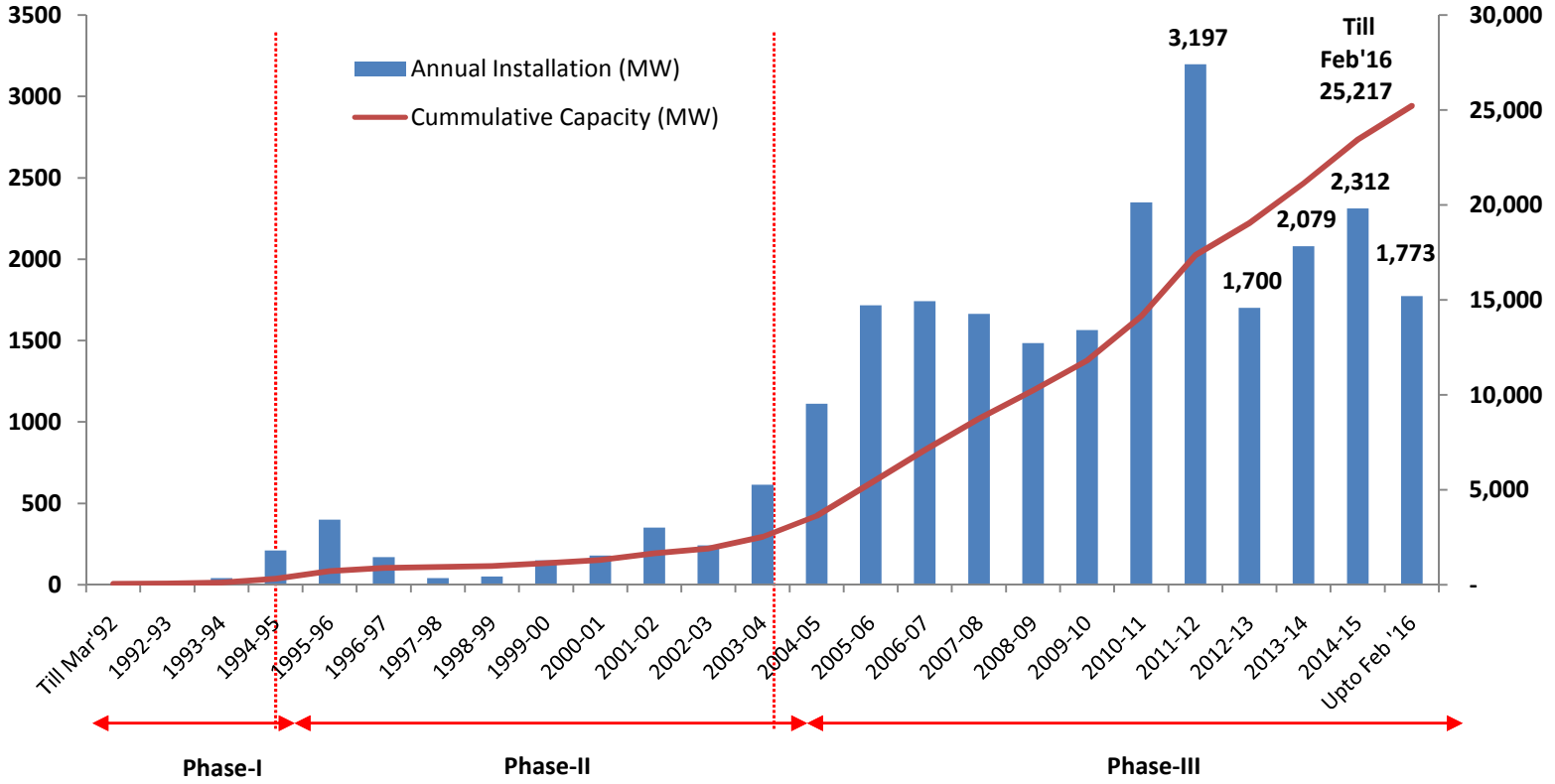
SHAKTI
SUSTAINABLE ENERGY
FOUNDATION

Idam

WIND VISION
INDIA 2032
Evolving consensus through stakeholder engagement

Wind Vision
200 GW by 2032

Wind has been mainstay of RE in India



- Renewable Energy constitutes 14% of total Installed Capacity of the country
- As on February 2016, 25.22 GW of Wind Power installed - 63% of total RE capacity
- India ranks 4th in the world in terms of cumulative Wind installed capacity, the first three being – China, US and Germany

