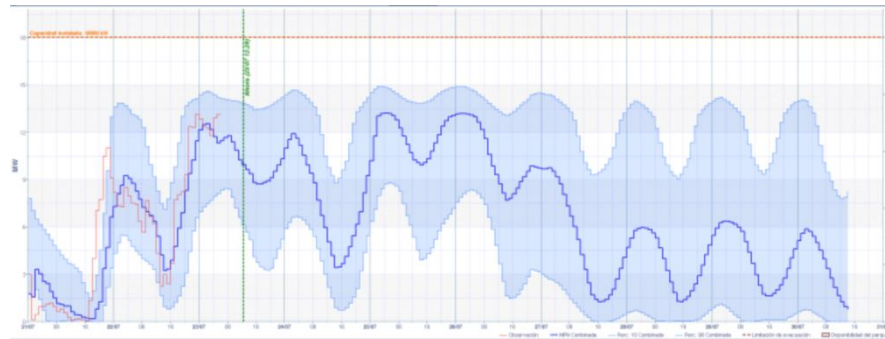# RE Forecasting
&
Renewable Energy Management Centers in India

22 Jan 2018
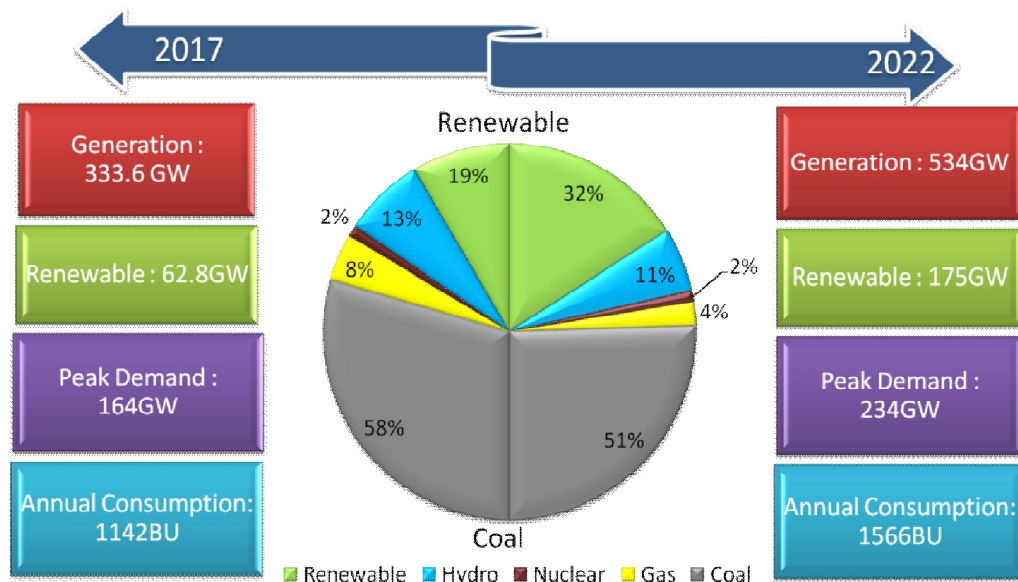
Power Grid Corporation of India Ltd
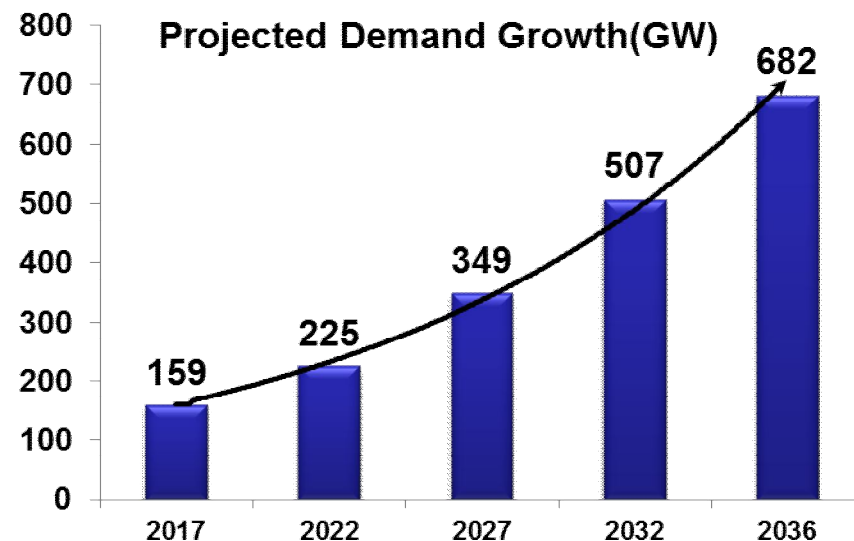
