



India – Market Potential for Renewable Energies



K S Popli

Chairman and Managing Director

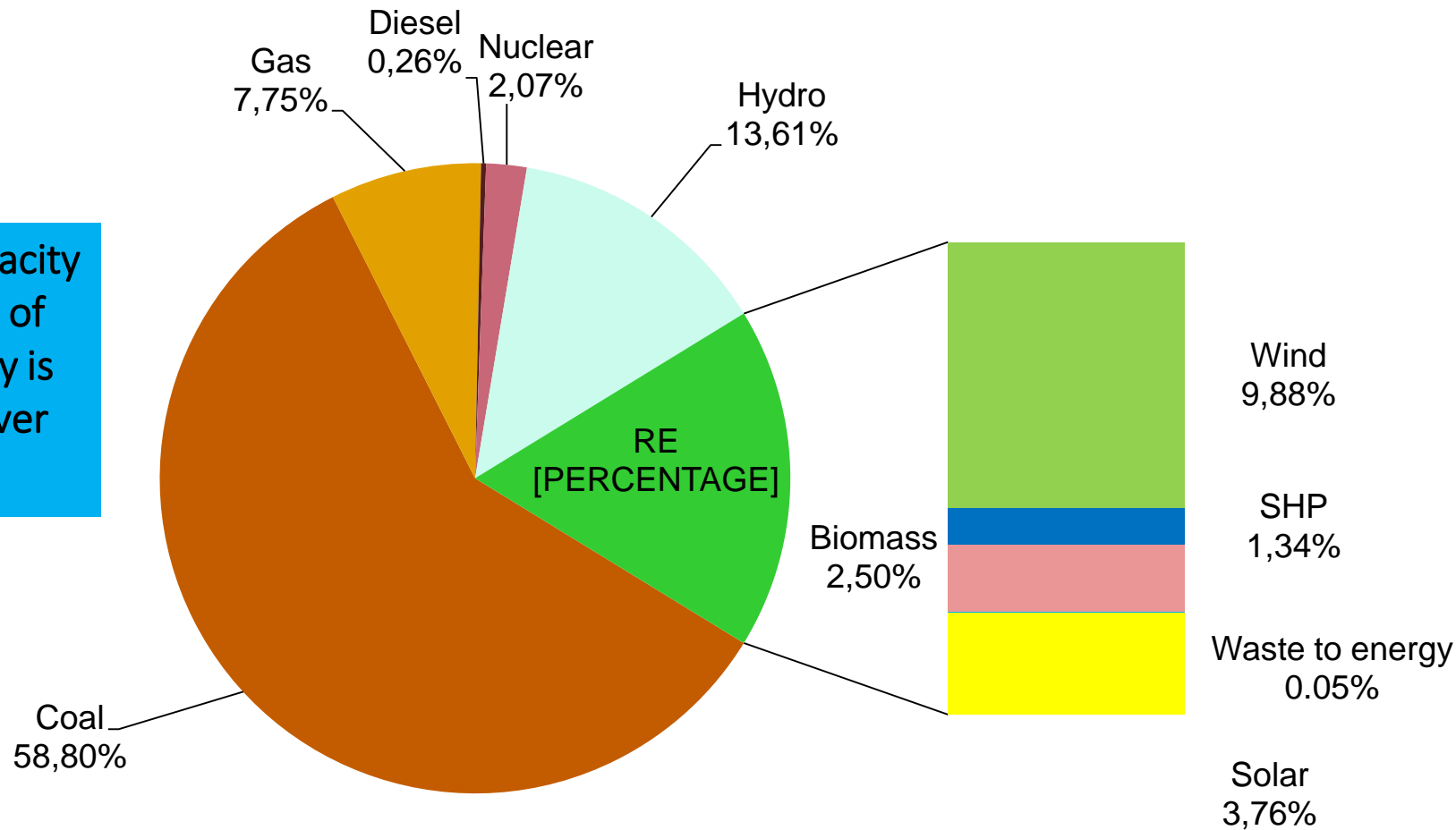
Indian Renewable Energy Development Agency Ltd. (New Delhi, India)

30th May 2017 | Duesseldorf, Germany

Power Scenario in India

Total Installed capacity of 326.85* GW, of which RE capacity is nearly 57 GW, over 17.5%.

*As on March 2017



Renewable Energy Potential Achievements & Targets

Sector	Potential (GW) (As on date)	Installed (GW) (as on Mar 2017)
Wind	302*	32.2
Solar	750	12.2
Small Hydro	20	4.3
Biomass incl bagasse Cogen.	23	8.3
Total	1095	57

**Target (2022):
175 GW**

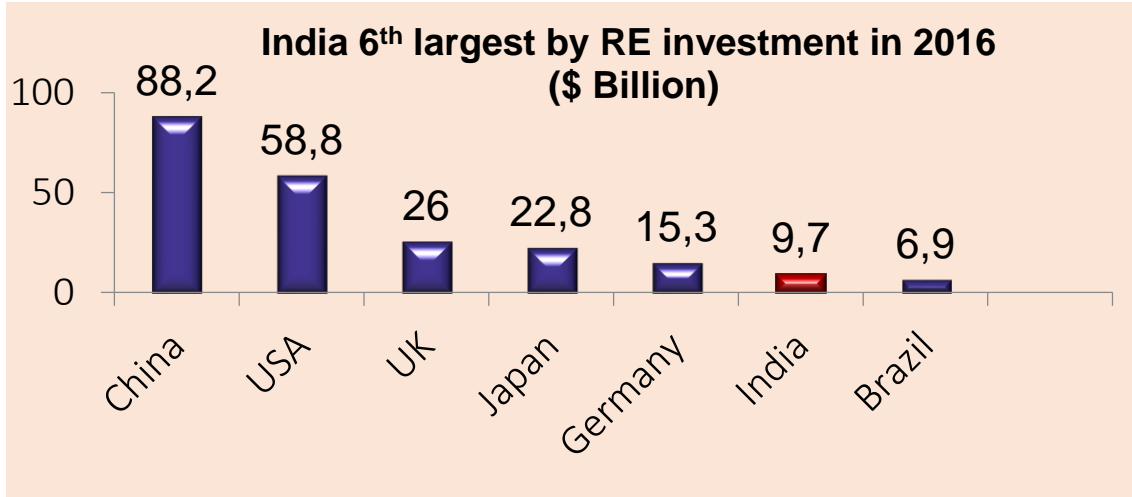
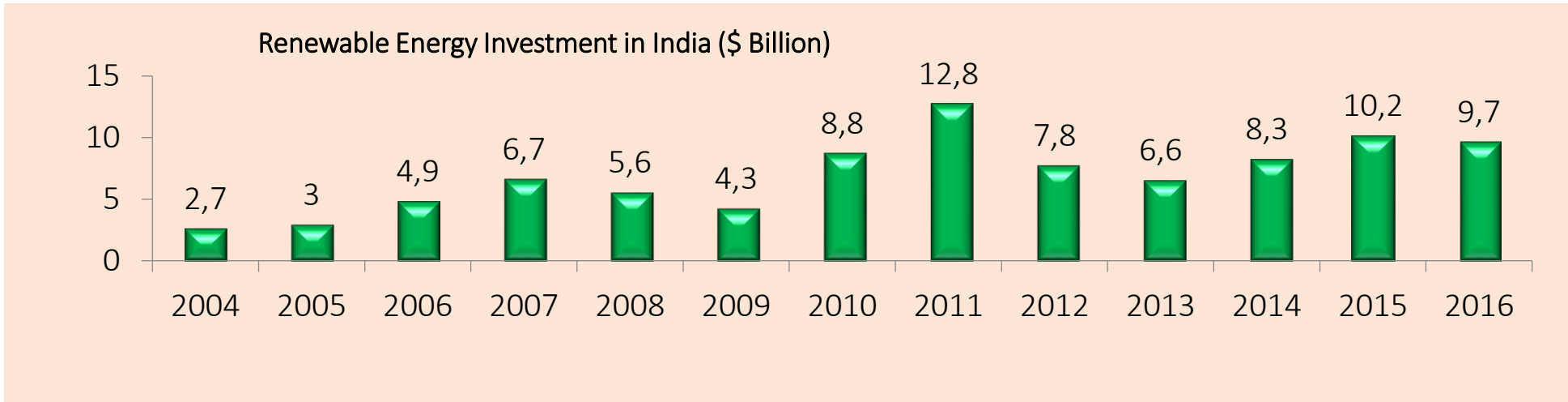
Solar	100 GW
Wind	60 GW
Bio Energy	10 GW
Small Hydro	5 GW

* At 100 m hub height estimated by NIWE

India - Intended Nationally Determined Contribution (INDC) Targets

- Increasing the share of non-fossil-based power-generation capacity to **40% of installed electric power capacity by 2030**.
- To **lower the emissions intensity of GDP by 33% to 35% by 2030** below 2005 levels.
- Create an additional carbon sink of 2.5 to 3 billion tonnes of CO2 equivalent through additional forest and tree cover by 2030.

