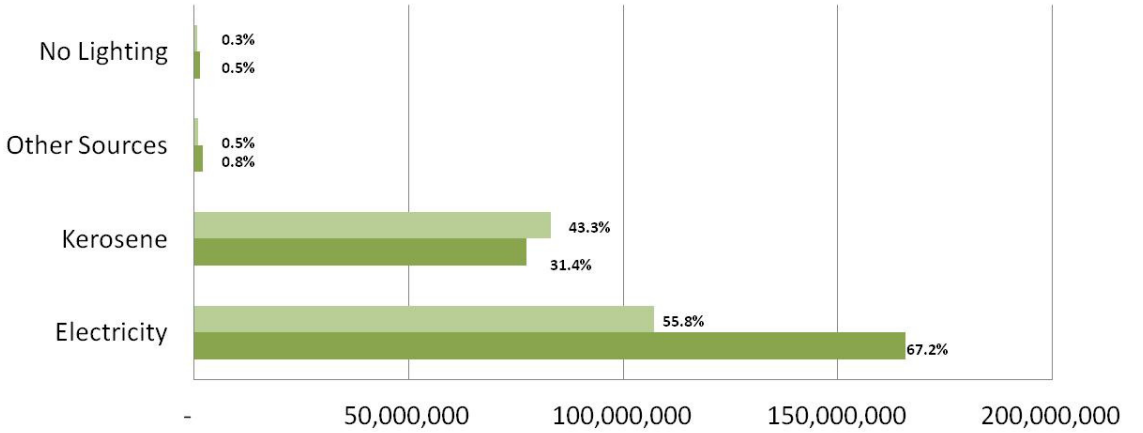
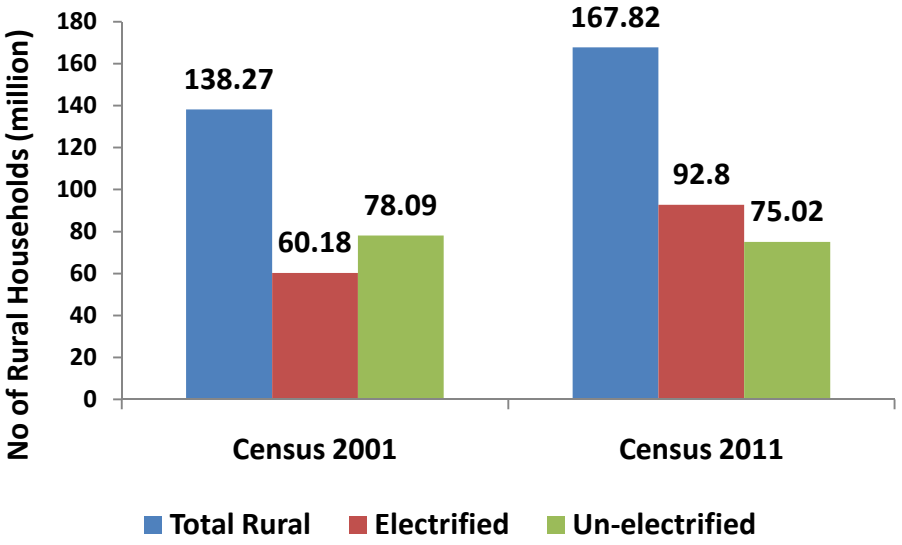
Off-grid Distributed Generation Based Distribution Franchisee (ODGBDF Model)

Paradigm Shift in Rural Electrification

Overview of Rural household electrification in India



	Electricity	Kerosene	Other Sources	No Lighting
2001	107,115,876	83,120,384	959,820	575,892
2011	165,777,472	77,461,497	1,973,541	1,233,463



- Despite 95% village electrification through grid extension, over 30% households still depend on kerosene for lighting
- There exists great disparity in household level electrification in States like Bihar (10.4%), Uttar Pradesh (23.8%), Assam (28.4%), and Jharkhand (32.3%), and Odisha (35.6%) lagging way behind states like HP (96.6%), Punjab (95.5%) and Andhra Pradesh (89.7%)

