WELCOME (Presentation by BESCOM)



Integration of renewables in Karnataka's DISCOM

Challenges in Integration of renewables :

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As per KERC (Procurement of energy from Renewable sources) Regulations issued from time to time, every distribution licensee shall purchase a minimum quantity of electricity from renewable sourced of energy expressed as a percentage of its total procurement during a financial year

RENEWABLE PURCHASE OBLIGATION (RPO)

•As per KERC (Procurement of energy from Renewable sources) Regulations 2011 & 2015, the RPO to be achieved is as below:

	Upto 2015- 16	2016-17	2017-18	2018-19	2019-20	2020-21
NON SOLAR RPO - TARGET	10%	11%	12%	12%	12%	12%
ACHIEVED (ACTUALS)	12.89 %	10.82%	12%	14.75%	13.36%	
SOLAR RPO - TARGET	0.25%	0.75%	2.75%	6.00 %	7.25%	8.50%
ACHIEVED (ACTUALS	0.45%	0.75%	3.79%	10.32%	13.83 %	

Apart from RPO(Renewable purchase obligation), as the cost per unit of Solar Power Projects is on decreasing trend year by year, distribution licensees are fascinated to purchase this RE Power.

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However, increase in RE power(Solar & Wind) poses challenges in power system planning, operation and flexibility in order to integrate increasing shares of variable renewable energy successfully. Not only DISCOMs, even EHT/HT consumers are importing power through Power Exchange in Open Access and buy power from the independent Power Producers who have wheeling and Banking agreements with DISCOMs.

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- Certain technical and operation challenges, like intermittencies and system-balancing problems, are inherent in high-renewable microgrids because of RE power variability and uncertainty.
- The variable nature of wind and solar poses problems for balancing supply and demand on different timescales (from seconds to seasons) and on different spatial scales. The distributed nature of these energy resources also adds complexity in terms of connecting them to the existing grid infrastructure. These aspects means that we need to amend and redesign not only the way in which we deliver electricity, but also the electricity market, which is designed for fossil fuel generators. Associated with this redesign is the need for new regulation and governance models and procedures.

- By increased energy efficiency, stabilized & reliable network systems along with energy storage systems, such as battery storage, pumped storage, the challenges of high RE penetration can be reduced.
- However, with all these said, DISCOM's are facing exiting of EHT/HT consumers fro the grid significantly, The statistics in respect of Wheeling and Banking Agreements executed, Open Access EHT/HT consumers importing power through Power Exchange are detailed here
- Even with introduction of ToD, incentive etc., DISCOM's are unable to captivate the consumers from going to captive/non-captive Generators. The easiest solution of decreasing the tariff per unit for these consumers can not be affordable as with increase penetration of variable and uncertain RE power (lot of frequency variation) which requires maintenance of the grid stability along with cost towards energy/back down charges from existing thermal Power Plants for reliable power supply poses a real challenge for DISCOM.

Year wise decreasing trend of Cost per unit of Solar Projects

					Rs pe	r unit
	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
NTPCVVNL Bundled power	14.12	14.12	12.2	10.3	10.2	10.12
Solar Mega watt rojects		8.25	6.74	6.21	6.2	6.2
Farmers Scheme			7.85	7.17	6.45	6.45
Talukwise				4.81	4.56	3.97
NSM Bundles power			4.85	4.85	4.85	4.85
SVG Scheme			5.5	4.91	4.38	3.85
Pavagada Solar						2.85
Kredl -pavgada solar						1.24

ABSTRACT OF SIGNED PPAs AND COMMISSIONED PROJECTS as on Dec- 2020								
		PPA exec	uted details	Commissioned in MWs				
Sl.No.	Type of NCE	No's	Capacity in MWs	No's	Capacity in MWs commissione d			
Non So	lar projects							
1	Wind	317	1580.46	312	1400			
2	Mini Hydel	16	190.4	14	184.4			
3	Co-gen-medium term(for five years)	36	305	36	305			
4	Biomass	9	59.5	9	59.5			
Solar p	ower projects							
5	Solar Projects	193	3034.34	173	2775.34			
Total		571	5169.7	544	4724.24			