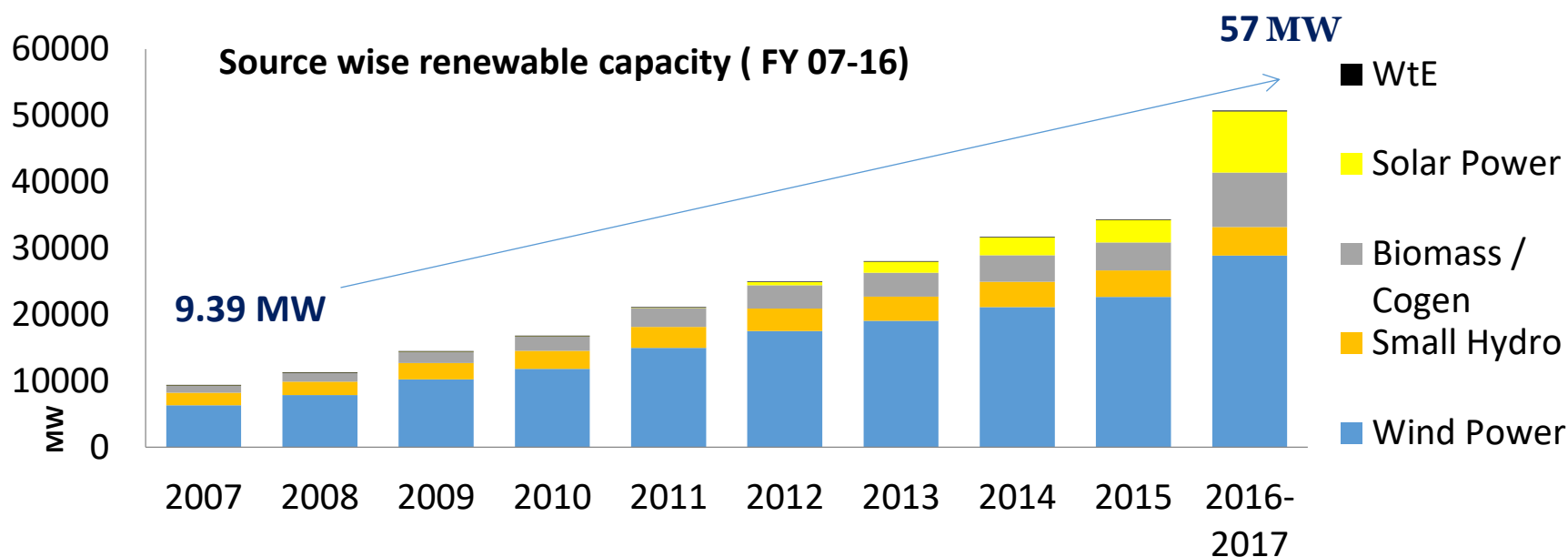
Renewable Energy Investment –Global vis-à-vis India



- Total Global investments in RE was \$287.5 Billion in 2016 (Fell 18% from 2015 levels)
- Reduction in technology costs, raw material costs, improved technology, conducive policy environment, better financing structuring of projects have resulted in low capital costs.
- Global Solar PV Capacity by end of 2016 was 295 GW, Wind Energy was 466 GW.

Source: Bloomberg New Energy Finance

Indian Renewable Energy Status: Growth and targets



Capacities in MW					
Source	Installed capacity by end of 11 th Plan (March 2012)	Target as per 12th Plan (April 2012 – March 2017)	Cumulative target by the end of 12th plan	Current installed Capacity (March 2017)	Revised Targets till 2022
Solar Power	941	10,000	10,941	12,289	1,00,000
Wind power	17,352	15,000	32,352	32,280	60,000
Bio Power	3,225	2,900	6,125	8,296	10,000
Small Hydro	3,395	2,100	5,495	4379	5,000
TOTAL	24,914	30,000	54,914	57,244	1,75,000

Renewable Energy – Market Drivers

Demand Supply Gap

- Demand-supply gap (3.2% peak deficit -FY 2015-16) in power generation and fuel supply issues have resulted in strong impetus to Renewable Energy
- Average per capita electricity consumption is 1010 units against world average of 3000 Units

Ample Renewable Energy Resources

- India is generously endowed with Renewable Energy resources like sun, wind, bio-mass/ agro materials and water resources. Estimated potential of 1095 MW.

Upscale RE Targets of 175 GW by 2022

- The Government has set Renewable Energy target of 175 GW by 2022
- GoI commitment of “Power for All” by 2019

Grid Parity

- Solar Power tariffs have come down as low as Rs. 2.44/kWh (€ 0.03), less than the APPC Costs, Wind Power Tariffs : Rs 3.46 (€ 0.05)

Energy Security

- Provides long term energy security and make the economy less vulnerable to global fuel prices which is critical for country like India, a net importer of its fuel requirements

Favourable Policies

- Various policy initiatives by GoI such as 15% RPO by 2020, benefits like subsidies, tax exemption and other incentives such as GBI, RECs, FIT, etc. gives a huge boost to Renewable Energy in India

GoI (Government of India), GBI (Generation Based Incentives), RPS (Renewable Portfolio Standard), REC (Renewable Energy Certificates), FIT (Feed in Tariffs)

Key incentives

FDI: Foreign Direct Investment

- 100% FDI under the Automatic Route
- Does not require approval from the Government of India
- The Indian Company receiving FDI is required to:
 - Report to the Reserve Bank of India the receipt of FDI within 30 days
 - File form FC-GPR within 30 days of issue of shares

JV: Joint Venture

- Automatic approval for up to 74% foreign equity participation in a JV
- Liberalized foreign investment approval regime
- 100% foreign investment as equity is permissible with the approval of Foreign Investment Promotion Board (FIPB)
- Various chambers of commerce and industry associations offer guidance on partners

- **Accelerated Depreciation:** @40% on Solar / Wind Assets
- Other incentives such as Capital Subsidy of upto 30% for Solar Rooftop Projects, Capital Subsidies for Bio Energy Projects, SHP etc.
- Earlier, incentives such as Generation Based Incentives (GBI), Income tax Holiday for 10 Years, Viability Gap Fund etc. were given the RE Sector. Some of the incentives have been recently withdrawn, as the RE technologies are achieving grid parity.

Funding Requirements

- To achieve the target of 175 GW from present 57 GW of renewable energy, approximately Rs. 5,75,000 Cr. (€ 80 Bn) needed over the period of next 5 years (until 2022)

**175 GW RE plan by 2022 entails investment of
Approx (€ 80 Bn) (About Rs. 5,75,000 Crore)**

Debt (70%)

€ 56 Bn
(~ Rs. 4,00,000 Crores)

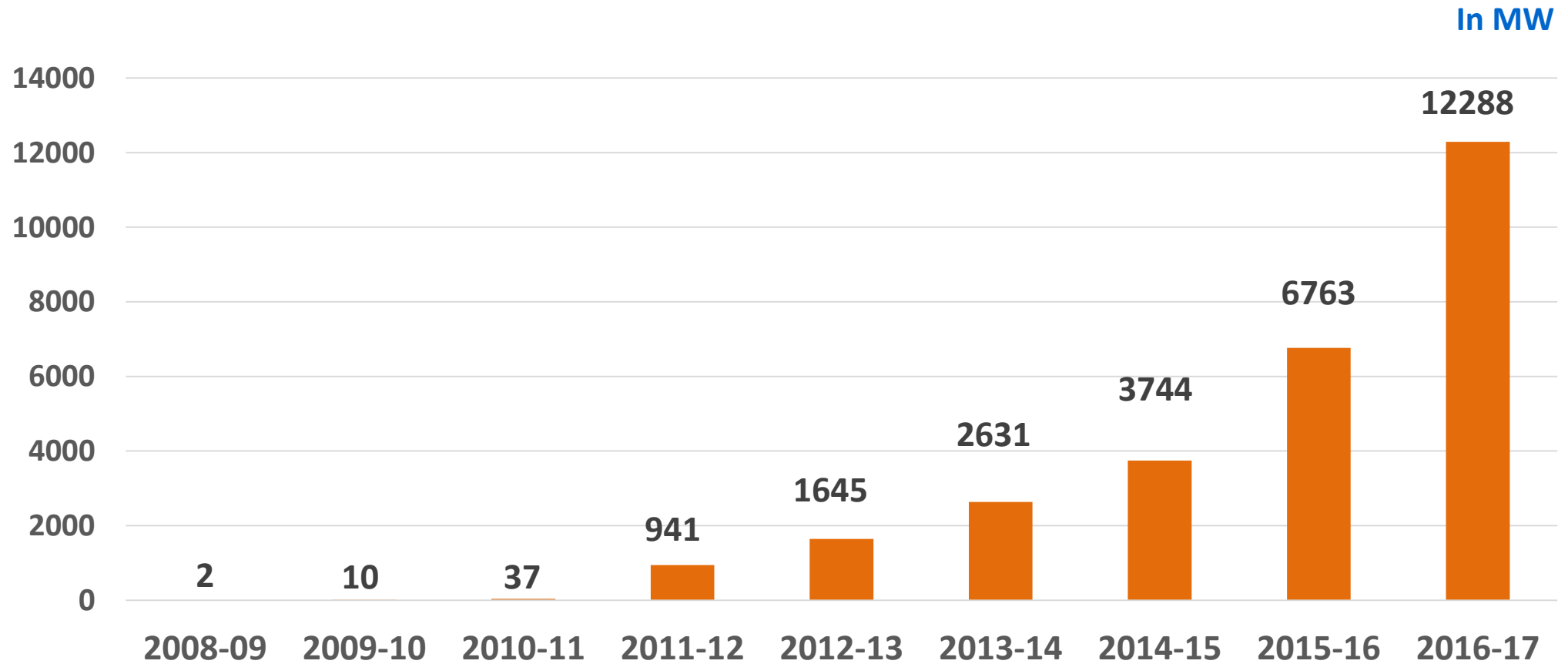
Equity (30%)