Rational for Off-Grid Renewable Energy for effective Rural Electrification

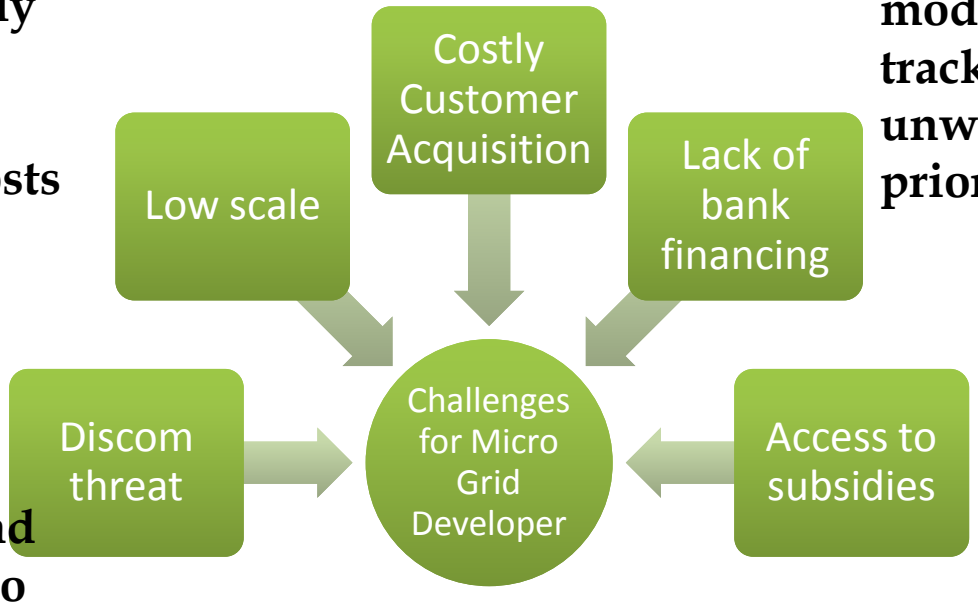
- Mission "Electricity for ALL by 2012" still distant unfulfilled dream
- Of 6 lakh villages, only 14,000 be electrified.
- >40% rural & >10% urban HHs still do not have access to electricity
- Several of these HHs are in un electrified villages, padas, bastis
- Even electrified villages are witnessing shortages in supply (<6hr)
- More 74 million HHs still depending kerosene as primary source for lighting
- With 240W connected load technical off-grid power potential is ~ 20GW/40BU
- Expensive to undertake extension of network, CoS of Rs. 20+/unit
- Difficult to maintain quality of supply for long network, voltage drops
- Need local generation to stabilise the grids
- Abundant RE resources are locally available
- Micro/ mini grids if structured properly, would be viable solutions

Challenges faced by Rural Micro Grid Developers

Need to convince the customers/villages on one's own. Takes time and high cost of effort

Often begin to supply only residential segment~ a few KW system. High unit costs

'High risks', 'low scale' , uncertainties of 'revenue model', and lack of 'credible track record' --→ bankers unwilling to lend, despite priority lending status



RGGY and MNRE subsidies are not easily accessible by private Developer's

Threat that discom will begin supply and outcompete the micro grid

Rationale for Development of New Policy Initiatives

- Large number of communities in hamlets/ bastis/ padas are yet to be electrified
- Many places grid has reached but supply is severely constrained
- Liquid fuels (kerosene & diesel) are being widely used for basic applications such as lighting
- Significant untapped local renewable energy potential exists
- RE though cheaper than kerosene, expensive than grid supply
- Existing policies/programs inadequate for large scale deployment of off-grid generation projects

Two distinct but interconnected problems

- Rural electrification consists of two distinct but interconnected problems
  - i.e. Generation & Distribution
- Different business models exist for generation & network