There is one forecast of which you can already be sure; someday RE will be the only way for people to satisfy their energy needs
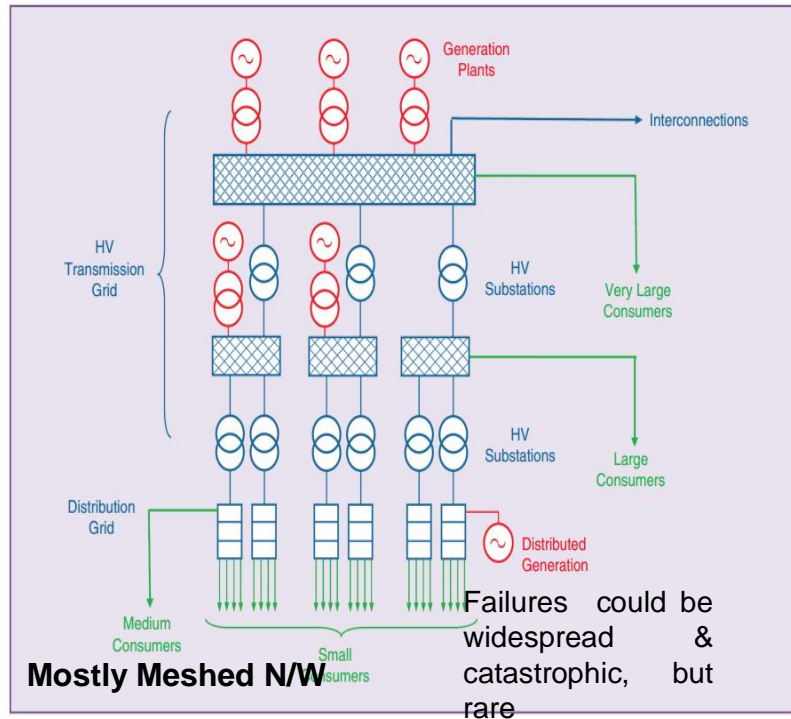
Future Indian Power System

