16.3
Mizoram	82	78	-4	-4.9
Nagaland	111	105	-6	-5.4
Tripura	215	214	-1	-0.5
North Eastern	1920	1782	-138	-7.2

News Briefs

Update on the ongoing hydro-electric projects (HEP) of North Eastern Electric Power Corporation Limited (NEEPCO)

The company has four projects at various stages of construction.

101 MW Tripura Gas Based Combined Cycle Project: NEEPCO signed a contract agreement with state owned equipment maker, BHEL last month for supply of equipments and services. The project is under execution at Monarchak in the district of West Tripura. It shall utilize 0.50 mmscumd of natural gas from the ONGC's field in Tripura. It comprises of one module consisting of one gas turbine and one steam turbine unit with all other associated auxiliaries. The water requirement shall be met from the river Gomti and project cost is estimated at ₹623.44 Crs.

60 MW Tuirial HEP: The concreting works are progressing slowly due to stoppage of work at the site owing to severe agitation of the local people. The project, located in the Aizwal district of Mizoram, envisages a 75 m-high zoned earth-fill dam on the Turial river, two diversion tunnels of 8-m diameter and length 770 m. The original sanctioned Project cost is ₹368.72 Crs.

600 MW Kameng HEP: The project involves construction of two dams, of heights 75 m and 25 m, on the Bichom and Tenga rivers, respectively, a head race tunnel (HRT) of 14.477 km length. It is estimated to afford an annual energy generation of 3,592 million units (MU), in a 90% dependable year. The estimated project cost is ₹2496.09 Crs.

110 MW Pare HEP: This project is part of the Dikrong-Panyor Development Scheme, in the state of Arunachal Pradesh. The Pare HEP involves the construction of a 78 m high concrete diversion dam, a 2.81 km long, modified horseshoe-shaped head-race-tunnel (HRT) of 7.5 m diameter and two 55 MW surface power house units. The estimated project cost is ₹573.99 Crs.

Dr. Farooq Abdullah calls upon Power Ministers of North Eastern States to maximize use of renewable energy

Minister of New and Renewable Energy, Dr Farooq Abdullah reviewed the implementation of renewable energy policies and programmes in the North Eastern States at a meeting in New Delhi on 2nd July 2011. The meeting was attended by the Chief Minister of Meghalaya and the Power Ministers of other North Eastern States, senior officials from the Ministry and the State governments.

It was informed during the meeting that out of 4,965 remote villages to be electrified/ illuminated through renewable energy systems in the region, 3,841 villages have already been provided solar lights. There are over 160 small/ micro hydel projects installed in the North Eastern States with 275 MW aggregate capacity. Apart from this, over 60,000 solar lanterns, home lighting systems and street lights have been set up. The region has over 1,18,000 biogas plants. The Ministry is now making a detailed assessment of wind resources in the North East. Arunachal Pradesh is implementing a special project to electrify/ illuminate all its villages along the international border through solar and micro hydel projects. Out of 1058 target villages under this project, 736 villages have already been covered. Dr Abdullah appreciated the difficulties faced by the North Eastern States and assured them all possible help from the Ministry. The States agreed to take action to strengthen the renewable energy programme. Power Ministers from the North Eastern States requested for 90 per cent funding from the Ministry of New and Renewable Energy for the renewable energy projects in the region. They also requested for help in preparation of State specific action plans for renewable energy. Dr Abdullah agreed to get the resource mapping for solar, wind and micro/ small hydro prepared for these States. The States in the region have also been advised to put in more efforts for popularisation of renewable energy for maximising the use of these technologies. The Ministers and concerned officers of North Eastern States will be given opportunities to visit showcase projects within and outside the country. Power Ministers from North Eastern States appreciated the leadership provided by Dr. Farooq Abdullah in promoting renewable energy in the country especially in the North Eastern States and new policies under Jawaharlal Nehru National Solar Mission.

Gujarat to host Asia's largest solar energy park

Gujarat would house the largest solar energy park in Asia in two years, with a power production capacity of 500 MW. This would be set up with an investment of around ₹8,000 crore flowing from companies such as GMR and Lanco, which have been assigned generation capacities under the Gujarat Solar Mission. Gujarat had announced a solar power policy in January 2009, with a target of installing 1,000 MW capacity by 2012 and 3,000 MW by 2014. The state has already signed power purchase agreements (PPAs) for 934 MW. The park, on the lines of an industrial estate, is being developed by Gujarat Power Corporation Ltd (GCPL), as the sectoral nodal agency, on around 2,000 hectares of wasteland bordering the Rann of Kutch, in Patan district. When commissioned, the project would provide annual energy generation of 800 million units. In the first phase, 15 solar power generation companies would produce 176 MW and Gujarat Energy Transmission Corporation would set up a power pooling station. The overall project cost in phase I would be ₹1287 crore. This would include ₹351 towards the cost of land and power infrastructure and ₹624 crore for evacuation facilities. The Planning Commission has already approved a one-time additional central assistance of ₹210 crore for the development of the solar park. The Asian Development Bank has approved a soft loan of USD 100 million for the project. This includes development of a 'smart grid' for evacuation of power.

City heritage sites tap sun's power, electricity bills dip

The solar panels at Jantar Mantar and Safdarjung's Tomb in New Delhi have helped slash the electricity bills of these centrally protected monuments almost by half. The Archaeological Survey of India (ASI) is now thinking of expanding the initiative and installing solar panels at 11 other heritage sites in the capital. The panels at these two heritage sites were installed following an initiative of the ASI and the Ministry of New and Renewable Energy (MNRE). The power bill for Jantar Mantar has seen a dip of ₹5,000 per month i.e. from monthly ₹15,000 to ₹10,000. At Safdarjung's Tomb, where ASI also has an office, the bill was reduced from ₹34,000 to ₹25,000 per month. The daytime load at all heritage sites includes indoor lighting and fans, ventilation, solar photovoltaic pumps for

irrigation, information kiosks and supply at the ticketing counters. The night load includes LED-based floodlights, garden and outdoor lights.

BHEL Executes Two Solar Power Plants In Maharashtra

The electronics division of Bangalore-based Bharat Heavy Electricals Limited (BHEL) has commissioned two grid-connected solar power plants of 2 MW each at Katol near Nagpur for Sepset Constructions Ltd. and Citra Real Estate Ltd. recently. These projects are commissioned under rooftop photovoltaic and Small Solar Power Generation Programme (RPSSGP) of IREDA under Jawaharlal Nehru National Solar Mission (JNNSM). Each of these PV plants are daily exporting 9,000 to 10,000 units of solar energy to 11kV grid of Maharashtra State Electricity Development Corporation Limited (MSEDCL).

How Waste Paper Could Be Turned Into High Grade Biofuel

Discarded Christmas cards and wrapping paper can fuel 20 moon trips by a double-decker bus and back - the staggering equivalent of 18 million km. Imperial College of London scientists have shown how waste paper could be turned into high grade biofuel, with the help of micro-organisms, to power motor vehicles. Some 1.5 billion cards and 83 sq km of wrapping paper are thrown away by British residents over Christmas.

Government To Regulate Marketing Charges On Natural Gas Levied By Cos Like Reliance Industries And Gail India

The government has decided to regulate natural gas marketing charges levied by companies such as Reliance Industries and Gail India to protect domestic consumers in the short-supplied market, government officials said. The oil ministry has asked the downstream regulator to fix marketing margins charged by various operators. This follows complaints from buyers, particularly fertiliser units, who alleged that marketing charges by gas suppliers were fixed arbitrarily.

Empowering Electricity Consumers

The Electricity Act, 2003 makes elaborate provisions to protect the interests of consumers. The preamble of the Act itself reads as follows: “An Act to consolidate the laws relating to, protecting interests of consumers.....for matters connected therewith or incidental thereto”. The Act envisages effective consumer participation in the regulatory decision making process. The National Electricity Policy 2005 and the Tariff Policy 2006 framed under the Act reinforce its provisions. They stipulate a road map and action plan for various stakeholders in ensuring protection of consumers’ interests. In line with these statutory provisions, the Assam Electricity Regulatory Commissions (AERC) notified regulations for protection of consumers’ interest. These include:

- **AERC (Guidelines for Redressal of Consumer Grievances) 2004** - These regulations, among other aspects, primarily provide the following:
 - a) Guidelines for constitution and operationalization of CGRF/ Ombudsman
 - b) Grievance submission process to be followed by consumer
 - c) Grievance handling and redressal process
 - d) Reporting requirements by the distribution licensee.