Parameters	Off-Grid		Grid Connected
	Without Grid	After Grid	
Generation	Must	Remains Idle	Not required
Hours of Supply	Limited based on technology	Depends on grid supply	As far as grid can supply
Certainty of supply	Fixed duration / fixed time	Depends on grid supply	Closely tied with grid supply
Distribution Network	Property of franchisee	Duplicate Network	DISCOM takes over
O&M of Distribution Network	Franchisee	Two separate operators	DISCOM / Franchisee
MBC	Franchisee	Duplicate efforts	Franchisee / DISCOM
Major Risk	Grid Interconnection	Idle Infrastructure	-

Proposed Business Model must address these problems

Key Considerations for developing new Business Models

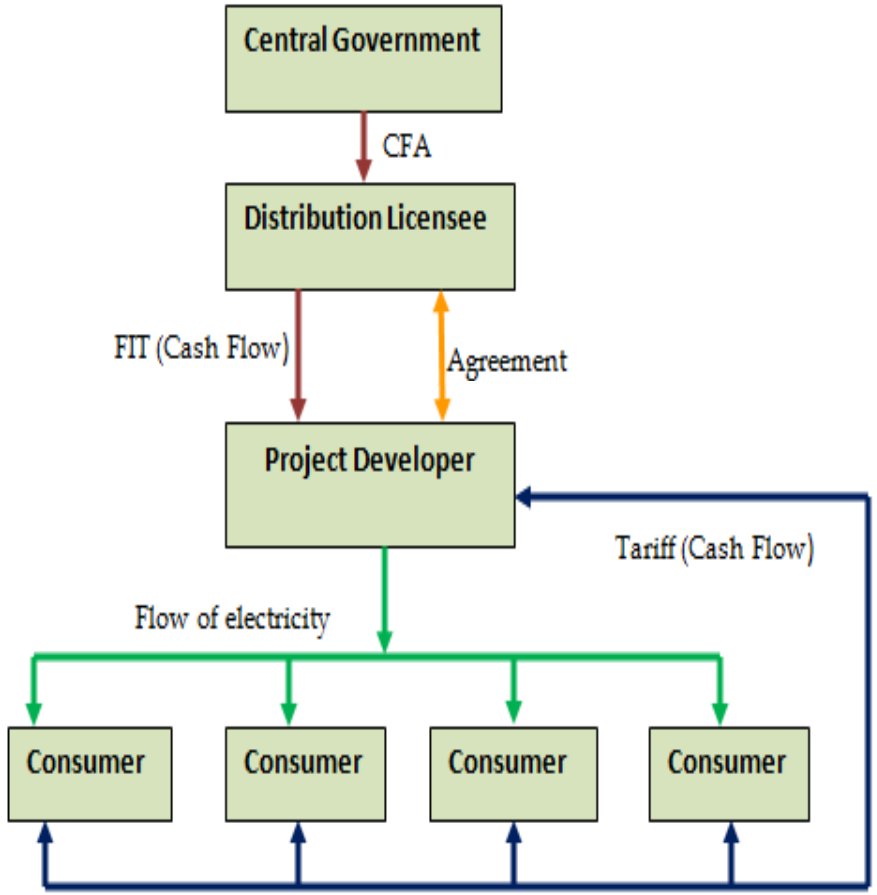
- Business model must work in off-grid & grid connected set up
- Consumer should not pay more than
  - Electricity tariff in adjoining areas (not more than DISCOM tariff)
  - Existing expenditure on lighting load
- Compliant with EA 2003, existing policies
- Create structure for flow of subsidy
- As far as possible, internalization of costs of Rural Electrification
- Should make use of existing institutional structure
- Avoid conflict between programmes of various ministries
- Should promote private sector involvement

In view of these requirements and the analysis carried out, potential models have been proposed