2017

Generation : 333.6 GW

Renewable : 62.8GW

Peak Demand : 164GW

Annual Consumption: 1142BU

2022

Generation : 534GW

Renewable : 175GW

Peak Demand : 234GW

Annual Consumption: 1566BU

Pie chart (Renewable / Coal):
- Renewable 32%
- 19%
- 13%
- 2%
- 8%
- 58%
- 51%
- 11%
- 2%
- 4%
- Coal

Legend: Renewable | Hydro | Nuclear | Gas | Coal
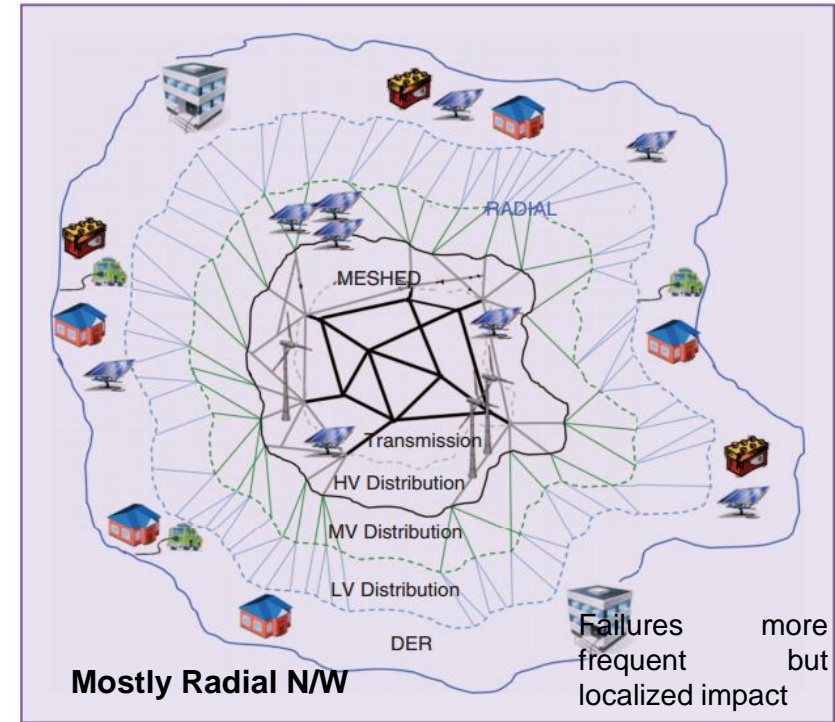
Data as on Dec'17

Drivers

- Demand Growth (Per capita consumption -1/3rd of world average)

- Govt. targets of 40% generation capacity from non-fossil fuel (INDC-COP21-2030)
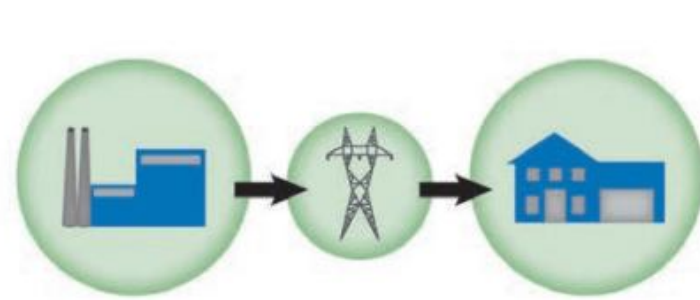
- Abundant RE Potential in Country

RE Capacity Penetration (%)

- 2012: 12.5%
- 2014: 12.9%
- 2016: 14.1%
- 2017: 19%
- 2022: 32.7%

Projected Demand Growth(GW)

- 2017: 159
- 2022: 225
- 2027: 349
- 2032: 507
- 2036: 682

Source- CEA monthly report & draft national electricity plan - transmission

End of the " Trickling Down" Paradigm

Traditional Power System

Mostly Meshed N/W

Failures could be widespread & catastrophic, but rare

Beyond Trickling Down Paradigm
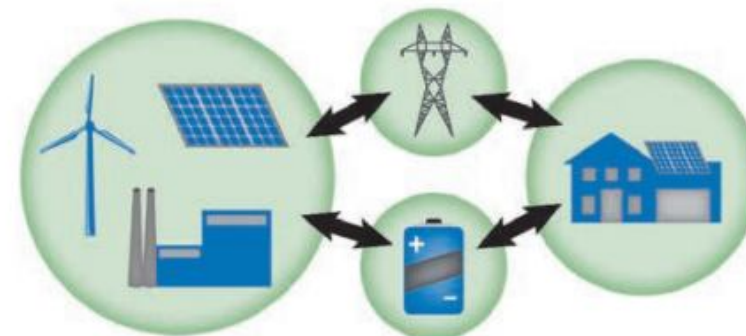

Mostly Radial N/W

Failures more frequent but localized impact

P & E, magazine, July/Aug 16

Present day

Future

IRENA Report on Smart Grid & Renewabl

Background of REMCs_India

- RE Forecasting is critical in addressing uncertainty of VERs, facilitating grid integration of RE (*Careful application of Statistics is a must*)