The distribution licensee namely Assam Power Distribution Company Limited has established four Consumer Grievance Redressal Forums (CGRFs) at Guwahati, Tezpur, Jorhat and Silchar for consumers of Lower Assam, North Assam, Upper Assam and Hills & Barak Valley respectively.

The Commission has also appointed full time Ombudsman who can be approached by any consumer who is not satisfied with the decision of the CGRF.

- **AERC (Distribution Licensees’ Standards of Performance) Regulations 2005** - In these Regulations, performance standards have been specified pertaining to requirements for good quality of supply and service. These regulations specify the time limits for redressal of different forms of consumer grievances, failing which the consumer has to be paid compensation as per the Regulations.
- **AERC (Supply Code & Related Matters) Regulations 2005** – These regulations contains matters connected with the supply of electricity to a person and other matters related to theft of electricity and measures to prevent such theft.

Besides the above mentioned Regulations, the Commission has notified various other regulations to regulate the generation, distribution and transmission operations in the state. All these regulations are available on its website: www.aerc.gov.in.

Consumer participation in electricity regulation is highly desirable because of the essential

nature of the service, as well its crucial role in rapid economic development. As per provisions in the statute, it is mandatory for regulatory bodies to ensure adequate consumer participation in the decision making process. Consumer views need to be taken into account while framing regulations and decisions on tariff proposals. This not only ensures transparency in the system but also help in holding the utilities accountable for their decisions and performance. In spite of a good mechanism and regulations in place, it is observed that public participation in many cases has been inadequate for some reason or the other.

THINGS TO BE DONE

1. The Commission earmarks a separate fund in the Annual Revenue Requirement of the distribution licensee for education of consumers on the various important consumer centric provisions in the regulations notified by the Commission. The consumers, Civil Society Organizations (CSOs) and print & electronic media need to perform the role of effective watchdogs and exert pressure on the licensee to be more transparent and accountable while spending this amount.
2. The distribution licensee is required to bring out a charter of information for the consumers incorporating procedures for new connection, meter and billing related matters, standards of performance and amount of compensation payable, mechanism of consumer grievance redressal, addresses of consumer service centres etc and this charter needs to be widely circulated in vernacular languages for knowledge to consumers.
3. Civil Society Organisations be encouraged to participate in third party audit of meter reading, billing, reporting of Standards of Performance and other such measures to help bring out the ground realities and make a framework for bigger efforts and enhance accountability of the Discoms.
4. Wide publicity to the provisions in the Supply Code and Standards of Performance Guidelines (through posters, pamphlets, advertisement) will bring pressure on field staff to improve the quality of supply.

The consumers need to be aware of their rights to be able to exert adequate pressure on the distribution licensee to improve supply and service conditions. This would go a long way in achieving the basic objectives of economic reforms.

RIGHT TO REDRESS: MECHANISM

<u>Nature of Complaint</u>	<u>Whom to Approach</u>
Complaints of General Nature	A complaint need to be lodged quoting the name of the consumer, Consumer No., Bill No. and Meter No. at Step 1: Billing Office/ Customer Care Centre/ AM/DM/Manager
Non- monetary Complaints Such as interruption in power supply, voltage related complaints, breakdown/ disconnection, delay in release of service connection, delay in issue of bills, defects in meters, delay in replacement of defective/ dead stop meters, etc.	In case the complainant is not satisfied with the response or there is no response within 7 days, the complainant will have the right to approach the Step 2: Office of the Assistant General Manager / Deputy General Manager In case the complainant is not satisfied with the response or there is no response within 7-10 days (depending on the nature of complaint), the complainant will have the right to approach the
Monetary Complaints Complaints involving monetary disputes due to - wrong billing - misapplication of tariff - difference in calculation of service connection charges & general charges - difference in security against consumption - defective metering etc.	Step 3: Consumer Grievance Redressal Forum There are four Consumer Grievance Redressal Forums at Guwahati, Tezpur, Jorhat and Silchar. In case the complainant is not satisfied with the response or there is no response within 30 days, the complainant will have the right to approach the Step 4. Electricity Ombudsman Time for redressal – 3 months

SUMMARY OF THE CURRENTLY APPLICABLE TARIFF SCHEDULE.

The revised tariffs for FY 2010-11 are applicable within the state of Assam w.e.f. 24.05.2011 until replaced by another order of the Commission and are as under.

Schedule of Tariff w.e.f. 24/05//2011					
LT GROUP					
Category			Consumption Pattern	Energy Charge	Fixed Charge
No	Name	Connected Load		₹/kwh	₹/KW/month
LT-I	Jeevan Dhara	upto 0.5 kW	Upto 30 kWh/month	2.50	15 per connection
LT-II	Domestic-A	upto 5 kW	0-4 kWh/day	3.25	30
			next 4 kwh/day	4.30	30
			balance kwh	5.00	30
LT-III	Domestic-B	above 5 upto 20kw	For all units	4.60	30
LT-IV	Commercial	upto 20 kW	For all units	5.00	110
LT-V	General Purpose	upto 20 kW	For all units	4.45	125
LT-VI	Public Lighting		For all units	4.70	120
LT-VII	Agriculture	upto 7.5 HP	For all units	2.75	30
LT-VIII	Small Industries	Upto 25KVA (20KW)	For all units		
i	Rural			2.80	30
ii	Urban			3.05	40
LT IX	Temporary				Minimum Charge
	Domestic	Either energy charge or Fixed charge - whichever is higher - is applicable		6.25	80/KW/Day
	Non-Domestic non agricultural			8.25	120/KW/Day
	Agricultural			4.25	50/KW/ Day

HT GROUP						
Category			Consumption Pattern	Energy Charge	Fixed Charge	Remarks
No	Name	Connected Load		₹/kWh	₹/KW/month	
		KVA	For all units		₹/KVA/Month	
HT-I	Domestic	Above 25		4.40	30	
HT-II	Commercial	Above 25		4.70	115	
HT-III	Public Water Works			4.55	125	
HT-IV	Bulk Supply	25 & above				
	Educational Inst.			4.25	110	
	Others			4.55	145	
HT-V(A)	HT Small Industries	above 25 & upto 50		3.25	40	
HT-V(B)	HT-I Industries	above 50 & upto 150		4.00	100	TOD Tariff
HT-V(C)	HT-II Industries	above 150				
		Option-1		4.10	140	TOD Tariff
		Option-2		3.40	270	
HT-VI	Tea, Coffee & Rubber			4.45	230	TOD Tariff
		Off-season		4.45	230	
HT-VII	Oil & Coal			4.50	270	TOD Tariff
HT-VIII	HT Irrigation	above 7.5 HP		3.70	40	

TOD tariff

1 T.O.D tariff for HT-I industries

Description	Energy charge
Time	₹/kWh
0600 hrs to 1700 hrs (normal)	4.00
1700-2200 hrs (peak)	6.25
2200-0600 hrs (night)	3.35

2 T.O.D tariff for HT-II industries

Description	Energy charge
Time	₹/kWh
0600-1700 hrs (normal)	4.10
1700-2200 hrs (peak)	5.55
2200-0600 hrs (night)	3.60

3 T.O.D tariff for Tea, Coffee & Rubber (for the whole year)

Description	Energy charge
Time	₹/kWh
0600-1700 hrs (normal)	4.45
1700-2200 hrs (peak)	6.25
2200-0600 hrs (night)	4.20

4 T.O.D tariff for Oil & Coal

Description	Energy charge
Time	₹/kWh
0600-1700 hrs (normal)	4.50
1700-2200 hrs (peak)	6.25
2200-0600 hrs (night)	4.35

Note: Details of Schedule of Tariff and other terms and conditions may be collected from the field offices of Discoms and also from our official website www.aerc.gov.in.

AERC (Fuel and Power Purchase Price Adjustment Formula) Regulations, 2010.

The AERC (Fuel and Power Purchase Price Adjustment Formula (FPPPA)) Formula Regulations, 2010 were notified on 28.12.2010 and it became effective in the state from this date. A brief write –up in question & answer format on these Regulations is provided below for awareness and understanding of our consumers:

1. Are FPPPA Formula Regulations necessary?

The Tariff Policy notified by the Government of India specifies that the uncontrollable costs need to be recovered speedily to ensure that the future consumers are not burdened with past costs. The uncontrollable costs include fuel cost, cost on account of inflation, variations in power purchase unit cost including on account of hydrothermal mix in case of adverse natural events etc.

