Renewable Energy Management Centers in India

05th Jun 2017

Power Grid Corporation of India Ltd

Indian Power System : Paradigm shift in Generation Portfolio
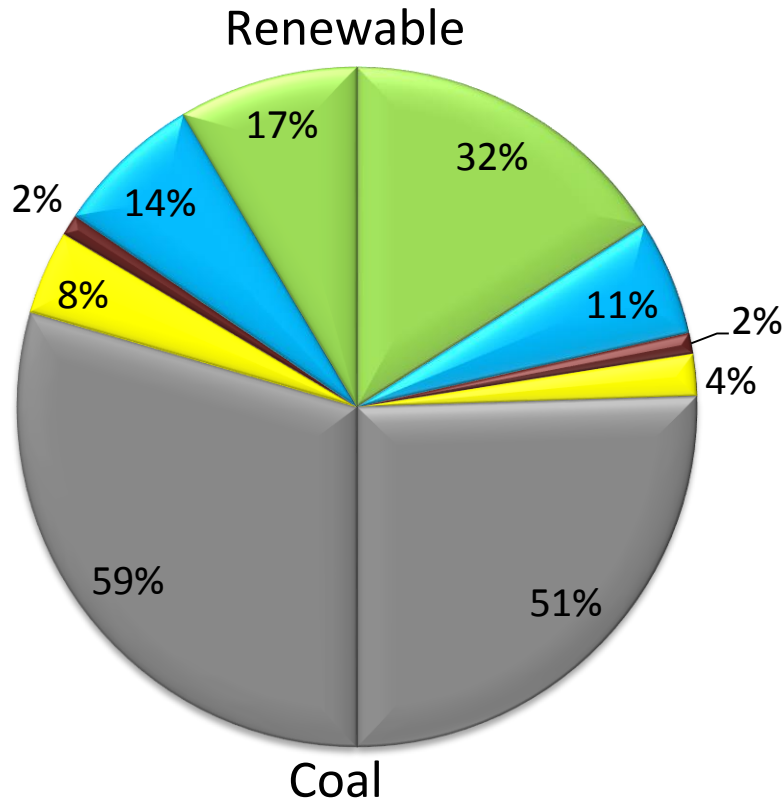