Background

- 'On-shore' potential is 302 GW at 100 meters, as per NIWE
- However, several recent studies indicate the **potential of ~ 2,000 GW**
- Huge untapped resource for Onshore Wind in India
- India's fast economic growth → huge energy requirement
- India must increase RE deployment if it wants to be energy secure
- Government of India has set ambitious targets – 175 GW RE by 2022
- Wind sector has the potential to contribute significantly
- However, various issues and perceptions have held back the growth of wind

In view of this, Shakti Sustainable Energy Foundation initiated a process
"Evolving Consensus on Thematic Issues in Wind Sector Through Stakeholder Engagement"

Shakti engaged Idam Infrastructure to execute this process

Project Description

Goal - Development of Wind Vision document with guidance from the Advisory Group and convene stakeholders to build consensus on possible solutions

Key Constituents –

- Advisory Group (industry, visionaries, civil society etc.) and
- Wind Discussion Forum (Policymakers, Regulators, Utilities, Manufacturers, Consultants, Civil Society, etc)

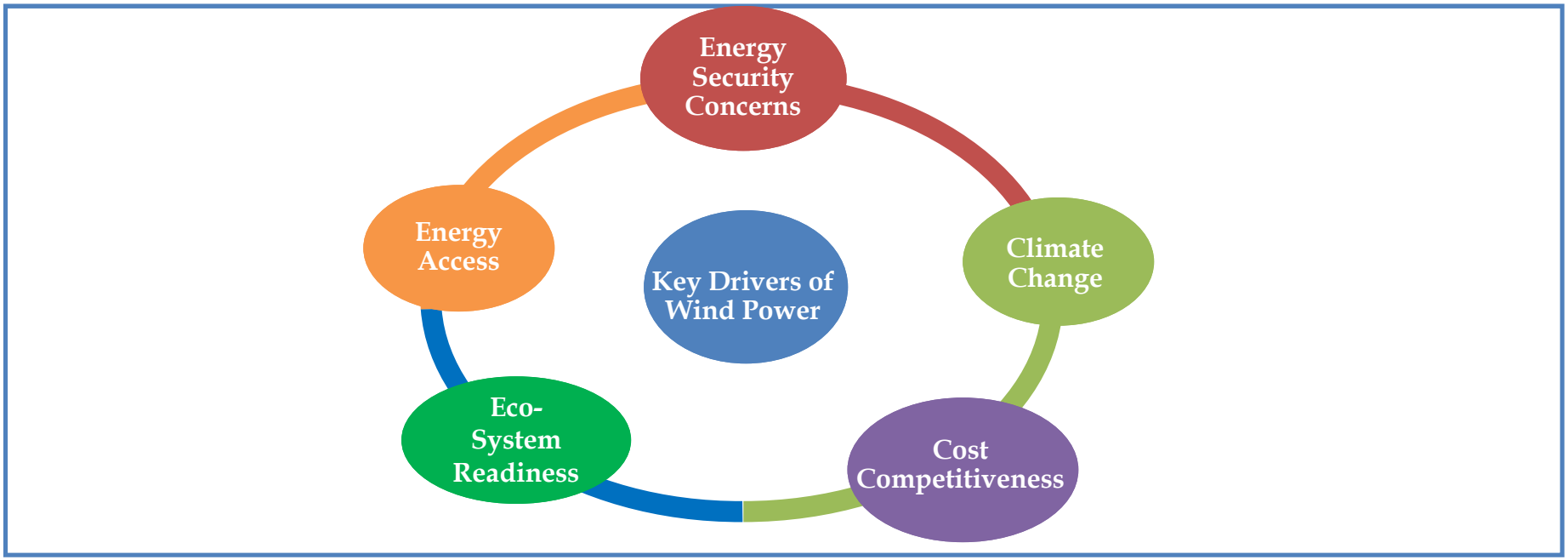
Stakeholder consultations – Four Discussion Forums and three meetings of the Advisory Group

Five Theme Papers

- Incentives - Policy, Regulatory and Tax
- Wind Financing
- Wind Project Development
- Procurement of Wind Power
- Grid Integration of Wind Energy