- 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 of RE rich states (7) [TN, AP, Karnataka, Mah, Gujarat, MP, Rajasthan], respective Regional LDCs (3) [SRLDC, WRLDC, NRLDC] 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 (11)

  - Estimated Cost – About 55 million Euros (USD 62 million)- 100% Funded by GoI

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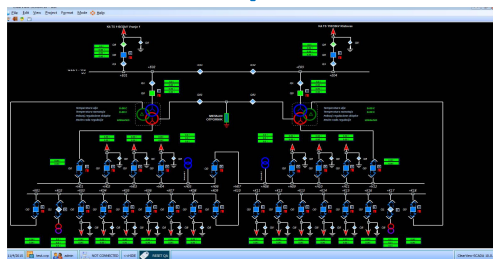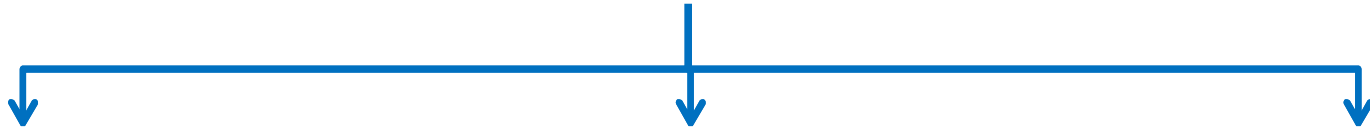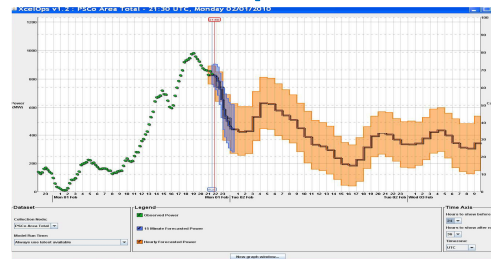
REMC Locations & Status
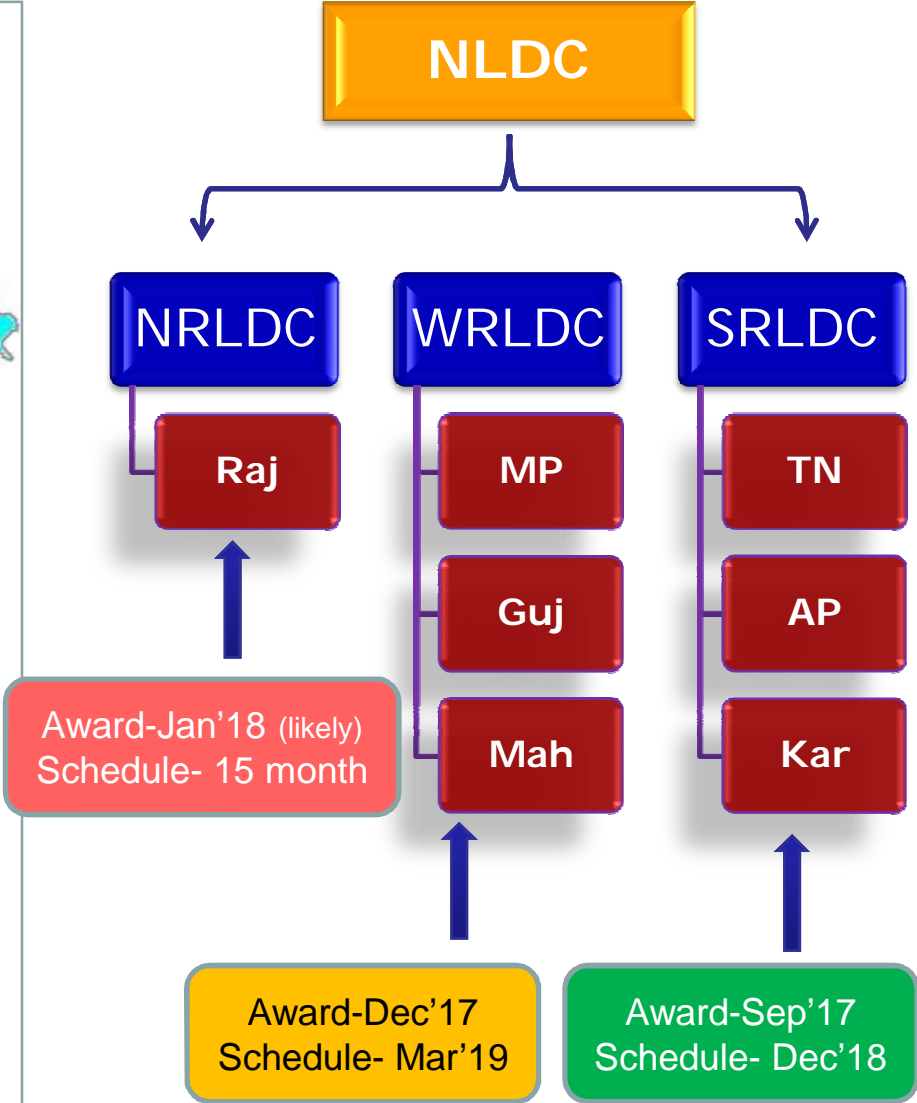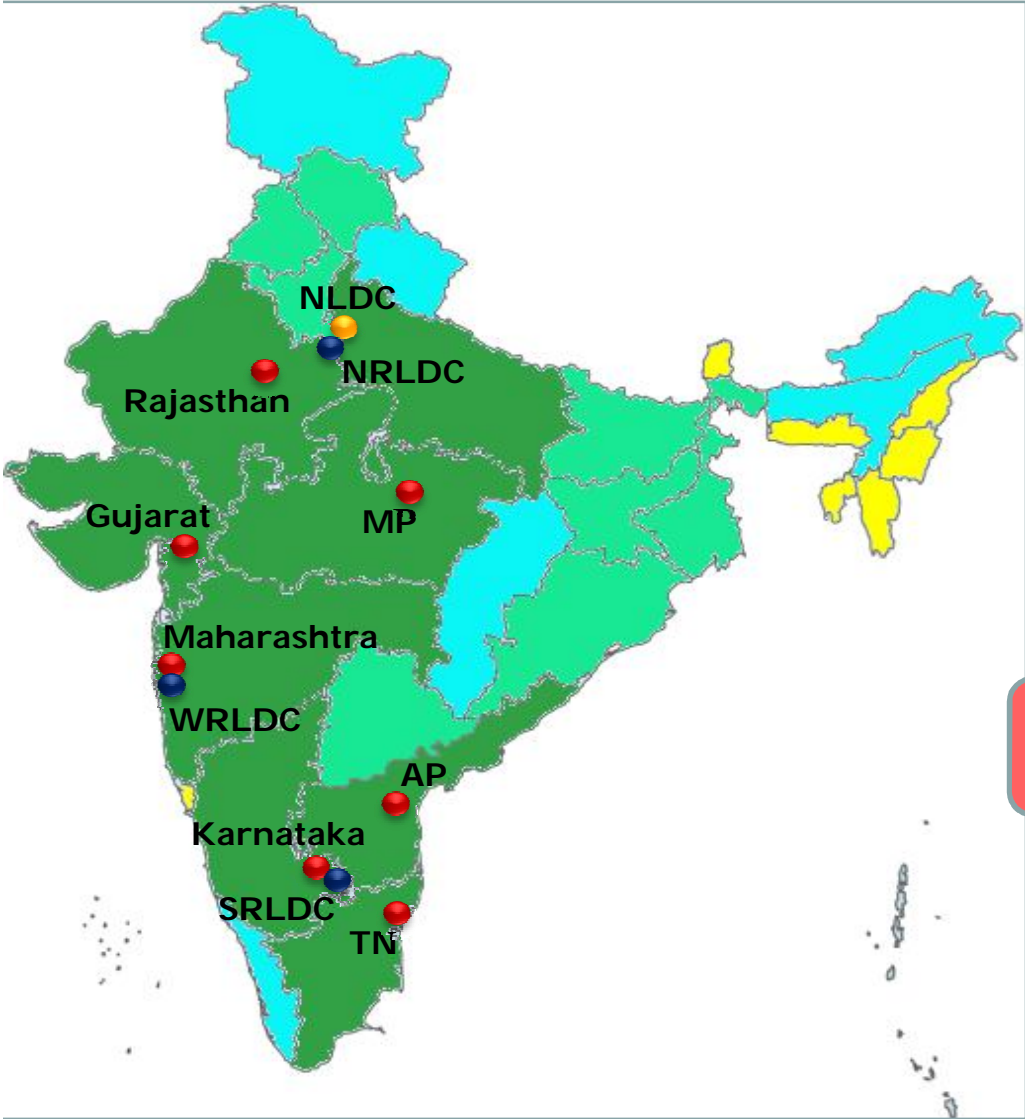
REMC Scope of works

