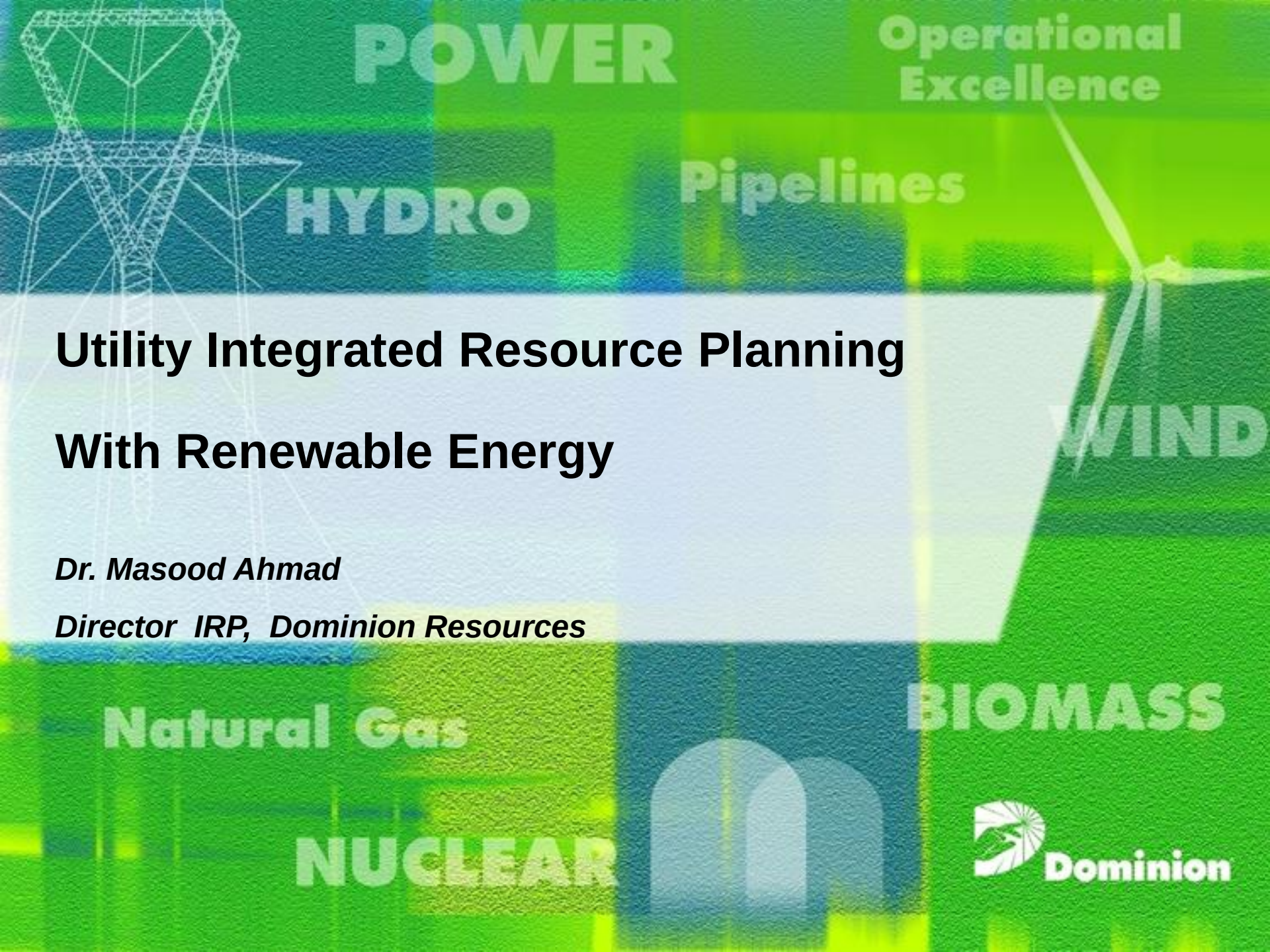

Utility Integrated Resource Planning

With Renewable Energy