'Wind Vision 2032' is aimed at providing inputs for the proposed National Wind Energy Mission

Key Drivers of Wind Power in India



Setting of Wind Vision Target

- Define Target Year
- Identify Electricity Requirement per annum based on 18th EPS of India
- Develop RE contribution trajectory based on NAPCC Targets
- Identify Wind Generation Requirement
- Calculate Equivalent Capacity based on Generation Requirement and set it as a Target

Segment wise Targets

(All figures in Giga Watt)	12th FYP (FY 2016-17)	13th FYP (FY 2021-22)	14th FYP (FY 2026-27)	15th FYP (FY 2031-32)
Wind Vision Target	**32**	**64**	**118**	**200**
Offshore Wind (10% of Wind Vision)		6	12	20
Small Wind				0.10
Repowering	1	4	9	20
Onshore Capacity	31	54	97	160

- **Address both current and future issues**
- **Scale up the annual capacity addition from present 1-3 GW to 12-15 GW.**

Benefits from Proposed Wind Capacity

Emission Reduction Potential

- Considering emission factor (0.79 tCO2/MWh), GHG emission reduction over useful life works out to 6158 Million tons of CO_2 equivalent by FY 2031-32
  - This translates to about 2.5 of todays annual GHG emissions

Job Creation Potential

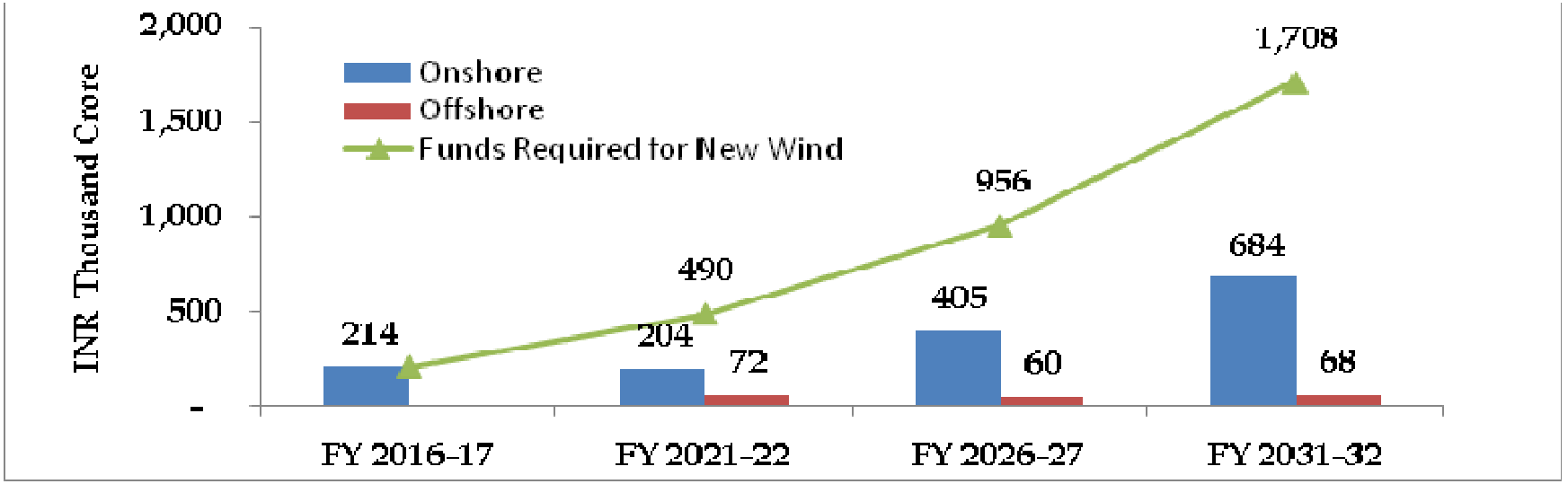
- Estimation based on average direct long term job creation of 4 persons/MW as per MNRE HRD report
- Total job creation potential is estimated to be **8.7 lakh till FY 2031-32**
- This translates to annual job creation potential of 48,260

Import Bill Reduction Potential

- Landed cost of imported coal -Rs 6000/ton with GCV of 5,500kCal/kg and Heat rate of 2,172 kcal/kWh as per CERC
- Cumulative import bill reduction potential over the useful life of wind projects is estimated at around Rs 18.4 lakh crore