Details of Wheeling and Banking Agreement executed between BESCOM, other ESCOMs, KPTCL & IPPs

RE projects	1	МНР	SPP			WPP Bio mass		o mass	Total		
ESCOM	Nos	Capacity	Nos	Capacity	Nos	Capacity	Nos	Capacity	Nos	Capacity	
BESCOM	2	3.5	39	294.23	23	133.90	0.0	0.0	64	431.63	
CESC	6	34.8	2	60.00	2	7.5	1.0	6.0	11	108.30	
HESCOM	0	0.0	11	389	76	790.2	1	1.54	88	1180.74	
GESCOM	9	107.1	40	738.475	22	202.32	0	0	71	1047.90	
MESCOM	5	82.25	0	0.000	4	7.25	0	0	9	89.50	

Wheeled energy by IPPs

- Every month Wheeled Energy statistics are compiled and furnished to SLDC.
- Preparation of BESCOM monthly Reactive Power bill for accounting of Wheeling energy and Banking energy for the Financial/Water year pertaining to IPPs within BESCOM.

Details of Wheeled Energy in mus during the FY 2017-18 & 18-19, 19-20 & 20-21													
Month	APRIL	MAY	JUNE	JULY	AUG	SEPT	ОСТ	NOV	DEC	JAN	FEB	MAR	TOTAL
2017-18	144.65	149.20	177.40	191.71	216.08	230.17	212.60	189.14	179.85	186.87	180.48	257.55	2315.70
2018-19	160.36	228.91	273.64	296.70	313.59	348.07	352.71	342.58	346.53	358.15	350.13	421.37	3792.74
2019-20	278.96	356.63	351.70	362.84	344.60	362.66	354.43	347.25	349.01	368.61	380.16	368.61	4225.46
2020-21	191.91	271.74	328.49	333.02	342.69	348.89							1816.74

Details of Open Access EHT/HT consumers importing power through Power Exchange

Details of Open access energy during the FY 2017-18, 2018-19, 2019-20 & 20-21													
YEAR	APRIL	MAY	JUNE	JULY	AUG	SEPT	ОСТ	NOV	DEC	JAN	FEB	MAR	TOTAL
2017-18	128.43	135.41	138.98	120.7	103.35	64.09	56.43	96.92	119.46	104.6 6	102.8	65.79	1237.02
2018-19	67.56	48.27	58.08	60.48	56.7	33.03	8.18	33.07	31.86	31.32	27.17	12.51	468.24
2019-20	34.01	31.05	28.20	27.16	25.35	33.65	35.40	38.71	33.76	35.29	30.99	25.27	378.84
2020-21	18.50	31.05	32.79	28.98	31.78	34.27							177.36

ENERGY PURCHASED in MU for the years 2018-19 and 2019-20

Source	2018-19	2019-20
KPCL Hydel	776.17	995.93
KPCL-Thermal	8452.31	7866.49
Total CGS	11482.79	11522.42
UPCL	3188.38	2046.30
Total RE	7595.28	8883.19
Others	12.33	101.42
TOTAL	31507.26	31415.75
Ratio of RE to total energy	24.10 %	28.27 %



JOURNEY OF SOLAR ROOFTOP & IMPLEMENATION CHALLENGES



SMT G SHEELA General Manager DSM BESCOM



SOLAR ROOFTOP PROGRAM (Net / Gross metering Arrangement)

- Karnataka is first among the Southern states in India to notify a separate <u>Policy for Solar energy</u> in 2011. The 2nd Policy notified on 22.05.2014.
- DISCOM's are designated as <u>implementing Agency</u> for Rooftop Solar under Net/ Gross metering.
- The Regulations & Tariffs are issued from time to time by issued by Karnataka Electricity Regulatory Commission



SOLAR ROOFTOP PROGRAM(Net / Gross metering Arrangement)

- The Rooftop program launched in BESCOM on 07.11.2014
 & extended to all ESCOM's
- Applications are invited from all the consumers of BESCOM i.e Residential, Commercial, Industrial etc.
- The Power Purchase agreement are executed for a period of 25 years.
- The present tariff Rs.3.99/- per unit for Residential and others Rs.3.07/- per unit)



