REVISED 10-06-16

Revised Slides 64 & 114

Integrated Resource Plan Public Advisory Meeting #4

September 16, 2016

Welcome & Safety Message

Bill Henley, VP of Regulatory and Government Affairs

Meeting Guidelines

Dr. Marty Rozelle, Facilitator

Agenda for today

9:00am Welcome

Meeting Agenda and Guidelines

Summary & Feedback from IRP Public Advisory Meeting #3

Guiding Principles

Final Model Results

Preferred Resource Portfolio

10:25am Break

Metrics & Sensitivity Analysis Results

11:45 – 12:30pm Lunch

Analysis Observations

Discussion of Results

Short Term Action Plan

IRP Public Advisory Process Feedback

Concluding Remarks & Next Steps

2:30/3:00pm Meeting Concludes

Meeting Guidelines

- Time for clarifying questions at end of each presentation
- Small group discussions
- The phone line will be muted. During the allotted questions, press *6 to un-mute your line, and please remember to press *6 again to re-mute when you are finished asking your question.
- Use WebEx online tool for questions during meeting
- Email additional questions or comments by September 23
- IPL will respond via website by October 7

Active Cases before the Commission

- Cause No. 38703, FAC 113
- Cause No. 42170, ECR-27
- Cause No. 44576, Rates (under appeal)
- Cause No. 44792, DSM 2017 Plan
- Cause No. 44794, SO_2 NAAQS and CCR
- Cause No. 44808, MISO Rider

Summary & Feedback from IRP Public Advisory Meeting #3

Joan Soller, Director of Resource Planning

Topics covered in Meeting #3

- IRP modeling update
- Draft model results for all scenarios
- Stakeholder feedback
- Sensitivity analysis setup

Presentation materials, audio recording, acronym list, and meeting notes are available on IPL's IRP webpage here: https://www.iplpower.com/irp/

Scenario Characteristics/Variable Drivers

	Scenario Name	Load Forecast	Natural Gas and Market Prices	Clean Power Plan (CPP) and Environment	Distributed Generation (DG)
1	Base Case	Use current load growth methodology	ABB Mass-based CPP Scenario	Mass-based CPP starting in 2022. Low cost environmental regulations: ozone, 316b, and CCR	Expected moderate decreases in technology costs for wind, storage, and solar
2	Robust Economy	High*	High*	Base Case	Base Case
3	Recession Economy	Low*	Low*	Base Case	Base Case
4	Strengthened Environmental Rules	Base Case	Base Case	20% RPS + high carbon costs. High costs: NAAQS ozone, 316b, OSM*	Base Case
5	Distributed Generation	Base Case	Base Case	Base Case	Base case with fixed additions of 150 MW in 2022, 2025, and 2032*
6	Quick Transition	Base Case	Base Case	Base Case	Fixed portfolio to retire coal, add max DSM, minimum baseload (NG), plus solar, wind and storage*

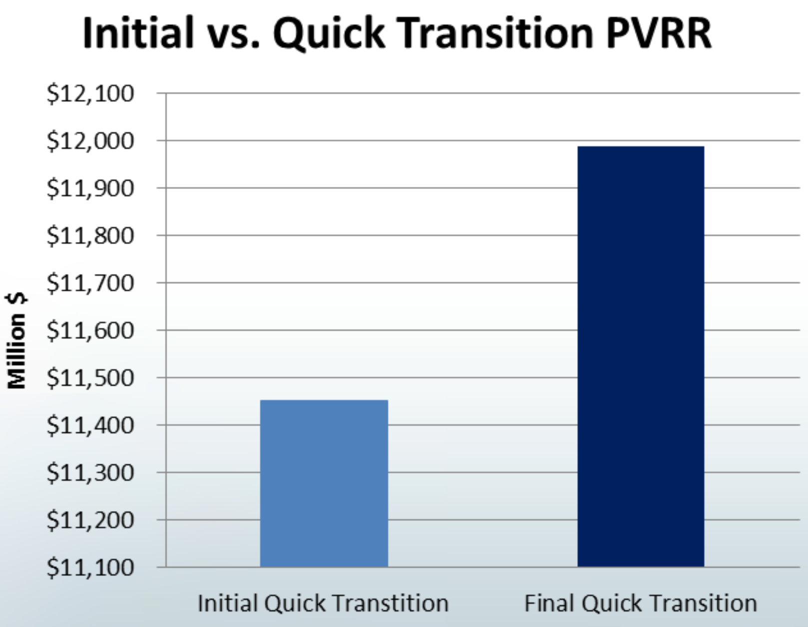
*Purple font indicates changes from the Base Case.

IPL response to feedback

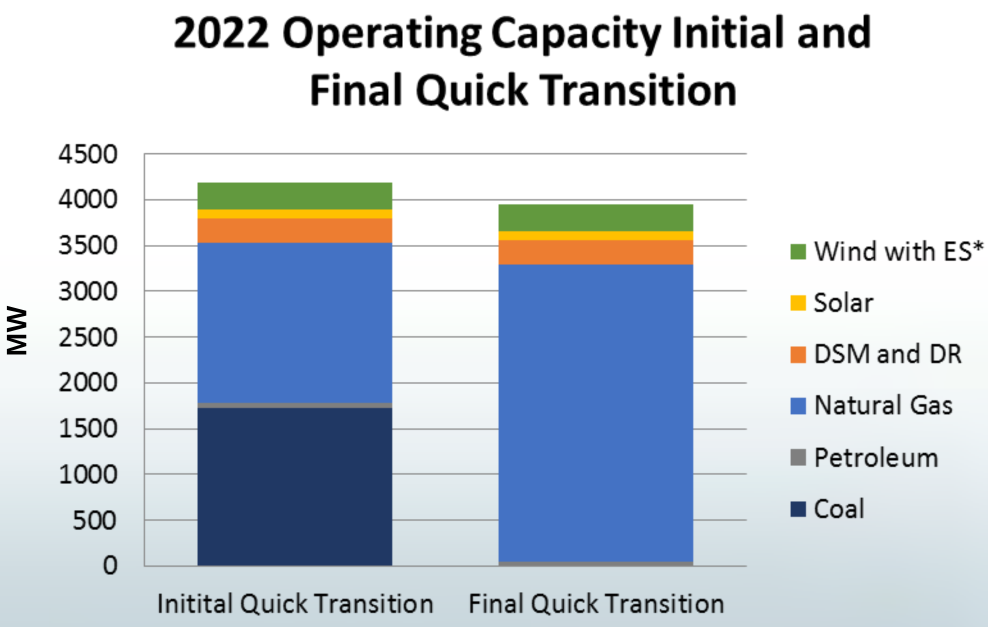
- IPL modified the Quick Transition scenario
  - Pete 1 retirement and Pete 2-4 refuel in 2018
  - Include maximum achievable DSM and balance of resources with solar, wind and batteries in 2030
  - Minimum NG resources stayed the same

Quick Transition results changed

PVRR (2017-2036) varied



Resources varied earlier



Questions?

Guiding Principles and Assumptions

Joan Soller

Guiding principles for IRP

- IPL will comply with IURC rules and orders, IAC requirements, NERC reliability standards and FERC approved MISO tariffs.
- Costs estimates for demand and supply side resources are based upon local economics and recent market experiences.
- IPL is agnostic to the resource mix comprising portfolio plans.
- The model is agnostic to resource ownership; however, IPL's capital structure is modeled to calculate costs.

IAC – Indiana Administrative Code, IURC – Indiana Utility Regulatory Commission, NERC – North American Electric Reliability Corporation, FERC – Federal Energy Regulatory Commission, MISO – Midwest Independent System Operator

DSM guiding principles

- Demand Side Management (DSM) is modeled as a selectable resource in this IRP which represents a change from previous IRPs.

- IPL plans to offer cost effective DSM programs that are inclusive for customers in all customer classes, appropriate for the market and customer base, modify customer behavior and provide continuity from year to year.

These assumptions are consistent in the study period

- IN regulatory framework
- MISO Capacity construct
- IPL engages in MISO stakeholder process
- Natural gas & market price correlation trends
- Distributed Generation (DG) is synchronized with the grid & not curtailed

These potential changes may affect future portfolios

- Technology enhancements
- Pending national election impacts on:
  - Pending environmental regulations
  - Public policy
  - Tax credits
- Stakeholder sustainability interests

Questions?

Final Model Results

Diane Crockett, Principal Consultant ABB

Portfolio Development Process

Metrix ND: develops high, low, and base load forecast

DSM Model: market potential study for DSM

ABB Reference Case: assumptions for gas, emissions and market prices

Capacity Expansion Module: develop scenario portfolios

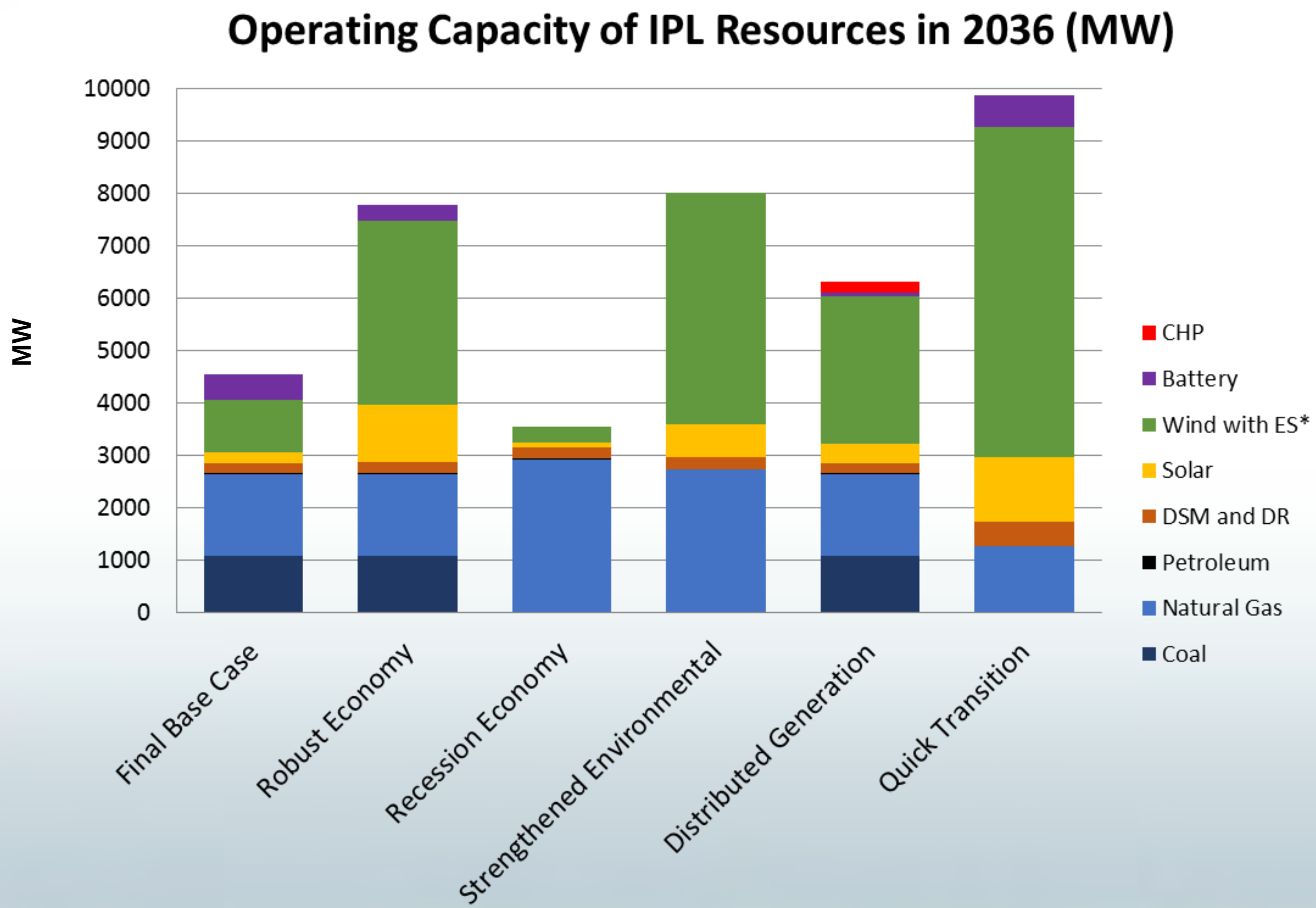
Strategic Planning Software: portfolio scenario evaluation and sensitivity analysis