€ 24 Bn
(~ Rs. 1,75,000 Crores)

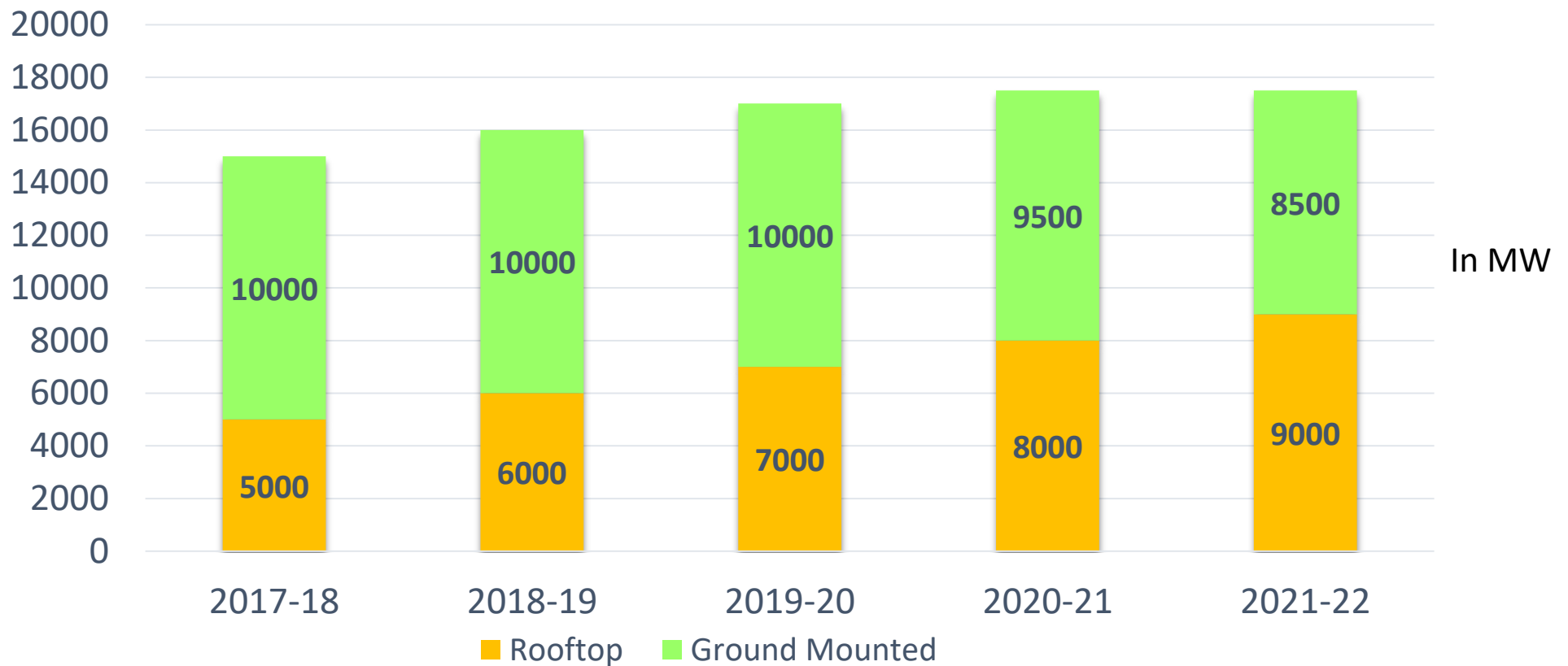
Solar Energy – Indian Scenario



Solar Power - Cumulative Growth of Installed Capacity



Solar- Growth Projections for next 5 years



100 GW Solar Target - Modes of Development

Gol: Capex support & Bundling

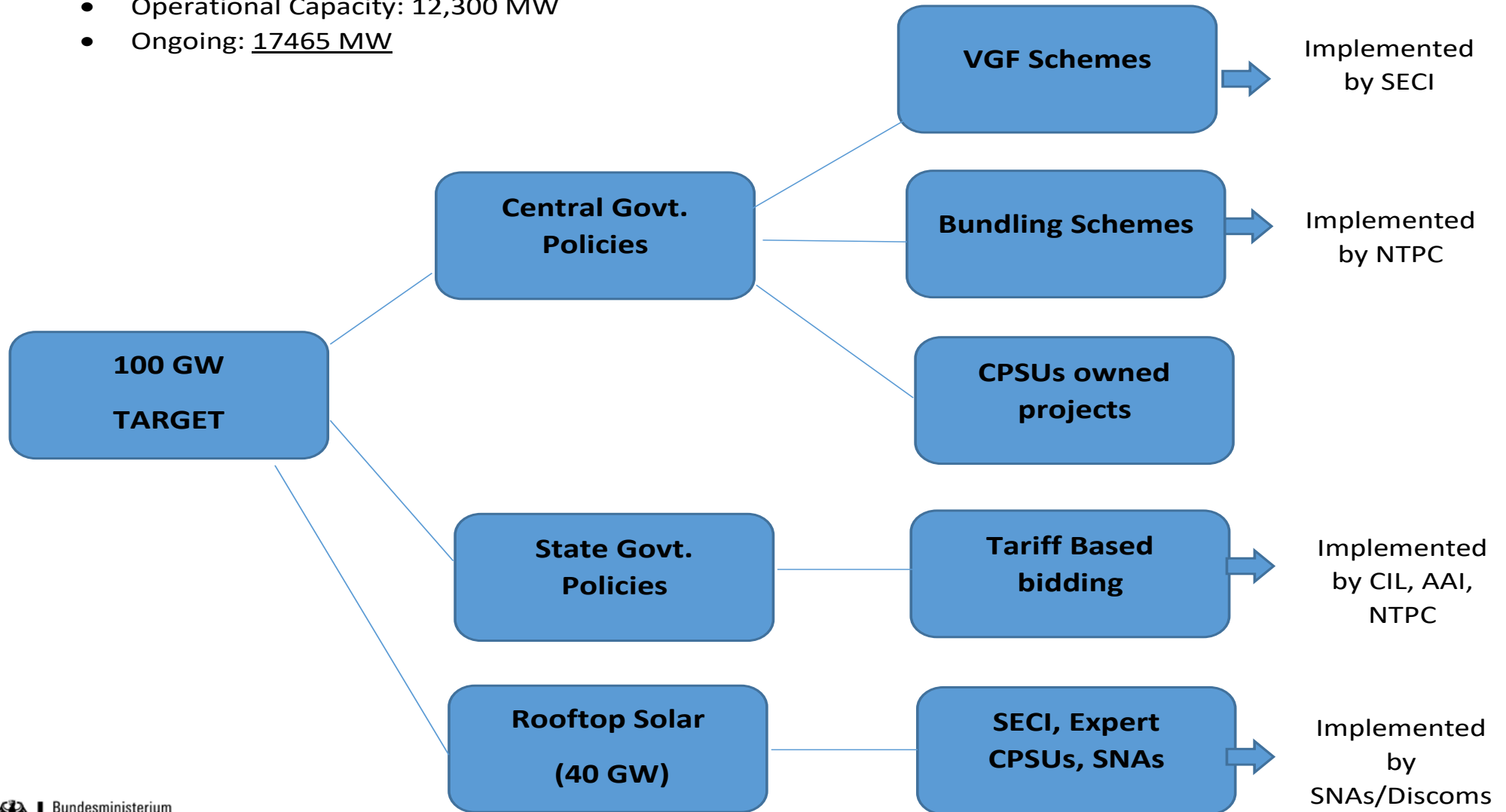
- VGF, CPSU, EPC, Canal & Bundling
- SECI & NTPC as intermediary