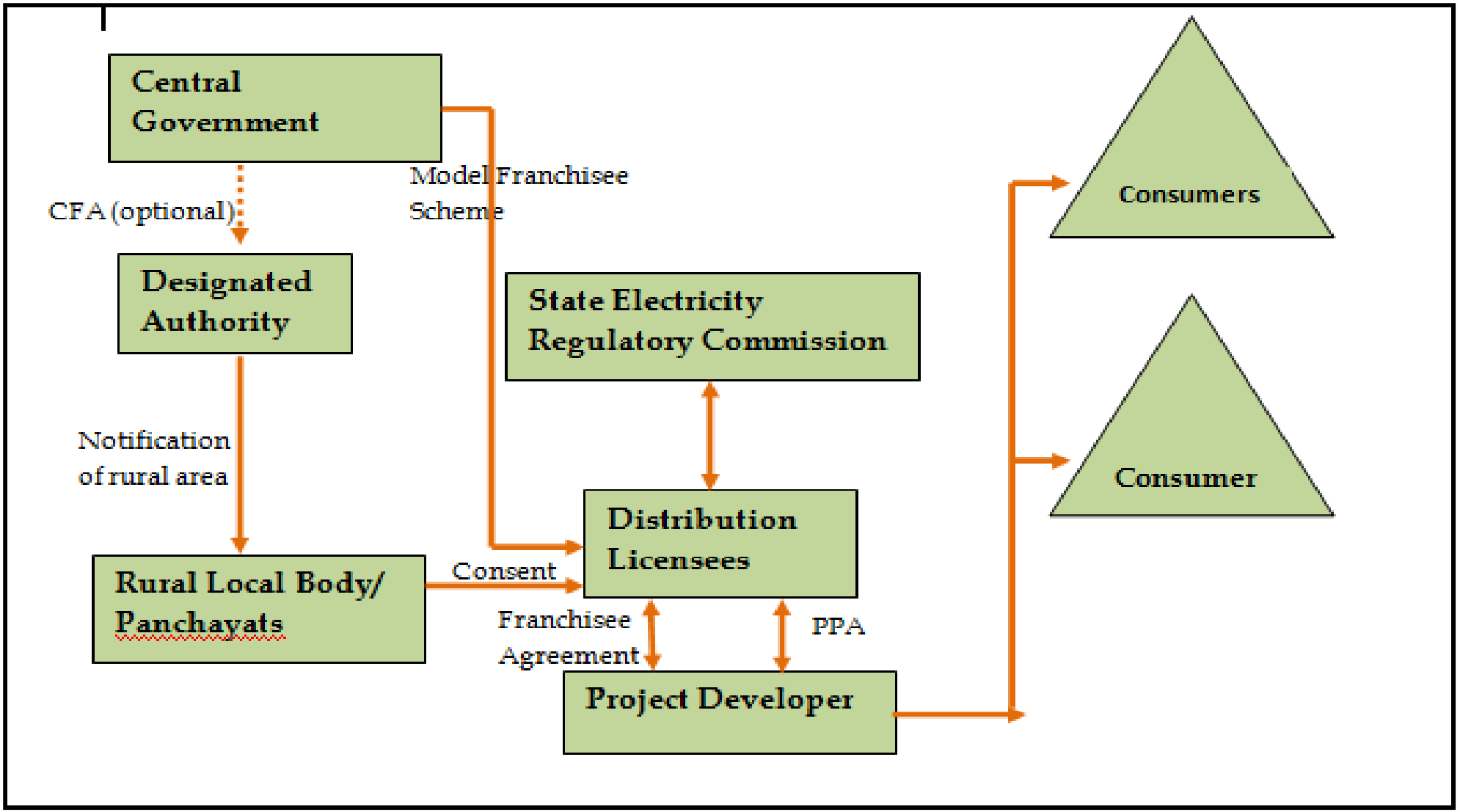
ODGBDF Model

(Off-grid Distribution Generation Based Distribution Franchisee)

- Project Developer (PD) will not only generate electricity but also undertake metering, billing, and collection (MBC) on behalf of DISCOM within the cluster
- Thus the developer will act both as generator and distributor franchisee
- So PD and DISCOM would need to draw up two agreements:
  - PPA for lifetime of proposed RE-based DDG power plant
  - Franchisee agreement for MBC on behalf of the DISCOM.
- DISCOM will pay agreed-upon FIT to PD. As per current practice, DISCOM will distribute electricity to rural consumers and PD will undertake MBC under franchisee agreement.