On the other hand, Section 62(4) of the Electricity Act 2003 states that tariff or part of any tariff should not ordinarily be amended more frequently than once in a financial year. Now, in order to recover uncontrollable costs as stated above, the Act allows that tariff may be amended in respect of any changes expressly permitted under the terms of any fuel surcharge formula as may be specified.

Based on the above guidelines, the AERC (Terms and conditions for determination of Tariff) Regulations, 2006 also states that “The Commission shall allow the recovery or refund; as the case may be, of additional charge for adjustment of tariff on account of change in fuel related costs of electricity generation and purchase of electricity within the period of a notified tariff order of the Commission. Thus, the Commission felt it necessary to introduce the regulations to recover the change in fuel price for the approved quantity of generation and power purchase for the distribution licensee.

2. What is the FPPPA Formula?

The Fuel and Power Purchase Price Adjustment (FPPPA) Formula as defined in the Regulations is given below:

- (i) The amount of Fuel & Power Purchase Price Adjustment (FPPPA) shall be computed as under :

$$V = VF + VPP$$

Where,

V = Amount of incremental Cost in a specified period on account of Fuel & Power Purchase (₹).

VF = Amount of differential cost on account of fuels on generation by different power stations of the state generators (₹).

VPP = Amount of differential cost on account of Power purchase (₹)

- (ii) The FPPPA rate shall be calculated as,

$$\text{FPPPA Recovery Rate} = \frac{V (\text{₹})}{\text{Energy sales (KWH)}} \times 100$$

(Paise/kWh)

Where Energy sales consist of,

(a) Metered sale of Energy.... (ES1)

(b) Assessment of unmetered sale (ES2)

(c) Deemed sale of Energy on account of excess T&D losses ...(ES3)

Less (d) Energy sale to the Exempted categories of consumers.(ES4)

The deemed sale of energy on account of excess T&D losses is equal to actual T&D losses minus losses allowed by the Commission. In case the figure is negative, the same may be ignored.

The recovery formula shall be as under:

$$\text{FPPPA Recovery Rate} = \frac{Q_C (RC2-RC1) + Q_O (R02- R01) + Q_G(RG2 - RG1)+ QPP (RPP2-RPP1)}{ES1 + ES2 + ES3 - ES4} \times 100$$

(Paise /Kwh)

FOR COAL BASED STATION:

Q_C = Quantity of coal consumed during the period in MT as per normative parameter.

SHR USO (MU)

- $Q_C = \frac{\text{-----}}{NCV_O} \times \left[\frac{\text{-----}}{(1-AUX)} \right] \times (1+L_O) \times 10^3$
- Q_O = Quantity of oil consumed during the period in KL as per normative parameter.
 = Generation (in MU) x specific oil consumption (ml/kWh) as approved by the Commission
- USO = Actual unit sent out in MU.
- AUX = Auxiliary Consumption Approved by the Commission (in %)
- SHR = Station heat rate as approved by the Commission in Kcal./Kwh.
- NCV_O = Approved calorific value of coal fired in kcal/kg.
- L_O = Transit & storage losses of coal as approved by the Commission.
- $RC1$ = Average rate of coal Ex. Power station coal yard as approved by the Commission for the period in ₹/ MT.
- $RC2^*$ = Average rate of coal Supplied Ex. Power station coal yard as per actual for the period in ₹ / MT.
- $RO1$ = Average rate of oil Ex. Power Station approved by the Commission for that period in ₹/K.L.
- $RO2$ = Average rate of oil actually supplied Ex. Power station during the period in ₹/K.L.

* If the grade of coal supplied is inferior or superior to the grade considered in the last tariff order, then average rate of coal supplied (RC2) will be corresponding to the grade of coal considered by the Commission in the last tariff order.

FOR GAS BASED STATION:

- Q_G = Quantity of Natural Gas consumed as per normative parameters during the period in 1000 SCM.
- $Q_G = \frac{SHR}{NCVG} \times \frac{USO}{(1-AUX)} \times (1+LG) \times 10^3$
- USO = Unit sent out in MU.
- AUX = Auxiliary Consumption approved in percentage.
- SHR = Station heat rate as approved by the Commission in kcal/kWh.
- NCV_G = Approved calorific value of Gas fired in kcal/SCM.

- L_G = Transit & storage losses of Gas as approved by the Commission, if any.
- $RG1$ = Average rate of Natural gas as approved by the Commission including Transportation in ₹/1000 SCM
- $RG2^*$ = Actual Average rate of Gas Supplied during the Period including Transportation in ₹/1000 SCM.

* If the grade of Gas supplied is inferior or superior to the grade considered in the last tariff order, then average rate of Gas supplied ($RG2^*$) will be corresponding to the grade of Gas considered by the Commission in the last tariff order.
[Q_C and Q_O & Q_G will have to be calculated station wise.]

LEGENDS:

SCM = Standard Cubic Metre

MU = Million Unit

KCal = Kilo Calorie

Kwh = Kilowatt Hour

FOR POWER PURCHASE:

$RPP1$ = Average rate of power purchase as approved by the Commission in ₹/kWh.

$RPP2$ = Actual Average rate of power purchase during the period in ₹/kWh.

QPP = Actual Quantity of power purchased during the period in kWh for sale to the Distribution Licensee's scheduled consumers.

N.B: For computation of Power Purchase, the ex-bus cost of energy from generating stations including associated transmission cost shall be considered.

3. How will the FPPPA charge be recovered?

The FPPPA will be recovered in the form of an incremental energy charge (₹/KWh) in proportion to the energy consumption.

This charge will be recovered as a separate item in the energy bill to be served on monthly or any other periodical basis.

4. When will the FPPPA formula be applied?

The formula will be applied at the end of each quarter (3 months) by Distribution Licensee. FPPPA surcharge for a quarter shall be charged from the first month of next

quarter.

5. Will the Distribution licensee require any permission from the Commission to apply the Formula?

Prior permission from the Commission for implementing the formula will not be required.

6. How will the Regulator ensure that there is no over- recovery of FPPPA surcharge by the distribution licensee?

The Distribution Licensee shall be obligated to provide all relevant information to the Commission and in any case where the Commission observes any discrepancies, the same will be adjusted during the next quarter. This mechanism will provide administrative and regulatory simplicity.

FPPPA charge is usually incurred by the generating company which is passed on to the distribution utility who in turn recover it from the end consumers. Therefore, the generating company owned by the state shall also provide all relevant details and supporting documents at the end of each quarter to the Commission for reconciliation.

Distribution Licensee shall file with the Commission all information including actual sales data required for calculation of the Fuel Surcharge (audited and certified by Cost Accountant/ Chartered Accountant) within 60 days of the end of the respective quarter failing which it shall forfeit any future claims on this account. It will also be incumbent upon Distribution Licensee to reconcile these figures at the end of the year based on audited accounts.

Further, Distribution Licensee shall file detailed computation of actual fuel cost in ₹/KWH for each financial year for each of power stations of the state generators as well as cost of power purchase (Fixed and Variable) from each source/station based on audited accounts and a separate set of calculations with reference to permitted level of parameters as stated in the AERC (Terms and Conditions for determination of Tariff) Regulations, 2006. (audited and certified by cost accountant / chartered accountant).

7. What will be the role of AERC if the refund on over-recovery by the distribution licensee is not done?

In case of any reduction in power purchase and fuel cost if the licensee or generating company fails to refund the additional charge to the consumers/customers within the stipulated time, the Commission shall suo-moto order the licensee or generating company to refund the same with 10 days notice to the licensee.

8. *Has any cap being imposed on the extent of recovery of from the FPPPA Charge?*

Yes. The FPPPA charge should not exceed 25% of the variable component of tariff or such other ceiling as may be stipulated by the Commission from time to time, where the variable component of tariff is defined as total estimated revenue from energy charges (EC) in a year approved in the last Tariff Order divided by total estimated sales of the year.

When FPPPA charges exceed 25% of the variable component of tariff, the Licensee shall make a petition to the Commission for recovery of the charges over the specified cap which shall be recovered only after Commission's scrutiny and directives.

