

**National Conference on  
“ Smart Grid Regulations for Distribution”**

**Solar Energy- Government  
initiatives, RPO/RGO, challenges,  
Regulation, Policy and Road Map**

By

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**SOLAR ENERGY CORPORATION OF INDIA LIMITED**  
(A Government of India Enterprise)

- Incorporated in year 2011 for implementation of National Solar mission
- 100% owned by Government of India.
- Scope widened to cover all Renewable Energy Resources
- Rated as AA+ (Outlook positive) by ICRA
- Debt – free Company
- Category–I Power Trading Company

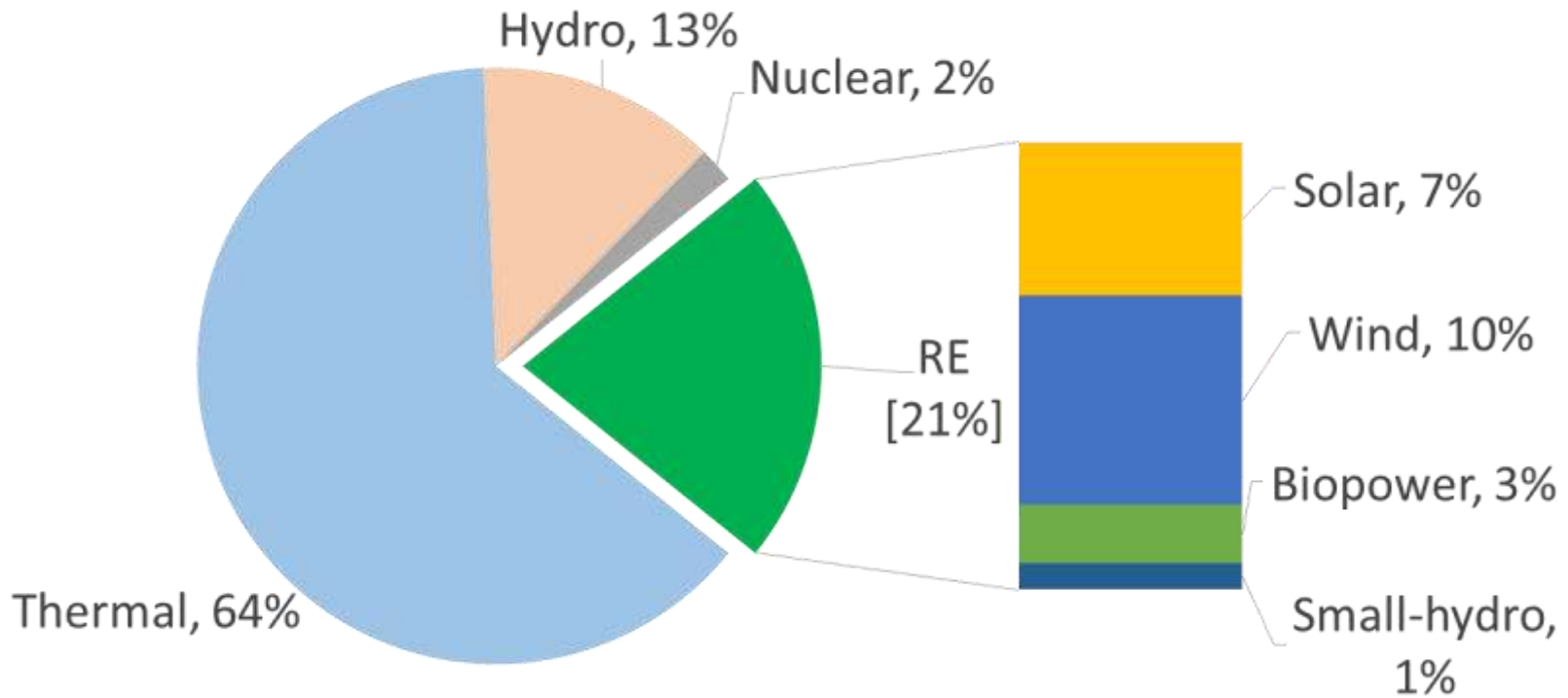
# Role of SECI

- SECI is a primary player in RE capacity creation-
  - As aggregator of capacities
  - Risk hedging of PPAs
- Currently handling 30,000 MW solar, rooftop and wind schemes
- Instrumental in achieving all time low Tariff in the Country:
  - Solar Power: Rs 2.44/kWh ,
  - Wind Power: Rs 2.44/kWh
- Facilitating entry of new technologies to India.