Dr. Masood Ahmad

Director IRP, Dominion Resources

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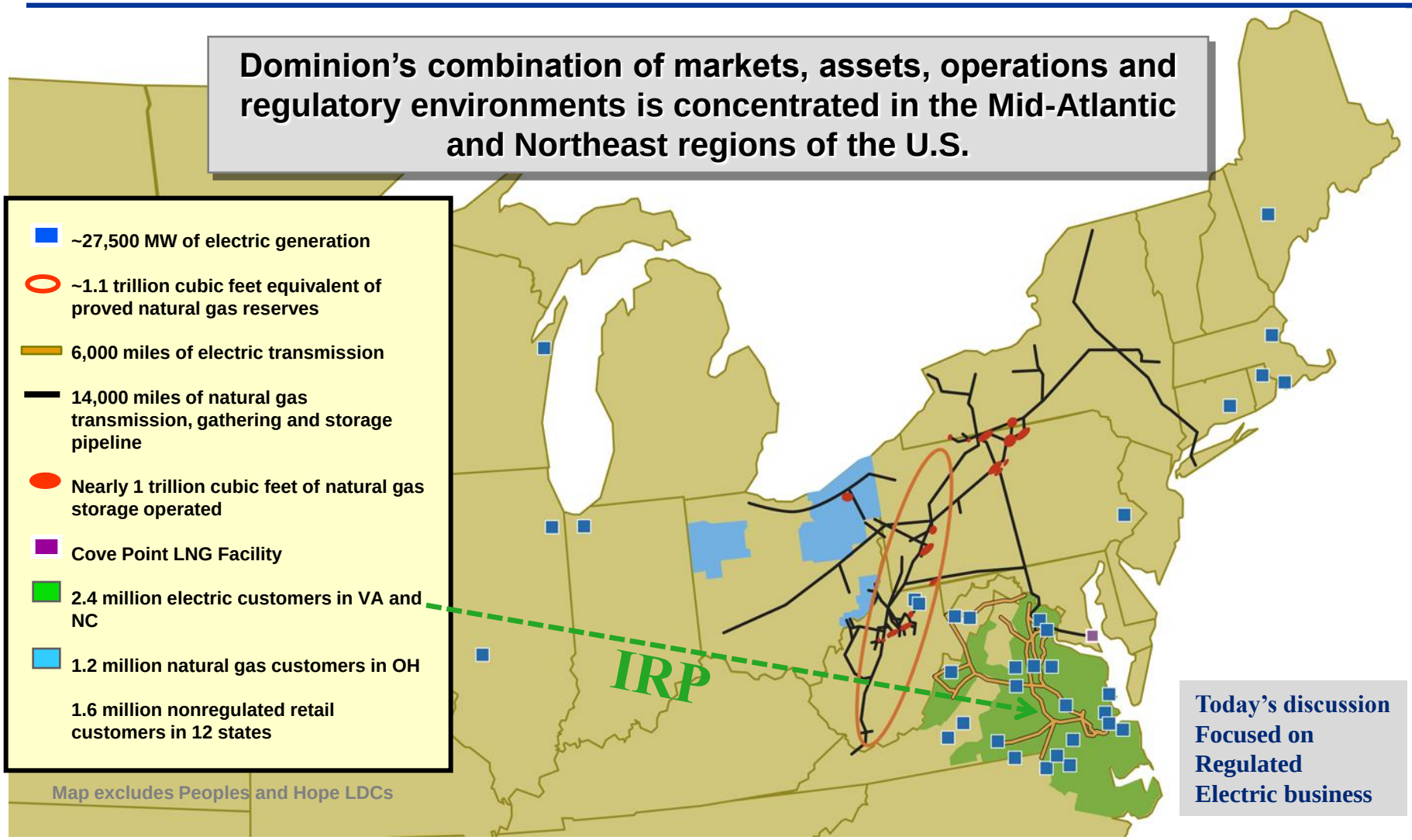
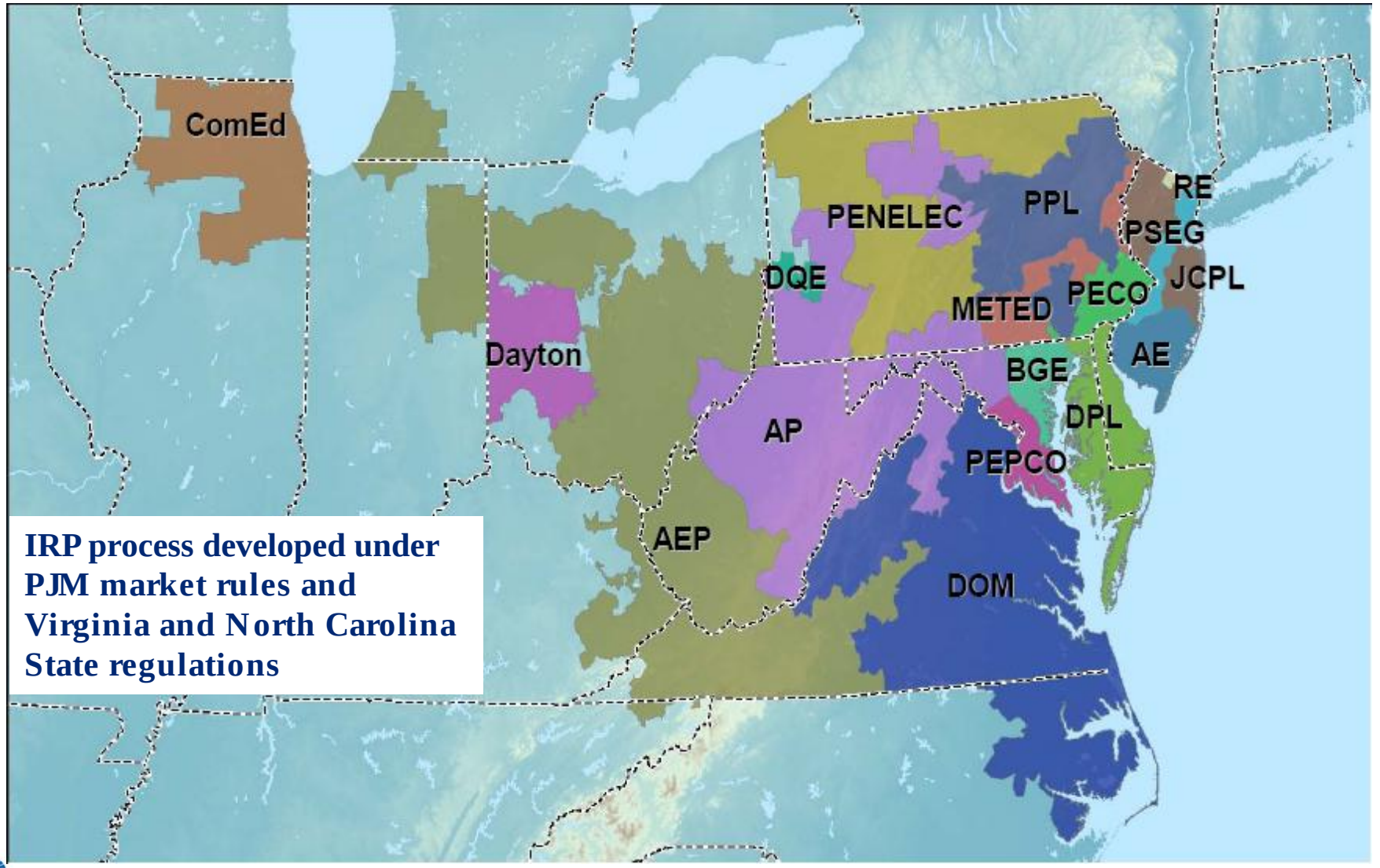
Dominion