Risk Module: stochastic portfolio performance metrics

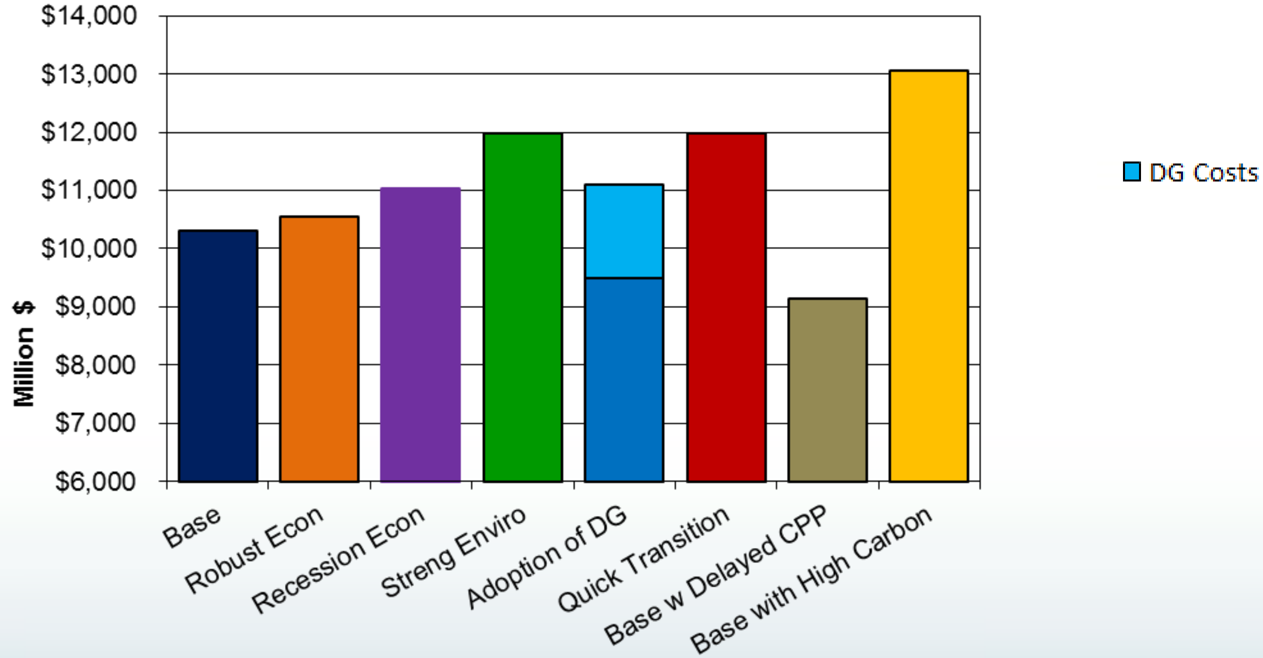
Review of resource alternatives

IRP Resource Technology Options	
	MW Capacity
Simple Cycle Gas Turbine	160
Combined Cycle Gas Turbine - H-Class	200
Nuclear	200
Wind	50
Solar	> 5 MW
Community Solar	1 MW
Energy Storage	20
CHP – industrial site (steam turbine)	10
DSM	Varies
Market purchases	Up to 200 MW

Scenario Capacity Mix in 2036

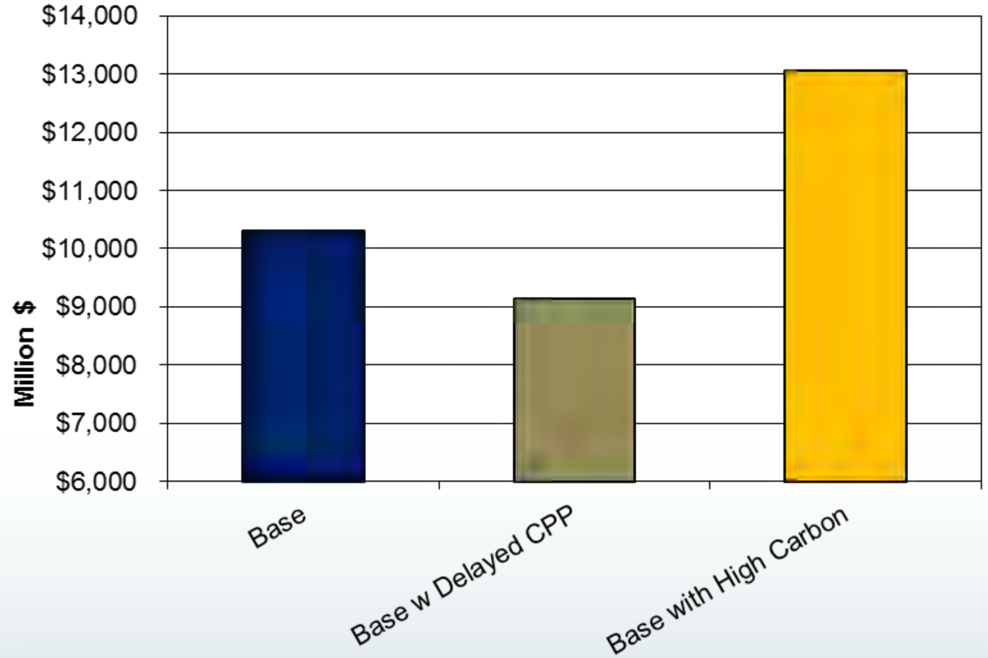


Scenario Present Value of Revenue Requirements (PVRR) 2017-2036



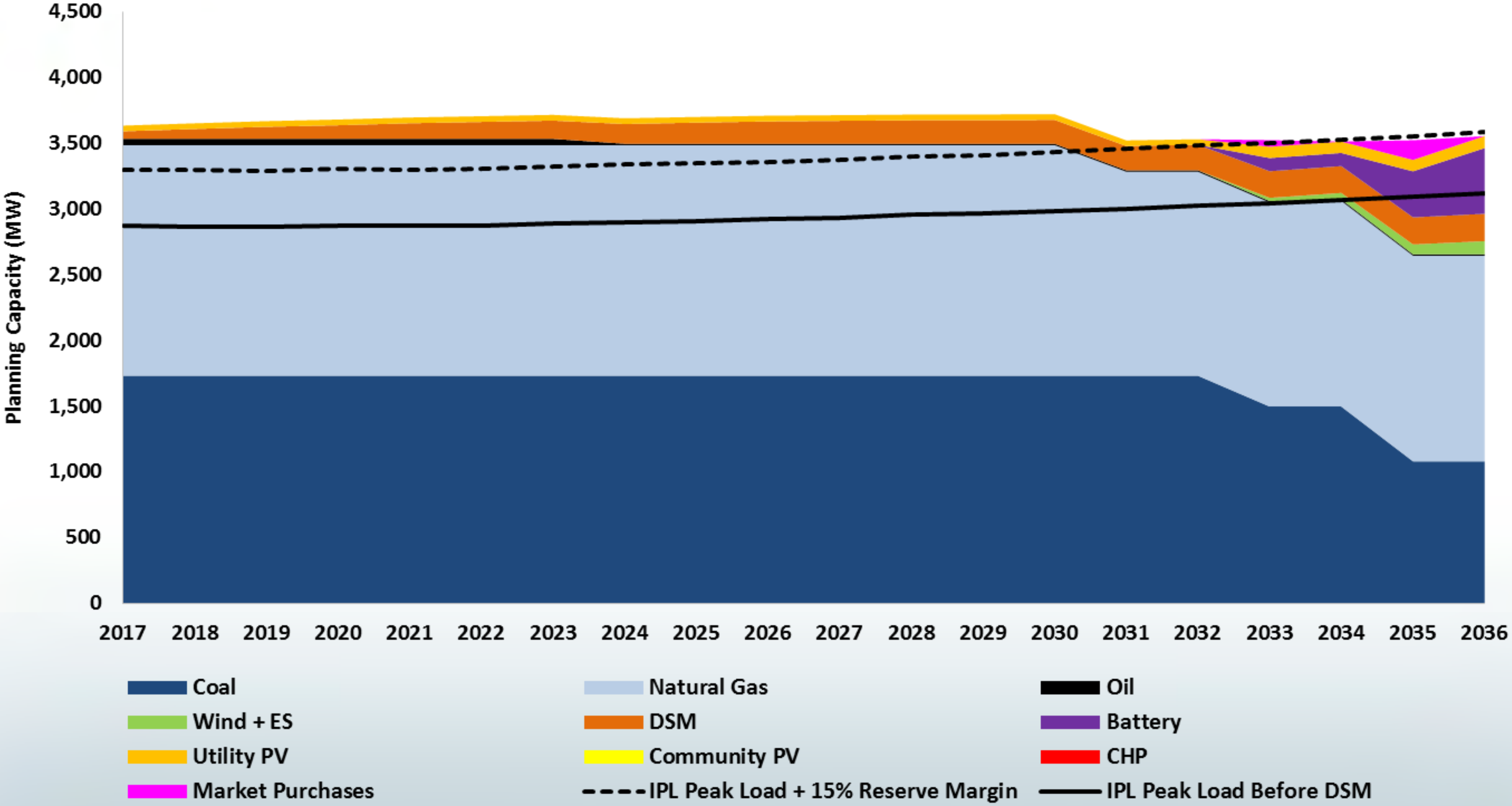
- Each portfolio was developed to perform best under the assumptions for that scenario
- Since assumptions vary between scenarios, not all portfolios are directly comparable
- This graph shows the PVRR of all portfolios *utilizing the base assumptions* prior to introducing stochastic uncertainty