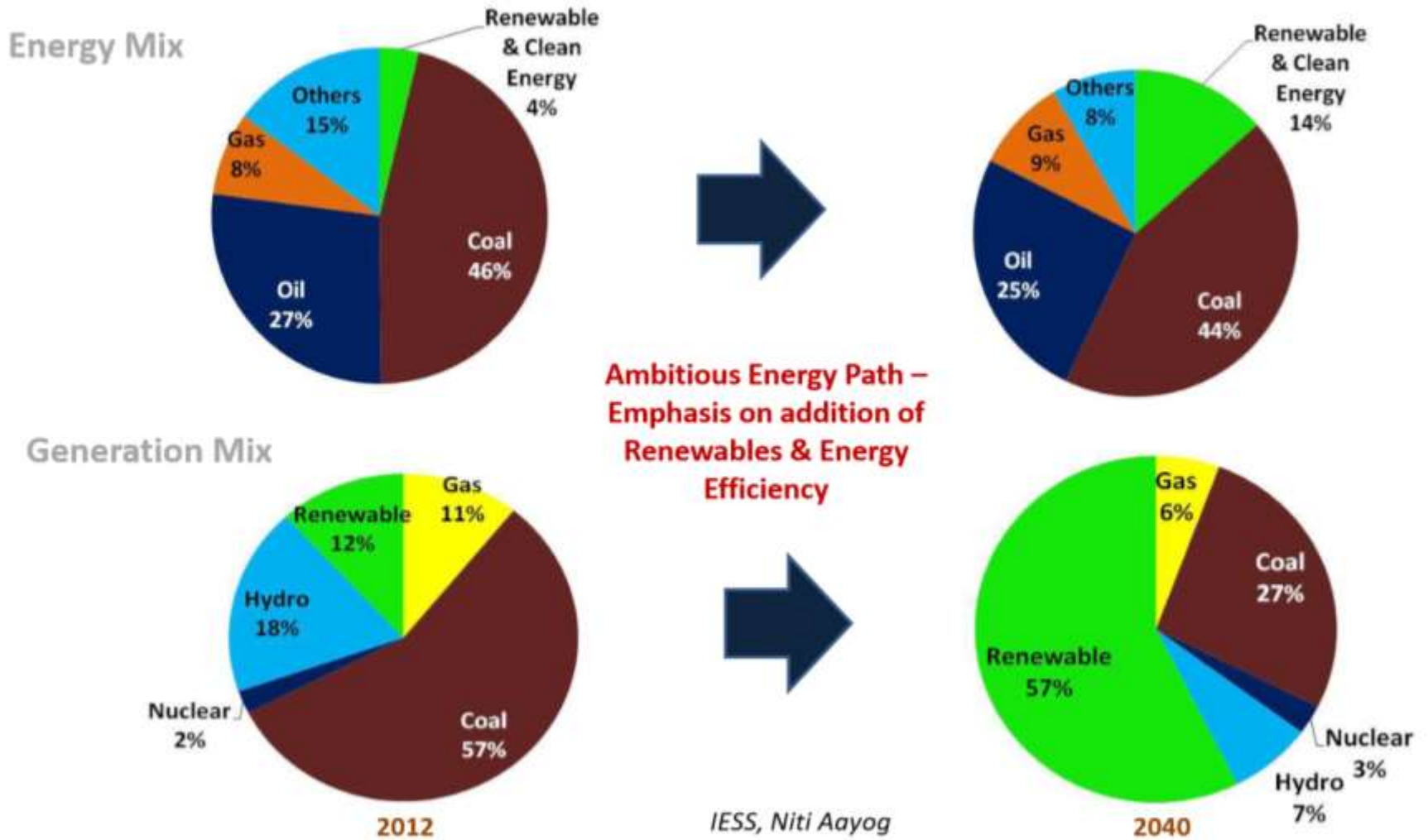
# Renewable Energy Sector in India

- Total Installed Power Generation Capacity: 351 GW
- Renewable Source share 20% of total capacity



- Solar capacity Installed: 26.03 GW (as on Jan, 2019)