Dominion's combination of markets, assets, operations and regulatory environments is concentrated in the Mid-Atlantic and Northeast regions of the U.S.



PJM Control Area

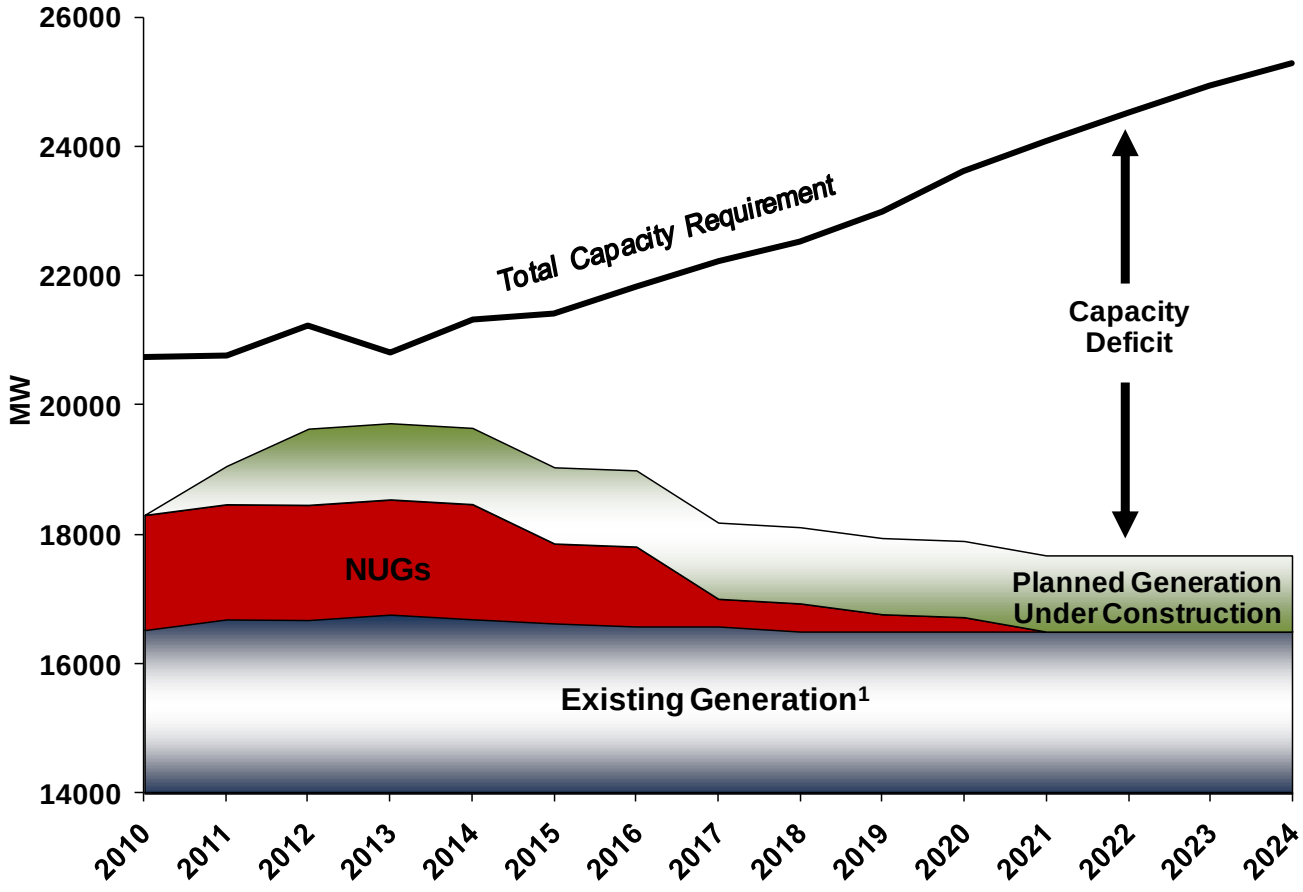


IRP process developed under PJM market rules and Virginia and North Carolina State regulations

