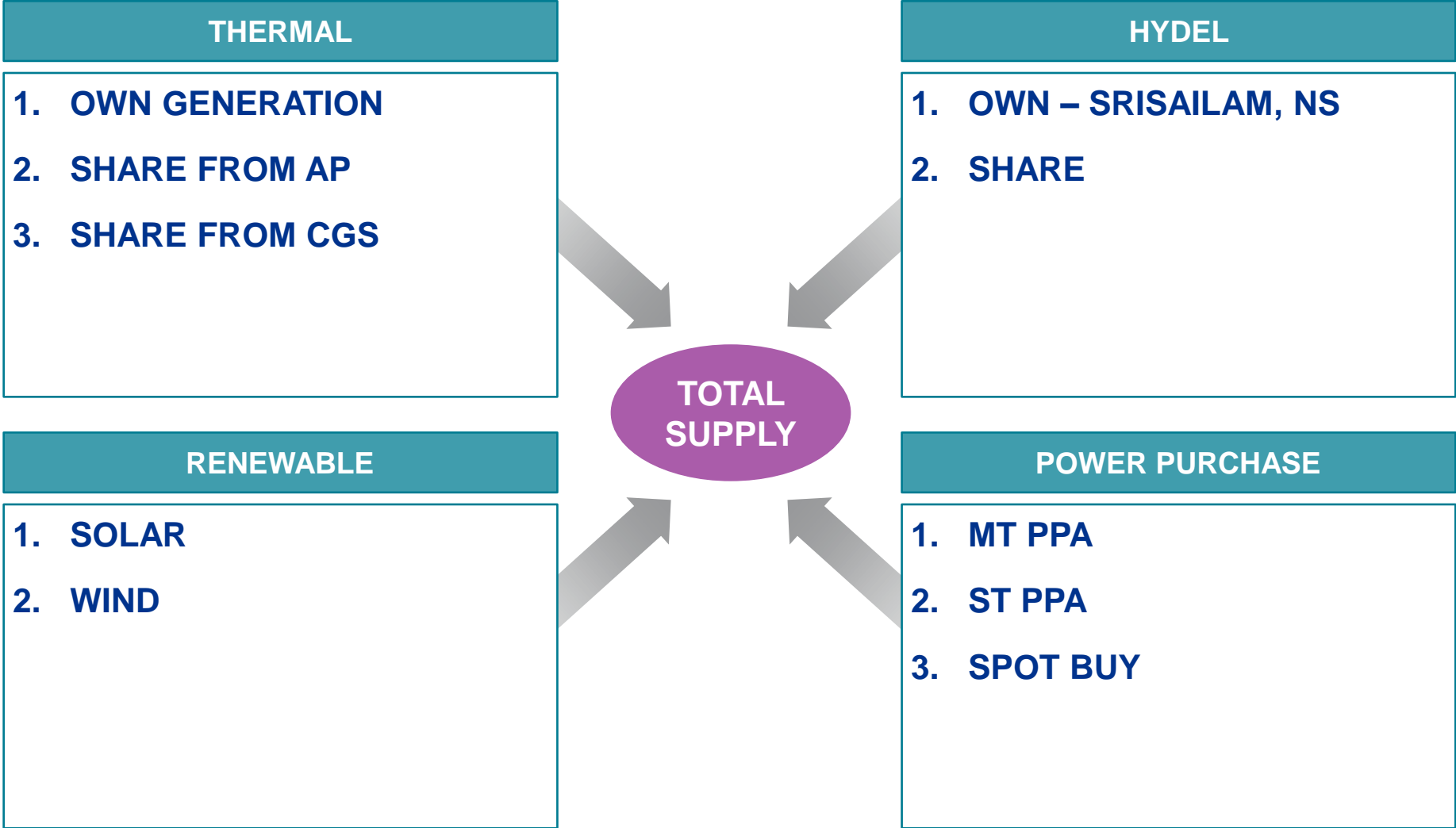




Telangana Power Sector

**ARVIND KUMAR, IAS
PRINCIPAL SECRETARY
ENERGY, INDUSTRIES, COMMERCE**

Sources of supply





Energy Balance for the year 2015-16



SUPPLY

	MW	MU
Genco AP	1,514	9,556
Genco TS	1,830	8,174
Hydel AP	892	7
Hydel TS	1,491	123
Central Generating Stations (CGS)	2,099	13,121
Gas Power plants	1,771	3,245
Renewables- Solar	392	947
Through PPA tie-ups		
Medium Term	1,085	4,221
Short Term	2,000	10,519
Total	13073	49,913