SOLAR ROOFTOP PROGRAM(Net / Gross metering Arrangement)

- GoK target of 2400MW to state by 2022 but till date 142.199MW capacity commissioned as against 1200 MWs BESCOM with 2647 nos under consumer investment model
- BESCOM ranked No. 1 in "STATE ROOFTOP SOLAR ATTRACTIVENESS INDEX – SARAL" launched by GoI on 21 Aug 2019



BESCOM INITIATIVES:

- Launching of <u>Simplified time bound Online portal</u>
- The necessary guidelines / orders of GoI /GoK / KERC/ BESCOM are updated in BESCOM website.
- Sparate <u>Solar helpdesk with supporting staff</u> at Corporate office with dedicated landline, email ID etc
- Formation of "<u>Centralized Solar Billing center</u>" at Corporate office, to process the <u>Gross metering & Net-</u> <u>metering bills</u> (Net metering bills above Rs. 1 Lakh)



BANGALORE ELECTRICITY SUPPLY COMPANY (A GOVT OF KARNATAKA UNDERTAKING)

BESCOM INITIATIVES:

- Inhouse training to Engineers,
- Consumer interaction meetings,
- Paper Advertisement,
- Participation in Exhibitions,
- distribution of phamplets etc.







BESCOM INITIATIVES:

Empanelment of

a. Grid tied inverters (String / Hybrid/ Micro inverters) – 17 Nos.

b. Bi-directional meters – 4 nos.





BESCOM INITIVATIVES:

- First time in India, a web based tool developed to assess the "<u>Rooftop</u> <u>potential for Bangalore city</u>" including Technical & Financial viability of each building rooftop using LiDAR Technology by M/s CSTEP.
- A surveyed area in **Bengaluru is 1,179 sq. km**
- Assessed potential- 2.5GW.





Projects (Work Completed):

- Installation of 51 nos of SRTPV on BESCOM office buildings with 0.678 MWp under Integrated Power Development Scheme (IPDS) of GoI
- Installation of 310 nos. of Grid connected Solar operated I.P sets on dedicated Agricultural feeder with SPV capacity of 2.52MW under – "Surya Raitha Pilot Project" with net-metering arrangement





Projects (Ongoing projects):

- Installation of SRTPV on various Govt buildings under 13th Finance Commission, GoI funds with proposed capacity of 10.2MW in BESCOM jurisdiction (work under progress).
- Installation of SRTPV of 30 MW +300 MW (Soura Gruha Yojane) on Residential / Group housing society under MNRE Central Finance Assistance program (Online applications are invited & Tendering notified on 11.11.2020)
- Installation of Ground mounted Solar power plant of 11 MW (Soura Bhoomi Yojane) under KUSUM scheme of MNRE (Empanelment of Agencies under progress & received applications for 57MW).



Projects (Ongoing projects):

- Consultancy tender invited for
- ✓ Capacity Aggregation of 1060MW Solar Rooftop Projects - BESCOM
- ✓ Capacity Aggregation of 10000MW Ground mounted Solar Projects - GoK



IMPLEMENTATION CHALLENGES

- 1. Decline in BESCOM revenue
 - Net-metering is mandate for Commercial & Industrial consumers.
 - Most of HT consumers opting for Open Access
- 2. Fall back in Capacity Aggregation, achieved capacity of 142MW against 1200MW target. Investment by the various stake holder is a challenge even though KERC has allowed various business model.



IMPLEMENATION CHALLENGES

3. As per present practice, Solar Rooftops capacity are allowed upto 80% of the Distribution Transformer Capacity or Line capacity

What is safe allowable capacity as the Utilization factor of Solar is only 19%?.

- 4. In case of high penetration of Solar to grid, viability to control the
 - a. Grid tied inverter,
 - **b. Reactive power injection &**
 - c. Impact of harmonics
 - is a challenge
- 5. Communication of small Rooftop plants is costlier while monitoring Solar Generation Data integration through utility dashboard

Present technology is to be adopted.



Be the change you want to see in the world

THANK YOU