9. *To which categories of consumers will the FPPPA charge be applicable?*

The FPPPA charge will be applicable to all consumer categories unless exempted by the Commission.

10. *How will the consumers know about the FPPPA charge being imposed?*

The FPPPA charge applicable to each tariff category of consumers shall be displayed prominently at the cash collection centres and on the website of the Distribution Licensee.

The Distribution Licensee shall also put up on its website such details of the additional burden on account of changes in fuel price and power purchase cost and the FPPPA charges levied to all consumers for each quarter along with detailed computations. The Assam Power Distribution Company Limited (APDCL) levied FPPPA charge of ₹0.69/ unit on all consumers uniformly irrespective of the consumer categories from 1st August 2011.

RENEWABLE ENERGY

What is Renewable Energy?

Energy produced from renewable resources is termed as Renewable Energy (RE).

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 resources.

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.

Why Renewable Energy?

1. There is probability of lesser thermal capacity being installed on account of lack of indigenous coal in the coming years because of both production and logistic constraints, and increased dependence on imported coal. India imports about 80% of its oil which may increase further. Gas reserves and production in recent years is likely to mitigate power needs only to a limited extent. Difficulties of large hydro are increasing and nuclear power is also beset with problems. The country thus faces possibility of severe energy supply constraints.

2. India's substantial and sustained economic growth is placing enormous demand on its energy resources. The demand and supply imbalance in energy sources is pervasive and require serious efforts by Government of India (GoI) to augment energy supplies.

3. Lack of rural lighting is leading to large-scale use of kerosene. This usage needs to be reduced, as it is leading to enormous costs in form of subsidies and increasing the country's import dependence.

4. A very large proportion of the citizens continue to live with no access to electricity and other forms of commercial energy. Others with access often have to cope with poor and erratic availability of electricity and other fuels. With constraints faced in resource availability and in delivery mechanisms, traditional means of energy will continue to remain a problem.

Renewable energy can make a substantial contribution in each of the above mentioned areas. It is in this context that the role of renewable energy needs to be seen. It is no longer “alternate energy”, but will increasingly become a key part of the solution to the nation's energy needs.

Constraints in Renewable Energy

The main constraints on their use are the costs of the energy they produce and the local environmental impacts of renewable energy schemes. Currently, the cost of energy from renewables is generally higher than that produced by “conventional” energy sources. However, as renewables become more established and the benefits of mass production take effect, the gap will reduce. In the case of wind power and some other technologies, this is already happening. As energy prices rise with the decline of oil, the cost effectiveness of the renewable options should increase.

Development of Renewable Energy

i) Role of Government & MNRE

India started its renewable energy program in 1981 with the establishment of Commission for Additional Sources of Energy which was later converted into Ministry of Non-conventional Energy Sources in 1992. In the year 2006 it was renamed as Ministry of New and Renewable Energy (MNRE). Today, MNRE operates one of the world's largest programmes for promotion of RE sources in the country.

The endeavour of the Ministry is to promote renewable energy utilization, develop affordable RE technologies and increase the contribution of renewable energy in the total energy mix today and in the years to come as well as to sub-serve the above objectives. The Ministry has a wide range of programmes on research and development, demonstration and promotion of renewable energy for rural, urban, commercial and industrial applications as well as for grid-interactive power generation. The Ministry adopts a three-fold strategy for the development, promotion and use of renewable energy technologies across the country: (i) providing budgetary support for research, development and demonstration of technologies; (ii) facilitating institutional finance through various financial institutions; and (iii) promoting private investment through fiscal incentives, tax holidays, depreciation allowance and remunerative returns for power fed into the grid.

Technical and Financial Institutions under MNRE

The Ministry has four specialized institutions under its administrative control, namely Solar Energy Centre (SEC), Centre for Wind Energy Technology (C-WET), Sardar Swaran Singh National Institute for Renewable Energy (SSS-NIRE) and Indian Renewable Energy Development Agency Limited (IREDA).

Solar Energy Centre (SEC)

The Centre carries out research activities for developing, testing and certifying solar thermal and solar photovoltaic devices, systems and components. It has been upgrading its testing equipment on a regular basis to meet national and international standards.

Centre for Wind Energy Technology (C-WET)

The C-WET carries out certification of Wind Turbines, Wind Resource Assessment and Forecasting besides carrying out research and development activities in Wind Technology.

Sardar Swaran Singh National Institute for Renewable Energy (SSS-NIRE)

Sardar Swaran Singh National Institute of Renewable Energy (SSS-NIRE), at Wadala Kalan, District Kapurthala (Punjab), an autonomous Institution of the Ministry, is focused

on biomass energy research and development. During the year, a state-of-the-art research facility for biodiesel, bio-ethanol, gasification, biogas, biomass cook stoves research & testing and for other areas in Bio-energy was developed. In addition, research projects on Integrated Technology Development for Biodiesel Production using Heterogeneous Catalyst; and hydro-cracking of non-edible vegetable oil was initiated.

Indian Renewable Energy Development Agency Limited (IREDA).

A Non- banking Financial Institution, IREDA provide funds for renewable energy and energy efficient projects. In FY 2011-12, IREDA sanctioned loans to the tune of ₹1923.00 crores and disbursed ₹1148.00 crores against the annual targets of ₹2888.00 crores and ₹1340.00 crores respectively. The loans were sanctioned for the establishment of about 599 MW of installed capacity of power generation. In addition to Government of India equity, IREDA also raised resources to the tune of ₹1146.63 crores up from various external sources Kreditanstalt fur Wiederaufbau (KfW), Agence Francaise Development (AFD) & Japan International Cooperation Agency (JICA).

For details on MNRE and its activities, you may visit its website: www.mnre.gov.in

Alternate Hydro Energy Centre (AHEC)

Alternate Hydro Energy Centre was established in Indian Institute of Technology, Roorkee, with initial sponsorship of Ministry of Non-Conventional Energy Sources in the year 1982. The mandate of the center is to promote power generation through the development of Small Hydropower projects in hilly as well as plain areas & development of decentralised integrated energy systems in conjunction with other renewable energy sources e.g. biomass, solar, wind etc.

ii) Role of Regulatory Commissions

The Electricity Act 2003 (EA 2003) stipulated the development of RE based power generation by mandating State Electricity Regulatory Commissions (SERC) with the function of RE promotion within the State. Under EA 2003, the SERCs are required to set

targets for distribution companies to purchase certain percentage of their total power requirement from renewable energy sources. This target is termed as Renewable Purchase Obligation (RPO).

Accordingly, AERC has defined RPOs for the Assam Power Distribution Company Limited (APDCL) as well as other obligated entities in the AERC (Renewable Purchase Obligations and its Compliance) Regulations 2010. According to these Regulations -

“Every obligated entity shall purchase not less than 1.4%, 2.8%, 4.2%, 5.6% and 7% of its total energy handled during 2010-11, 2011-12, 2012-13, 2013-14 and 2014-15 respectively from renewable energy sources under the Renewable Purchase Obligation or until reviewed by the Commission.

Provided that 0.05 percentage point out of the renewable purchase obligation so specified in the year 2010-11 shall be procured from generation based on solar as renewable energy source and shall be increased at a rate of 0.05 percentage every year thereafter till 2014-15 or until reviewed by the Commission.”

where “obligated entity” means the distribution licensee, consumer owning the captive power plants and open access consumer in the state of Assam who are mandated to fulfill renewable purchase obligation under these Regulations.

If the power from renewable sources is not available within the state, then the obligated entities will have to fulfill their RPOs through purchase of Renewable Energy Certificates (REC) from power exchanges. A brief note on REC is provided at the end of this chapter.

According to Section 61 (h) of the Electricity Act 2003, the Commission shall specify the terms and conditions for determination of tariff for promotion of co-generation and generation of electricity from renewable sources of energy. The Central Electricity Regulatory Commission (CERC) vide L-1/94/CERC/2011 dated 06.02.2012 notified the CERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2012 under which different aspects of tariff determination for various renewable energy technologies has been incorporated. Therefore, in line with that of CERC

regulations mentioned above, the AERC notified the Assam Electricity Regulatory Commission (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2012. With the coming into force of these Regulations, some specific provisions of the Assam Electricity Regulatory Commission (Co-generation and Generation of Electricity from Renewable Sources of Energy) Regulations, 2009, where price caps were specified by the Commission for purchase of electricity from cogeneration and renewable sources, stands repealed.