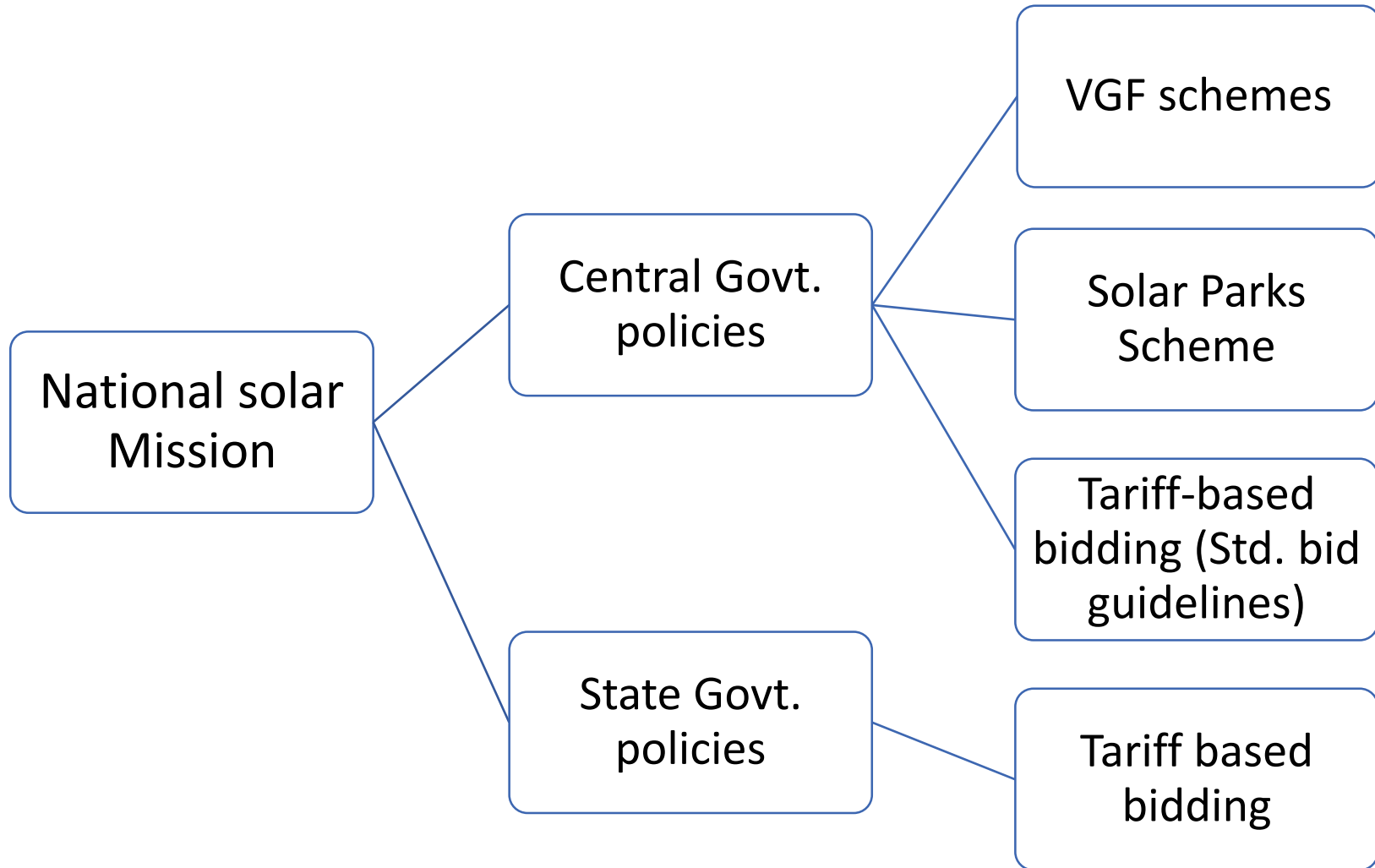
# RE target



# Mission 175 GW RE by 2022

- India's commitment in Paris Climate Agreement (COP21)
  - to reduce emission intensity of the economy by one-third
  - to have at least 40% of the electric power generation capacity from clean energy sources by the year 2030
- Towards this a target of 175 GW by 2022 announced in 2015:
  - Solar: 100 GW
  - Wind: 60 GW
  - Biomass: 10 GW
  - Small Hydro: 5 GW

# National Solar Mission



# Promotional Policies and Initiatives



- **Promotion of Solar energy has taken up in mission mode with the following initiatives..**
  - Feed in tariff, bundling and VGF schemes launched to promote large scale solar projects.
  - Fiscal incentives like tax holiday, Accelerated depreciation, Excise duty exemption etc. were provided to reduce the tariff.
  - Grid infrastructure made available at free of cost till 2022.
  - Developing Green corridors for providing Transmission and evacuation infrastructure.
  - Solar parks developed for hassle free development of solar projects.
  - Open access and Wheeling and banking facilities provided to promote captive generation.
  - Net metering facilities provided to promote rooftop sector.
  - Subsidies for promotion of rooftop and solar pumps and small projects at distribution level.
  - Domestic manufacturing promotion.

# Feed in tariff, bundling and VGF schemes

- **Initially Solar projects promoted with Feed in tariff under RPSSGP scheme implemented by IREDA.**
- **Bundling schemes (2011-17)**
  - Selection of projects based on tariff-based reverse bidding on tariff fixed by regulator
  - Solar power allocated to DISCOMs after bundling with cheap thermal power
  - Being implemented by NVVN and NTPC.
- **VGF schemes (2014-17)**
  - Pre-determined fixed tariff specified by MNRE.
  - Selection of projects based on reverse bidding on VGF.
  - Negative VGF in the form of discount in fixed tariff allowed.
  - SECI is implementing VGF schemes.
  - As the tariff reduced below Average purchase price of power in India, the VGF support for upcoming projects has withdrawn and tariff based bidding introduced.

- **Tariff based bidding- Standard bidding Guidelines (2017 onwards)**
  - Standard Bidding Guidelines notified in Aug, 2017
  - Selection of projects based on reverse bidding on tariff, based on a benchmark tariff agreed with the buying utility
  - 25 year PPA to be signed with SECI
- **State tenders - tariff based bidding (2017 onwards)**
  - Earlier states were free to decide their own mechanism
  - Presently, states also has to adopt Standard Bidding Guidelines

# Fiscal Incentives

- **Tax holiday:**
  - 10 year tax holiday was provided initially along with all power projects.
  - Tax holiday removed after April 2017.
- **Accelerated depreciation**
  - 80% accelerated depreciation provide initially as per income tax regulation..
  - Reduced to 40%.
- **Excise duty exemption**
  - 100% customs and Excised duty exemption provided for solar projects for all the components.
  - After GST the duty exemptions removed and Solar equipment has kept at lowest bracket ( 70% @5% and 30% @18%)



# Grid infrastructure

- Grid infrastructure made available at free of cost till 2022.
- Dedicated green corridors identified at RE resource rich regions.
- Phase-I under development and Phase-II about to start.
- 10 lakh acres of Land patches identified in 6 major solar rich states plans for providing connectivity by extending the CTU network.
- 67.5 GW net work is being planned and 17 GW in phase-I is cleared.
- **Challenges:** Matching timelines in development of transmission network as per solar mission targets.
- Increasing utility of highly capital intensive Transmission network due to low CUF of Solar projects.