IRP Requirements

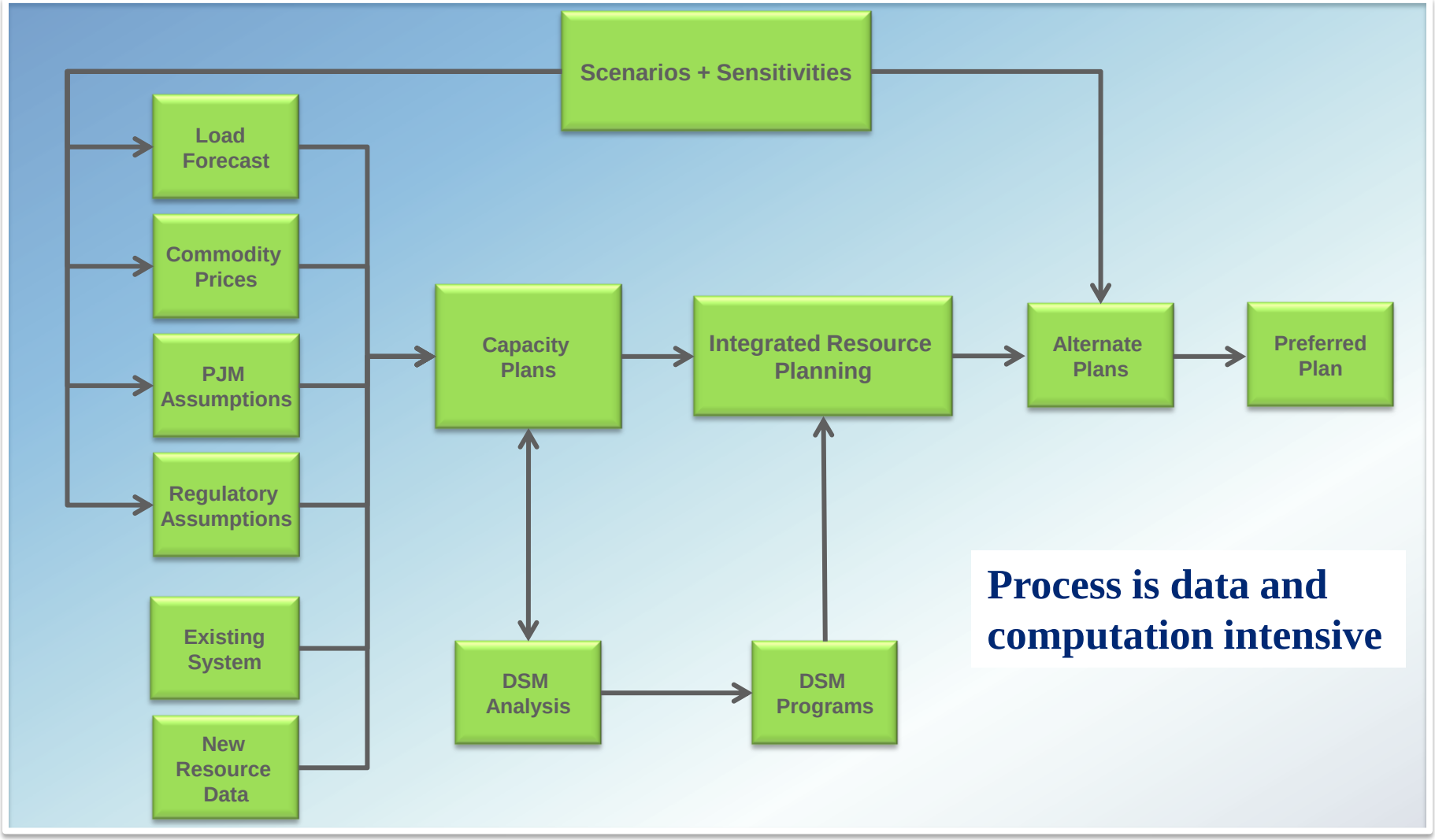
- 15 Year Plan to be filed September 1st
  - Load Forecast and Reserve Requirements
  - Supply Side Analysis (Traditional and Alternative)
  - Demand Side Analysis
  - Scenarios and Sensitivities
- Short Term Action Plan (5 years)
- Renewable Targets Compliance Plan (NC only)

What is IRP?



Essence of the IRP is to fill capacity deficit with "cost effective" resources

IRP Process


Scenarios + Sensitivities
Load Forecast
Commodity Prices
PJM Assumptions
Regulatory Assumptions
Existing System
New Resource Data
Capacity Plans
Integrated Resource Planning
Alternate Plans
Preferred Plan
DSM Analysis
DSM Programs
Process is data and computation intensive

Renewable Generation Portfolio

Facility	Status	Capacity
<<<<< Biomass >>>>>		
Pittsylvania	Operating	83 MW
Altavista	Operating	6 MW
VCHEC [1]	Construction	117 MW
Undisclosed	Development [4]	100 MW
Biomass Subtotal >>>		306 MW
<<<<< Wind >>>>>		
NedPower [2]	Operating	132 MW
Fowler Ridge I [2]	Operating	150 MW
Fowler Ridge II	Development [4]	150 MW
Prairie Fork	Development [4]	300 MW
Virginia Wind [2,3]	Development [4]	245 MW
Wind Subtotal >>>		977 MW
Total Biomass and Wind		1,283 MW

1) Assumes 20% co-firing
2) Dominion's 50% share
3) Includes Wise County and Tazewell County as well as other undisclosed facilities
4) Development projects are subject to change

Virginia RPS Requirements

VA Requirements

Year	Percent of RPS	Annual GWh
2010-2015	4% of Base Year Sales	1,733
2016-2021	7% of Base Year Sales	3,032
2022-2024	12% of Base Year Sales	5,198
2025	15% of Base Year Sales	6,497

- Voluntary
- Allows REC purchase
- Targets based on 2007 retail sales less nuclear generation
- The company plans to meet the target “at reasonable cost and in a prudent manner” as follows
  - Use existing renewable resources
  - Purchase of RECS
  - Build new renewable generation if economical