- 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)
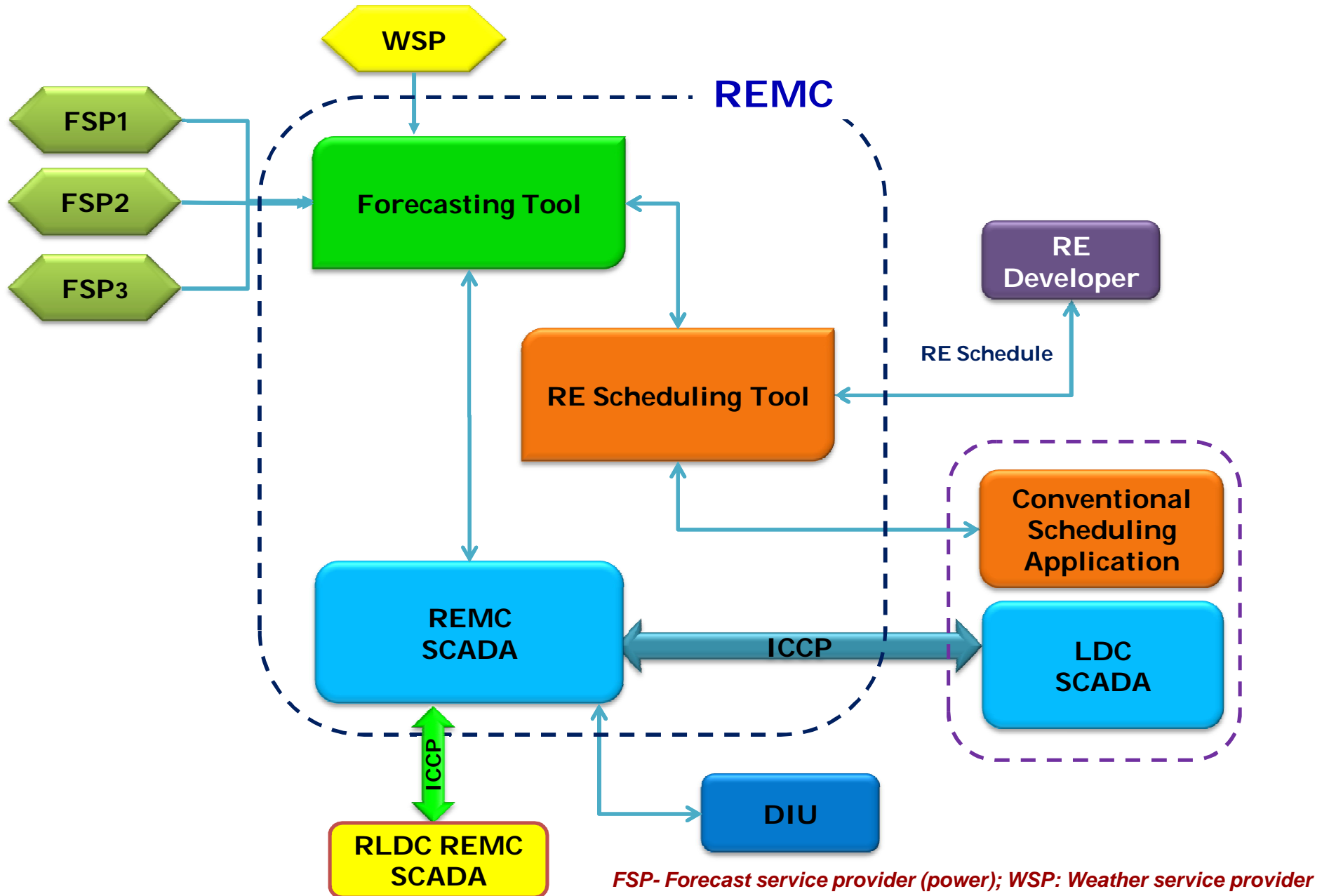
REMC main modules