Institutional & Contractual Structure of ODGBDF Model implementation



Major Advantages of ODGBDF Model

- Would enable large scale deployment of off-grid projects which no other model can do
- Model could be used for off-grid as well as on-grid supply augmentation
- Maximum certainty of revenue to the developer
- Benefits of economies of scale
- Economic benefit to the consumers
- Accounting and Optimum utilisation of the government subsidy, if offered
- FIT guidelines at national level would bring in uniformity.
- Proper integration of off-grid projects with grid as and when is feasible
- Internalisation of costs of rural electrification
- Distribution Licensee can meet twin objective of electrification and RPO
- Possible to customise model according to local requirements

Bihar Feed In Tariff for Off-Grid Generators

Voltage-wise Cost of Supply

The cost of supply at each voltage level has 4 elements which are added to arrive at per unit cost of supply as tabulated below:

Voltage Level (kV)	220	132	33	11	0.4	Total
Cost of power purchase (Cents/Unit)	6.8	6.8	6.8	6.8	6.8	**6.8**
Cost of Loss (Cents/Unit)	0.29	0.62	0.64	1.02	5.36	**3.67**
Wire cost (Cents/Unit)	0.00	0.00	0.33	2.07	3.55	**2.44**
Retail Supply Cost (Cents/Unit)	0.00	0.00	0.00016	0.002713	1.15	**0.70**
Cost of supply (Cents/Unit)	**7.08**	**7.42**	**8.15**	**10.69**	**16.86**	**13.63**

Urban-Rural Cost of Supply

Cost of Supply	Urban	Rural	Total
Cost of power purchase (Cents/Unit)	6.8	6.8	**6.8**
Cost of Loss (Cents/Unit)	4.35	7.95	**5.36**
Wire cost (Cents/Unit)	1.99	7.6	**3.54**
Retail Supply Cost (Cents/Unit)	0.92	1.75	**1.15**
Cost of supply (Cents/Unit)	**14.06**	**24.11**	**16.86**

Clearly, cost of supply to LT rural consumer is much higher than grid tariff charged This necessarily implies that, **grid extension to serve rural consumers would further increase the distribution costs of Discom.**

This, to some extent, supports hypothesis that, proposed higher FITs to be paid to off-grid RE based DDGs for rural electrification might not be really too high and even subsidy as such as real cost of supplying power to rural consumer even through grid extension may even be higher than FIT in some cases.

Feed-in Tariffs for Off-Grid Generators

- As per the PPA to be signed between the two parties, the Feed-In tariff is to be pa

	Up to 25 kW	25-50 kW	50-75 kW	75-100 kW
Biomass	30.7	26.91	23.79	20.95
Solar	38.28	35.96	31.90	30.88
Micro Hydel	15.11	12.75	10.56	8.55

Particulars	Levelised COG/ FiT (Cents/kWh)											
	Without Subsidy			With 30% Subsidy			With 70% Subsidy			With 90% Subsidy		
	Biomass	Solar	Hydro	Biomass	Solar	Hydro	Biomass	Solar	Hydro	Biomass	Solar	Hydro
Total COG	**20.92**	**30.88**	**8.55**	**17.10**	**23.07**	**5.98**	**11.98**	**12.65**	**2.56**	**9.41**	**7.45**	**0.86**

Way Forward

- Develop state specific draft regulations for ODGBDF in potential states (ongoing)
- Develop Feed-in-Tariff (FiTs) for Small-Scale Off-Grid RE power plants (ongoing)
- Develop and implement few pilot projects based on proposed business model
  - To put in place requisite policy and regulation framework
  - To show case proof of concept of viability
  - To get insight and learning for launching large-scale deployment programme
- Assessment of entrepreneur ability to undertake electrification
- Assessment of the financial institutions to fund projects under ODGBDF Model
- Explore possible synergy with SPEED programme or new 1000 village program

Thank You

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