2017

2022

Generation : 327GW

Renewable : 57.2GW

Peak Demand : 159GW

Annual Consumption: 1142BU

Generation : 534GW

Renewable : 175GW
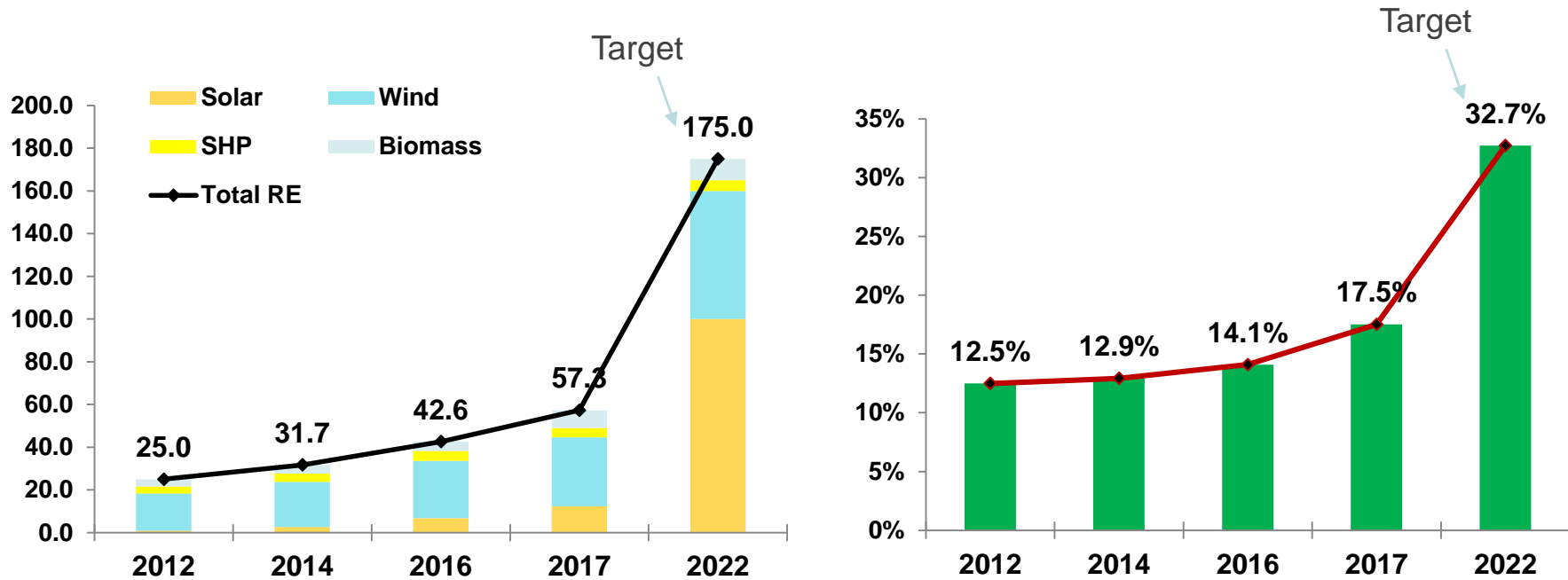
Peak Demand : 234GW

Annual Consumption: 1566BU

Renewable

17% 32%

2% 14%

8% 11%

2%

4%

59% 51%

Coal

■ Renewable ■ Hydro ■ Nuclear ■ Gas ■ Coal

Renewable Penetration in India-2022

Left chart — Renewable capacity (GW), Target for 2022:
Legend: Solar, Wind, SHP, Biomass, Total RE
Total RE values: 2012: 25.0, 2014: 31.7, 2016: 42.6, 2017: 57.3, 2022 (Target): 175.0

Right chart — Renewable penetration (%), Target for 2022:
2012: 12.5%, 2014: 12.9%, 2016: 14.1%, 2017: 17.5%, 2022 (Target): 32.7%

| COP-21 Commitment By 2030 | • 33-35% Reduction in Emission Intensity
• 40% of electricity from non-fossil fuel
• Carbon-Sink to absorb 2.5 to 3 billion tonnes of CO_2 |