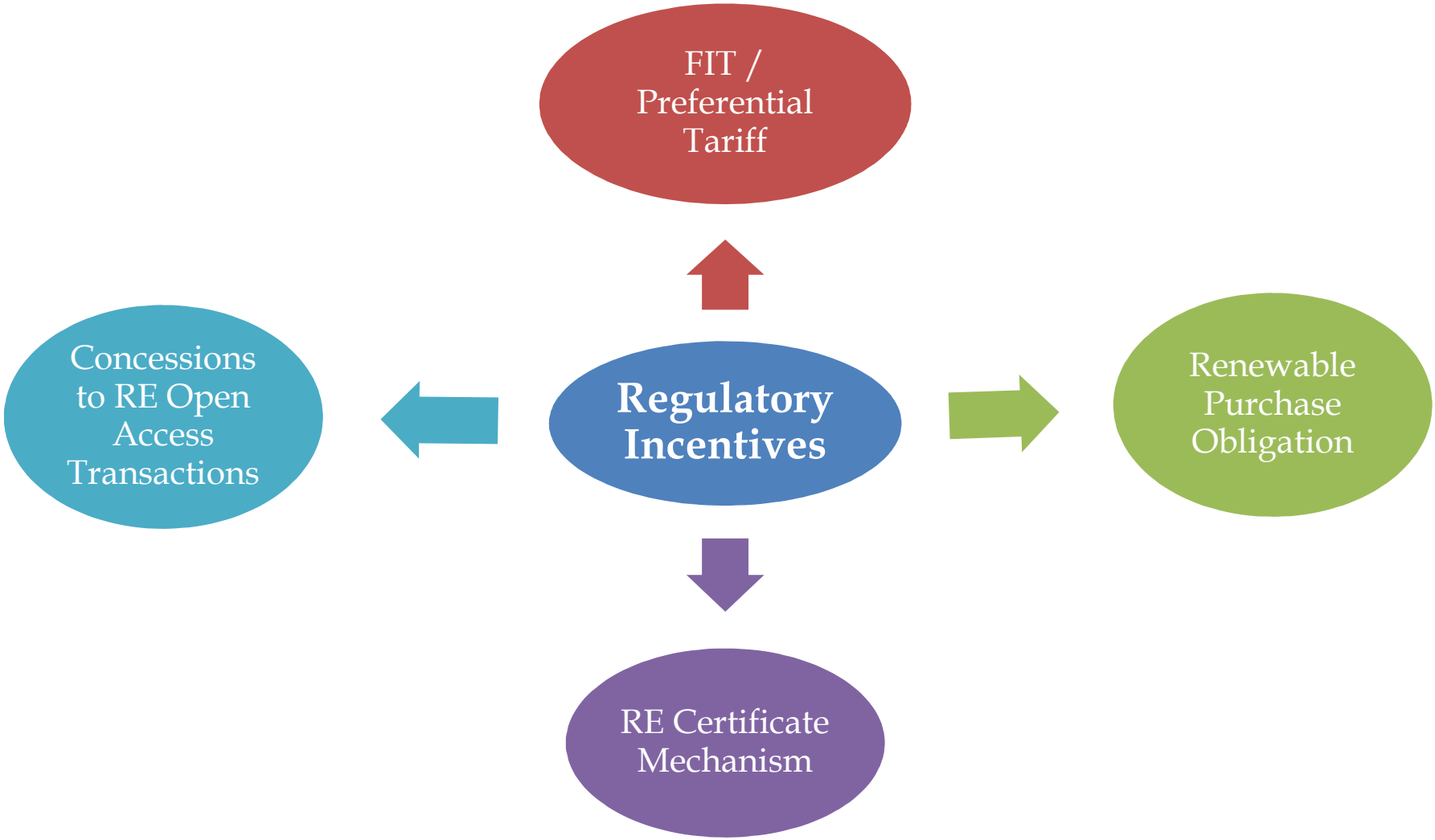
Quantum of Financing Requirement

- Funds required in New Wind:



- Financing requirement is worked out considering the following **assumptions**:
  - Onshore wind capital cost of INR 6.50 crore/MW (with 1.5% annual escalation).
  - Offshore wind capital cost assumed to be INR 12 crore/MW, INR 11 crore/MW and INR 10 crore/MW, for FY 2021-22, FY 2026-27 and FY 2031-32 respectively.
  - Investment required to achieve the target of INR 17.08 lakh crore by FY 2031-32, translates to INR 1.07 lakh crore per annum from FY 2016-17.