Renewable Energy Potential in Assam & North East

As per the directions of the Government of India, 10% of the annual budget of the Ministry is allocated for the promotion of renewable energy programmes & projects in the North-Eastern States of India including Sikkim. Special emphasis is accorded to the implementation of programmes such as remote village electrification, biogas, small hydro power, village energy security test projects & biomass gasifiers for meeting the lighting, cooking and other electrical needs of the far and remote villages and hamlets in the North-Eastern States including Sikkim. Against an allocation of ₹120 crore as 10% of the Gross Budgetary Support (GBS) at RE stage for NE Region an amount of ₹109.49 crore was released during the FY 2011-12 upto February 28, 2012.

This section provides brief information about the achievement for different RE source in Assam and North East during the year 2011-12. (Source: www.mnre.gov.in)

1. Family Type biogas achievements in the North Eastern Region (NER)

The National Biogas and Manure Management Programme (NBMMP) is being implemented in the North-Eastern Region (NER) States through State Government Departments/ State Government Agencies. The Khadi and Village Industries Commission (KVIC) is also implementing the programme in the State of Assam, Nagaland, Meghalaya, Arunachal Pradesh, Tripura and Sikkim. The State-wise numbers of family type biogas plants installed in the region during the year 2011-12 (upto 31-12-2011) is given in the Table below. One Biogas Development and Training Center for the NER States for

providing technical and training support under the programme has been continued during the year at Indian Institute of Technology, Guwahati, Assam.

Sl. No.	Name of the State	Plants Installed (upto 31-12-2011)
1.	Arunachal Pradesh	17
2.	Assam	2791
3.	Meghalaya	473
4.	Mizoram	89
5.	Manipur	-
6.	Nagaland	636
7.	Sikkim	133
8.	Tripura	94

2. Solar Photovoltaics: During 2011-12, the Ministry has sanctioned 15000 solar lanterns and 5000 home lights for earth quake affected people in Sikkim. Another project of six standalone power plants of 530 kWp at different Government Buildings was sanctioned in Sikkim. Two 100 kWp standalone SPV power plants were sanctioned for installation Police Battalions of Arunachal Pradesh. 4373 Solar home lights were also sanctioned in Arunachal Pradesh. 220 nos of solar street lights and another 220 nos of solar home lights were sanctioned for Aryabhatta Science Centres throughout the State in Assam. Another project for installation of power plants with aggregate capacity 354 kWp was also sanctioned for DC and BDO Offices in the State of Assam. In Nagaland, a project was sanctioned for installation of 47 solar power plants of aggregated capacity of 670 kWp for Government buildings in Kohima. In Mizoram, SPV power plants with aggregate capacity 761 kWp were sanctioned for installation at Government institutions. In Manipur, stand-alone SPV power plants of capacity aggregating to 802 kWp and 200 solar street lights were sanctioned. A project for installation of solar power plants at 66 police stations was sanctioned in Tripura. During 2011-12, State Renewable Energy Development Agencies have reported installation of 496 solar lanterns, 319 solar home lights in Arunachal Pradesh and Nagaland, 30 street lights in Sikkim, 3 solar pumps in Arunachal

Pradesh and 266 kWp standalone SPV power plants in Assam (200 kWp) and Nagaland (66 kWp).

3. Solar Thermal Programme

The Ministry is promoting use of solar water heaters under an off-grid programme on solar energy applications by providing financial support in terms of capital subsidy and soft loan. The support for the North eastern States is available up to 60% of the cost of the system subject to a benchmark of ₹6600/- and ₹6000/- per square meter of solar collector area for flat plate and evacuated tube collector based systems, respectively. Alternatively, soft loan at an interest rate of 5% on up to 80% of the benchmark cost of solar water heating systems may be availed under this scheme.

4. Remote Village Electrification programme

The Ministry is implementing Remote Village Electrification (RVE) Programme for providing financial support for lighting/basic electricity using renewable energy sources. The villages in the North-Eastern Region, including Sikkim are most suitable for electrification through stand alone renewable energy devices. A large number of villages in these states are too remote to be electrified through grid extension. Therefore, special attention under the Programme is given to these states and a significant portion of the budget for Remote Village Electrification the Programme is earmarked for these states. So far, 3186 remote villages and hamlets have been provided renewable energy based systems and projects in another 400 remote villages and hamlets are under implementation in various North Eastern states. The status of RVE Programme in the North-Eastern States is given below:

Sl. No.	State	Nos. of Remote Villages/ Hamlets Electrified	Projects Under Implementation in Villages/ Hamlets
1.	Arunachal Pradesh	297	0
2.	Assam	1730	283
3.	Manipur	191	49
4.	Meghalaya	149	0
5.	Mizoram	20	0
6.	Nagaland	11	0
7.	Sikkim	13	0
8.	Tripura	775	68
Total		3186	400

5. Small Hydro Power : North-Eastern States have fairly good potential to develop small hydro power projects. Among the NE States, Arunachal Pradesh has the highest potential followed by Sikkim, Meghalaya and Mizoram. MNRE has been giving special emphasis for the development of small hydro projects in the NE region and higher level of financial support has been provided to the State Governments under SHP schemes. So far, 169 SHP projects aggregating to 280 MW have been setup in the NE States and another 133 projects aggregating to 71.32 MW are under implementation. During the FY 2011-12, five SHP projects were commissioned in Arunachal Pradesh and Assam. Ministry is implementing a project for electrification/ illumination of 1058 border villages in Arunachal Pradesh through completion of ongoing and installation of new small hydro power projects and solar photovoltaic systems. So far 775 villages including 523 villages from solar photovoltaic home lighting systems and 252 villages from small / micro hydel projects have been illuminated / electrified as part of the project. A detailed exercise was undertaken last year to assess the renovation and modernization requirement of existing small hydro projects in Arunachal Pradesh. Based on this, the Ministry has sanctioned renovation of 15 SHP projects in Arunachal Pradesh during the current year.

Small Hydro Projects of ASSAM

Sl No.	Name of the SHP	Location	Total Installed Capacity (MW)	PLF (%)	Total Project Cost (in Cr)	Total Project Cost (in Cr)/MW	Date of completion	Date of tariff order	Tariff (₹)	Tariff Period (in Yrs)	Tariff fixation by	Name of IPP/ Developer
1	Champawoti	Garubhasha, Kokrajhar Dist	2.25	40	17.23	7.658			3.2	35	Preferential Tariff	M/S Hayen Hydel power co ltd
2	Bardikarai	Sonitpur	4.7		42.0958	8.957		7/11/2008	2.73		Competitive bidding	M/S North east cables and conductors
3	Pahumara	Barpeta Dist	2	45	15.66	7.830	March, 2010	5/10/2009	2.9114	35	Preferential Tariff	Bodoland Infrastructure re company Pvt Ltd. (BIDC)
4	Rupohi	Bagsa Dist	0.4	45	3.7	9.250		30/09/2009	3.133	35	Preferential Tariff	M/S Manas Hydel Power co pvt ltd
5	Desang	Dillighat bridge, Namrup	9	58	73.85	8.206		5/10/2010	2.88	35	Competitive bidding	M/S L D Power Ventures
6	Kalanga	Karbi Anglong Dist	6						2.9832	35	Competitive bidding	M/S Transstroy (INDIA) Ltd, Hyderabad
7	Lungnit	Near Diphu, karbi anglong	6	49			2012-13					M/S Jyoti Ltd and M/S P das & co.
8	Myntriang	Karbi Anglong	9	49			2012-13					M/S Sharda Eco Power Ltd.

"Example is not the main thing in influencing others, it is the only thing."**- Albert Schweitzer**

Renewable Energy Certificates.

What is REC?

Renewable Energy Certificate (REC) mechanism is a market-based instrument to promote renewable energy and facilitate renewable energy purchase obligations.

What is the main objective of the REC mechanism?

It is aimed at addressing the mismatch between availability of RE Resources in state and the requirement of the obligated entities to meet Renewable Purchase Obligation.

What are the basic characteristics of RECs?

One REC is equal to 1 MWh (1000 KWh) of electricity generated through renewable energy sources. A REC is valid for a period of 365 days from the date of its issuance. One REC can be traded in the exchange only once, repeated trading is not allowed.