# Solar Parks

- To provide infrastructure support to project developers solar park scheme launched.
  - Land Development
  - Power evacuation
  - Roads, Water and local approvals.
- 40,000 MW Schemes for development of solar parks.
- 40 solar parks totaling **26,144 MW** capacity under development.
- Grant support Rs 2 million/ MW.
- **Challenges:**
  - Delay in land acquisition
  - Delays in connectivity.
  - Solar park charges are high



1000 MW solar park at Kurnool, AP, India

Capacity approved (Total)	26,144 MW
Project Commissioned	2,395 MW
Under Implementation	4,300 MW
Under Tendering	2475 MW

# New Solar Park scheme

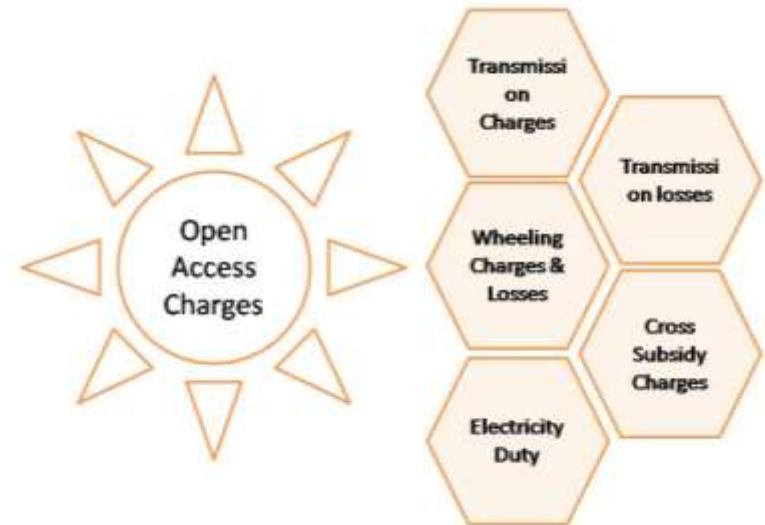
- Teams constituted by MNRE has identified around 10 lakh acres waste land in 6 solar radiation rich states.
- State governments will be provided Rs.0.02/kWh for facilitation of land for RE projects.
- SECI will be the solar park developer.
- External Transmission development Agency (ETDA) will provide evacuation facilities.
- RE project developer shall develop internal facilities.
- 20 Laks/MW CFA will be provided ETDA
- RE project developer shall meet 40% evacuation system cost of ETDA.
- Payment Security Fund @ Rs 0.02/KW will be added to tariff and maintained by SECI.

Sl. No	State	Area identified (Acres)
1	Andhra Pradesh	52,000
2	Karnataka	73,000
3.	Tamil Nadu	40,000
4.	Rajasthan	3,00,000
5.	Gujarat	2,50,000
6.	Madhya Pradesh	2,80,000
	<b>Total</b>	<b>9,95,000</b>

# Open access, wheeling and banking

- To promote captive solar projects various states came out with open access incentives. as per electricity Act .

- Waiver of wheeling charges for solar projects.
- Waived/ reduced wheeling and banking charges.
- Waiver cross subsidy charges.
- Net metering facilities.
- Waiver of electricity Duty etc.



- **Challenges:**

- After solar power became viable option the open access promotions are slowly being withdrawn or curtailed.
- Solar policies of the states are being modified