DEMAND

	MU	
Low Tension	Domestic	9,752
	Commercial	2,654
	Industries	1,077
	Agriculture	11,663
	Others	1,114
High Tension	Industries	11,278
	Commercial	2,151
	Agriculture & LIS	860
	Traction	602
	Resco	641
	Others	321
	Total Sales	42,113
T & D Losses	7,800	
Total	49,913	

As per AP Reorganization Act, TS share is 53.89% in Genco plants, Renewables are allocated based on Geography

Energy Dispatch by the Generators = Total Sales + Transmission and Distribution Losses(15.6%)

Telangana State Sales Projections

Category	FY 2016-17 Projected Sales (MU)	% contribution to the Total
Low Tension		
LT I: Domestic	10,823	23%
LT II: Non-Domestic/Commercial	2,943	6%
LT III: Industry	1,125	2%
LT IV: Cottage Industries	16	0%
LT V: Agriculture	12,090	26%
LT VI: Street Lighting & PWS	1,148	2%
LT VII: General	107	0%
LT VII: Temporary Supply	1	0%
Total LT	28,253	60%
High Tension		
HT I (A): General	12,192	26%
HT I (B): Ferro Alloy Units	283	1%
HT II: Others	2,283	5%
HT III: Airports, Bus Stations and Railway	93	0%
HT IV Agriculture, Government LIS, CPWS	2,098	4%
HT V: Railway Traction	697	1%
HT VI: Townships & Residential Colonies	287	1%
HT VIII: Temporary	51	0%
Category: RESCOs	685	1%
Total HT	18,667	40%
Total (LT + HT)	46,921	100%



Power Purchase cost for the year FY 15-16

Generating Source	Fixed Cost in INR Crs	Variable Cost in INR Crs	Fixed cost per unit (INR/kWh)	Variable Cost Per unit (INR/kWh)	PP cost (INR/kWh)
Genco AP	1,182	3,222	1.24	3.37	4.61
Genco TS	1,436	2,120	1.76	2.59	4.35
Hydel AP	123	-	178.95*	0.00	178.95
Hydel Ts	523	-	42.46*	0.00	42.46
Central Generating Stations	1,188	3,090	0.91	2.35	3.26
Gas Power Plants	165	1,442	0.51	4.44	4.95
NCE	1	493	0.00	5.22	5.22
PPAs – Medium Term	686	918	1.62	2.18	3.80
PPAs -Short Term	362	5,700	0.34	5.42	5.76
Total	5,665	16,984	1.14	3.40	4.54

*Due to very low availability of Hydel power in FY 15-16, the fixed cost per unit is abnormally high (130 MU as against 4040 MU projected by TSERC)

**For every unit consumed, 1.18 unit needs to be generated (loss of 15.6%) –
Effective cost of power at consumption = 4.54 x 1.18 = 5.38**



Average Cost of Supply (ACS) for year FY 15-16

Key Elements of Cost of DISCOMs		Total (INR Crs)	Per unit of Sales (INR/ kWh)	Cost Contribution (%)
Power Purchase Cost		22,649	5.38	81%
Network Maintenance Cost	Distribution	3,034	0.72	11%
	Transmission	1,163	0.28	4%
	SLDC Charges	37	0.01	0%
	PGCIL Charges	926	0.22	3%
	ULDC Charges	9	0.00	0%
	Sub Total	5,169	1.23	18%
CSD interest & Other Costs	Interest on Consumer Security Deposits	241	0.06	1%
	Supply Margin	18	0.00	0%
	Sub Total	259	0.06	1%
Average cost of Supply (ACS)		28,077	6.67	100%

ACS - To supply one unit of power to the consumer from the generating plant inclusive of transmission, distribution charges and also accounting for losses – **INR 6.67/kWh**



Average Revenue Realization (ARR) for FY 15-16

Category	Total Sales (MU)	Total Revenue in Crs	Average Revenue Realization (INR/kWh)
LT Domestic	9,752	3,679	3.77
LT Non-Domestic/Commercial	2,654	2,531	9.54
LT Industries	1,077	781	7.25
LT V: Agriculture	11,663	102	0.09
LT Others	1,114	667	5.99
Total Low Tension (LT)	26,260	7,761	2.96
HT Industries	11,278	7,903	7.01
HT Commercial	2,151	2,002	9.31
HT Agriculture, Government LIS, CPWS	860	484	5.63
HT Railway Traction	602	411	6.82
HT Others	321	245	7.62
HT RESCOs	641	60	0.94
Total High Tension (HT)	15,853	11,105	7.00
Total	42,113	18,866	4.48

ARR -The average revenue realized by selling of one unit of energy to the consumer - **INR 4.48 /kWh**