Base Sensitivity PVRRs 2017-2036



- CPP starts in 2030 instead of 2022 for the delayed case
- More stringent CPP is represented by using high carbon cost scenario beginning in 2022

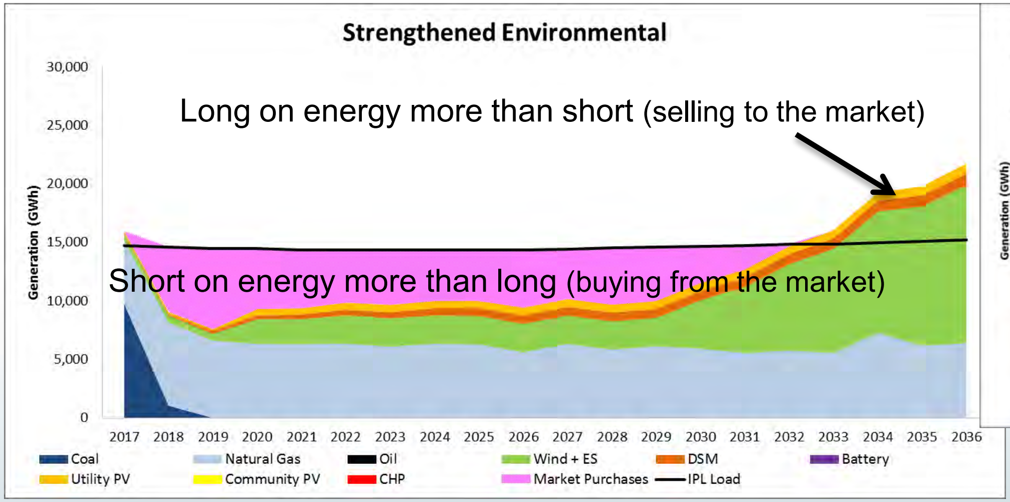
Base Case Capacity

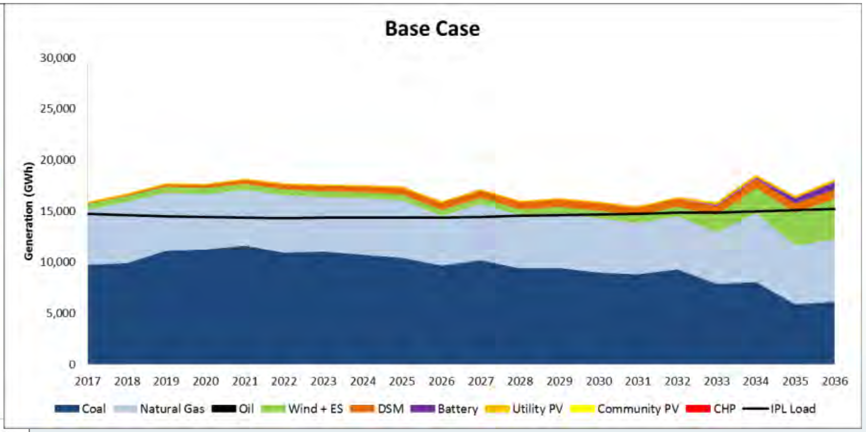


- Includes Petersburg upgrades for NAAQS, SO_2 and CCR

How to Read Energy Mix Slides

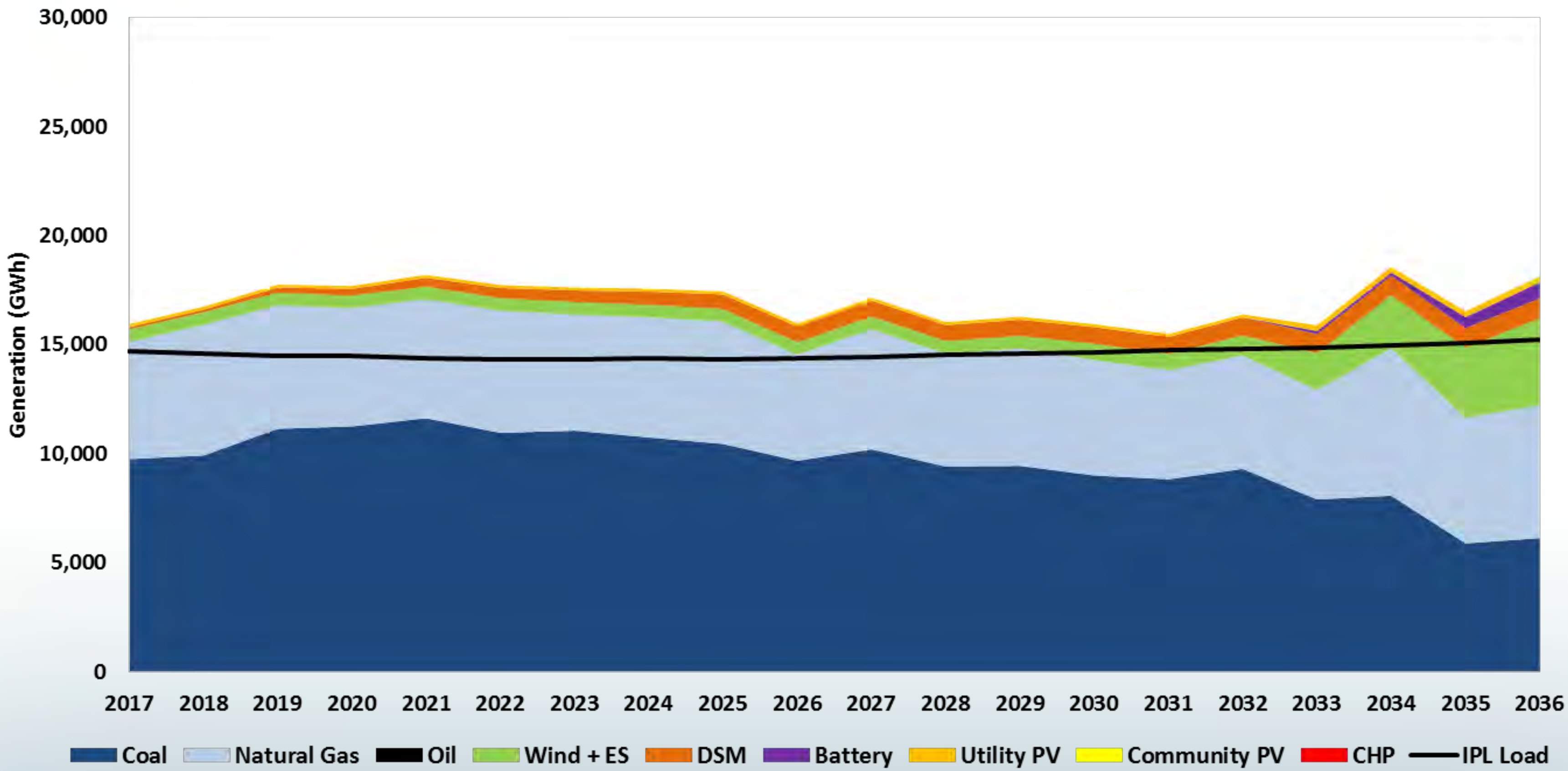
- “Long”= more generation in a single hour than load
  “Short”= more load in a single hour than generation
- IPL is long and short throughout the year at different times



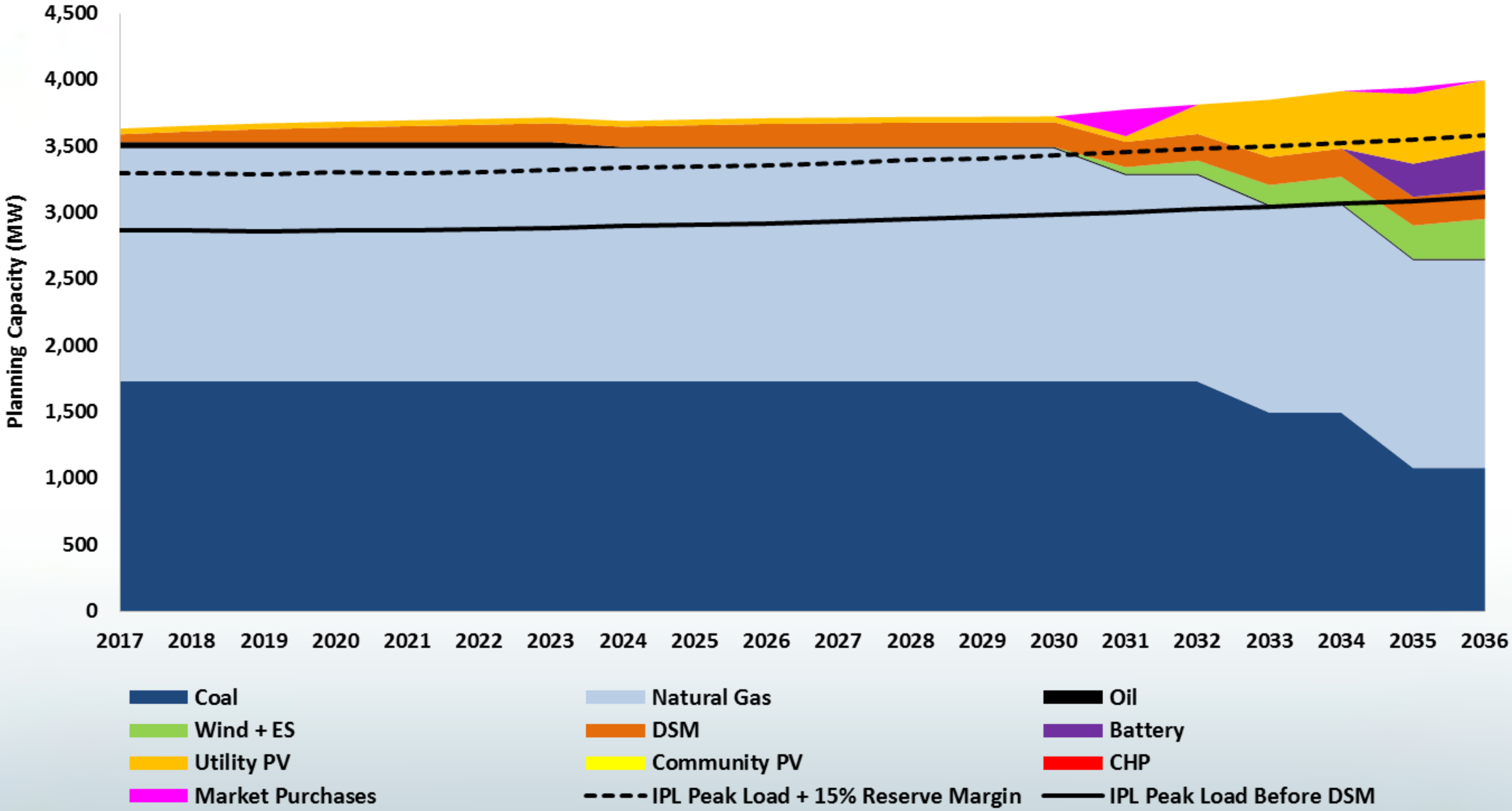


- Based on the nature of dispatching units, IPL will still buy and sell from the market in the base case