REMC

SCADA **Forecasting tool** **Scheduling Tool**

REMC Architecture

WSP

FSP1

FSP2

FSP3

REMC

Forecasting Tool

RE Scheduling Tool

RE Developer

RE Schedule

Conventional Scheduling Application

REMC SCADA

ICCP

LDC SCADA

ICCP

RLDC REMC SCADA

DIU

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

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
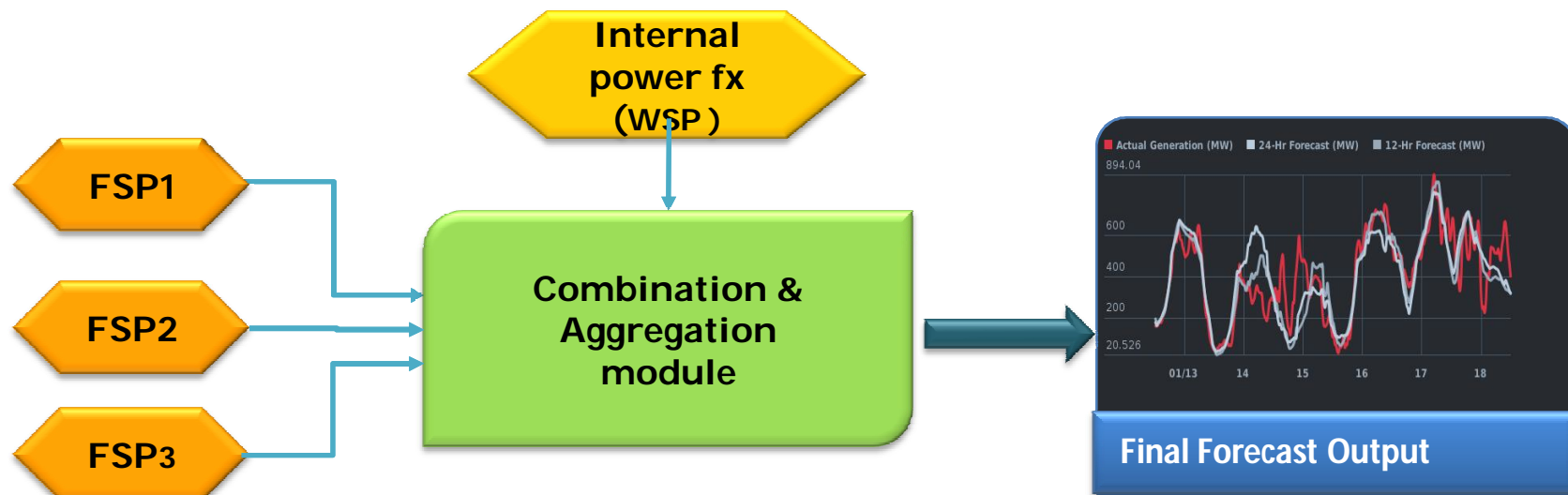
Other Salient features of RE Forecasting Tool

- 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

- 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)