Green Energy Corridors : Components

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Green Energy
Corridor
(USD 5820 Mn)
├── Transmission Syst. Strengthening (USD 5220 Mn)
│   ├── Inter State (USD 1750 Mn)
│   └── Intra State (USD 3470 Mn )
└── Control Infrastructure (USD 600 Mn)
    ├── REMC (USD 35 Mn)
    ├── Dynamic Compensation (USD 185 Mn)
    └── Energy Storage & Real time Mon. (USD 380)
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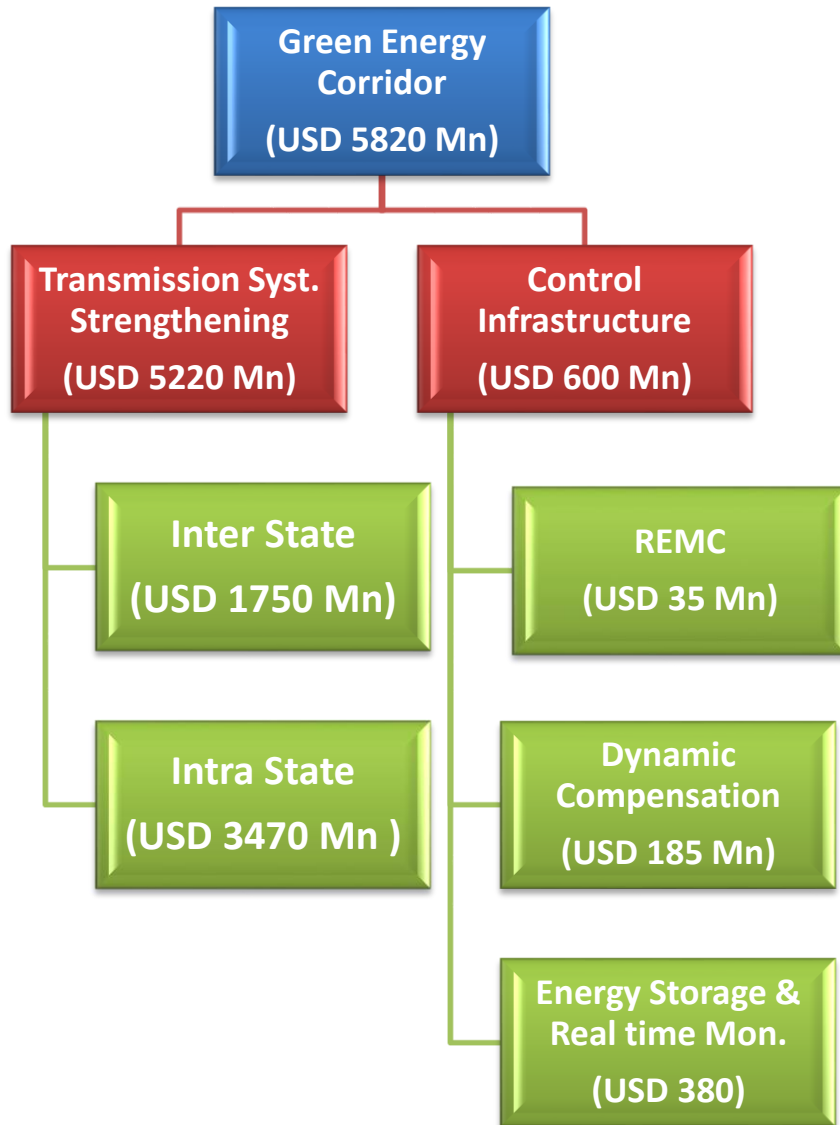
- ➤ Transmission System Strengthening at Intra State (InSTS) as well as Inter state level (ISTS)

- ➤ Renewable Energy management centers equipped with RE forecasting, scheduling & monitoring systems

- ➤ Dynamic reactive Compensation (SVC/STATCOM) at strategic locations

- ➤ Grid Scale Energy Storage

Background of REMCs_India

- RE Forecasting is critical in addressing uncertainty of VERs, facilitating grid integration of RE

- Establishment of Renewable Energy Management centers (REMC) equipped with Forecasting systems envisaged as part of control infrastructure of Green Energy Corridors

- REMCs at RE resource rich State, Regional & National level are proposed to be co-located with respective Load dispatch centers

- 11 nos. REMCs envisaged in states LDCs (7), respective Regional LDCs (3) and NLDC (1)

Background of REMCs_India

- German Govt. through GiZ provided technical assistance for preparation of REMC DPRs