Base Case Energy

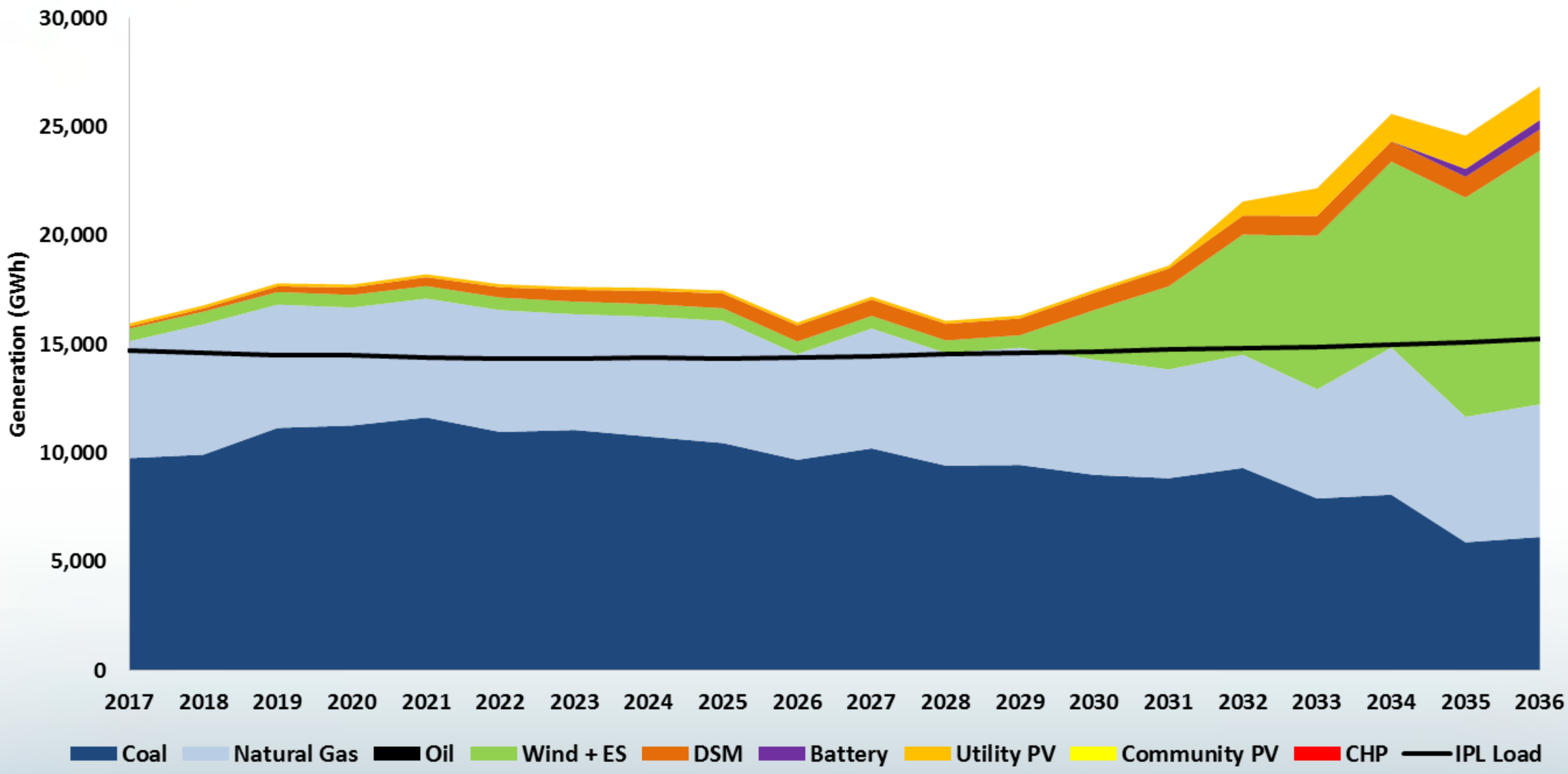


Robust Economy Capacity

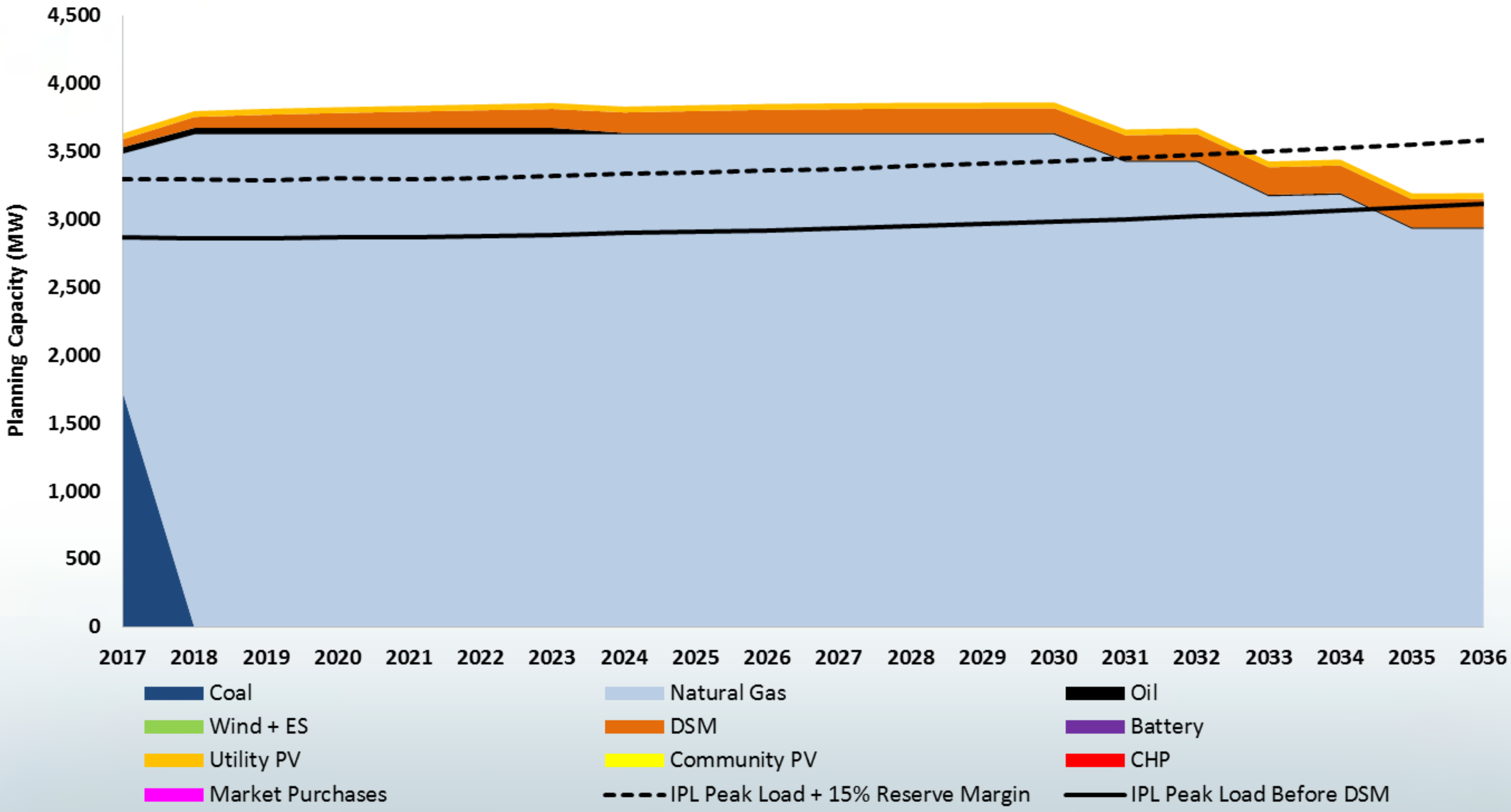


- Includes upgrades for NAAQS, SO_2 and CCR
- High load capacity expansion plan under base load assumption