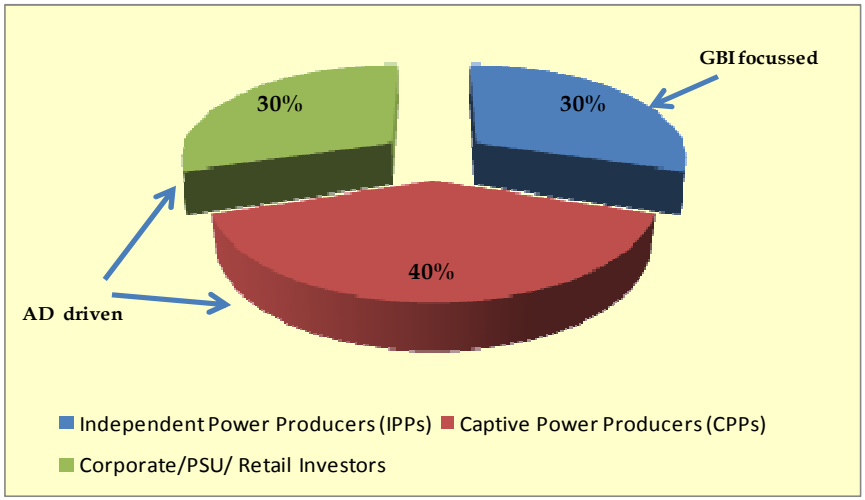
Incentives


FIT / Preferential Tariff
Concessions to RE Open Access Transactions
Regulatory Incentives
Renewable Purchase Obligation
RE Certificate Mechanism

Incentives: Fiscal and Tax Incentives

- **Accelerated Depreciation (AD):** Govt of India has announced decrease in AD from 80% to 40% in the next Fiscal, i.e. FY 2017-18.
- **Generation Based Incentive (GBI):** Visibility only till FY 2016-17 or 15,000 MW capacity installation wef April 2012.
- Both the schemes have different objectives and target developers. While AD targeted small and medium players (primarily captive consumers) and focussed on capacity addition, GBI targeted large Independent Power Producers (IPP) investors with a focus on energy generation.

- AD has been and continues to be the most influential incentive tool for investment decision.
- A CRISIL Ratings Report for PHD Chamber of Commerce published in February 2015, provides the respective share of AD and GBI in the wind sector as 70% and 30% respectively.