ACS –ARR Gap



Cost Description	Total (INR Crs)	INR/unit sales
Average cost of Supply	28,077	6.67
Revenue at current tariffs	18,866	4.48
Revenue gap at current tariffs	(9,211)	(2.19)
Subsidy for FY 2015-16	4,257	1.01
Revenue Surplus/(gap)	(4,954)	(1.18)

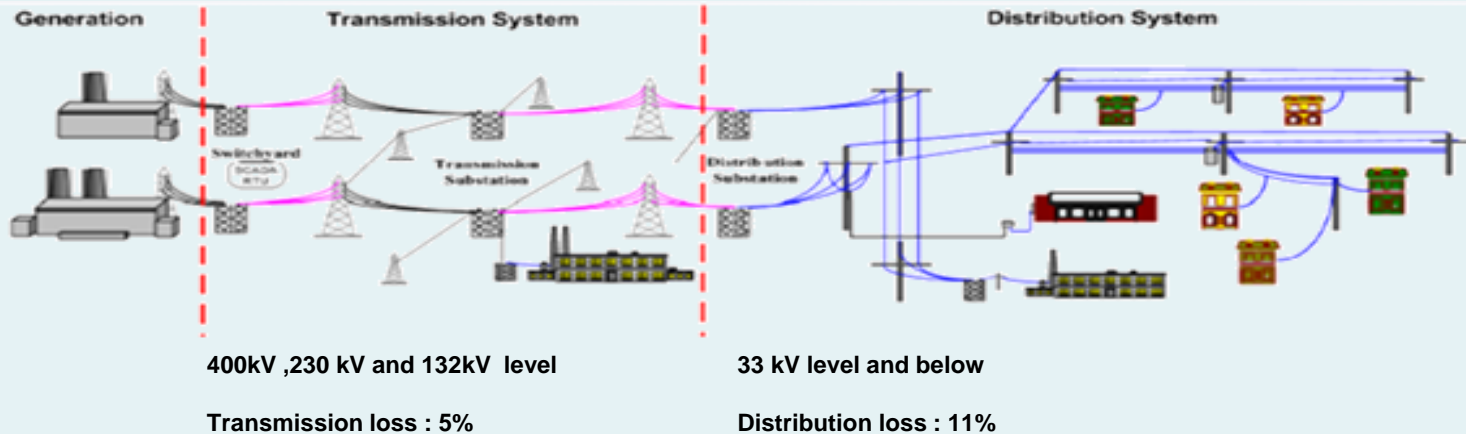
Major reasons for the gap after Subsidy

- Need to purchase **short term power-**
 - Hydel Failure Approved hydel- 4038 MU, Actual hydel for the year – 130 MU
 - Higher energy requirement compared to TSERC approved FY 15-16 by 1362 MU
- Sales mix variation – The increase in consumption of Subsidized categories (Domestic, agriculture) compared to subsidizing categories – Industries, commercial



Key Terminology

- 1 Million Unit (MU) = 10^6 units (1 unit is 1 kWh – basic unit of energy consumption)
- 1 Mega Watt (MW) = 1000 kW = 7.5 MU
- **EHT** – Extra High Tension (Power Supply at 132kV and 220 kV)
- **HT** – High Tension (Power supply at 11 kV, 33kV)
- **LT** – Low Tension (Power supply at 400 V (3- phase) , 230 V (1-phase))
- T & D Loss- Transmission and Distribution Loss



- AT & C loss - Aggregate Technical and commercial loss – T & D loss adjusted for Collection efficiency



Key Terminology



- **Billing Efficiency** =
$$\frac{\text{Total energy Billed}}{\text{Total Energy Sold}}$$

- **Collection Efficiency** =
$$\frac{\text{Total revenue collected}}{\text{Total Revenue for the billed sales}}$$

- **UDAY** - UJJWAL DISCOM ASSURANCE YOJANA – A GOI scheme for Improving the viability of Discoms -State shall take-over 75% of DISCOM debt as on 30th September 2015

- **Benefits**

- Reduction in interest burden due to Lower Interest rates (*Effective interest rate decreases from 12% to 8.22%*)
- Avoiding Tariff increases required to offset previous DISCOM losses/ True-up Claims



Impetus to Renewable Capacity Addition – National Level

- ❖ India targets **1,75,000 MW green power** by 2022
 - ❖ Solar Power – 1,00,000 MW
 - ❖ Wind Energy – 60,000 MW
 - ❖ Biomass Energy – 10,000 MW
 - ❖ Small Hydro Projects – 5,000 MW

- ❖ Two broad approaches for adding solar capacities
 - ❖ **Centralized Approach** – Solar Parks: Contiguous land area identified for development of solar park. Infrastructure support of 20 lakhs/ MW provided for solar park development by Gol. Solar project developer identified through bidding
 - ❖ **Distributed Generation Approach:** Land parcels identified at Substations which have spare capacity. Bid floated and successful bidders identified for setting up of solar projects