- Govt. of India (GoI) assigned Power Grid Corp to implement REMCs

    - Estimated Cost – About 55 million Euros (USD 62 million)- Funded by GoI

- PGCIL to hand over the REMC upon its commissioning to respective owners (SLDC/RLDC-POSOCO)
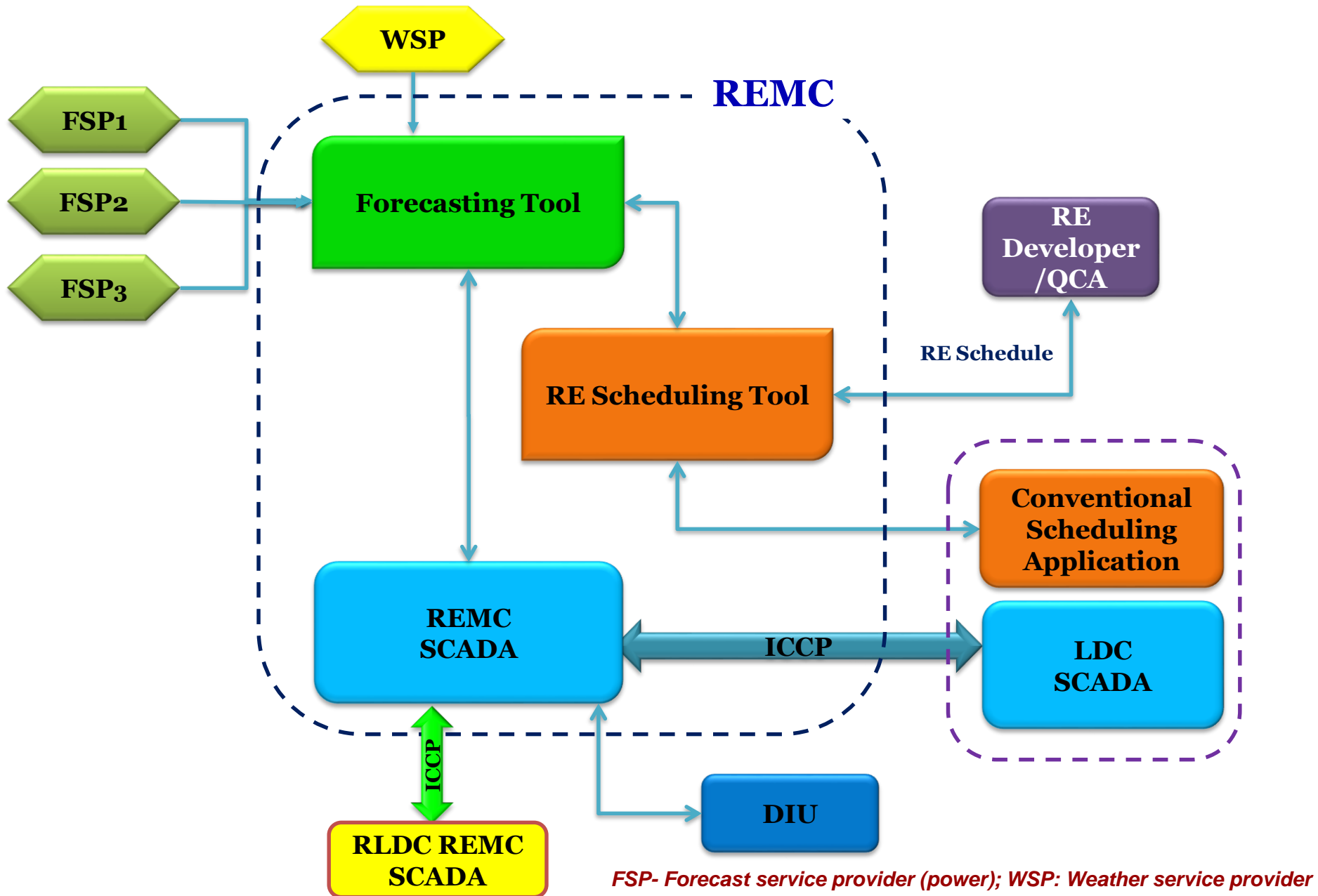