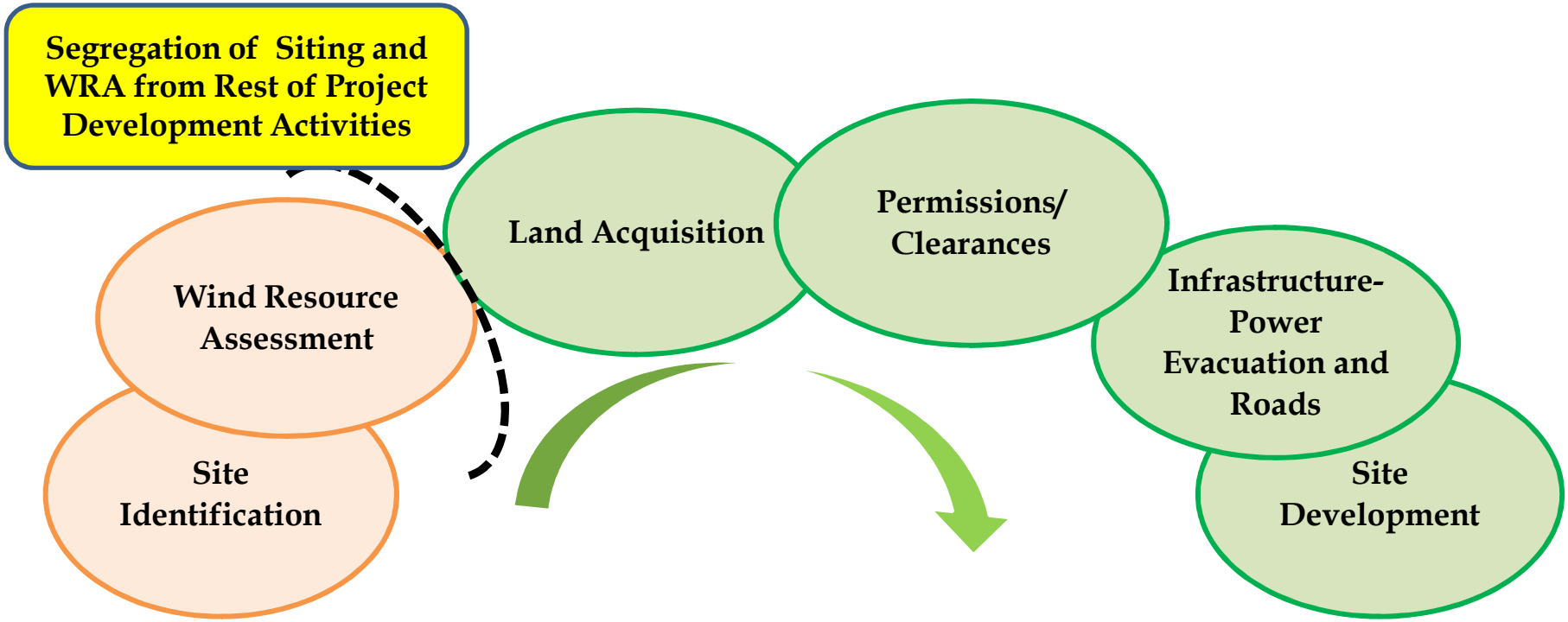
- **Considering the Government of India's target of 60 GW by 2022, continuity of both AD and GBI is required, as both cater to different segments of developers and investors.**

Wind Project Development: Current Status

Challenges / Perceptions

- 'Head-start' in value-chain to turbine manufacturers providing turnkey solutions
- IPPs feel they don't have level playing field – as having limited of being a provider of capital
- In order to expand investors base, alternate model needs to be explored

Wind Project Development: Proposed Model



- Manufacturers, IPPs, PSUs & WRA entities would be at par (Level playing field for all)
- Multiple project development initiatives in parallel → increase project pipeline, share business risks, reduce timelines.
- SNA to be responsible for WRA, DPR quality, land matters
- Power Evacuation to be planned at high voltage on MW/GW Scale
- Confidence to the Project Developers/Investors

Government to develop Mega Wind Projects

- Significant investment required from Govt. to achieve ~12 to 15 GW/annum.
- "Solar Park" concept need to be introduced in Wind Sector.
- Govt. should take up GW scale wind park development till clearance stage for multiple developers with well defined selection criteria.
- Separate 'National Wind Development Company' for this purpose may be formed (like SECI) for developing WIND UMPPs.
- Involvement of private investors for WRA as a separate activity.

How this can be done?

Step 1:	Identify the most suitable sites/zones for wind development-Based on pre-defined criteria
Step 2:	Develop infrastructure in collaboration with all stakeholders-Land procurement, access to roads, transmission layout, water linkages, etc.
Step 3:	Invite participation from the developers /investors to implement projects within the identified sites
Step 4:	Different power procurement modes could be used as basis to select developers/offer sites