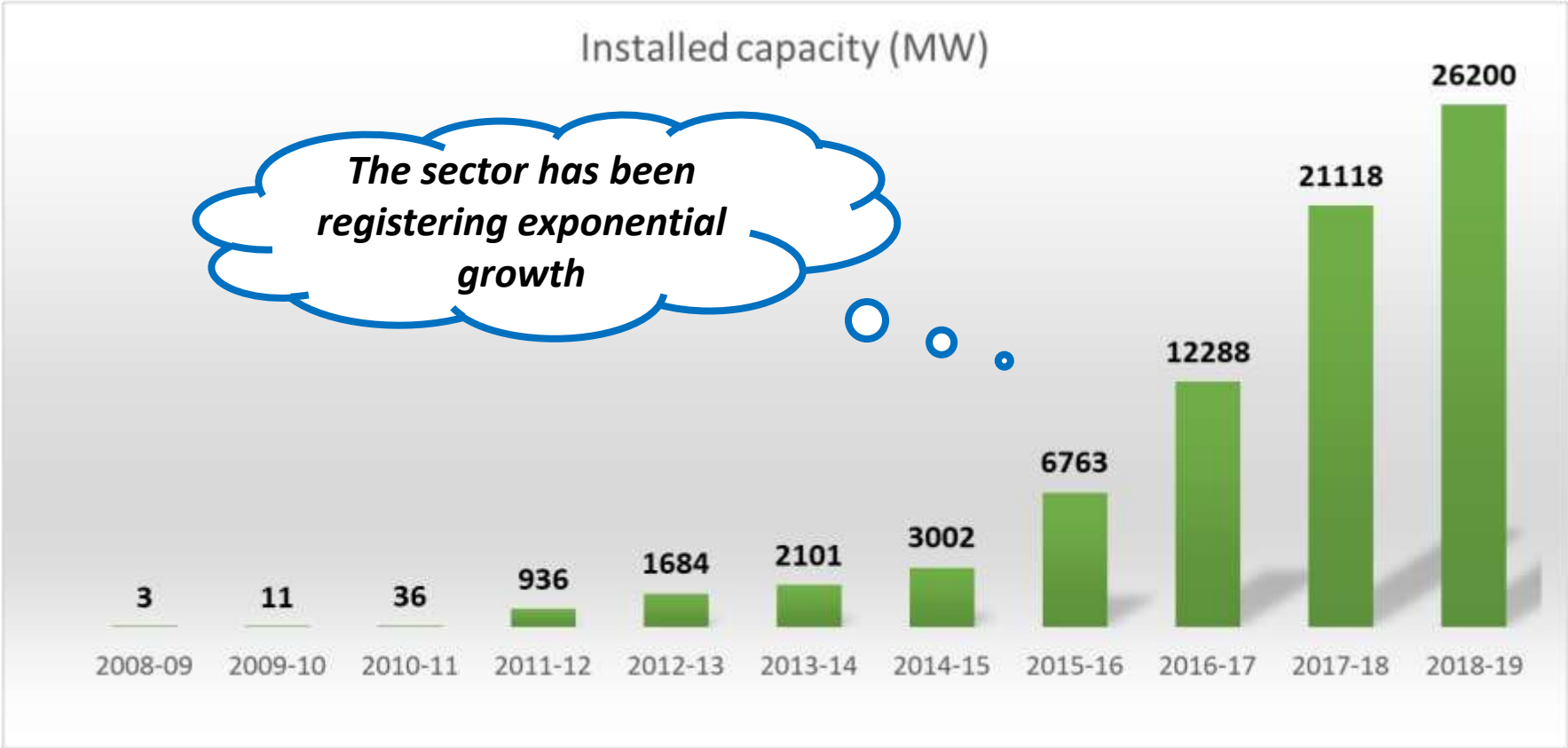
# RPO and RGO regulations and REC

- Renewable purchase obligation was introduced to promote renewables.
  - RPO targets were specified to all the states.
  - REC frame work developed to support RPO.
  - Enhanced RPO targets to 10.5% by 2022 for both solar and non-solar.
- Some states are fulfilling the targets specified.
- Low demand for RECs at IEX, inventory pile up.
- Floor and forbearance prices reduced.
  - Old projects are being suffered.
- **Challenge:**
  - Challenges in strict enforcement.
  - Some states are not taken it seriously.
  - Imposition of penalties is not being taken up by some SERCs



% of compliance of RPO (2018)	No. of states complied
>100%	6
75-100%	3
50-75%	4
<50%	16