Robust Economy Energy

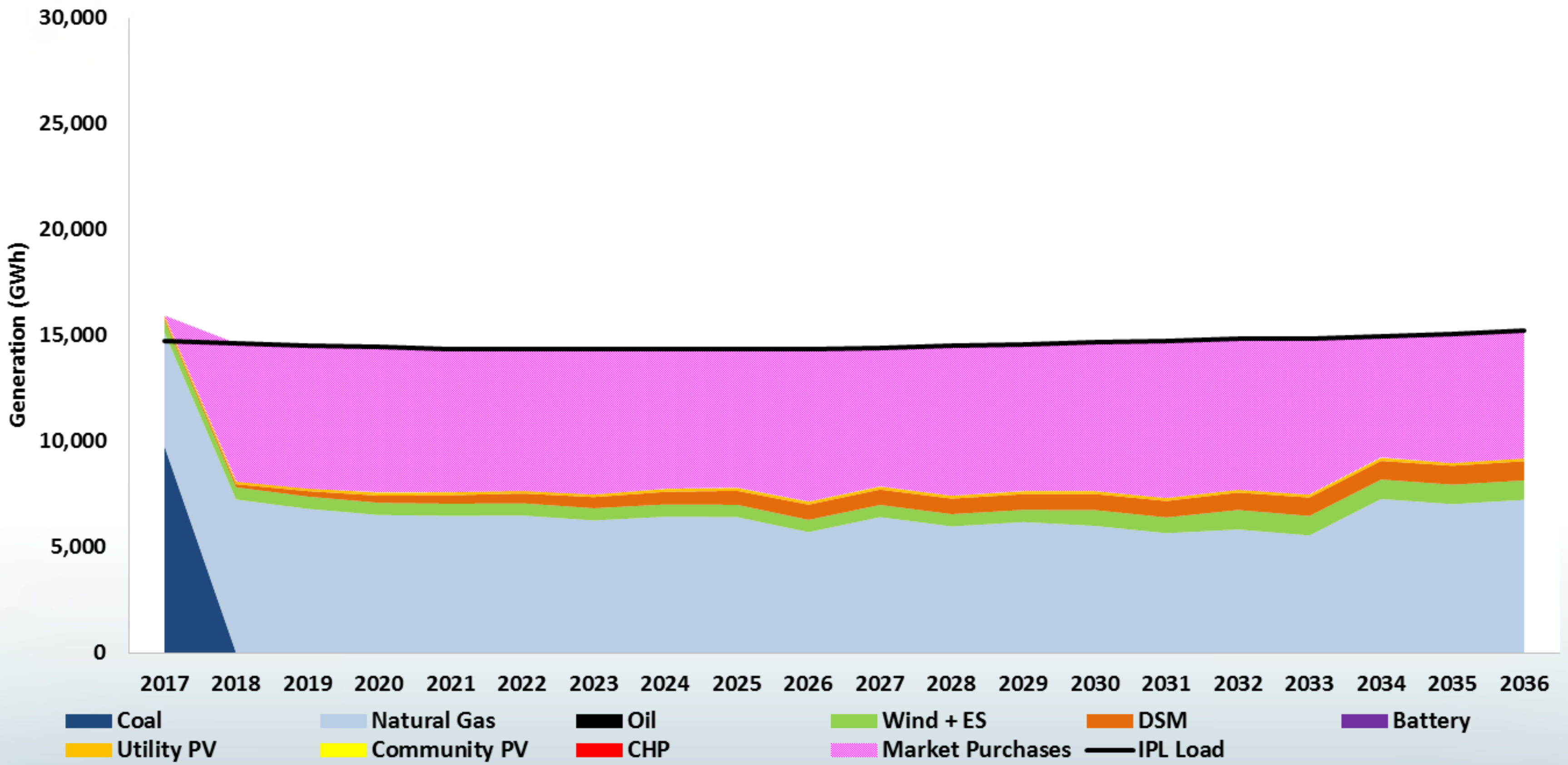


Recession Economy Capacity



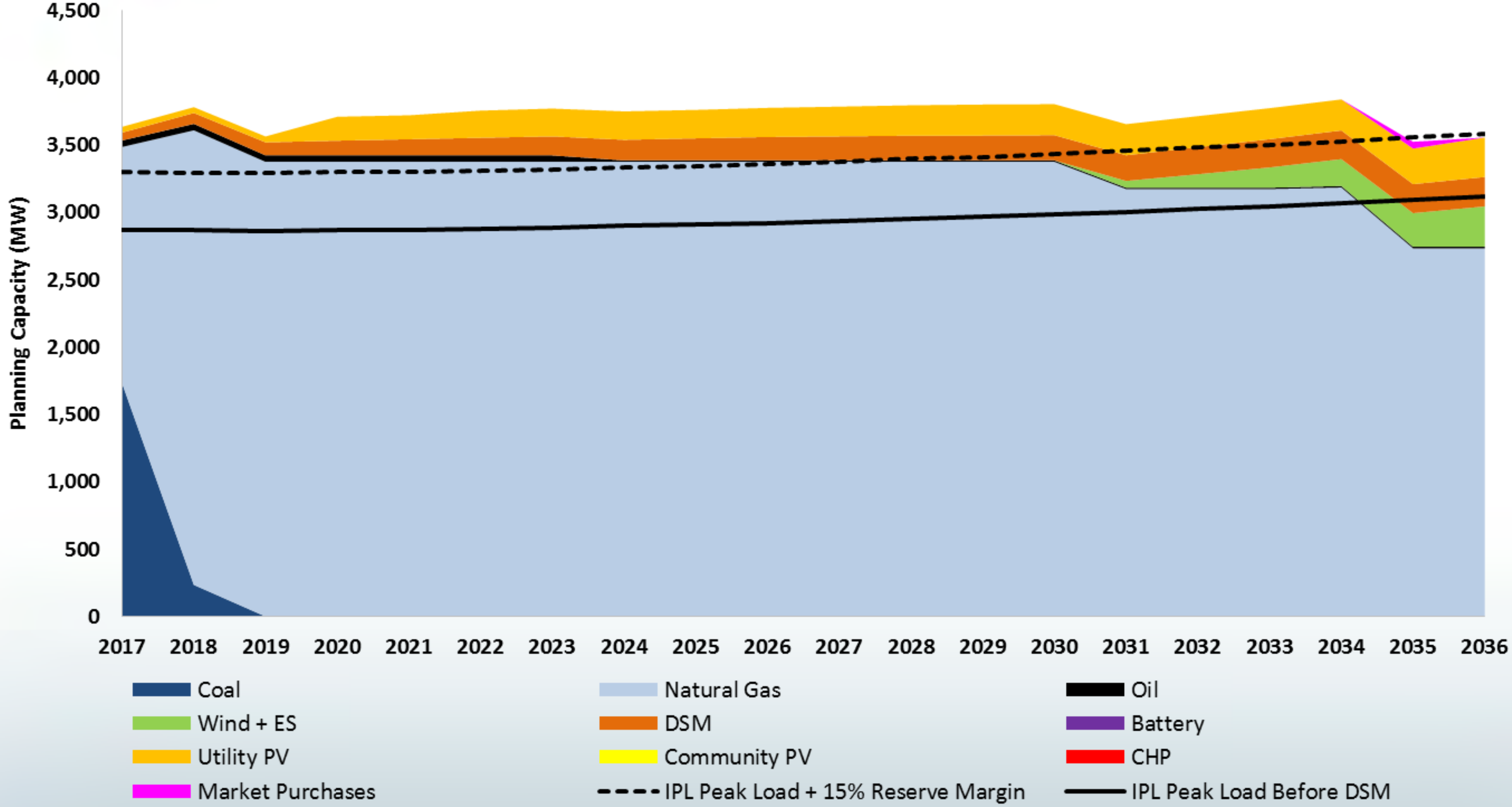
- Refuel Pete 1-4
- Low load capacity expansion plan under base load assumption

Recession Economy Energy



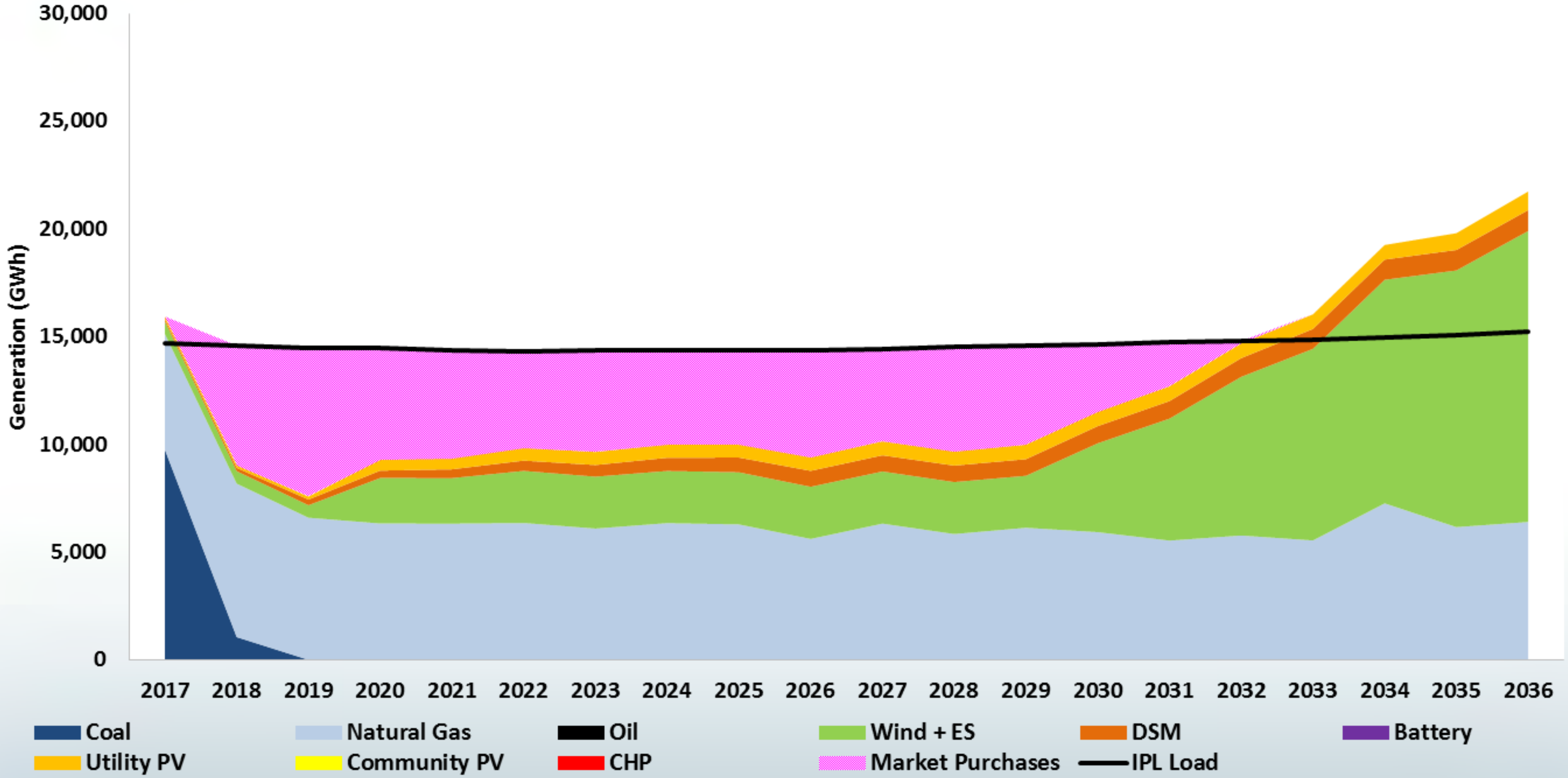
- Refuel Pete 1-4
- Low load capacity expansion plan under base load assumption