What are the types of RECs?

Two categories viz solar RECs and non-solar RECs. Solar RECs are issued to obligated entities for generation of electricity based on solar as renewable energy source and non-solar RECs are issued to eligible entities for generation of electricity based on renewable energy sources other than solar.

What are floor price and forbearance price of RECs?

Floor price is the minimum price of an REC. CERC has notified floor price for 2011-12 of ₹1500/REC (non-solar) and ₹12000/REC (Solar).

Forbearance price is the maximum price of an REC determined by CERC. Forbearance price for 2011-12 is determined as ₹3900/REC (non-solar) and ₹17000/REC (Solar).

Therefore, the price of one solar REC in the power exchanges would be anything between ₹12000 – ₹17000 per REC and for one non-solar REC, the price would be between ₹1500

and ₹3900 per REC. CERC vide its Order dated 23.08.2011 determined floor and forbearance price for FY 2012-13 to FY 2016-17 as follows:

	Non Solar REC (₹/MWh)	Solar REC (₹/MWh)
Forbearance Price	3300	13400
Floor Price	1500	9300

Who are eligible for REC?

A generating company engaged in generation of electricity from renewable energy sources shall be eligible for participation under REC Scheme by fulfilling some conditions such as:

- It does not have any PPA at a preferential tariff.
- Sells to distribution licensee at a price not exceeding the pooled cost of power purchase,
- Sells to open access consumer at mutually agreed price.
- Sells through power exchange at market determined price.

Are Captive Power plants eligible for REC?

A CPP based on renewable energy source shall be eligible for REC for the entire power generated from such a plant including self consumption.

To whom REC would be issued?

REC would be issued to RE generators only.

Who could buy RECs? Can RECs be used to fulfill RPO?

RECs could be purchased by the obligated entities to fulfill their RPOs namely Distribution Companies, Open Access Consumers and Industries consuming captive power. RECs could also be purchased by entities other than obligated entities on voluntary basis by individuals and companies under Corporate Social Responsibility (CSR).

Where RECs are traded?

RECs are traded only in the Central Electricity Regulatory Commission (CERC) approved power exchanges. RECs are traded in the last Wednesday of every month.

When does an obligated entity become eligible for REC trading in the Power Exchanges?

An obligated entity (client) becomes eligible for REC trading in the Power Exchanges (trader) with signing of MOU between the client and trader and subsequent registration at the exchanges. \

What happens if the obligated entity do not comply with the RPO?

If the obligated entity does not fulfill the RPO as per the regulations, the Commission may direct the obligated entity to deposit into a separate fund, to be created and maintained by the State Agency (AEDA), such amount as the Commission may determine on the basis of the shortfall in units of RPO and the forbearance price decided by the Central Commission. The penal charges will be equivalent to the forbearance price multiplied by shortfall in units of RPO.

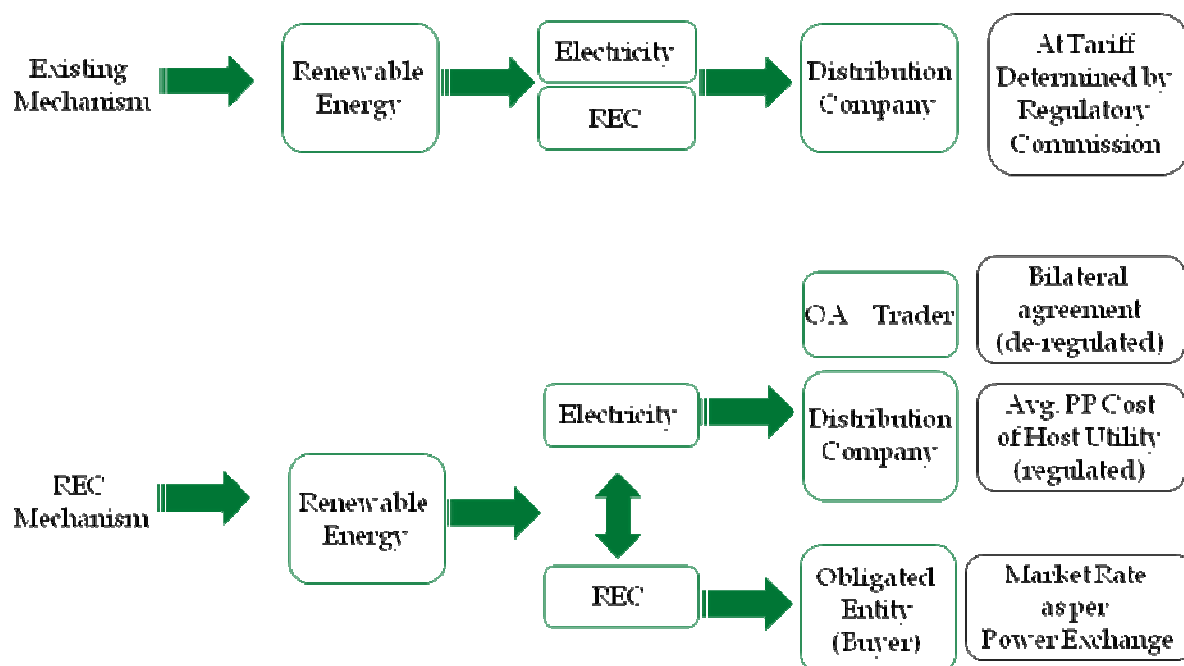
Development of the concept of REC mechanism

RECs have been used extensively as a successful market based policy instrument to promote renewable energy in many countries, such as Australia, Japan, US, Netherlands, Denmark and UK. However, these schemes vary in detail and had to be customized for local legislations and market situations. Further federal structure of governance as found in India and electricity being part of the concurrent list poses unique challenges for development of such scheme.

Purchase of REC is deemed as purchase of power generated from RE sources. It is acknowledged that renewable energy generation entails production of certain environmental attributes apart from electricity generation per se. Thus, RE generator can

sell two different products on account of renewable energy generation. These products are the electricity and the environmental attributes associated in the form of RE Certificate. It is proposed to adopt the same philosophy for REC mechanism in India.

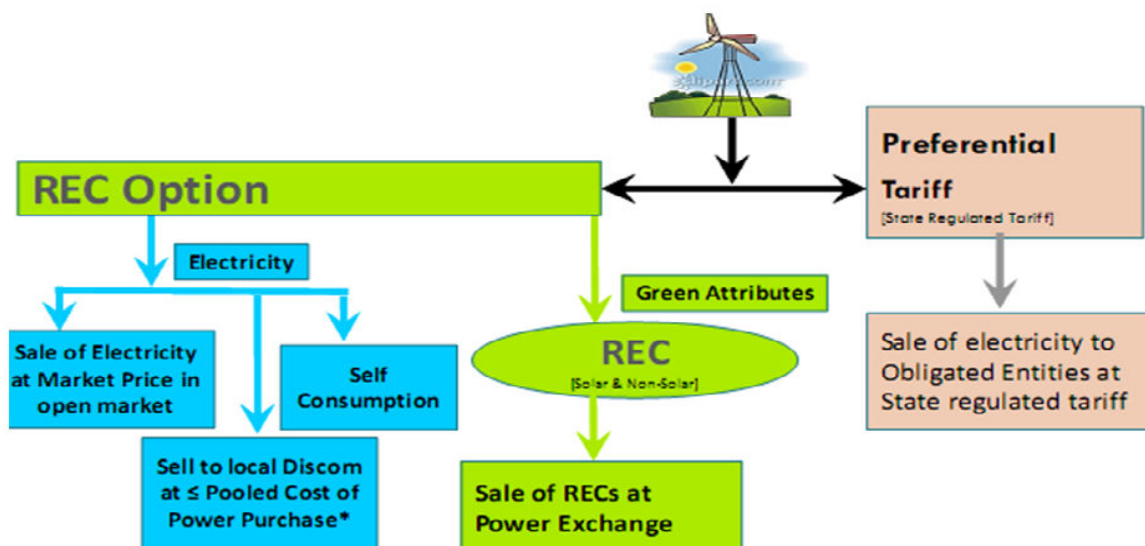
Concept of REC Mechanism:



In the proposed mechanism, one REC will be issued to the RE generator for one MWh electrical energy fed into the grid. The RE generator may sell electricity to the distribution company and associated RECs to the distribution company or any other obligated entity. The RE generator may sell RECs to the entities with RPO target in the State or outside the State. The entities with RPO target, such as distribution companies and other entities which are required to purchase Renewable Energy have been referred to as ‘Obligated Entities’. The purchase of RECs will be deemed as a purchase of power generated from renewable sources and accordingly will be allowed for compliance of the RPO target. The REC

mechanism will enable Obligated Entities in any State to procure RECs generated in any of the States in India and surrender the same to satisfy its RPO target.