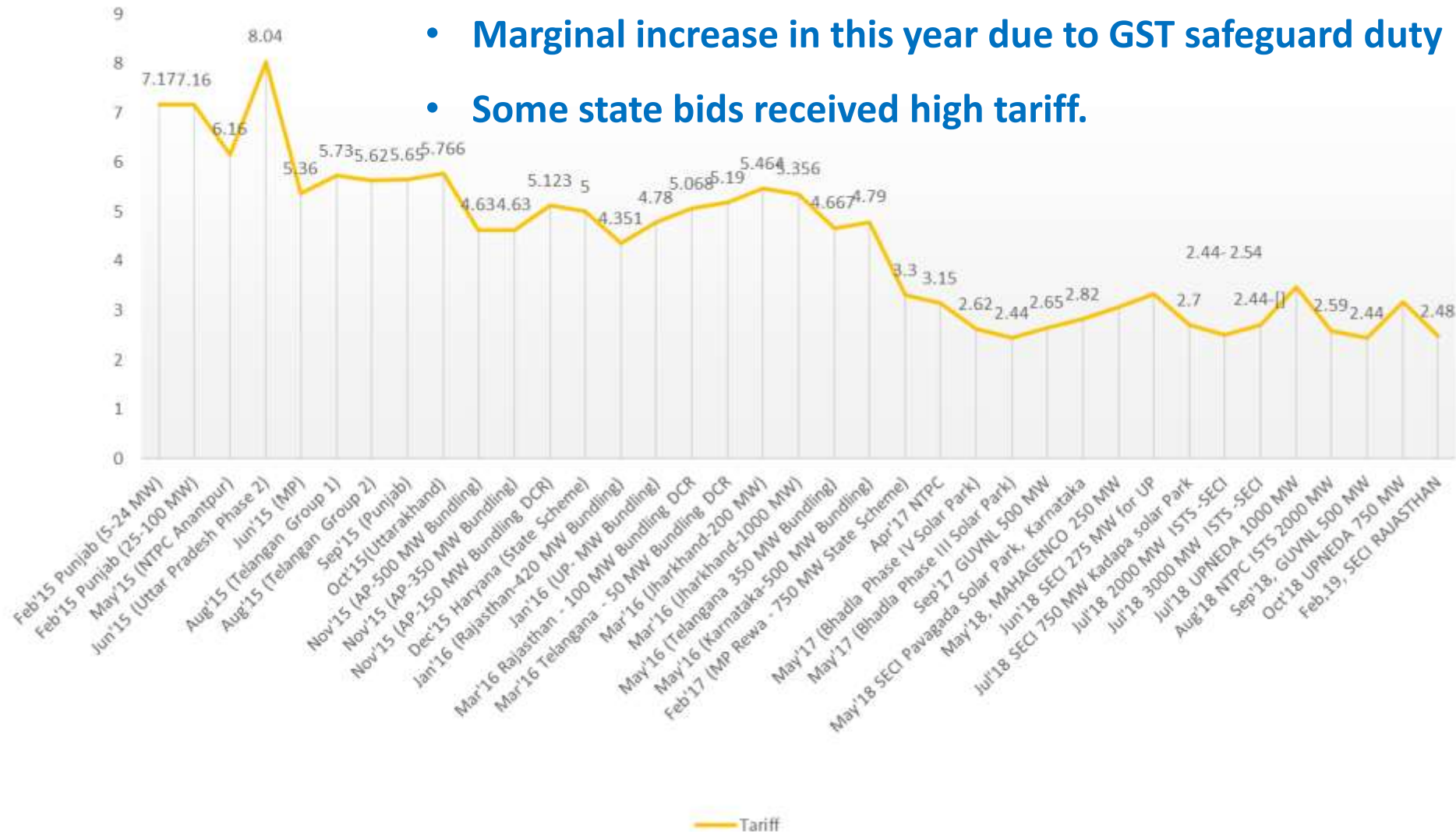
# Growth of Solar Capacity in India



**Current installed capacity crossed 26 GW by Jan 2019**

# Tariff Trend in large solar projects

- Steep decline in tariffs in past 5 years
- Marginal increase in this year due to GST safeguard duty
- Some state bids received high tariff.



# Roof top projects

- Roof top solar is the best options for Discoms, where the power is
  - Consumed at generation level.
  - No transmission charges, wheeling losses etc.
- 30% capital subsidy for small scale roof top projects.
- Large scale projects are actively promoted.
- Subsidies in roof top sector are slowly reduced/ removed.
- Strong policy push is required to reach targets.
- Easier access loans, promotion by DISCOMs, ease in permits and clearances are required.
- US \$ 1,470 million of concessional credit lines for the rooftop solar market from multilateral financial institutions such as ADB, World Bank, KfW has earmarked.



# Roof top projects – Challenges

- Net metering guidelines are published by the most of the states.
- Many states are limiting the roof top solar project capacity.
  - State to state Limits varies from 15 to 80% of the connected load.
  - Need to be permitted up to 100%.
- For large scale roof top projects net metering is limited upto 1 MW – need to be increased.
- Strengthening of DISCOM network and augmentation of transformers required to absorb more capacity.
- Building codes shall mandate roof top solar.
- Roof top with battery storage is another option to push more capacity within available network.



# SRISTI scheme

- Sustainable Roof top Implementation for Solar Transfiguration of India (SRISTI) scheme approved by Gol to meet the target of 40GW in roof top sector on 8<sup>th</sup> March 2019.
  - Component A. Setting up of 4 GW by Central Financial Assistance.
  - Component B: 18 GW projects to be developed by DISCOMS, with incentives to DISCOMS
- Incentives to DISCOMs: DISCOMS will be given incentives in achieving targets beyond certain level.
- Around 12000 Crores is budgeted to achieve the target by 2022.
- Implementation guidelines will be issued soon.



# KUSUM Scheme

- Kisha Urja Suraksha evam Utthaan Mahabhiyan (KUSUM) scheme launched recently to promote:
  - Installation of grid connected solar plants upto 2MW in rural areas- 10000 MW.
  - Installation of standalone off-grid solar water pumps for irrigation – 8250 MW
  - Solarization existing grid connected agriculture pumps – 7500 MW
  - Solarization of tube well and lift irrigation projects of governments.
- Scheme is beneficial for
  - Farmers- electricity generated form solar pumps during off crop days can be sold to Discoms.
  - Discoms will get rid of transmission losses, load shedding,