State own: 16,000 MW

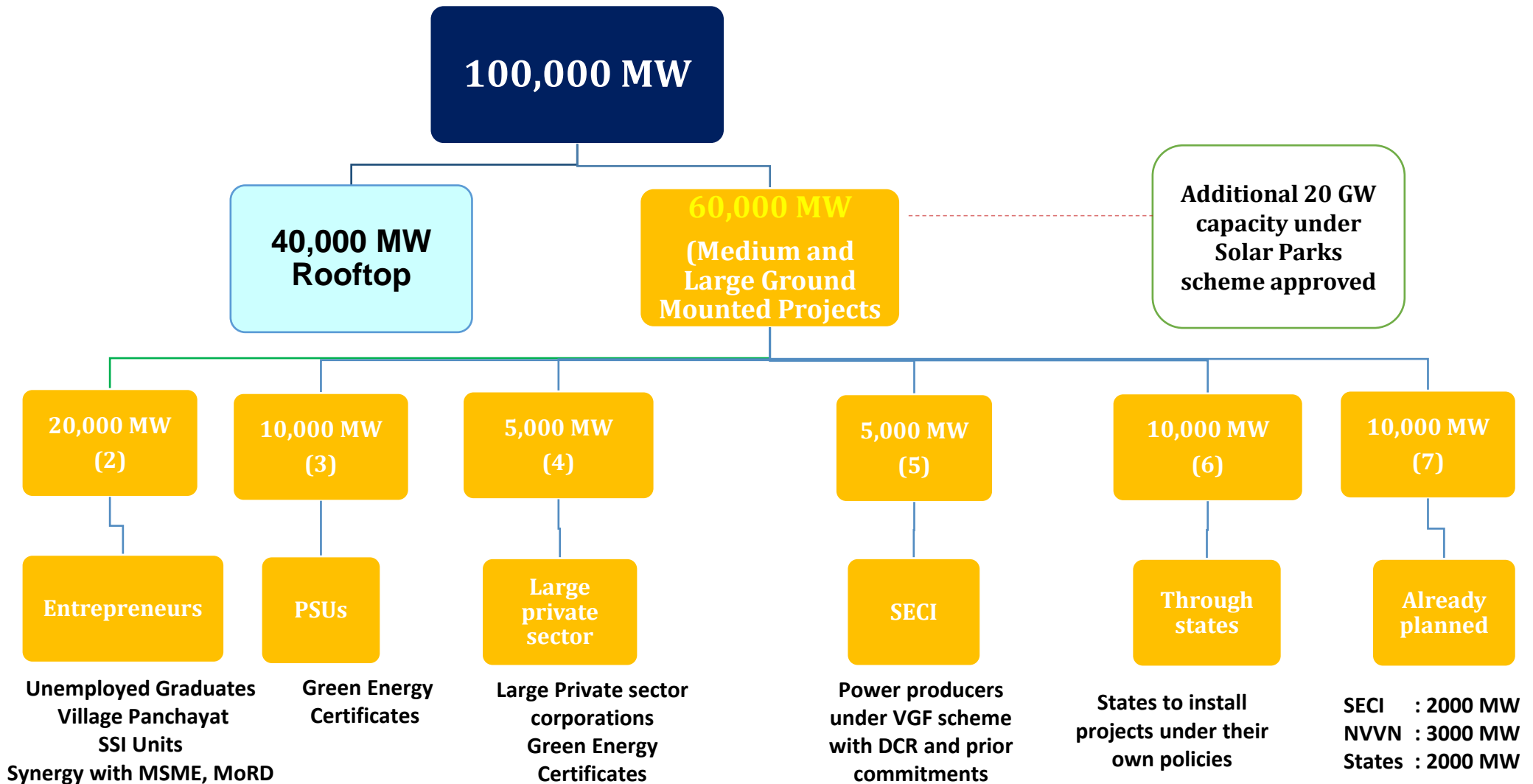
Progress

- Operational Capacity: 12,300 MW
- Ongoing: 17465 MW

Modes of Development

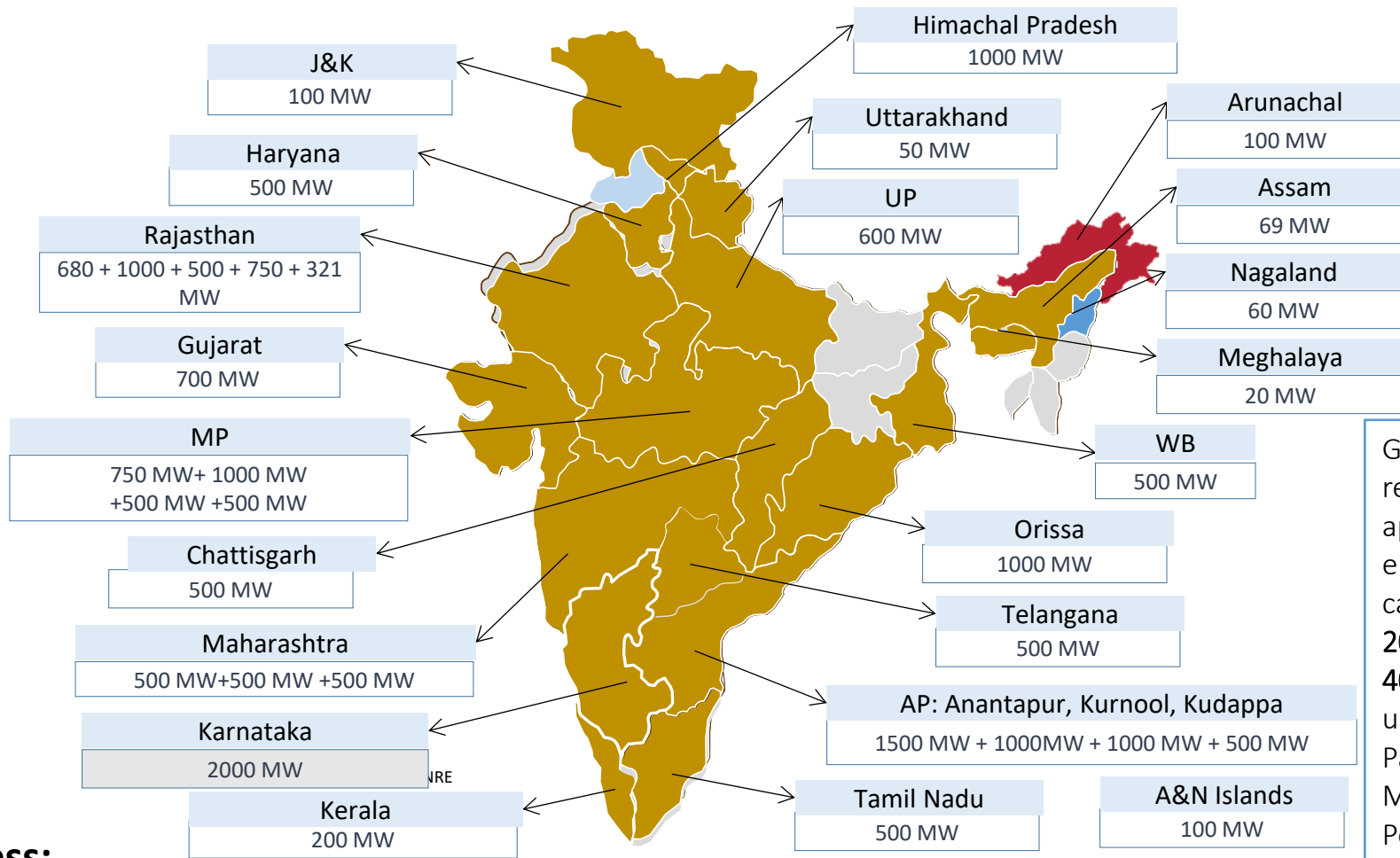


Solar: 100 GW Vision by 2022 - Opportunities



Solar Parks: 20,000 + 20,000 MW

34 Parks (22 states) with capacity 20,000 MW approved



Govt. has recently approved enhancement of capacity from 20,000 MW to 40,000 MW under "Solar Parks and Ultra Mega Solar Power Projects".

Progress:

- Land Acquired: 70,152 Acres | Projects Tended: 7,200 MW
- Commissioned: 1586 MW | Central Finance Assistance Released: Rs. 900 cr (€ 124 mn)

Progress of Solar Parks

Name of Solar Park & Site	Capacity (MW)	D/o in principal Approval	Land Acquired (Acres)	Common Infrastructure		Transmission System	
				Road	Water	Internal	External
Anathapuramu Solar Park - Andhra Pradesh	1500	28.11.2014	8431	Work is completed	Completed	1 ESS done, rest by Oct. 2017	Completed
Kurnool - Andhra Pradesh	1000	28.11.2014	5208	Under progress	Work under progress	completed	Completed
Kadapa -Andhra Pradesh	1000	09.10.2015	5422	tender yet to be issued	tender yet to be issued	tender yet to be issued	tender yet to be issued
Anathapuramu Solar Park - II - Andhra Pradesh	500	15.01.2016	4022	tender yet to be issued	tender yet to be issued	tender yet to be issued	tender yet to be issued

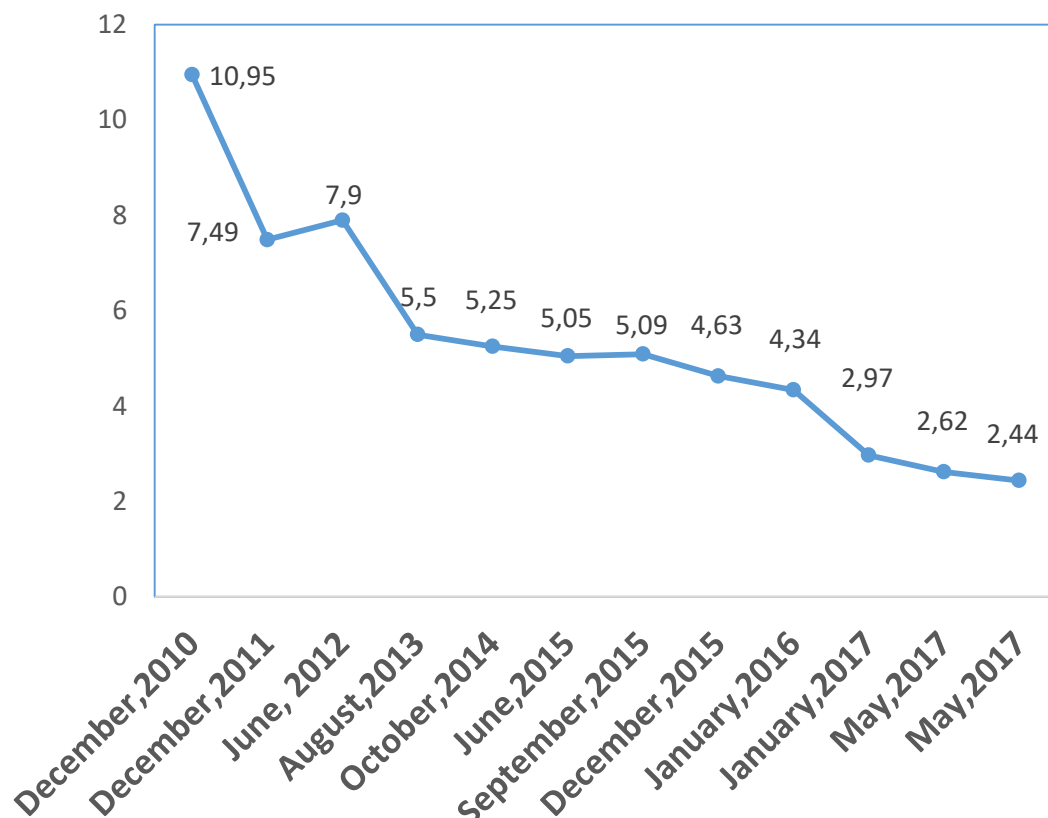
Name of Solar Park & Site	Capacity (MW)	D/o in principal Approval	Land Acquired (Acres)	Common Infrastructure		Transmission System	
				Road	Water	Internal	External
Bhadla - III	1000	12.12.2014	6066	Work awarded	—	Expected completion, Sep 2017	would be ready by December 2017
Radhnesaada - Gujarat	700	01.12.2014	3475	Tender yet to be awarded	Allocation of 1.5 MLD water is granted by SSNNL	GETCO requested to take up the work	Being Developed by Power Grid
Pavagada - Gujarat	2000	19.03.2015	11100	Completed	Almost completed	4 Stations to be completed, June 2017	Work under progress
Rewa - Madhya Pradesh	750	01.12.2014	3390	On National highway	Being Awarded	Expected to be completed by June, 2017	Expected to be completed by June, 2017
Bhadla Phase-II, Rajasthan	680	02.12.2014	4440	Work is completed	Almost completed	Almost completed	Work under progress