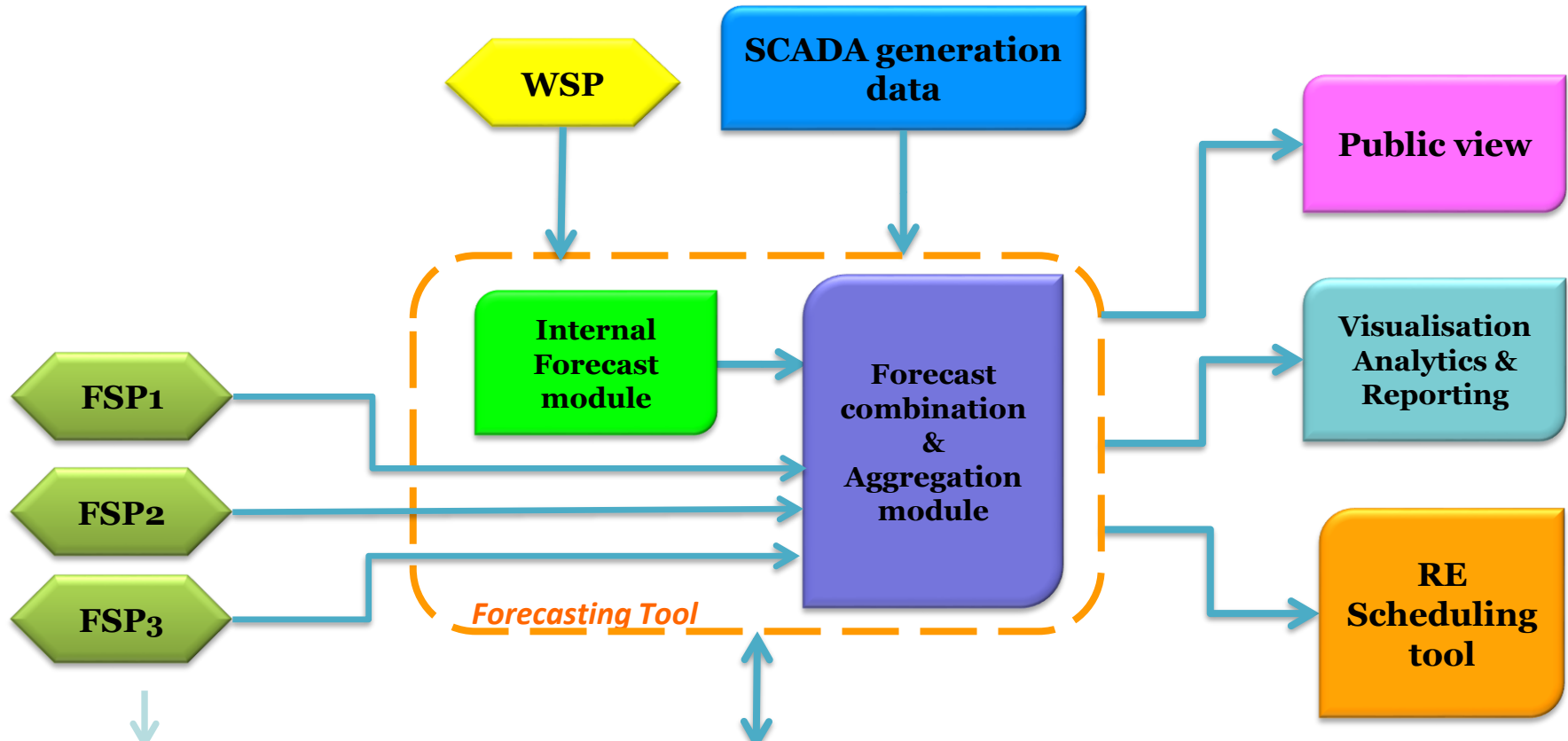
REMC Locations
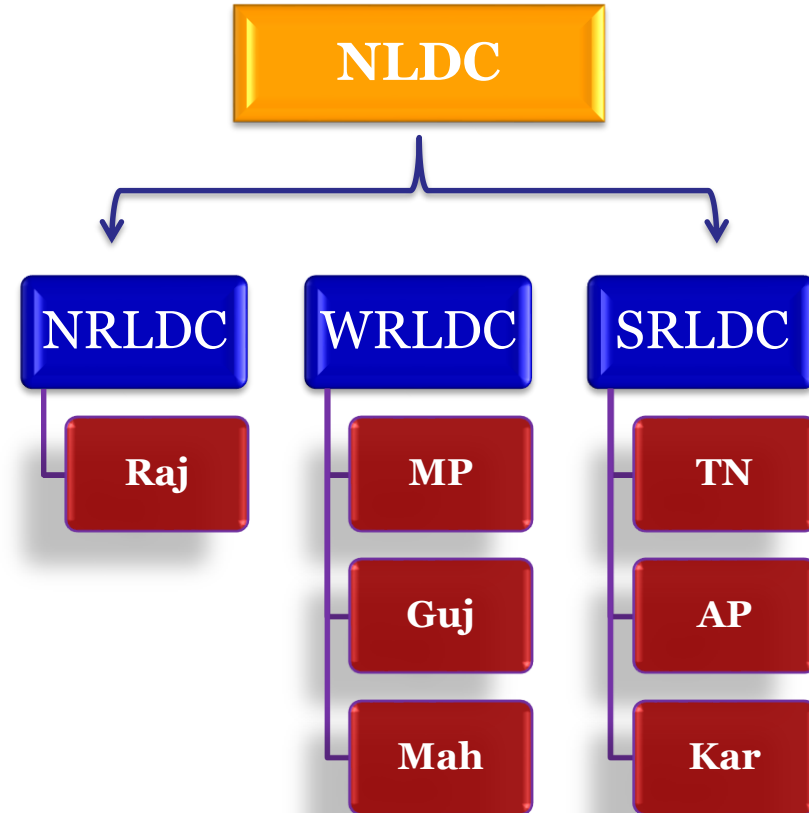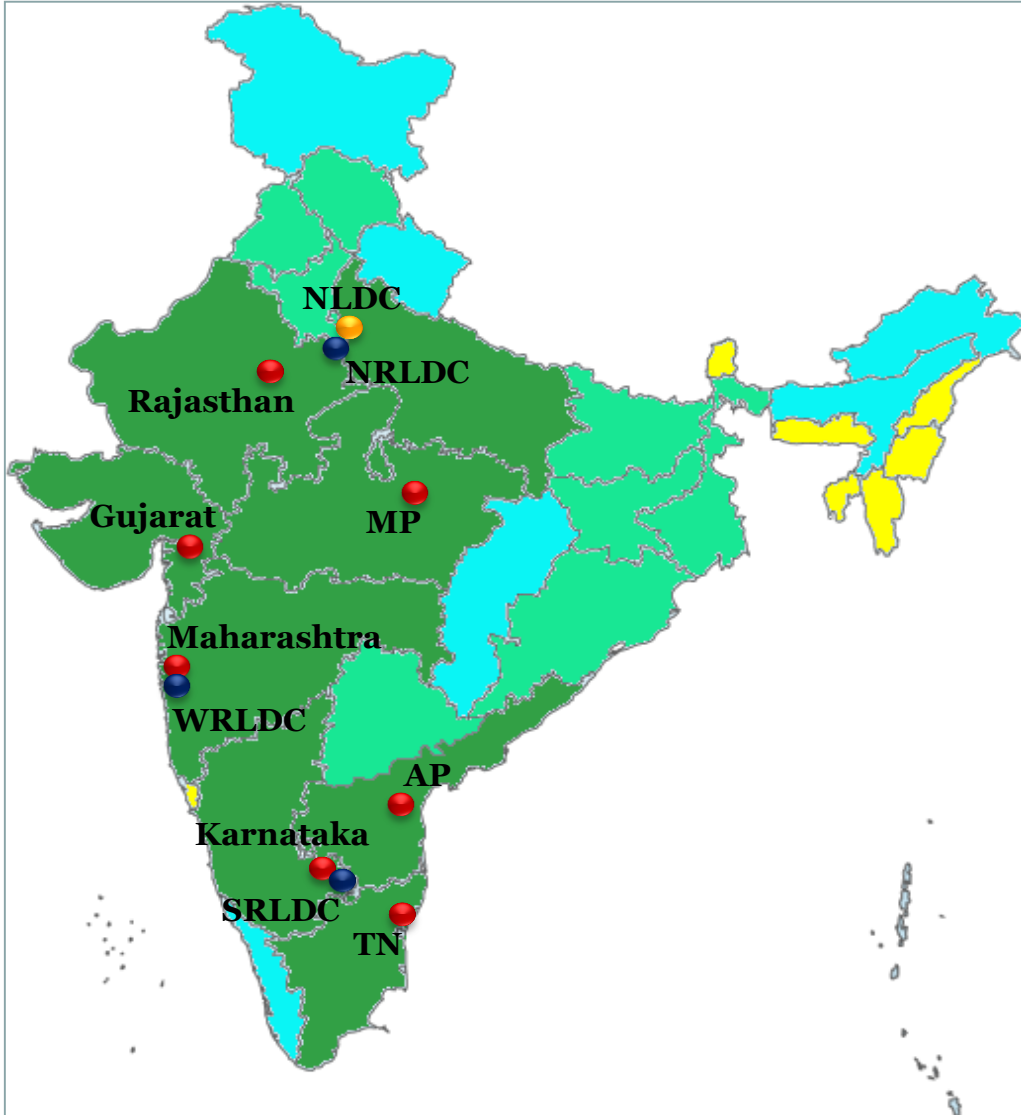
REMC Scope of works