Renewable Energy in TS

Status of Projects	Capacity in MW
Existing/Under construction	1,341
Under process of finalization	2,049
Under Proposal (NTPC Bundling scheme)	400
Total	3,790

1 MW = 5 Acres

Panels slanted
@15 deg south
Facing

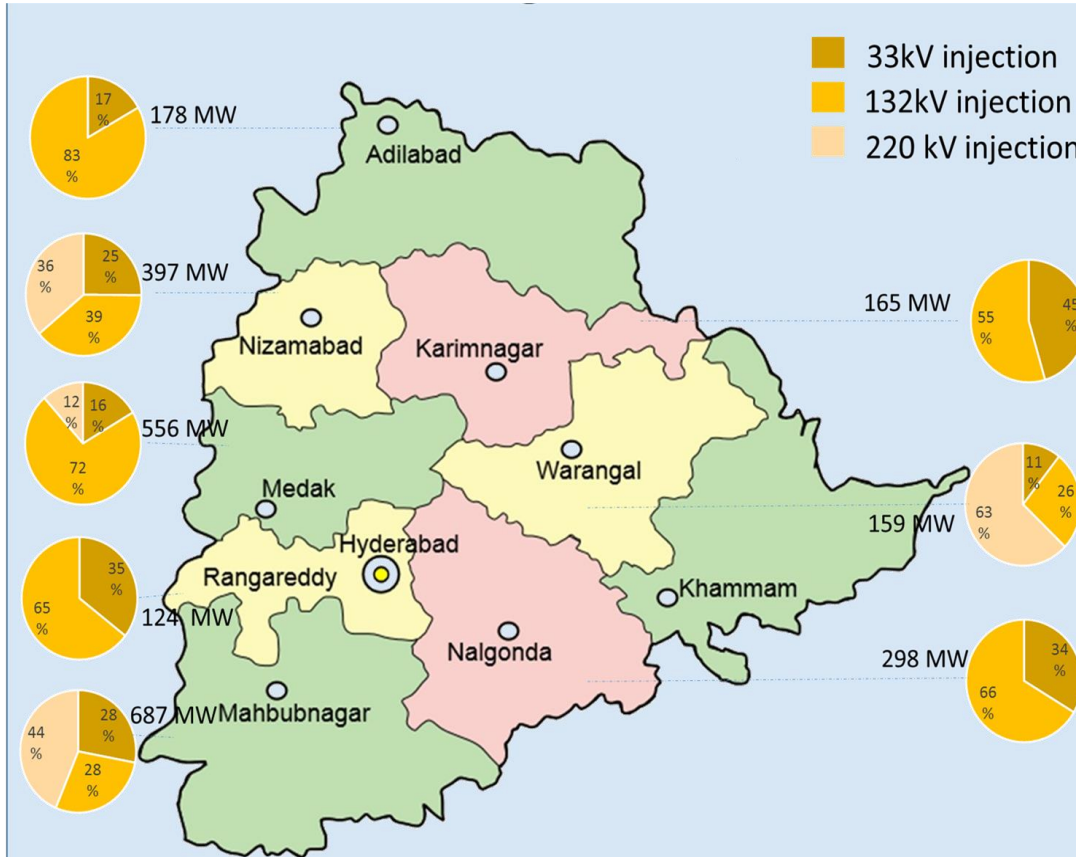


**10 MW Solar Power Plant at Midgil Village ,
Mahbubnagar District**



Key Highlights of 2,000 MW and 515 Solar Tender – Distributed Generation Approach

❖ The spread of solar capacities across the districts in Telangana is depicted in the diagram.



Advantages of Distributed Generated Model

- Based on evacuation available at sub station level
- PPP – LA by bidder
- Reverse bid
- Minimize transmission losses
- more even spread
- Agriculture

In addition to the tangible financial benefits, the distributed model of solar generation is expected to bring in socio-economic benefits due its spread across remote parts of the state

ISSUES

TRENDS

SUPER CRITICAL THERMAL
COAL AVAILABILITY
STORAGE IN R.E.
TRANSMISSION

ACS=ARR

1 SYSTEM IMPROVEMENTS
2. TARIFF INCREASE
3. AGRICULTURE COSTING
4. CROSS SUBSIDIZATION

ISSUES

RELIABILITY

1. R.E AS A RELIABLE SOURCE?

1. TIMINGS
2. PLF
3. TRANSMISSION
4. STORAGE

NATION AS A WHOLE

1 SURPLUS
2. INTER STATE TRANSMISSION