Reducing cost of power from Solar

- Tariffs evolved in FIT - Competitive bid process (INR/kWh)

Tariff (Rs./kWh)



Project	Capacity on Offer (MW)	Levellised / Lowest tariff (Rs/KWh)	Year
NSM – Batch I	150	10.95 (€ 0.15)	December, 2010
NSM – Batch - II	350	7.49 (€ 0.10)	December, 2011
Madhya Pradesh	125	7.90 (€ 0.11)	June, 2012
Karnataka	130	5.50 (€ 0.08)	August, 2013
Andhra Pradesh	500	5.25 (€ 0.07)	October, 2014
Madhya Pradesh	300	5.05 (€ 0.07)	June, 2015
Punjab	500	5.09 (€ 0.07)	September, 2015
Andhra Pradesh	350	4.63 (€ 0.06)	December, 2015
Rajasthan	420	4.34 (€ 0.06)	January, 2016
Madhya Pradesh	750	3.30 (€ 0.05) (with 1 st yr. tariff @ Rs. 2.97/unit)	January, 2017
Andhra Pradesh	250	3.15 (€ 0.04)	April, 2017
Rajasthan	250	2.62 (€ 0.04)	May, 2017
Rajasthan	500	2.44 (€ 0.03)	May, 2017

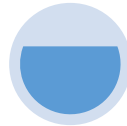
Factors leading to reduction in solar tariffs

De-risked Bidding



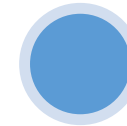
Guarantee by Off-takers

- Payment security with NTPC and SECI as the power off-takers in most bids
- Three month payment guarantee in case of delays from the distribution company



Online reverse bidding

- Enables developers to lower their bids in real time
- Promotes competition with transparent lower tariffs



Scale of projects and Solar Parks

- Large scale projects being bid result in economies of scale
- Faster and easier implementation of projects
- Common pool of resources and better network utilisation

Reduction in EPC costs



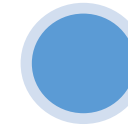
Reduced technology costs



Strong competition with lower margins for EPC's



Larger pool of investors



Concessional financing

Entry of major foreign players

Rooftop Solar: Target to achieve 40 GW grid tied rooftop



Status	656 MW Installed capacity 2100 MW Projects approved (in Principal) [Potential for 124 GW exists]
Target	40 GW by 2022
Current support	Subsidy of 30% of capital cost (except for Private, Industrial, Commercial)

Promotional measures:

- 36 States/UTs have notified net metering regulations
- Rooftop included under Integrated Power Development Scheme and guidelines issued
- Guidelines issued to include rooftop under housing loan and banks have issued instructions
- Central Electricity Authority (CEA) has notified technical standards for connectivity and metering
- A grant of INR 50 Billion (\$ 757 Million) has been approved to support 4200 MW rooftop projects
- \$ 2 billion line of credit through KFW, WB and ADB for rooftop projects

Rooftop Solar: Sanctioned Capacity in MW

State/ UT's	Target MW	Sanction under Scheme	Capacity installed	Capacity Tendered
Andhra Pradesh	2000	35	14	39
Assam	250	24	2	10
Andaman & Nicobar	30	1	2	1
Chattisgarh	700	6	12	7
Delhi	1100	84	35	84
Gujarat	3200	82	38	53
Goa	150	0	1	0
Haryana	1600	70	45	3
J&k	450	7	1	0
Jharkhand	800	55	7	29
Kerala	800	10	38	0
Karnataka	2300	11	46	0
Lakshdweep		1	0	0
MP	2200	115	6	30
Maharashtra	4700	100	64	100
Odhisa	1000	0	3	4
Puducherry	100	5	0	
punjab	2000	25	69	25
Rajasthan	2300	31	25	31

State/ UT's	Target MW	Sanction under Scheme	Capacity installed	Capacity Tendered
Tamil Nadu	3500	307	83	24
Telangana	2000	70	15	0
Tripura	50	0	0	46
Uttrarakhnad	350	49	16	12
Uttar Pradesh	4300	7	36	3
West Bengal	2100	5	15	13
Chandigarh	100	28	12	5
Manipur	50	8	0	10
Himachal Pradesh	320	10	1	0
Mehgalaya	50	0	0	0
Nagaland	50	0	0	0
Sikkim	50	0	0	0
Dadra & Nagar Haveli	300	0	0	0
Daman & Diu	0	0	0	0
Bihar	1000	0	3	0
Arunachal Pradesh	50	0	0	0
Mizoram	50	0	0	0
Sub- Total	40,000	1146	656	529

Rooftop Solar - Key Implementation Challenges

- Need for Speedy approval of net-metering and connectivity following up of regulatory framework by DISCOMs.
- Absence of Sustainable Business Models for different consumer segments, viz
 - Industrial & Commercial
 - Government
 - Institutions
 - Residential
- Lack of awareness, information and financial incentives to customers.
 - Although Reserve Bank of India has notified renewable sector under Priority Sector Lending, it needs to be made effective at the branch level to ease the lending to the borrowers.
 - Train bankers to help unlock local debt for solar rooftop projects

Contd..

- Challenges in getting standard Roof Lease Agreement
- Absence of large corporate houses showing interest in RESCO Business.
- RESCOs yet to gain experience in Solar Rooftop segment.
- As the sector is new and lack of well established developers with proven track record.
- Lack of trained manpower

Solar - Manufacturing Base

- India's total module manufacturing capacity is estimated at 5,286 MW.
- About 88% of all module requirement in India is met through imports
- The Government of India, together with state governments, is offering several incentives for manufacturing modules in India – including capital subsidy, operating cost subsidy and export incentives – under different policies

Solar - Proposed Action Plan for 2017-18

- More and more states to adopt Standard bid documents & Bidding Guidelines
- Development of Model PPA , RfP etc
- Solar Park: Expediting Clearances, Land, Connectivity etc
- Ensuring Must Run Status
- Payment for Deemed Generation - Grid Unavailability / Back Down
- Strong Payment Security: PSM Fund, State Guarantee
- Introduction of Credible Intermediary: Reducing Offtaker risks

International Solar Alliance (ISA)

- The Hon'ble Prime Minister of India launched the International Solar Alliance (ISA) at the CoP21 Climate Conference in Paris on 30th November, 2015.
- Special platform for mutual cooperation among 121 solar resource rich countries lying fully or partially between Tropic of Cancer and Tropic of Capricorn.
- Dedicated to address special energy needs of ISA member countries and provide opportunities to member countries to work together to increase solar capacity across emerging markets.
- ISA aims 1,000 GW of solar capacity by 2030 across its member countries.
- Expected investments are to the tune of about USD 1000 Bn.