# Future Challenges

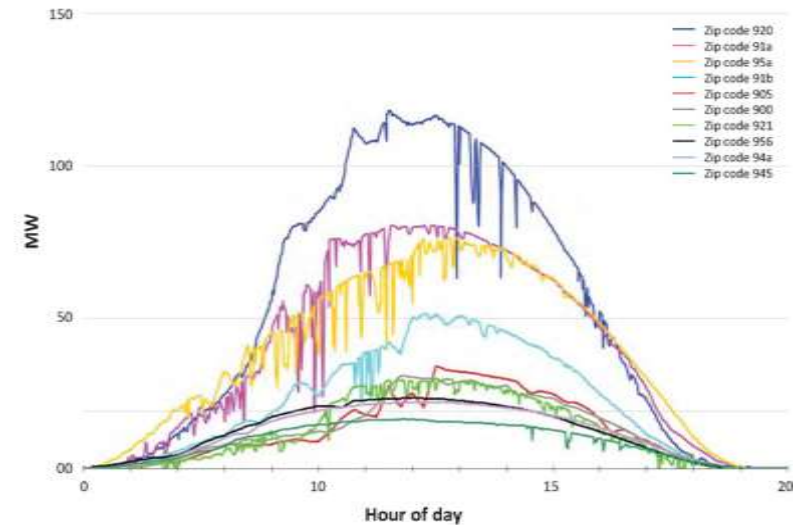
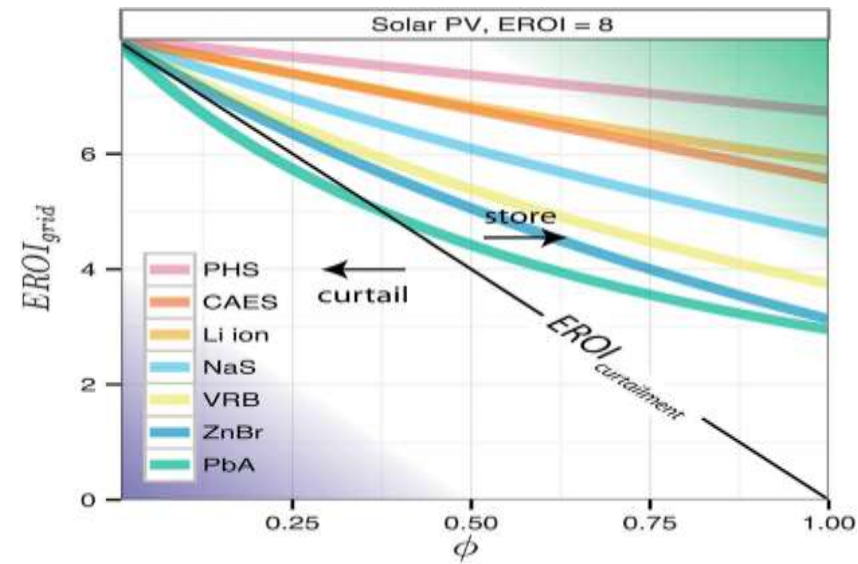


# Future Challenges

- Cost of T&D : CUF of solar projects are below 25% the cost of T&D becomes high – Hybrid projects or Distributed generation to be promoted
- Grid Stability: Solar is being infirm and fluctuating resources grid stability is challenge – Energy Storage to be introduced
- Lack of demand: Many states are power surplus. - Industrial growth and future planning of conventional sources are critical.
- Bankability of PPAs: PPAs are bankable based on financial strength of DISCOMS- Strengthening of DISCOMS through reforms
- Honoring of PPAs.
  - Some states are forcing to reduce the PPA tariff after signing.
  - CERC has resolved issues in PPAs due to GST.
- Land: Per capita land availability is very low in India, and land is a scarce resource. Solar projects are land intensive – Floating solar to be promoted.
- Dependence on imports: >90% of the solar modules are imported- Domestic manufacturing to be supported.

# Issues in high Solar Power penetration

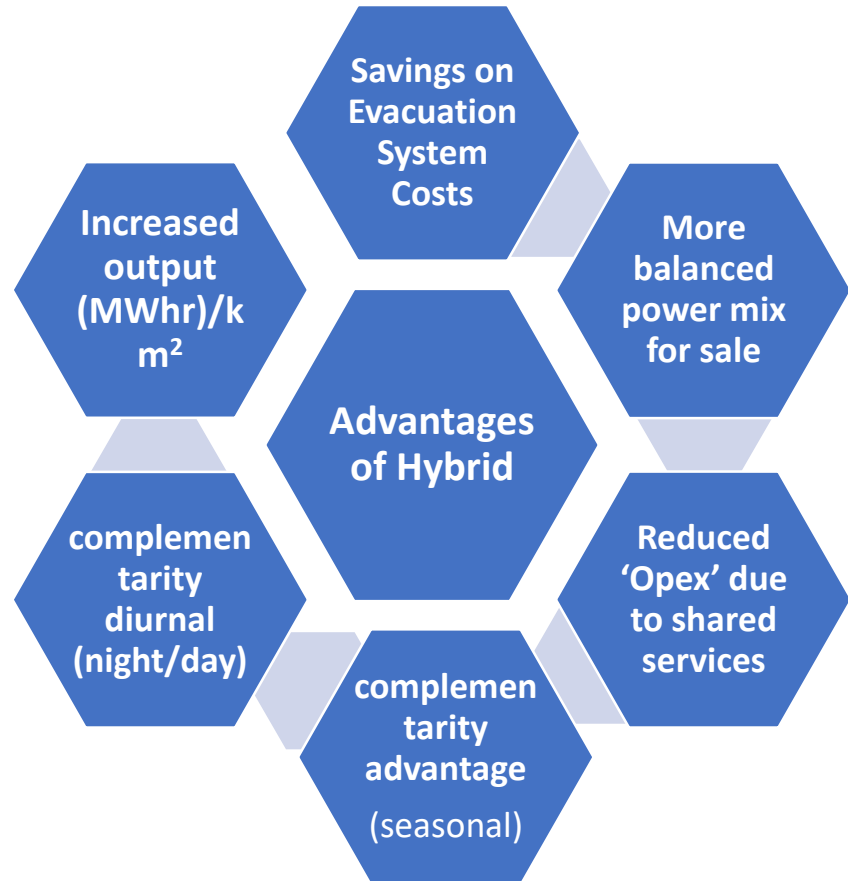
- Exponential Solar Growth leads to
  - Curtailment
    - Generation and load mismatch leads to curtailment.
  - Grid stability
    - Fluctuating sources RE will impact the grid stability.
  - Difficulty in scheduling.
    - Intermittent generation will impact the scheduling of RE along with other sources.
  - Impact on viability of other sources.
    - Infirm nature and must run status of RE will impact the generation other sources.