Overview of Operational Framework for REC Mechanism



REC mechanism will address the issues of scarcity of RE sources in some of the States which currently have negligible RPO targets in view of the limited RE potential in the State. In addition, in RE rich States, the REC mechanism will reduce the risks for Obligated Entities in continued procurement of renewable power beyond their RPO targets.

AGENCIES IN REC MECHANISM

- **NLDC – Central Agency**
 - Responsible for registration, issuance of RECs, maintaining accounts, settlements, repository, monitoring and such other functions incidental to the implementation of REC mechanism
- **State Agency - Accreditation Body**

- An approving authority which checks RE generators against their eligibility criteria and the norms specified by MNRE
- **State Load Despatch Centres - Monitoring Body**
 - Verifies electricity generation from RE sources and notifies the Central Agency
- **Power Exchange - Trading Platform**
 - Facilitates transactions
 - Keep record of trading
- **Compliance Auditors - Monitors effective compliance by RE producers**

The REC framework entails appointment of an agency at national level to facilitate the registration of eligible RE generators, issuance of RECs and maintenance of record of procurement of RECs by Obligated Entities. The National Load Despatch Centre (NLDC) has been designated as the nodal agency for the above functions. The State Load Dispatch Centres (SLDC) and a State Level Agency plays a pivotal role in day-to-day operation of REC mechanism. The Assam Energy Development Agency (AEDA) has been designated as the State Agency for the REC mechanism. The success of the REC mechanism will depend on adoption of precise definition of the roles and responsibilities of these institutions, adoption of the appropriate governance structures and capacity building to undertake defined roles and responsibilities.

Few State RPOs for FY 2011-12 at a Glance

Region	Sl. No.	State	RPOs	
			Solar %	Non - Solar %
Northern Region	1	Haryana	0.25	1.25
	2	Himachal Pradesh	0.10	11
	3	Jammu & Kashmir	0.10	2.90
	4	Punjab	0.03	2.40

	5	Rajasthan	100 MW PPA for Discoms only	9.50
	6	Uttar Pradesh	0.50	4.50
	7	Uttarakhand	0.025	4.50
Western Region	8	Chattisgarh	0.25	5.00
	9	Gujrat	0.50	5.50
	10	Maharashtra	0.25	6.75
	11	Madhya Pradesh	0.40	2.10
Southern Region	12	Tamil Nadu	0.05	9
	13	Kerela	0.25	2.75
	14	Karnataka	0.25	Bescom, Mescom, CESC – 10% Gescom , Hescom & Hukeri -7 %
Eastern Region	15	Bihar	0.50	2.00
	16	Jharkhand	0.50	2.50
	17	Orissa	0.10	4.90
North Eastern Region	18	Assam	0.10	2.70
	19	Manipur	0.25	2.75
	20	Meghalaya	0.30	0.45
	21	Mizoram	0.25	5.75
	22	Nagaland	0.25	6.75
	23	Tripura	0.10	0.90

A GLANCE OF REC TRADING

In its first trading (all non-solar) in March 2011, a total ₹11,94,650 equivalent to 424 RECS was traded at ₹3900 (150 nos. at IEX) and ₹2225 (274 nos. at PXIL). Each REC certificate is equivalent to 1 MWh (1000kWh) generation of energy and can be traded only once in its life of one year.

The response for the REC certificate was very low in the market and very few developers came up with renewable projects based on REC'S mechanism during the earlier season of FY 2011-12. However, the markets gained momentum within a few months. This momentum is expected to grow in future with recent steps taken by CERC which includes 15-30% cut in REC prices effective April 2012 for five years. The REC trading data for Indian Energy Exchange and Power Exchange India Limited is given below in Table 1 and Table 2 respectively.

Table 1: REC trading in Indian Energy Exchange (IEX)

Year	Month	Type	Buy Bids (REC)	Sell Bids (REC)	Cleared Volume (REC)	Cleared Price(₹/REC)	No. Of Participants
2011	April	Solar	-	-	-	-	-
		Non-Solar	260	4,046	260	1,500	3
	May	Solar	-	-	-	-	-
		Non-Solar	14,002	15,143	14,002	1,500	9
	June	Solar	-	-	-	-	-
		Non-Solar	72,002	21,331	15,902	1,505	10
	July	Solar	-	-	-	-	-
		Non-Solar	81,493	34,976	14,668	1,555	39
	August	Solar	1	-	-	-	1
		Non-Solar	145,204	49,897	22,096	1,800	124
	September	Solar	7	-	-	-	4
		Non-Solar	196,159	76,026	41,385	2,300	164
	October	Solar	1	-	-	-	1
		Non-Solar	201,532	135,424	92,303	2,700	129
	November	Solar	43	-	-	-	2
		Non-Solar	257,578	155,917	96,154	2,900	147
	December	Solar	495	-	-	-	6
		Non-Solar	264,093	166,000	105,942	2,950	137
2012	January	Solar	2,635	-	-	-	10
		Non-Solar	414,387	186,610	165,460	3,051	210
	February	Solar	582	-	-	-	9
		Non-Solar	360,330	215,157	190,482	3,066	293
	March	Solar	5,782	-	-	-	26
		Non-Solar	272,366	223,907	192,354	2,900	389

Table 2: REC trading in Power Exchange India Limited (PXIL)

Month, 2011-12	REC Type	Buy Bid (No. of certificates)	Sell Bid (No. of certificates)	MCP (₹ / Certificate)	MCV (No. of certificate) Qty (MWH)
April, 2011	Solar	0	0	0	0
	Non Solar	0	565	0	0
May, 2011	Solar	0	0	0	0
	Non Solar	4500	5322	1500	4500
June, 2011	Solar	0	0	0	0
	Non Solar	10000	3183	1500	483
July, 2011	Solar	0	0	0	0
	Non Solar	14766	9800	1550	3900
September, 2011	Solar	0	0	0	0
	Non Solar	38101	8155	1710	3000
October, 2011	Solar	0	0	0	0
	Non Solar	33869	3201	3000	3201
November, 2011	Solar	2	0	0	0
	Non Solar	20882	30317	2800	9373
December, 2011	Solar	5	0	0	0
	Non Solar	21179	14336	2950	5679
January, 2012	Solar	0	0	0	0
	Non Solar	18113	6072	3051	6064
February, 2012	Solar	1007	0	0	0
	Non Solar	28933	19045	3051	15706
March, 2012	Solar	3319	0	0	0
	Non Solar	51401	7405	3100	7373

As is evident from the tables above, the REC market is now more than a year old and is growing. The investors have shown interest in RECs over this period of time and trading gained momentum as the obligated entities tried to fulfill their RPOs by the end of FY 2011-12.

“The only place that success comes before work is in the dictionary” –

--VINCE LOMBARDI

Green Buildings – What are These?

Green building is the practice of increasing the efficiency with which buildings use resources — energy, water, and materials — while reducing building impacts on human health and the environment, through better site, design, construction, operation, maintenance, and removal i.e. the complete Building life cycle.

The Energy and Resource Institute plays a very important role in developing green building capacities in the country. TERI came up with a rating system called GRIHA which was adopted by the Government of India as the National Green Building Rating System for the country. GRIHA aims at ensuring that all kinds of buildings become green buildings. The strengths of GRIHA lie in the fact that it rates even non-air conditioned buildings as green and puts great emphasis on local and traditional construction knowledge. THE CESE building in IIT Kanpur became the first GRIHA rated building in the country and it scored 5 stars, highest in GRIHA under the system. It has become a model for green buildings in the country. It has proved that with little extra investment, tremendous energy and water savings are possible. There are various projects which are the first of their kinds to attempt for green building ratings like apartment residential buildings and non-air conditioned buildings. Measures are being taken to spread awareness about the GRIHA-National Green Building Rating System of India.