Dominion

North Carolina REPS Requirements

NC Requirements

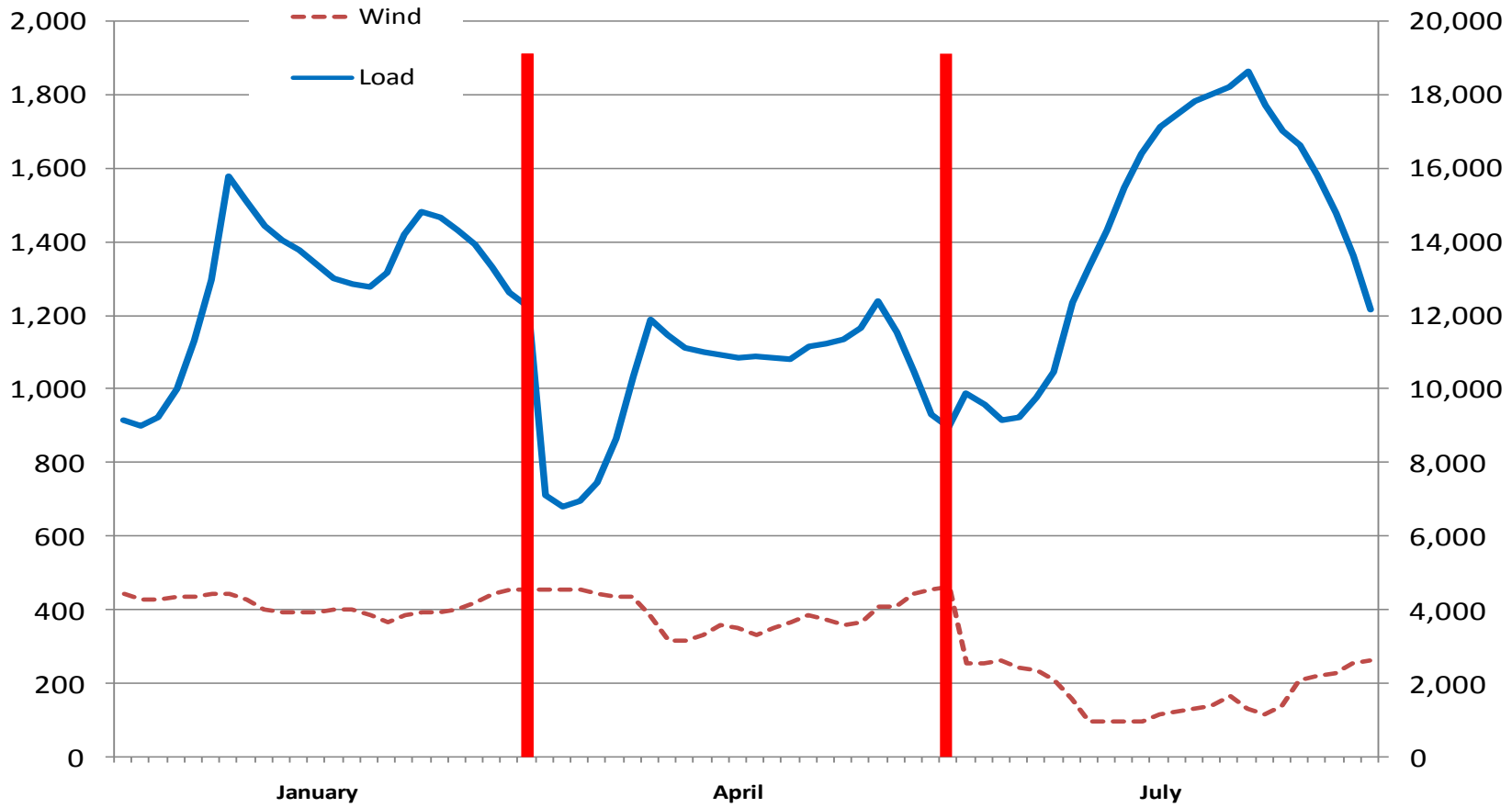
Year	Percent of REPS	Annual GWh
2012	3% of 2011 NC Retail Sales	117
2013	3% of 2012 NC Retail Sales	121
2014	3% of 2013 NC Retail Sales	124
2015	6% of 2014 NC Retail Sales	252
2016	6% of 2015 NC Retail Sales	256
2017	6% of 2016 NC Retail Sales	261
2018	10% of 2017 NC Retail Sales	442
2019	10% of 2018 NC Retail Sales	449
2020	10% of 2019 NC Retail Sales	458
2021	12.5% of 2020 NC Retail Sales	584