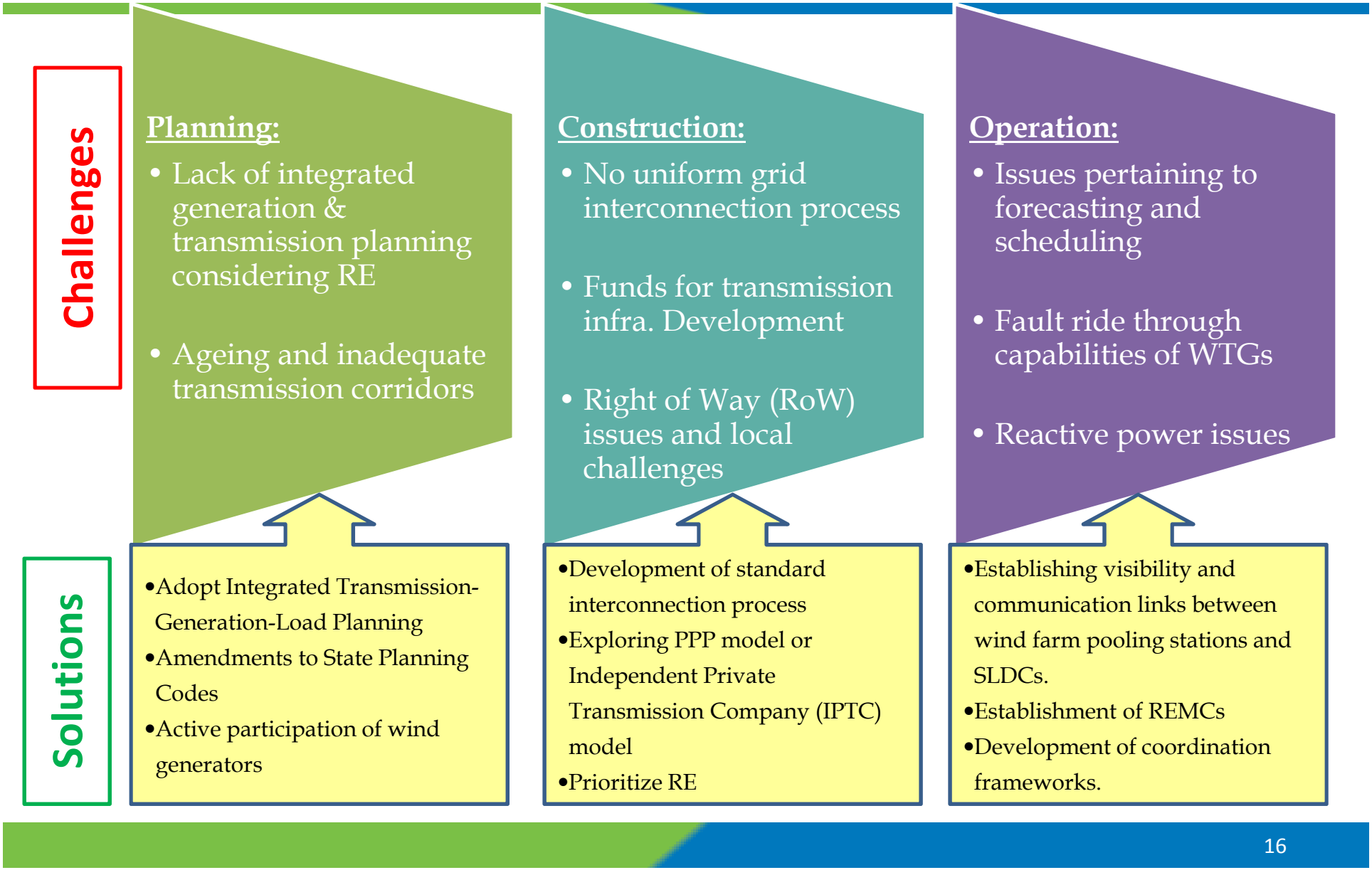
Challenges in Wind Power Procurement

- Wind rich States have reached saturation in Grid Integration and hence not keen on future Wind development.
- Inter-State transactions suffer from high transaction costs.
- FIT and REC has dependence on state Renewable Purchase Obligation (RPO), which in many states are not enforced strictly.
- Regulatory commissions till date has not imposed any penalty on defaulting Discoms which has resulted in delay of achieving RE targets.
- Financial conditions of DISCOMS raises questions about their ability to meet RPO targets, participate in REC markets & promote RE development.

Procurement of Wind Power: Key Recommendations

- Stringent RPO M&V framework with RE technology specific targets along with enforcement standards would be pre-requisite to ensure competitive bidding
- Preparatory work for project development by Government which addresses information asymmetry
- Guidelines may be formulated with pilot/demonstration bidding in few cases to garner investor confidence
- Enable inter-state Wind transaction using CERC determined FITs
- Strengthening of REC mechanism need to be addressed at early date