- Forecasting of RE generation on Very short term (15 mins), day-ahead, Intra day and week-ahead basis

- Real time tracking of generation from RE sources and its geo-spatial visualization

- Scheduling solutions including for QCA/Project Developers

- Close coordination with respective LDC for RE generation and control for smooth grid operation

- Single source information repository and coordination point for RE penetration (Static /dynamic data)

REMC main modules

SCADA

Forecasting tool

Scheduling Tool

REMC Architecture

REMC

WSP

FSP1
FSP2
FSP3

Forecasting Tool

RE Developer /QCA

RE Scheduling Tool

RE Schedule

Conventional Scheduling Application

REMC SCADA

ICCP

LDC SCADA

ICCP

RLDC REMC SCADA

DIU

FSP- Forecast service provider (power); WSP: Weather service provider

RE Forecasting Tool

Fx Combination & Aggregation module

➢ Forecast available for a single area/location have different strengths & weaknesses due to weather situations

➢ Statistical combination of multiple forecasts using auto adaptive algorithms shall help in generating blended/accurate forecast

➢ Optimised Forecast to be generated at aggregated/state as well as pooling station level/QCA/Generator level
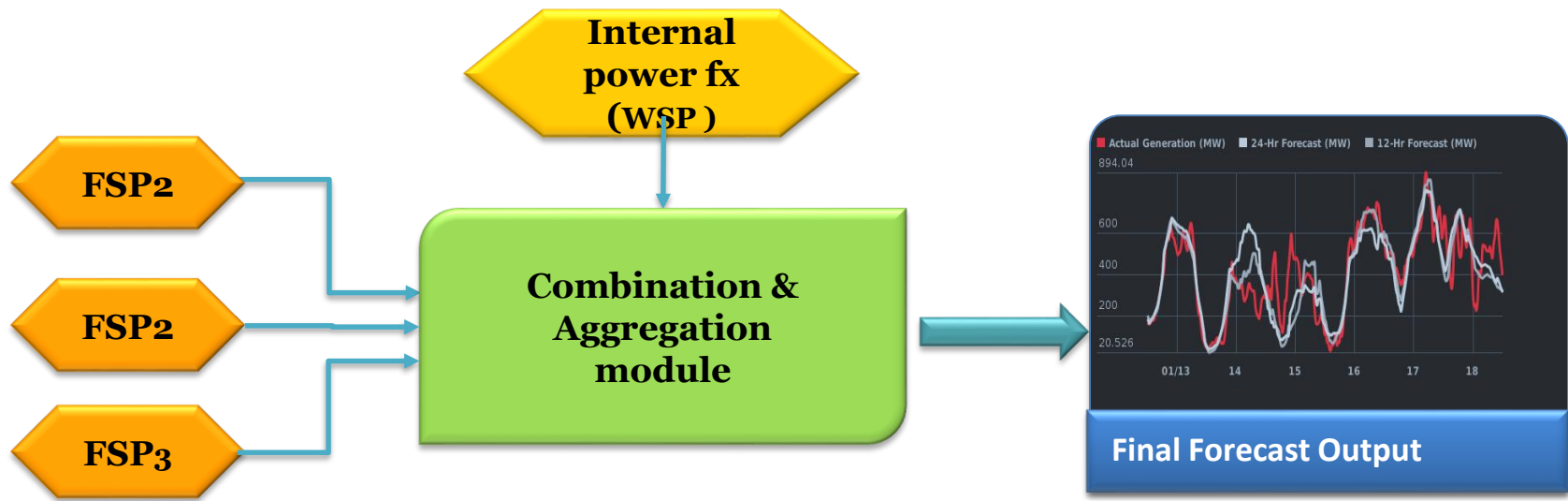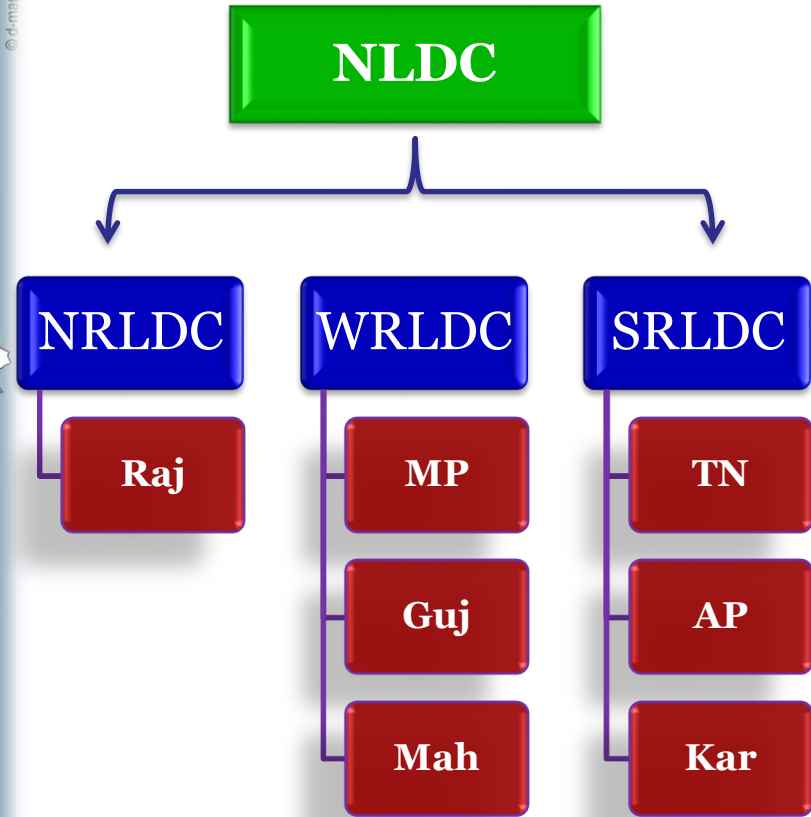
Way Forward

➤ Implementation of REMCs in India progressively from Sep'18: 1st Project award in June'17

➤ Operationalisation of REMCs for SR, WR & NR packages

➤ 2nd Phase REMCs in few other states are to be taken up

Thank you

kashish@powergridindia.com

REMC Locations

Salient features of RE Forecasting Tool

- ➤ Data Exchange
  - • Share Static, Historical and Real Time SCADA data with Forecast Service Providers (FSPs)
  - • Collect Power forecast from different FSPs as well as Internal Fx tool
  - • Transfer of power forecasts to scheduling Tool
  - • Historical data from Repository

- ➤ RE Forecasting
  - • Use forecast from different FSPs and internal forecast system to generate blended final forecast
  - • Week Ahead, Day Ahead, Intraday & short term forecasts

- ➤ Analysis module
  - • Accuracy Analysis of power forecasts which has implication on payments terms – performance based payments
  - • Performance based retentions terms for FSPs (after two years)