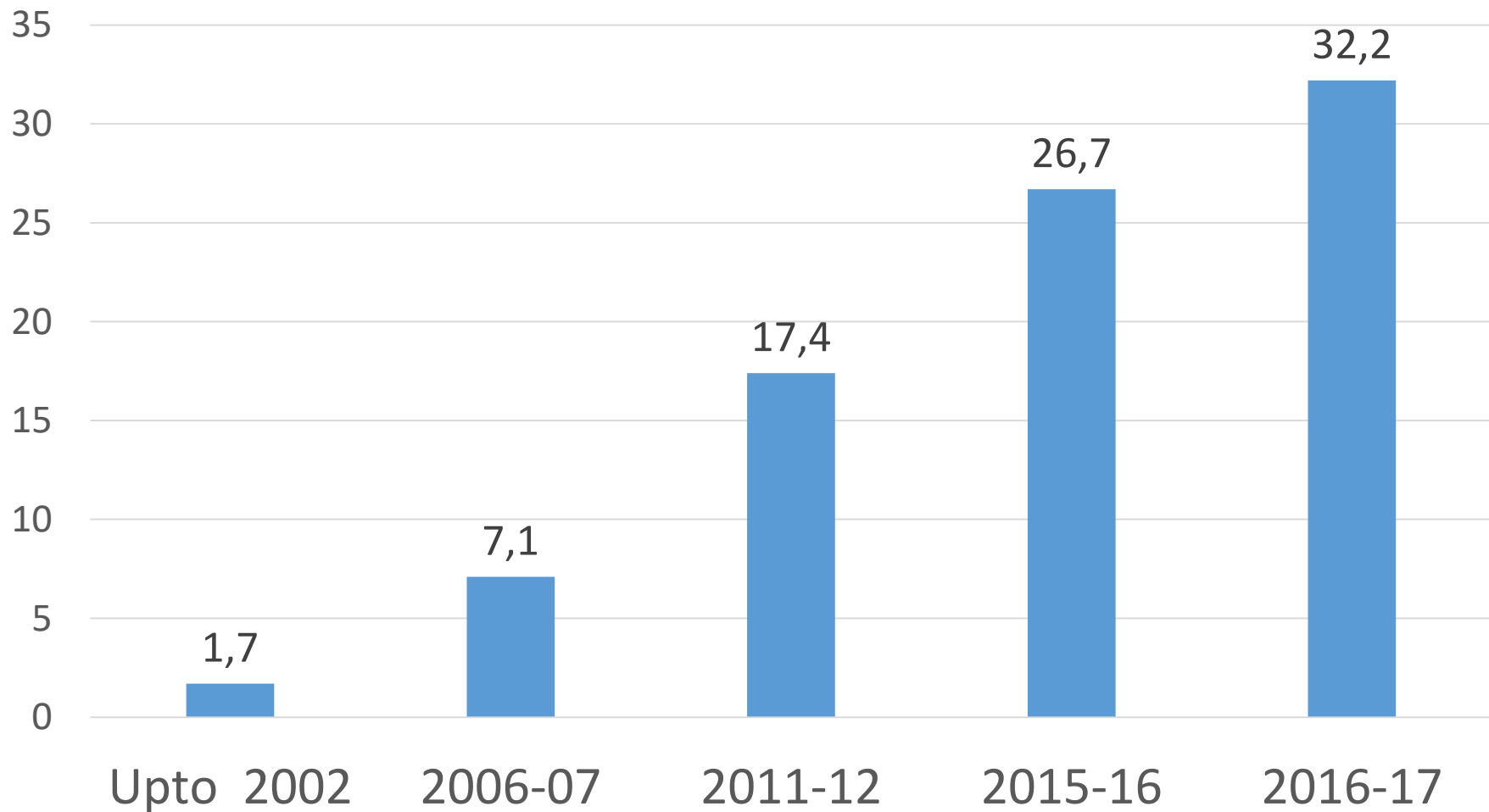
Programmes / Projects under ISA to create buyers market

- “Scaling Solar applications for agricultural use”
- “Affordable Finance at Scale”

Wind Energy – Indian Scenario



Wind Power - Cumulative Growth in India (In GW)



Reducing cost of Power from Wind

States	Cumulative installed Capacity as on March, 2017 (MW)	Current Wind Tariff (Rs. /kWh)
Andhra Pradesh	3621	4.84(€ 0.07)
Gujarat	5223	4.19(€ 0.06)
Karnataka	3751	4.5(€ 0.06)
Madhya Pradesh	2498	4.78(€ 0.07)
Rajasthan	4282	5.76 & 6.04 (€ 0.08 & 0.9)(*)
Tamilnadu	7876	4.16(€ 0.06)
Maharashtha	4772	3.82 - 5.56 (€ 0.05-0.08)(*)
Telangana	101	3.5(€ 0.05)
Kerala	52	4.13-6.60 (€ 0.06-0.09)(*)
Others	4	-
Total	32180	

Wind power tariff dropped to a **record low of Rs 3.46 (€ 0.05) per unit** in an auction of 1,000 MW capacity conducted by Solar Energy Corporation of India (SECI) in the month of February, 2017

* Based on Wind Zones/ Region wise

Wind - Manufacturing Base

- Manufacturing capacity around 10 GW per annum
- 21 manufacturers with 54 models
- Indigenization over 70%
- Cost of Indian wind turbines among lowest in the world

Wind Power : Proposed Action Plan

- **Facilitate Inter State sale to Non Windy States**
 - FIT vs competitive bidding: 1000MW auctioned: Rs. 3.46 per unit
 - Auction 4GW of Wind projects based on ISTS
 - Standard Bidding Guidelines & SBDs under finalization.

- **Repowering Policy: Over all Target - 10GW**
 - 3 GW Capacity - Small turbines: Early installations + Best Sites
 - Incentive framework under preparation.

- **Hybridization Policy – Over Target: 10 GW**
 - Solar & Wind Power: Complementary + Minimize variability
 - Optimally utilize land & transmission system

Bio Energy – Indian Scenario



Biomass power and Cogeneration

- The current availability of biomass in India is estimated at about **500 million metric tons per year**.
- Estimated surplus biomass availability at about 120 to 150 million metric tons per annum covering agricultural and forestry residues
- **Potential of about 18,000 MW power**
- **7,000 MW additional Potential** - Bagasse cogeneration in the country's 550 sugar mills.
- **Achievement: 8182 MW** (as on 31.03.2017)

Biomass Power - Proposed Action Plan

- **Ensuring Sustainable Biomass Supply chain & price control mechanism.**
 - Market mechanism for Biomass collection, transportation and Storage
- **Promoting multiple End use of Biomass through-**
 - Biomass based Pellets/ Briquettes
 - Bio-Ethanol/ Bio Diesel
- **Single Window Mechanism for project approvals at State level**
- **Promote Biogas/ Bio CNG & Biomass Projects**
 - Sugar Industries, distilleries, starch and agro industries
 - Vegetable market wastes and rice mills

Renewable Purchase Obligations

Long term trajectory of RPO as per the tariff policy

	2017-18	2018-19
Non Solar	9.50%	10.25%
Solar	4.75%	6.75%
Total	14.25%	17.00%

- Notify RPO level as per this trajectory
- Ensure RPO compliance by increasing RE through:
 - State level Bidding
 - Participation in SECI or NTPC bidding
 - Inter State Power Purchase
 - Purchase of REC

Payment Security Mechanism(PSM)

- **Commensurate to 3 months billing through**
 - a) Letter of Credit (LC)
 - b) Payment Security Fund
 - c) State Government Guarantee

Proposed Payment security Fund

Features

- **Facility Size** : Around Rs. 2,000 crs (€ 276 mn)
- **Capacity** : 5,000 MW of Solar (Phase – I)
- **Administrator** : IREDA
- **Coverage** : 3-12 Months of PPA payments
- **Gross Tariff Savings** : Around 40 paise ((€ 0.01) per kWh)
- **PSM Fee** : 4 paise/ kWh (by Developers)

PSM Benefits to States

- Support states in their own Solar/ Wind bids
- Will improve Credit quality of State Discoms - Reducing Tariffs

Ujwal DISCOM Assurance Yojana (UDAY Scheme)

- GOI Launched UDAY for operational and financial turnaround of State owned Power Distribution Companies (DISCOMs)
- States shall take over 75% of DISCOM debt as on 30 September 2015
- States will issue non-SLR bonds with maturity period of 10-15 years with a moratorium on principal up to 5 years
- So far, 26 States/UTs signed MoUs with MoP under UDAY
- As of now, more than 60% has already been transferred to state Governments and or refinanced in the form of State Government Bonds
- The operational/ Financial parameters of Discoms have been constantly improving as the scheme is progressing.

Open Access / Third party sale - Renewable Energy Scenario

- Third-party PPAs are emerging as an attractive option for RE developers, particularly
 - In states with a strong industrial base
 - High retail power tariffs for commercial and industrial consumers
 - In some states where the FiT tariffs are low.
 - Delayed payment issues with the current FiT model,
- Private PPAs help the developers diversify their risk and revenue profile
- Model has been most popular among generators in states where cross-subsidy surcharge (CSS) is low/exempted applicable to buyers.

Enabling Provisions

- Recently Government has waived inter state transmission charges and losses on transmission of electricity generated from Solar and Wind sources
- Majority of States allow banking of power for third-party sale.
- Efforts are also being made to reduce/rationalize Cross Subsidy Surcharge, Wheeling and Banking charges etc.

Standards and Certifications in the RE Sector

For Standards and Certifications in the RE Sector, India has specialized “Centre of Excellence” Institutions:

Solar Energy

- National Institute of Solar Energy (NISE)

Wind Energy

- National Institute of Wind Energy (NIWE)

Bio Energy

- SSB National Institute of Bio-Energy (SSBNIBE)

Others

- Central Electricity Authority (CEA) Technical standards for connectivity to the Grid

About IREDA

Dedicated NBFC for Financing Renewables

- Established in 1987 as a Dedicated FI under erstwhile Department of Non-Conventional Energy Resources(DNES), Ministry of Energy, Govt. of India.
- Notified as Public Financial Institution under section 4(A) of the Companies Act during FY 1995-96
- Financing Renewable Energy projects since last 30 Years.
- Catalyzed RE Market Development in India.
- Financed more than 2380 RE projects - largest share in RE Project Financing in India.
- Loans Sanctioned to the tune of more than Rs. 48,832 crore (€6.7 Bn) & Disbursed Rs. 27,788 crore (€3.8 Bn) as on 31.03.2017.
- Profit earning since inception and dividend paying.