RE Forecasting Tool
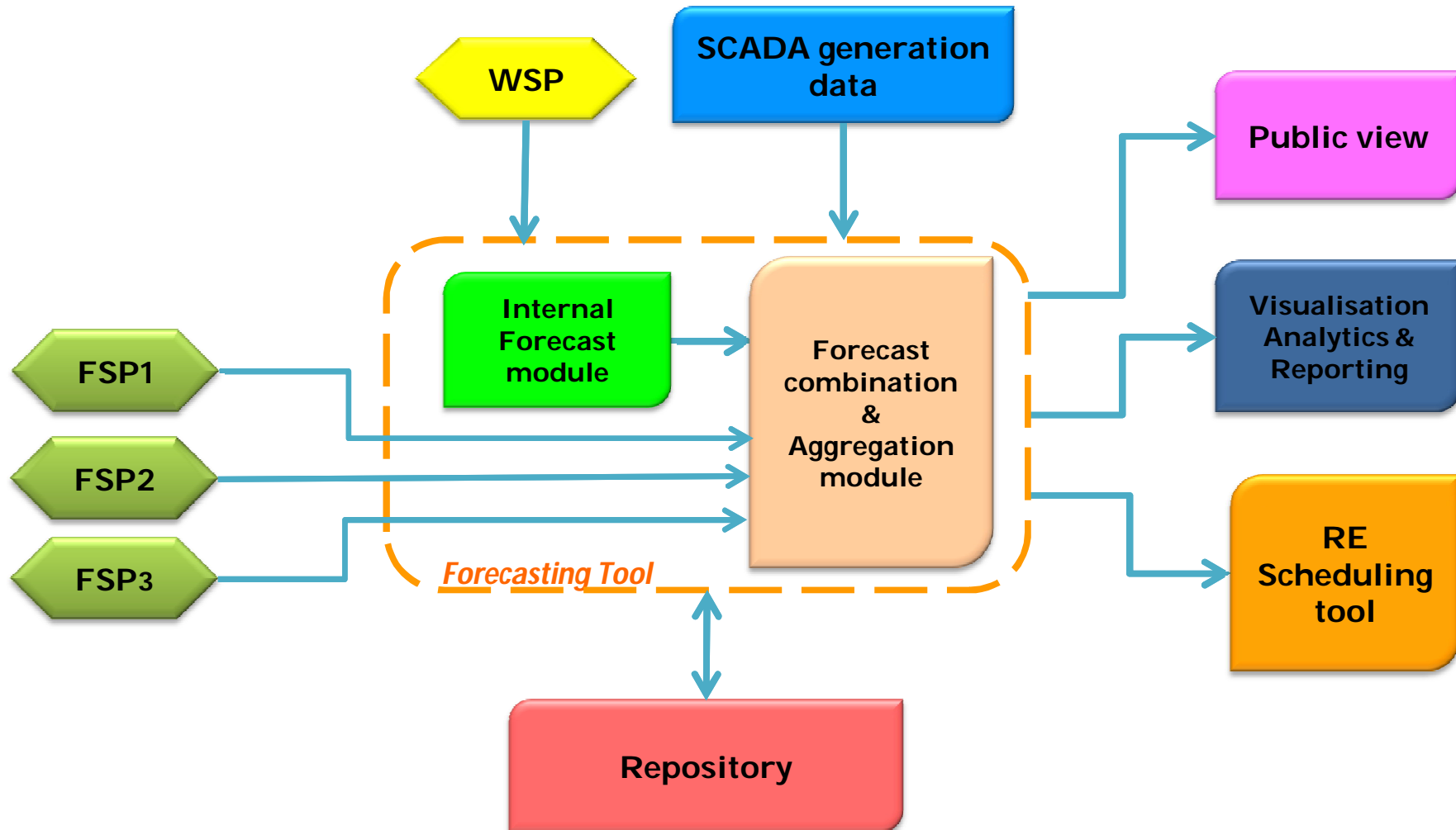
Way Forward

➢ Implementation & Operationalization of REMCs in India progressively from Dec'18

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

➢ Demand forecasting must also be taken up by States

Thank you

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