The Confederation of Indian Industry (CII) plays an active role in promoting sustainability in the Indian construction sector. The CII is the central pillar of the Indian Green Building Council or IGBC. The IGBC has licensed the LEED (Leadership in Energy and Environmental Design) Green Building Standard from the U.S. Green Building Council and currently is responsible for certifying LEED-New Construction and LEED-Core and Shell buildings in India. There are many energy efficient buildings in India, situated in a variety of climatic zones. One of these is RMZ Millenia Park, Chennai, India's largest LEED gold-rated Core & Shell green building.

Triggering off the Green building movement in India is the first Platinum Green Building in India; CII-Sohrabji Godrej Green Business Centre in Hyderabad as per the LEED Rating system. This landmark achievement put India on the global map of green building movement, through support of all stakeholders from the construction industry. With a

modest beginning of 20,000 sq ft (1,900 m²) green built-up area in the country in the year 2003, as on date, 1,724 projects in India have registered under the IGBC Rating programmes, with a total footprint of over 1.2 billion sq. ft. These developments include various kinds of buildings like: Corporate offices, Hotels, Hospitals, Airports, IT Parks, SEZs, Townships, Gated Communities, Residential Buildings, Government Offices, Schools, Colleges etc.

Today, India has 267 certified green buildings, which are fully functional and operational.

The Indian Bureau of Energy Efficiency (BEE) had launched the Energy Conservation Building Code (ECBC) on February 2007. The code is set for energy efficiency standards for design and construction with any building of minimum conditioned area of 1000 Sq mts and a connected demand of power of 500 KW or 600 KVA. The energy performance index of the code is set from 90 kWh/sqm/year to 200 kWh/sqm/year where any buildings that fall under the index can be termed as "ECBC Compliant Building" More over the BEE had launched a 5 star rating scheme for office buildings operated only in the day time in 3 climatic zones, composite, hot & dry, warm & humid on 25 February 2009.

The Reserve Bank of India's buildings in Delhi and Bhubaneswar in Orissa have already been rated 4 star and 5 star respectively. Wipro Office in Gurgaon is also a green building. In Tamil Nadu 11 buildings were star rated by BEE, in the year 2010, including RBI buildings. In Tamil Nadu, Government is planning to build solar powered green houses for rural poor. It has allotted ₹1,080 Crore for construction of 60,000 houses.

"The best career advice to give to the young is - 'Find out what you like doing best and get someone to pay you for doing it.'" -- Katherine Whitehorn.

"A single conversation across the table with a wise person is worth a month's study of books."

Brain Teasers

1. A month back, the local Primary school was visited by the Government School Inspector who was there to check that teachers were performing well in their respective classes.

He was very impressed with one particular teacher. The Inspector noticed that each time the class teacher asked a question, every child in the class put up their hands enthusiastically to answer it.

More surprisingly, whilst the teacher chose a different child to answer the questions each time, the answers were always correct. Why would this be?

Answer

The children were instructed to ALL raise their hands whenever a question was asked. It did not matter whether they knew the answer or not.

If they did not know the answer, however, they would raise their LEFT hand.
If they knew the answer, they would raise their RIGHT hand.

The class teacher would choose a different child each time, but always the ones who had their RIGHT hand raised.

2. Once there was a night watchman who had been caught several times sleeping on the job. The boss issued the final warning. On the next night, he was caught with his head on his hand and his elbows on the desk.

"Aha, I've caught you again," exclaimed the boss. The watchman's eyes popped open immediately and he knew what had happened. Being a quick thinking man, he said one word before looking up at the boss. The boss apologized profusely and went home. What was the one word?

Answer

The one word was "AMEN", thus making the Boss believe he was praying rather than sleeping.

Some facts on Global Warming

What is causing global warming?

Scientists agree that the burning of fossil fuels like oil and coal cause greenhouse gases to escape into the air and that these gases are causing most of the warming. Another cause is deforestation (cutting down trees). Trees soak up carbon dioxide (one of the greenhouse gases) from the air and when they are cut down release all of that carbon dioxide back into our atmosphere.

What is the difference between "global warming" and "climate change?"

"Global warming" refers to the increase of the Earth's average surface temperature, due to a build-up of greenhouse gases in the atmosphere. "Climate change" is a broader term that refers to long-term changes in climate, including average temperature and precipitation.

What will happen if global warming continues?

An increase in global temperature will cause sea levels to rise and warming is expected to be strongest in the Arctic and would be associated with continuing retreat of glaciers, permafrost and sea ice. Other likely effects of the warming include more frequent occurrence of extreme weather events including heat waves, droughts and heavy rainfall events, species extinctions due to shifting temperature regimes, and changes in agricultural yields. Warming and related changes will vary from region to region around the globe, with projections being more robust in some areas than others. The ecosystem services upon which human livelihoods depend would not be preserved. If the warming gets worse, as scientists expect, there may be some kinds of plants and animals that would become extinct (disappear completely) because they can't move to new homes. There may be more storms and floods. Sea level may rise so much that people have to move away from the coasts. Some areas may become too dry for farming.

What is being done about global warming?

Most countries are parties to the United Nations Framework Convention on Climate Change (UNFCCC), whose ultimate objective is to prevent "dangerous" anthropogenic (i.e., human-induced) climate change. Parties to the UNFCCC have adopted a range of policies designed to reduce greenhouse gas emissions and to assist in adaptation to global

warming. Parties to the UNFCCC have agreed that deep cuts in emissions are required, and that future global warming should be limited to below 2.0 °C (3.6 °F) relative to the pre-industrial level. Analyses by the United Nations Environment Programme (published in 2011) and International Energy Agency (2011) suggest that current efforts to reduce emissions may be inadequately stringent to meet the UNFCCC's 2 °C target.

THINGS TO DO TO CONTROL GLOBAL WARMING

Scientists agree that the burning of fossil fuels is causing global warming. Since these fuels are burned for energy, and everyone uses energy, everyone can help stop global warming just by using less energy. By cutting back the amount of energy we use each day, we'll be reducing our contribution to global climate change. The following may be done to curb global warming:

- Unplug chargers when not in use.
- Walk short distances instead of asking for a ride in a car. We will save 1.5 kg of carbon dioxide for every 5 km we don't drive. Switch off the car if it has to be stopped for more than two minutes.
- Close the blinds on a hot day if the sun is shining in. Dress lightly instead of turning up the air conditioning continuously to stay cool. Move the Air-conditioning thermostat up 2 degrees. We can save about 900kg of carbon dioxide a year with this simple adjustment. Set the thermostat of the room air conditioner at 25C to get the most comfort at the least cost.
- Dress warmly inside our house when it's cold instead of turning up the heat.
- Plant a tree. A single tree will absorb one tonne of carbon dioxide over its lifetime.
- Use efficient lighting. Replace incandescent bulbs with compact fluorescents (CFLs). These use four times less energy. And they last eight times longer. So this not only cut our electricity bills dramatically, we can also save a lot of money buying bulbs.
- Use energy efficient electric appliances. They use two to ten times less electricity for the same functionality, and are mostly higher quality products that last longer than the less efficient ones. In short, efficient appliances save us lots of energy and

money. In India, appliances like refrigerators and ACs have efficiency rating labels ranging from 1 to 5 stars, the higher number being more efficient.

- Check our tyres. Keeping the tyres inflated properly can improve the fuel efficiency of our car. Every litre of petrol saved keeps 2.5 kg of carbon dioxide out of the atmosphere. Using radial tyres will help us save 3 to 7 % of fuel.
- Use water carefully. We may try to harvest rain water in our locality. It takes a lot of energy to heat water- so let us use efficient heating appliances.
- Use renewable energy. Sunlight can be used in many different ways to save energy. Use a solar water heater instead of an electric geyser. A 100 litre solar water heater can save around 1500 units of electricity every year. For lighting, batteries can be used that can be charged with sunlight. A solar cooker cooks rice and vegetables without losing their essential nutrients. In a village, we can use biogas from cow-dung which is readily available to save energy.
- Turn off electronic devices when not in use. Simply turning off our television, stereo, computer, fans, lights when we are not using them will save us thousands of kilograms of carbon dioxide a year.
- Reuse & recycle. Recycling and re-using products like paper and bottles will help protect the environment. We may recycle our office and household waste.

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"A successful man is one who can lay a firm foundation with the bricks others have thrown at him." - David Brinkley

"There is nothing in a caterpillar that tells you it's going to be a butterfly."
Richard Buckminster Fuller