Strengthened Environmental Capacity



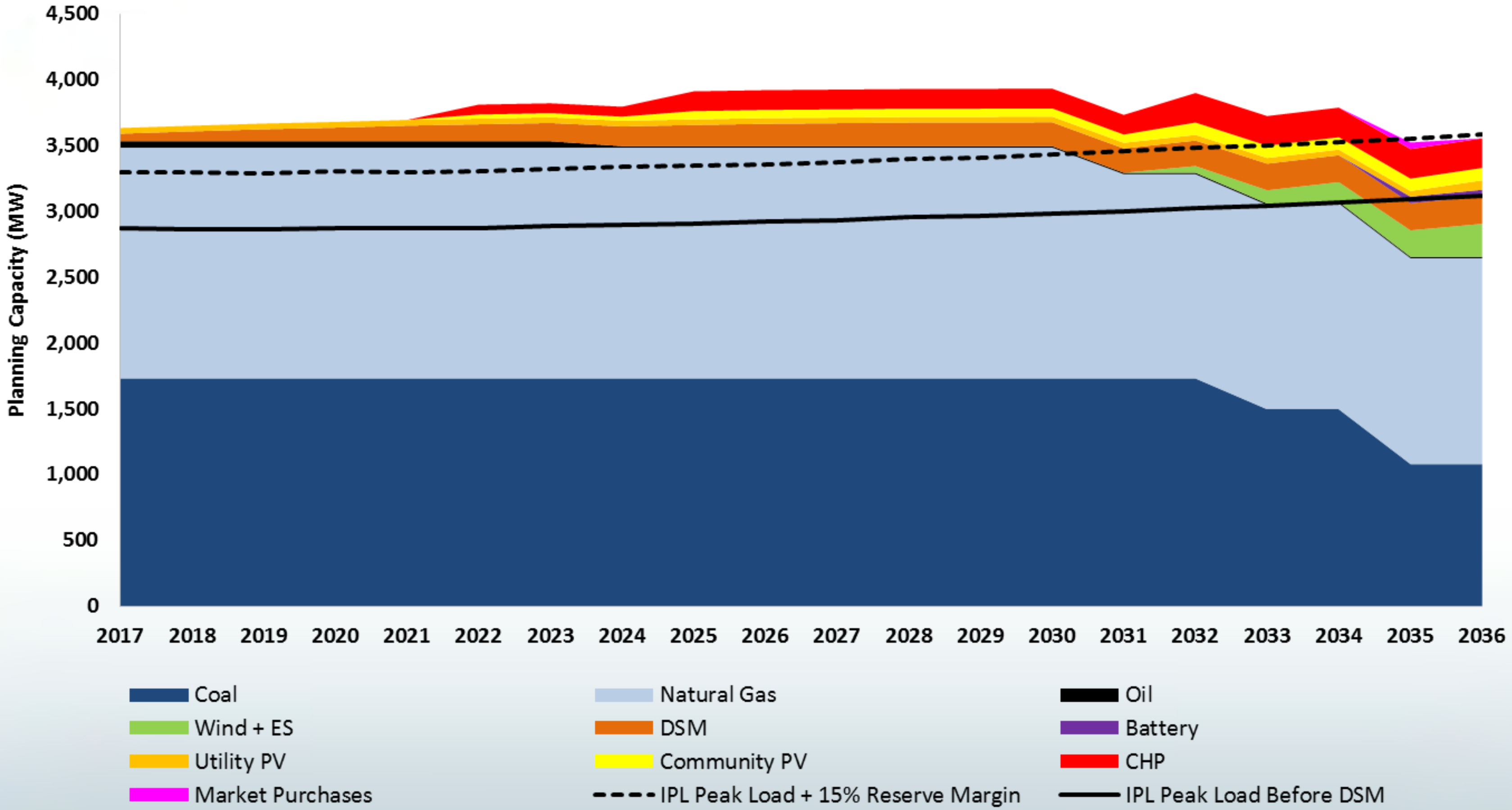
- Retire Pete 1
- Refuel Pete 2-4
- 20% Renewable Portfolio Standard by 2022

Strengthened Environmental Energy



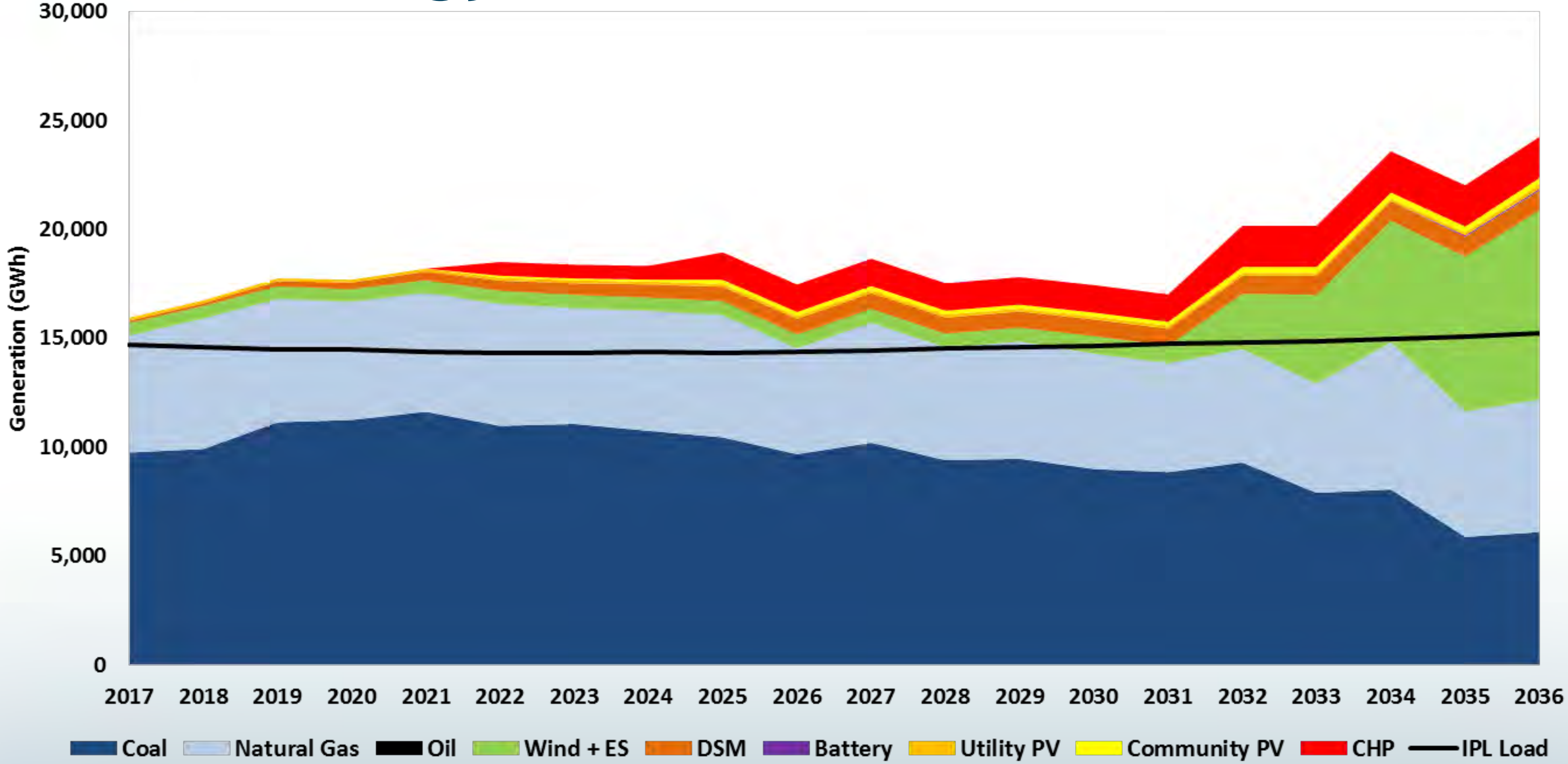
- Retire Pete 1
- Refuel Pete 2-4
- 20% Renewable Portfolio Standard by 2022

High Customer Adoption of DG Capacity



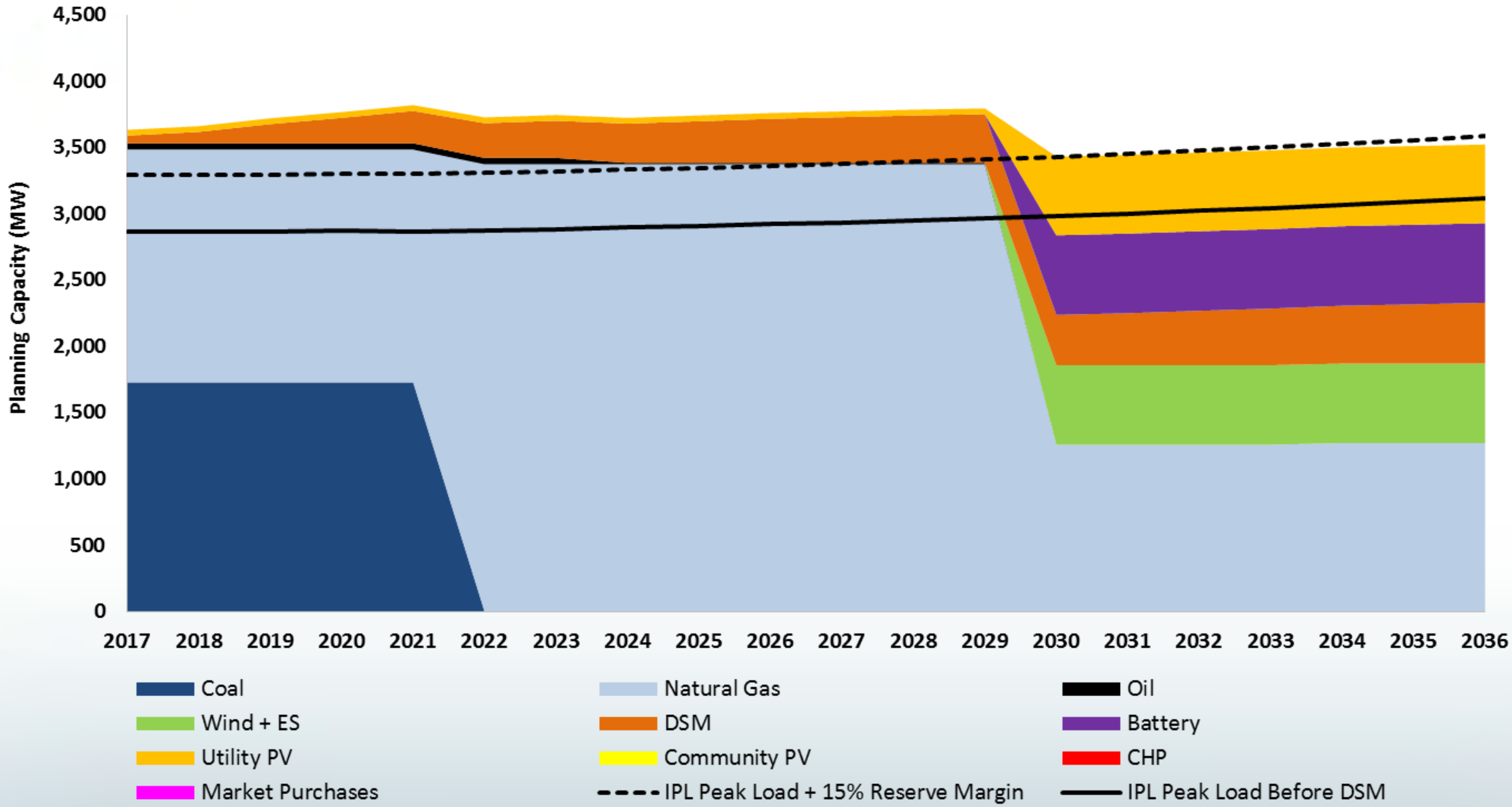
- Includes upgrades for NAAQS, SO_2 and CCR
- 10 MW of Wind, 65 MW of Community Solar and 75 MW of CHP in 2022, 2025 and 2032