Grid Integration of Wind in India



Way Forward for implementation for F&S

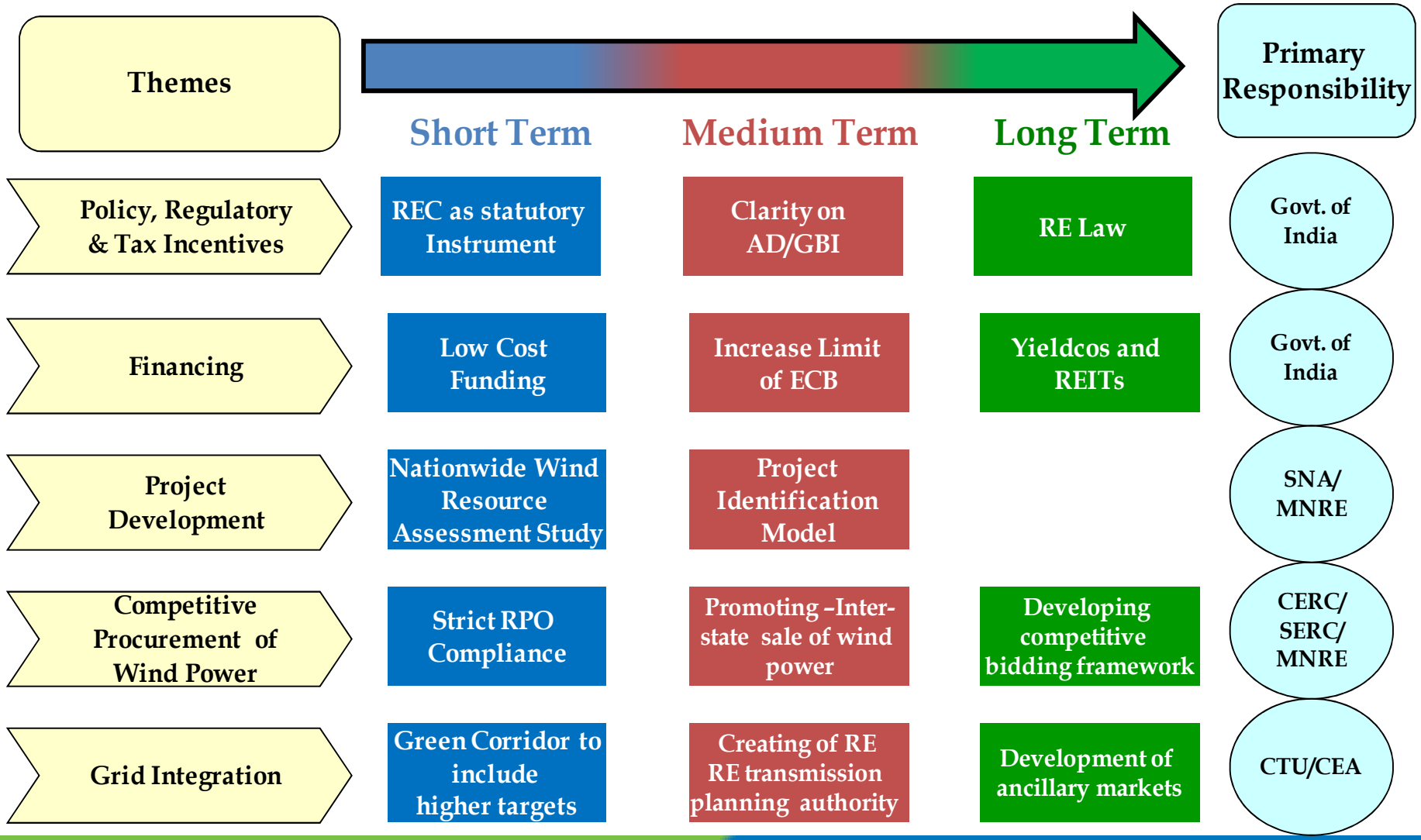
- **Need for visibility:**
  - Additional IT infrastructure to be established for visibility of pooling stations
  - Pooling S/S: Gujarat (52), Rajasthan (18), Maharashtra (43), Tamil Nadu (120)

- **Robust communication facility**:
  - Need for establishing communication facility for tracking real-time generation of pooling station at SLDC
  - Who would install? Who would bear the cost for establishing the communication network

- **Need for uniform settlement mechanism:**
  - Different practices for generator payment exist in different States. Except Maharashtra settlement made on schedule generation basis
  - Institutional Set up and deviation Settlement mechanism.

Implementation Roadmap

Actions to Scale Up the Market to 200 GW by 2032



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Plan to Launch

Wind Vision Document

by May / June 2016

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Thank You