IREDA - Operational Areas

IREDA's financing is spread across the following sectors:



Wind



Solar



Hydro



Biomass Power



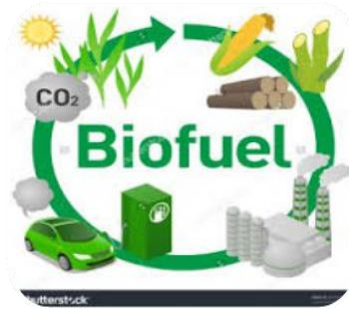
Bagasse & Industrial
Cogeneration



Waste to Energy



Energy Efficiency



Biofuel /
Alternate Fuels



Hybrid Projects with
RE Technologies



New & Emerging RE
Technologies

IREDA Financing Products / Schemes

- IREDA has always been the prime mover and showing the way to its peers in RE financing.
- IREDA has been continuously developing new /innovative schemes to meet the market requirement & for the development of RE sector.

Direct Lending

Project & Equipment Financing

Loans for Manufacturing

Take Over Loans from other Banks / FIs

Co-financing/ Consortium

Bridge Loans against SDF

Loan against Securitization

Funding Scheme for Rooftop Solar PV Projects

Lending through and with Financial Intermediaries

Line of Credit to NBFCs for on-lending to RE / EEC Projects

Underwriting of Debt / Loan Syndication

Other Services

Credit Enhancement Scheme

Guarantee Assistance Scheme to RE Suppliers / Promoters

Discounting of Energy Bills

Letter of Comfort/ Letter of Undertaking

Responsible for fund handling for some of the MNRE schemes

VGF : Viability Gap Funding | GBI : Generation Based Incentive | SDF : Sugar Development Fund

Introduction of New Schemes / Products

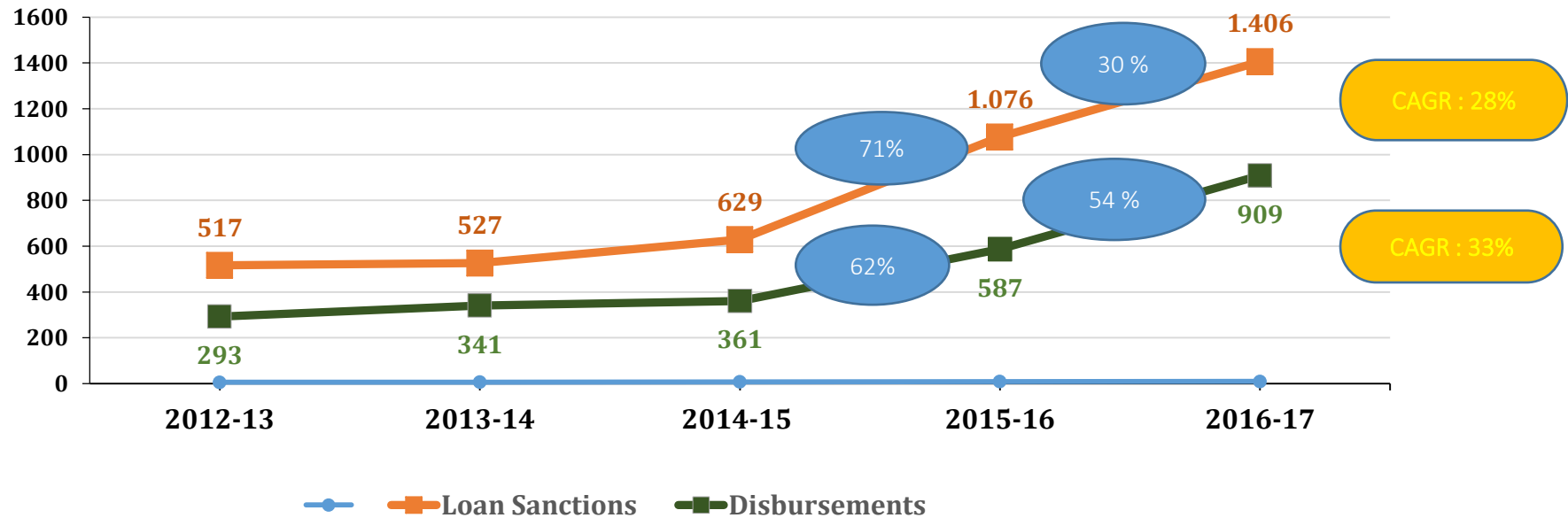
Several innovative and new financial schemes /products introduced to cater emerging markets, namely:

1. Scheme for **Solar Roof Top** through Aggregator (RESCO)
2. Scheme for **discounting of Energy Bills** to address the issue of delay of payments by DISCOMs.
3. **Lines of credit** to Non-Banking Financial Companies for on-lending to RE/EEC projects
4. **Short term loan** assistance to RE developers / suppliers / contractors
5. **Bridge loan** assistance to RE promoters / developers against capital subsidies / VGF/ GBI
6. **Underwriting** of debt / loan syndication
7. Intermediary Loan Scheme - **Financing to Farmers** for SPV Water Pumps through an Aggregator/Sugar mill.
8. **Guarantee assistance** to RE suppliers / promoters.
9. **IREDA-NCEF RE-finance Scheme** – for revival of stressed projects in biomass and small hydro sectors.
10. **Credit Enhancement Scheme** for raising Bonds towards Renewable Energy Projects (Solar / Wind).
11. Loan Scheme for **“Access to Energy Projects”** with **“First Loss Mechanism”** under KfW Line of Credit
12. Policy for issue of **Letter of Comfort (LoC)/ Letter of Undertaking (LUT)** for opening Letter of Credit (LC).

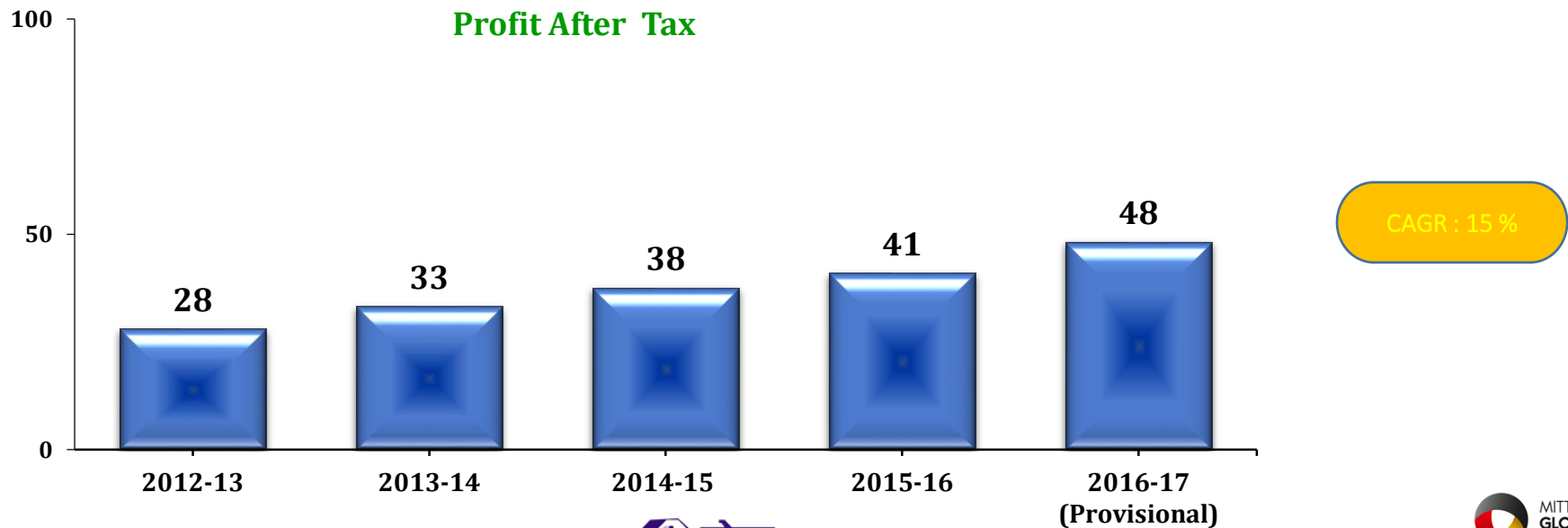
Highlights of Performance – Last 5 Years

Loan Sanctions & Disbursements

€ mn



Profit After Tax



Support of International Lenders

A. Lines of Credit fully availed & utilized

	Sources	Year of Receipt	Amount	INR Equivalent (Rs. in Crs.)
1	Govt of Netherland	1991	NLG 18 Million	75.00
2	WB (1st LoC)	1993	\$ 145 Million	394.39
3	DANIDA	1993	\$ 15 Million	74.72
4	ADB-1	1997	\$ 100 Million	464.75
5	KfW (1st LoC)	1999	€ 61.36 Million	301.55
6	WB (2nd LoC)	2000	\$ 109 Million	498.34
7	NIB (1st LoC)	2010	\$ 50 Million	228.00
8	KfW (2nd LoC)	2008	€ 50 Million	329.76
9	KfW (3rd LoC)	2009	€ 19.97 Million	130.42
10	AFD (1st LoC)	2010	€ 70 Million	446.76
11	JICA	2011	JPY 30000 Million	1888.69
12	KfW (4 th Loc)	2011	€ 200 Million	1476.55
	Total			6308.93 (€ 870 mn)

B. On-going Lines of Credit

S.No.	Source	Year of Receipt	Amount	INR / Cr Equivalent
1.	JICA - II	2014	JPY 30 Bn	1717.38
2.	EIB	2014	€ 200 Mn	1432.58
3.	AfD - II	2014	€ 100 Mn	723.19
4.	ADB – II	2015	\$ 200 Mn	1362.24
5.	KFW-V	2015	€ 100 Mn	714.52
6.	KFW VI	2016	€ 20 Mn	142.90
7.	World Bank*	2017	\$ 100 Mn	656.00
			Total	6,748.21 (€ 930 mn)

* To be signed soon

Successfully mobilized AfD-II and KFW-V & VI Lines of Credits without sovereign guarantee

Indo - German Cooperation

Indo-German Cooperation (IREDA & KfW Cooperation for Renewable Energy)

- IREDA has received 4 line of credit (€ 331.33 million) with government guarantee and 5th & 6th line of credit of € 100 & € 20 million resp. without sovereign guarantee.
- The technologies financed under various lines of credit include: Solar PV, Wind, Cogeneration, Biomass Power, Small Hydro, etc
- All these lines of credit have immensely helped IREDA in promoting and developing renewable energy in the country.