High Customer Adoption of DG Energy



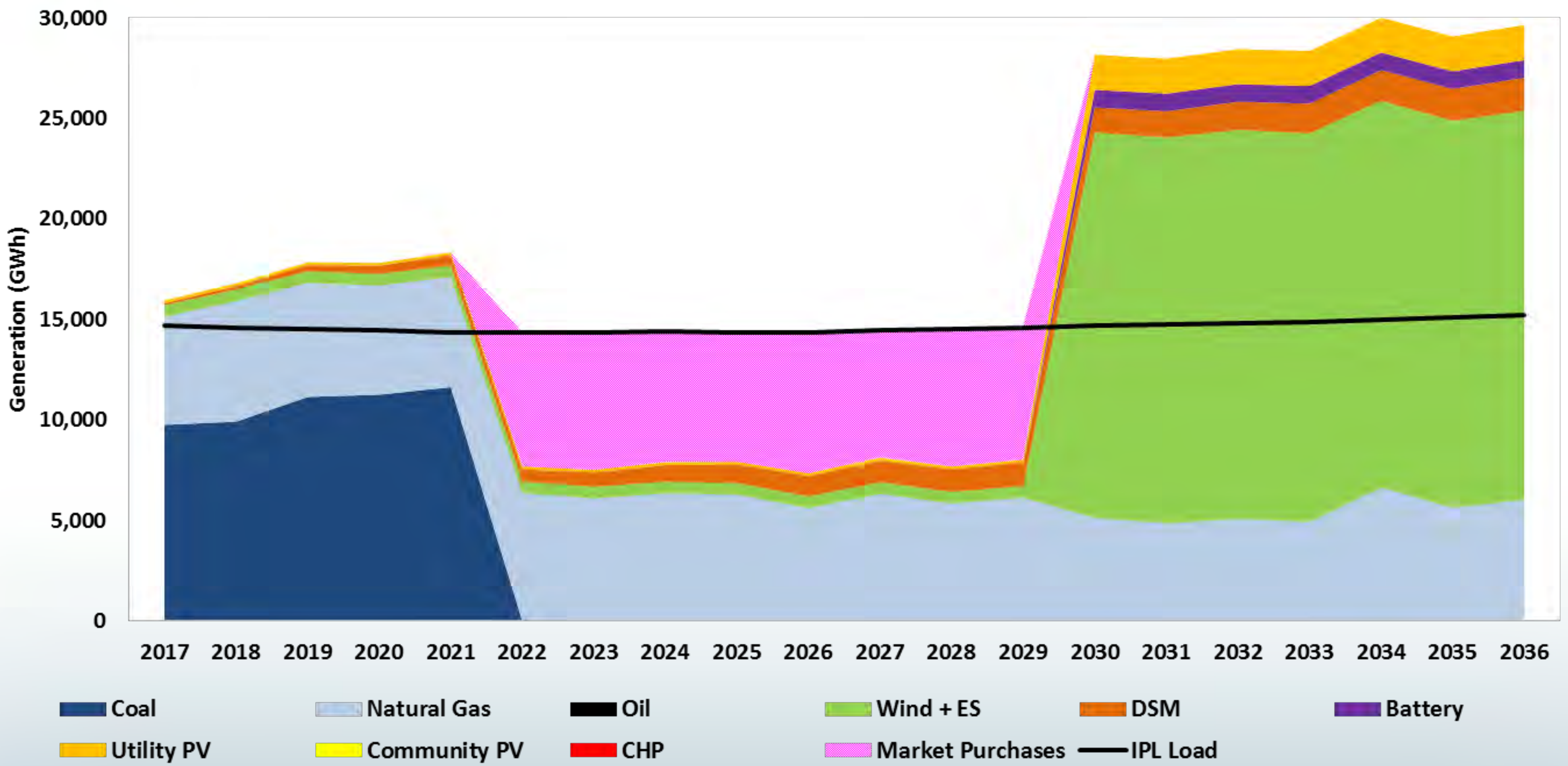
- 10 MW of Wind, 65 MW of Community Solar and 75 MW of CHP in 2022, 2025 and 2032

Quick Transition Capacity



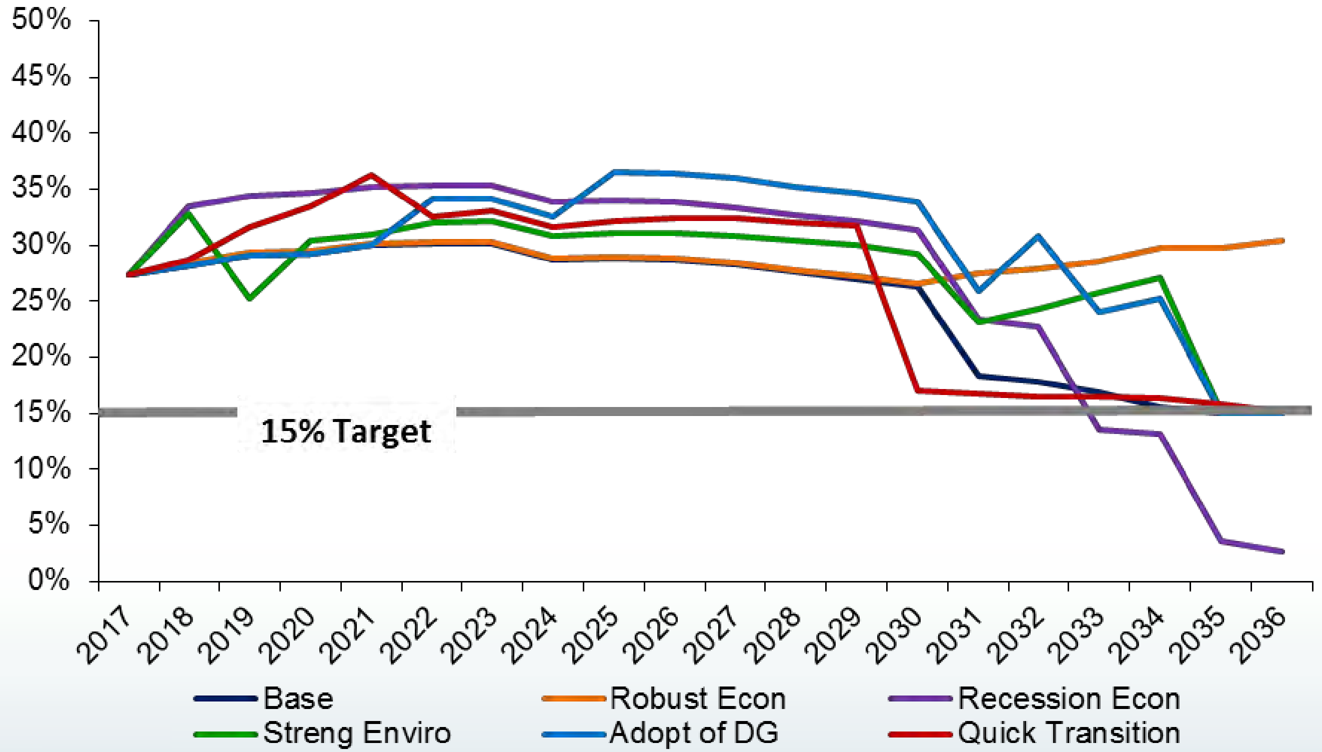
- Includes upgrades for NAAQS, SO_2 and CCR
- Retire Pete 1 and Refuel Pete 2-4 in 2022
- Retire Pete 2-4, HS GT 4-6, HS 5&6, HS IC1, Pete IC1-3 in 2030

Quick Transition Energy



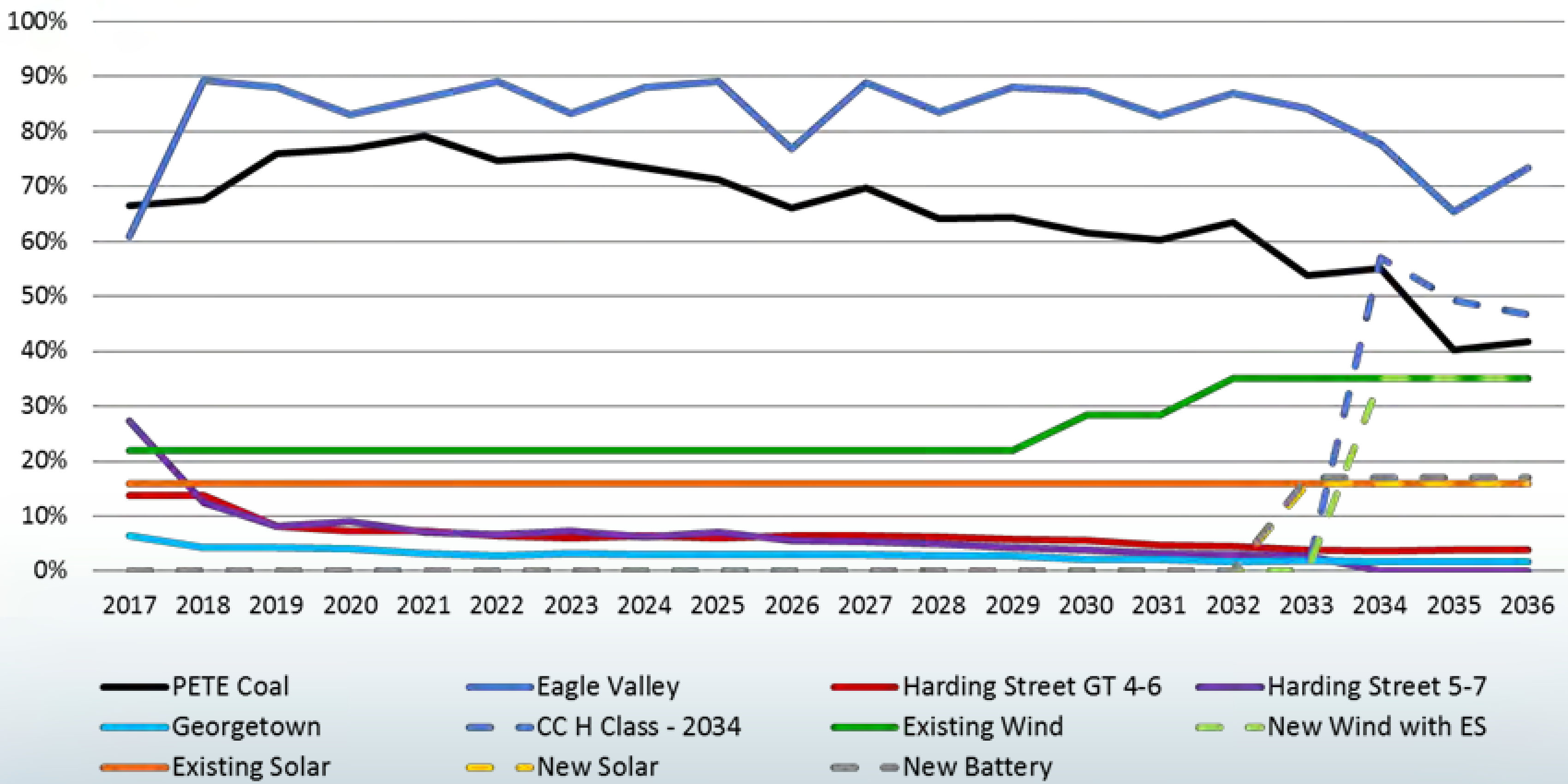
- Retire Pete 1 and Refuel Pete 2-4 in 2022
- Retire Pete 2-4, HS GT 4-6, HS 5&6, HS IC1, Pete IC1-3 in 2030