# Mitigation Measures & New Initiatives

# Solar-Wind Hybrid projects

- Concept of co-locating Wind and Solar capacities for land and transmission optimization.
- Reduces overall cost.
- Improves scheduling of RE power.
- Improves utilization of T&D network by higher CUF.
  - First Tender concluded for 1200 MW.
  - Tariff received as rs 2.69/kWh with PLF 35%.
- NIT issued for 1200 MW second phase..



# Solar Projects with Storage

- Solar and wind projects with storage is being promoted by SECI.
  - Improves PLF up to 50%
  - Curtailment of wind power can be reduced .
  - Reduces Intermittent generation.
  - Reduces Fluctuations in generation.
- SECI is developing 160 MW Solar Wind hybrid project with 20 MWh Battery Energy Storage.
- NIT released for 1200 MW solar projects with 2 hours storage.



# Floating Solar projects

- Solar projects are land intensive.
- Land to be preserved for future needs.
- Floating solar projects an option to deal with land limitation.
- Floating solar projects also have other advantages like
  - Reduction in water evaporation.
  - Hybridization with hydro projects Increased generation of solar power due to cooling effect.
  - Utilization of existing evacuation system.
- Potential for FSPV: ~ 700 GW



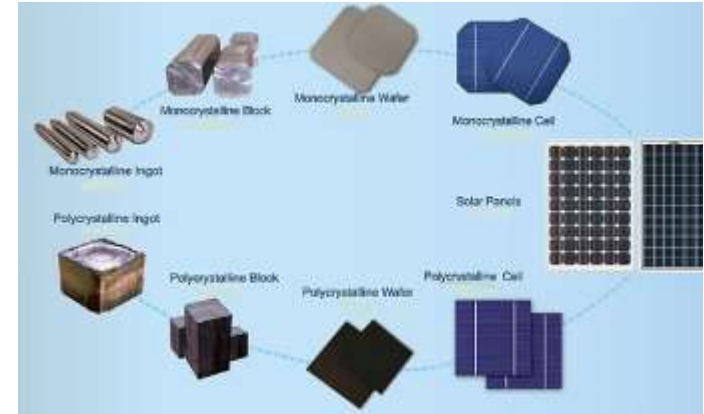
# Floating Solar projects

- SECI is working on developing 10 GW of Floating Solar projects.
- EoI issued for market sensitisation - good response received.
- Potential for >2,500 MW has been identified initially (Rihand- 500 MW, Omkareshwar- 500 MW, Indira Sagar- 1000 MW, Hirakud- 500 MW etc.)
- RfS for 150 MW (Rihand) already issued .
- Tariff of Rs 3.29/kWh received.



# Promotion of domestic manufacturing

- Various initiatives being taken up to promote domestic manufacturing..
  - Off-take assurance provided in the form of PPAs with SECI for double the capacity of manufacturing.
  - The manufacturing plant and the solar projects to be developed in the time frame of 3 years.
  - RfS for 1.5 GW manufacturing coupled with 3 GW solar projects.
- CPSU scheme with VGF support for 12000 MW launched by GoI for use of domestically manufactured solar cells and modules.





# Round the Clock / flexible Renewables

- Growth of RE capacities lead to curtailment of Thermal Projects .
- Operating thermal projects at lower capacities are not efficient.
- RE generation to be flattened to gel along with conventional sources.
- RTC Renewable is the solution.
  - Solar + Wind+ Hydro+ storage
- Scheme is under development.
- RTC can slowly replace conventional sources.
- Received interest by two Discoms for 400 MW.



- To achieve the 100 GW solar Capacity by 2022 and beyond
  - RPO compliances to be tightened.
  - Roof top projects and distributed generation to be promoted.
  - Land and connectivity issues for larges scale solar projects to be addressed timely.
  - Innovative technologies to be promoted for better grid utilization and stability
    - Solar projects with storage
    - Hybrid projects
    - Round the clock / flexible renewables.
  - Small scale solar projects at DISCOM level to be actively promoted.
  - Floating solar projects to be promoted.
  - Promotion of Domestic manufacturing under make in India.



**Thank You**