- Mandatory
- Up to 25% from Energy Efficiency and 40% starting 2020
- Some additional requirements for solar, swine and poultry waste

North Carolina is about 5% of the total system load

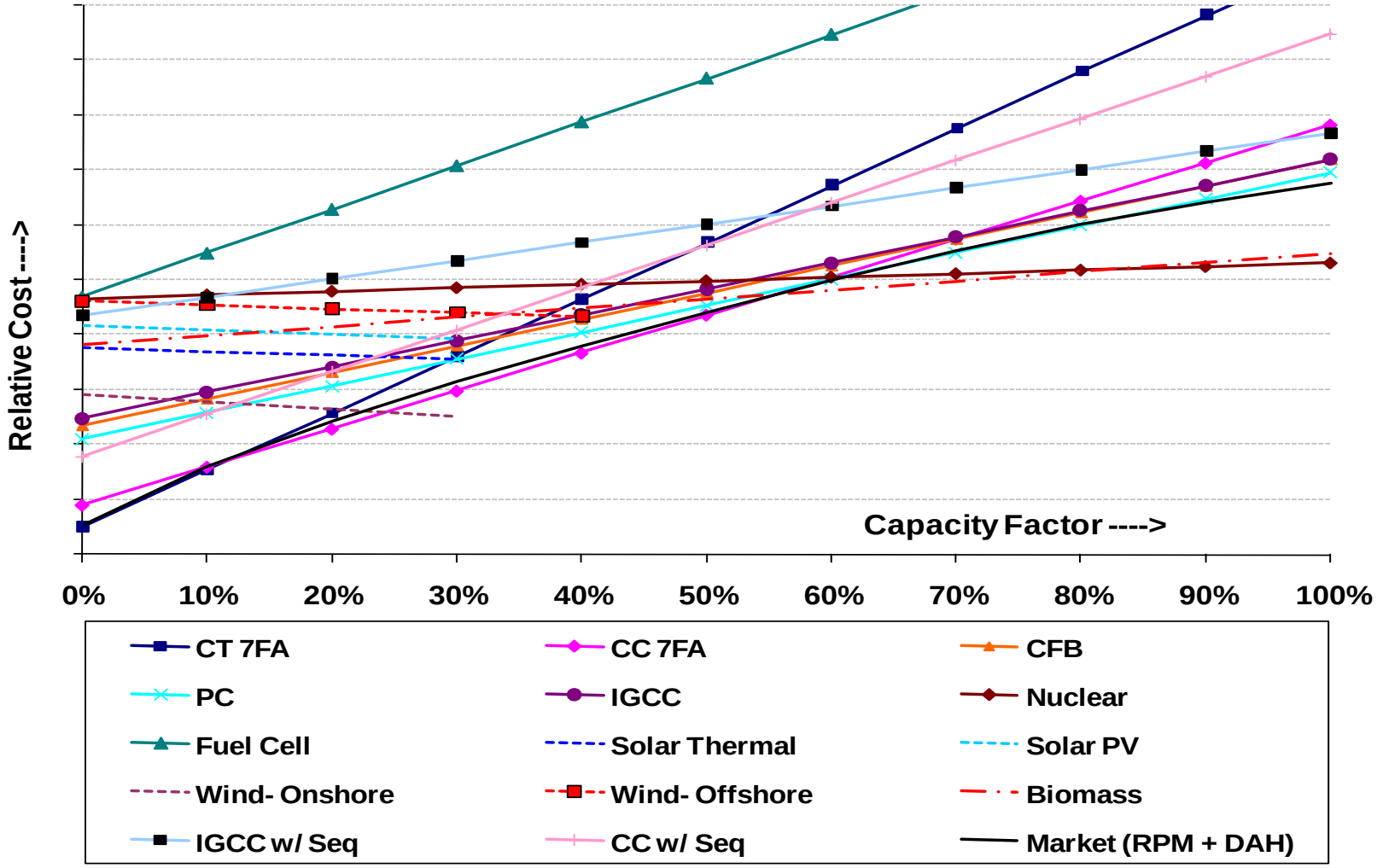
Dominion

Wind does not follow the load

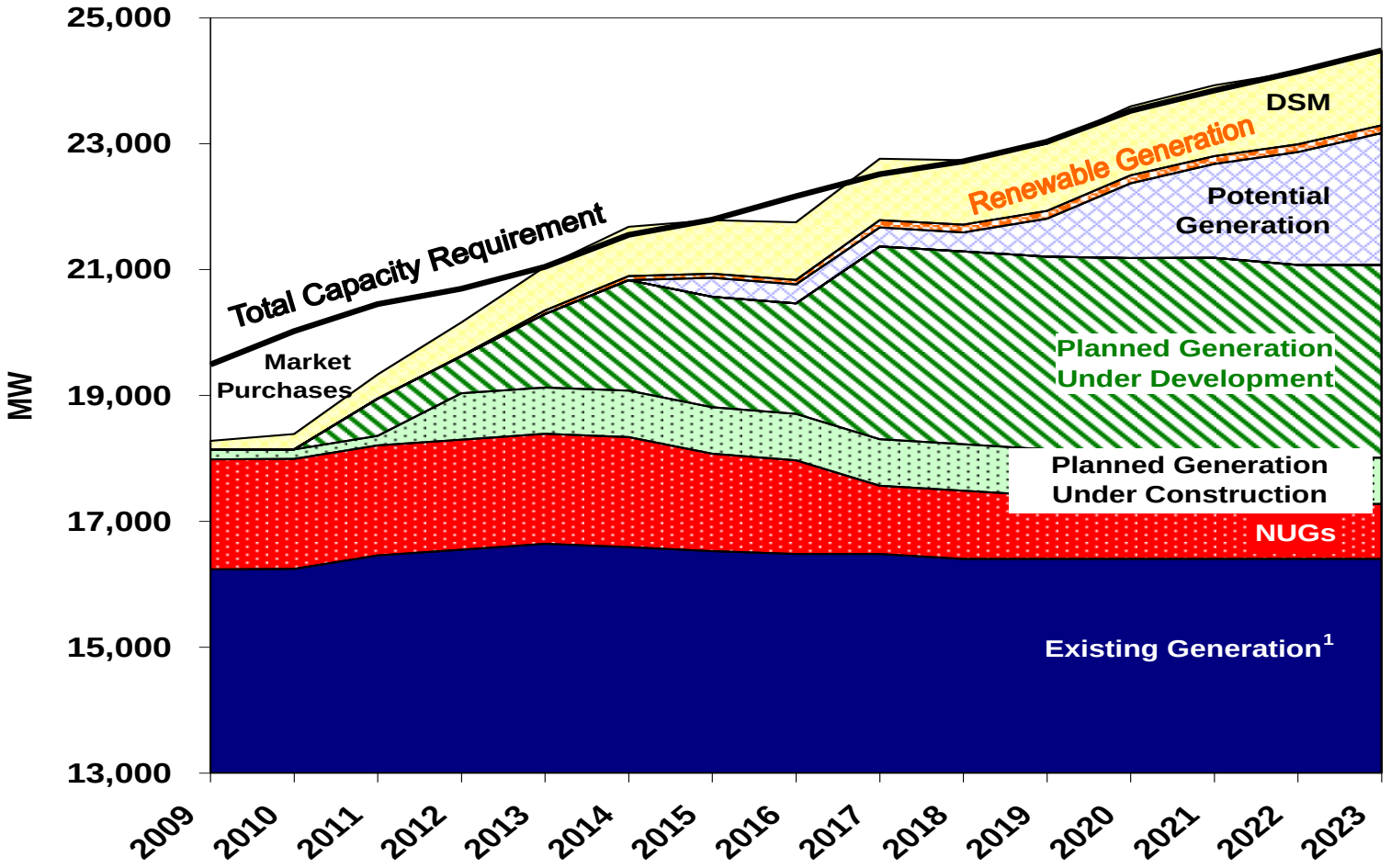


Wind annual CF ~ 30% and Max capacity available ~60%

Bus Bar Analysis



The IRP


25,000
23,000
21,000
19,000
17,000
15,000
13,000
MW
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
Total Capacity Requirement
Market Purchases
DSM
Renewable Generation
Potential Generation
Planned Generation Under Development
Planned Generation Under Construction
NUGs
Existing Generation[1]

Conclusion

- Incorporation of Renewable Resources in long term planning depends on;
  - Technical Potential - availability of renewable resources in the area
  - Regulatory requirements (RPS, REPS, RECs)
  - Policy (Such as PTC)
  - Economics - do these resources make it in the least cost plan or they are added as a requirement

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