<p style="text-align: center;"><u>LoC -1 : 1999</u></p> <p>€ 61.36 Million 144.53 MW SPV (5), Cogen(3) & Wind (26)</p>	<p style="text-align: center;"><u>LoC -2 : 2008</u></p> <p>€ 50 Million 76 MW Hydro (2), Cogen(2)</p>	<p style="text-align: center;"><u>LoC – 5 : 2016</u> € 100 Million (on going) 2 Solar projects of capacity 20 MW approved as of now</p>	<p style="text-align: center;">Total RE capacity sanctioned (LoC -1,2,3,4,5)</p> <p style="text-align: center;">1155 MW {Hydro (5), Cogen (8), Solar (24), Wind (34), WTE (3), Biomass (1)}</p>
<p style="text-align: center;"><u>LoC -3 : 2009</u></p> <p>€ 19.97 Million 41.625 MW WTE (3), Biomass(1) & Cogen (1)</p>	<p style="text-align: center;"><u>LoC -4 : 2011</u></p> <p>€ 200 Million 872.80 MW Hydro (3), Cogen (2), Solar (17), Wind (8)</p>	<p style="text-align: center;"><u>LoC -6: 2016</u> (Access to Energy) € 20 Million (on going) (1st project under consideration)</p>	

Indo-German Cooperation in Other areas of RE Sector)

- KfW Support of Euro 1 bn for “Green Energy Corridor”
- Also Euro 1 bn for Solar roof top, Decentralized applications and Solar Parks
- **Indo-German Energy Programme (IGEN):** for improved market mechanisms for integration of renewable energy into the grid

“Access to Energy Projects” under KfW 6th Line of Credit

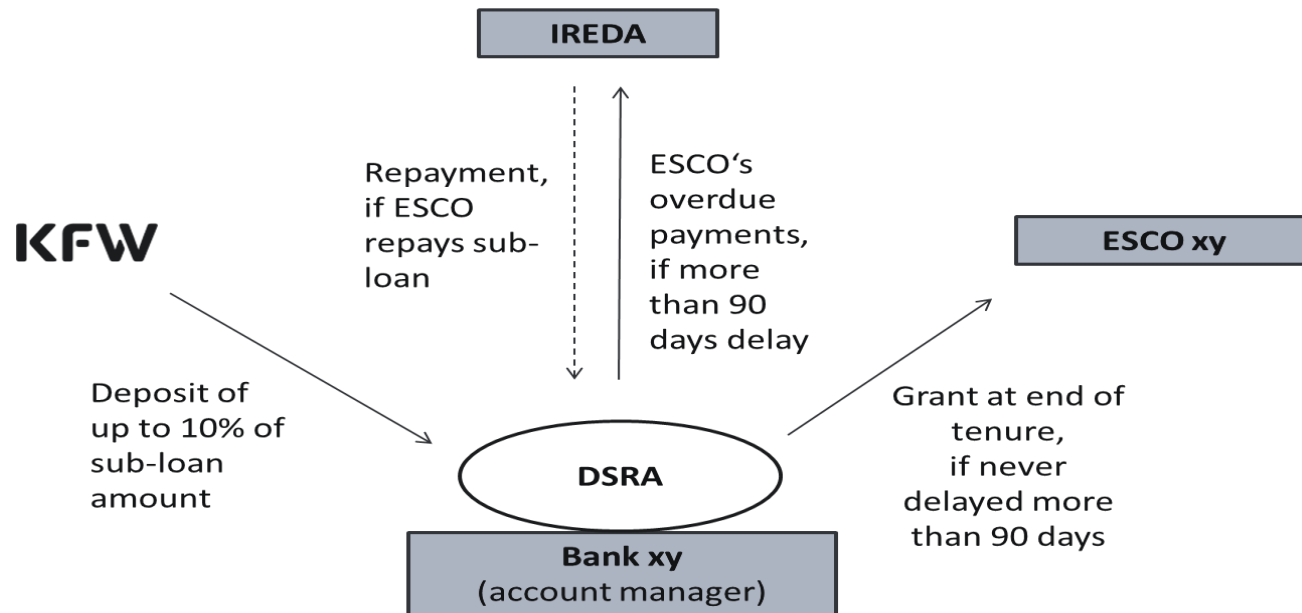
- Scheme aims to provide financing to Off-Grid Renewable Energy Projects/ Systems in remote areas. Systems may include PV Irrigation Pumps, Lighting systems, Decentralized Systems etc.
- The scheme addresses default risks by Developers (First loss)
- Under the above credit line, 4 million EUR Extra Grant also earmarked for 3 different purposes:
 - € 2 million for DSRA to reduce IREDAs default risk (First Loss) for individual sub-loans,
 - € 1 million to cover default risks of the overall portfolio of IREDA by establishment of a portfolio risk reserve account (PRRA),
 - € 1 million to ESCOs after commissioning.

“First Loss Mechanism” under KFW scheme “Access to Energy”

First Loss under the scheme has compensation in 2 stages:

1. 1st Stage “First Loss” covered through **DSRA**
2. In 2nd Stage, if balance DSRA is insufficient then “First Loss” is compensated to IREDA through **“Portfolio Risk Reserve Account (PRRA)”**

1. Structure of DSRA for an individual sub-loan



'First Loss Mechanism' under KfW Line of Credit for "Access to Energy Projects"

Broad terms of the Scheme

- **Quantum of loan** : upto 70% of the total project cost
- **Minimum promoter contribution** : 30% of the project cost
- **Maximum Debt Equity Ratio (DER):** not more than 3:1
- **Repayment Period** : upto 7 years
- **Interest Rates:** : 9.75 % to 11.50%

Key Technologies/Areas for Collaboration with Germany

- **Next generation solar technology / R&D in Solar**
- **Grid Integration of Roof top Solar/ Net Metering etc.** - lot to learn from the German experience where the rooftop program has been immensely successful in engaging citizens
- **Renewable Energy storage**
- **Off shore wind**
- **Climate Friendly E- mobility**
- **Geothermal Energy**
- **Knowledge Co-creation, Capacity Building**

Opportunities for Germany – Indian RE Sector

Project Developer

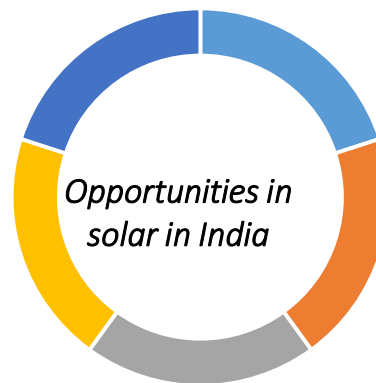
- Opportunities for global players to develop portfolio in India
- Target to install 175 GW RE by 2022
- Fixed feed-in-tariff for wind and competitive bidding in solar

Manufacturing

- Cell/Module manufacturing
- Wind Turbines
- Push for “Make in India”
- MOUs signed between global manufacturers and Indian developers

Financing

- Investment to the tune of € 98.4 Bn required in RE sector in next 5 years
- Govt. of India keen to work on new mechanism like green bonds, innovative hedging, Infra bonds, etc.



EPC

- A lot of new entrants in Market, requiring EPC
- Many Govt. companies have signed Green energy commitments and need EPCs

Emerging Technologies/ Markets

- Hybrid
- Storage Batteries
- E- mobility etc.

RE-INVEST

Global Investor's Meet

- 1st Global Investors meet held in Delhi during February, 2015
- Over 3,000 delegates from 41 countries including 200 large investors attended.
- 119 companies / organizations participated in Exhibition.
- Country Pavilions by Germany, Italy, UK & UAE.
- 16 Global Firms Committed 62,000 MW Green Energy projects

Green Energy Commitments (GEC)

- 464 Companies - Commitments of ~ 292 GW
 - 16 foreign companies - Commitments of 62 GW
- 17 Manufacturers - 62 GW of manufacturing
- 40 banks / FIs – 79 GW Commitment for financing.

RE – Invest 2017: 2nd Global Investors meet

- Proposed to be held during current year 2017 at Gandhinagar, Gujarat, India

The background of the slide is a soft-focus image of pink cherry blossoms on branches, with several colorful butterflies (blue, green, and purple) fluttering around. The overall color palette is light and vibrant, with a mix of pinks, greens, and blues.

THANK YOU



Indian Renewable Energy Development Agency Limited
Email: cmd@ireda.in | www.ireda.in