Reserve Margins

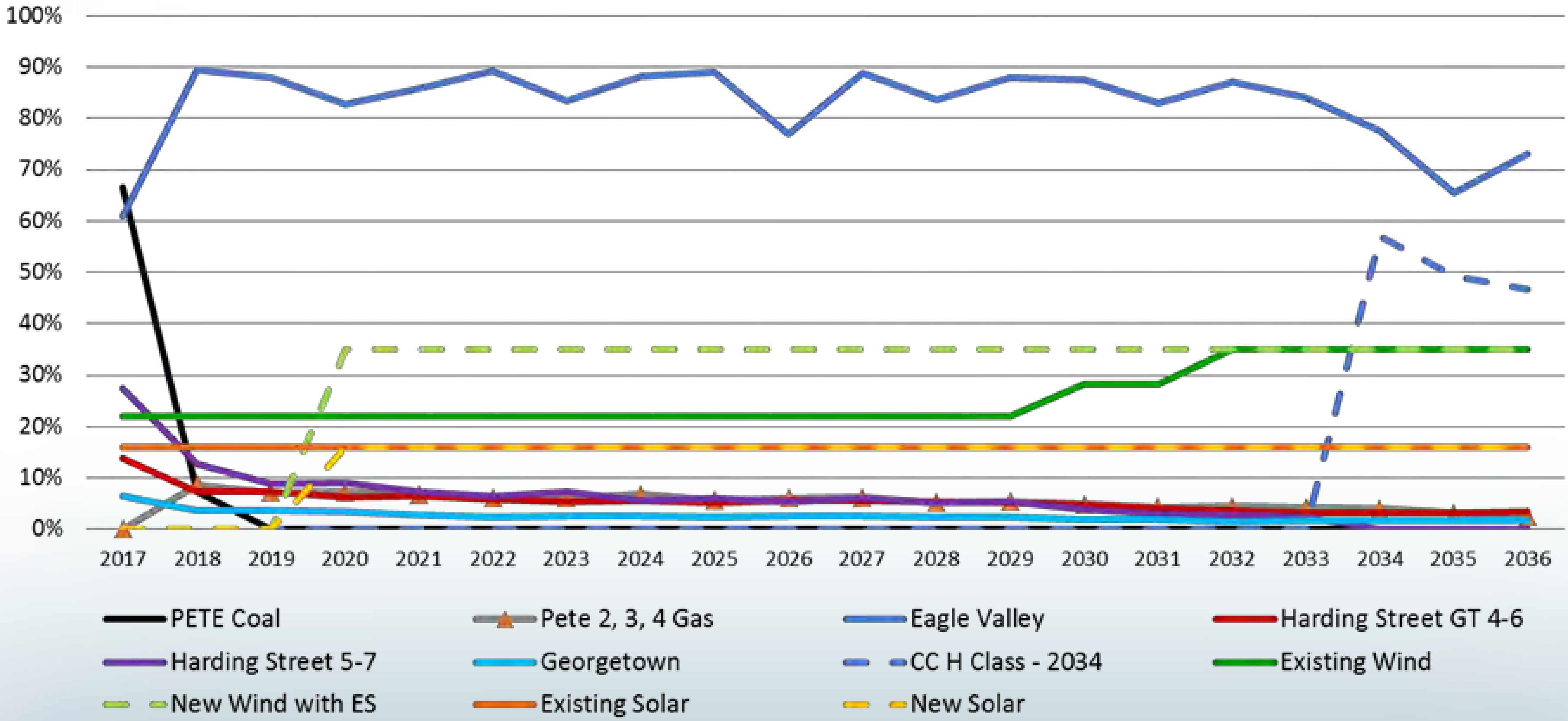


- This graph shows the Reserve Margin for all plans *utilizing the base load assumption*
- All portfolios optimized for the load forecast of the specific scenario
  - Example: Low load forecast was a driver in Recession Economy scenario. This chart shows the reserve margin if IPL planned for a low load forecast and the base load forecast materialized.

Capacity factors for Base Case



Capacity factors for Strengthened Environmental



Questions?

Preferred Resource Portfolio

Joan Soller, Director of Resource Planning

Rationale for determining the Preferred Resource Portfolio

- IPL's preferred resource portfolio reflects the most likely inputs and most probable risks known at this point in time.
- The primary selection criteria is the reasonable least cost to customers stated in terms of the Present Value Revenue Requirement (PVRR) metric.
- Other metrics including rate and environmental impacts, market reliance and risk exposure were considered but not equally weighted.

IPL's IRP Preferred Resource Portfolio

- The preferred resource portfolio is the Base Case in the 2016 IRP
- PVRR is the lowest
- Risk tradeoff between probable PVRR costs and variance is most favorable for customers
- Subsequent IRP analyses will consider changes to assumptions and risks
- IPL will continue to monitor risks associated with resource planning

Preferred Resource Portfolio summary

Final Base Case resource changes (2017 to 2036)

- Upgrade Pete units for NAAQS-SO_2 and CCR
- Implement 206 MW DSM
- Retire (32 MW oil) HS GT 1&2
- Retire (628 MW NG) HSS 5, 6, 7
- Retire (651 MW coal) Pete 1 & 2
- Purchase 200 MW capacity
- Add 1000 MW wind, 100 MW Solar, 500 MW Battery
- Add 450 MW CCGT

Questions?

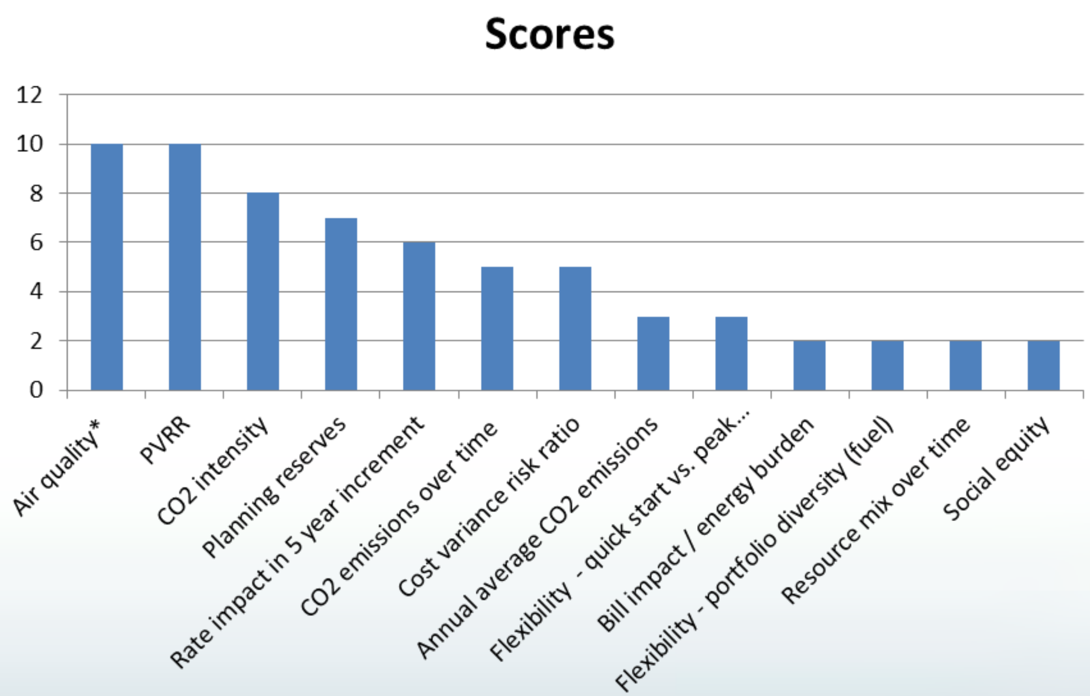
Short Break

Metrics & Sensitivity Analysis Results

Patrick Maguire, Director, Corporate Planning & Analysis
Megan Ottesen, Regulatory Analyst, Resource Planning

Recall stakeholder metrics exercise feedback

Metrics	Scores
Air quality*	10
PVRR	10
CO_2 intensity	8
Planning reserves	7
Rate impact in 5 year increment	6
CO_2 emissions over time	5
Cost variance risk ratio	5
Annual average CO_2 emissions	3
Flexibility - Quick start vs. peak load	3
Bill impact / energy burden	2
Flexibility - Portfolio diversity (fuel)	2
Resource mix over time	2
Social Equity	*2*



green = stakeholder proposed

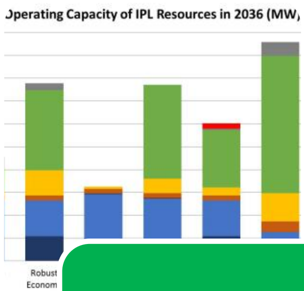
blue= IPL proposed

*other pollutants including PM, NOx, SO2, methane emissions

Metrics developed with stakeholder input

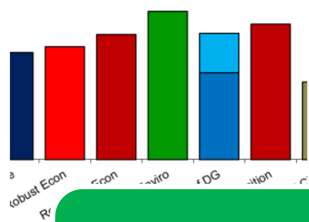
Cost	Financial Risk	Environmental Stewardship	Resiliency
• Present Value Revenue Requirement (PVRR) • Rate Impact	• Risk Exposure	• Average annual CO_2 emissions • Average annual NO_x emissions • Average annual SO_2 emissions • CO_2 intensity	• Planning Reserves • Distributed Generation penetration • Market reliance (energy and capacity)

Recall sensitivity analysis setup from Meeting 3…



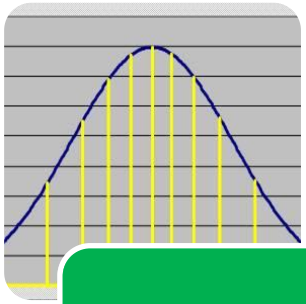
Deterministic Capacity Expansion Model

Complete



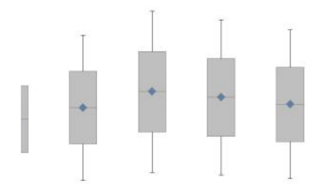
Production Cost Model Run with Base Assumptions for All Portfolios

Complete



Stochastic Parameter Setup

Complete



Stochastic Modeling and Risk Analysis

Complete

Metrics are based upon a blend of model results

Deterministic Model

- Change selected variables by a fixed and known amount
- Example:
  - Natural gas prices up 10%
  - Load up 10%
- Output
  - PVRR for each sensitivity
  - Change in emissions

Stochastic Model

- Subject multiple variables to randomness
- Ranges are bound by estimated probability distributions and statistical properties
- Output
  - 50 model iterations for each portfolio
  - Risk profiles
  - Financial metrics

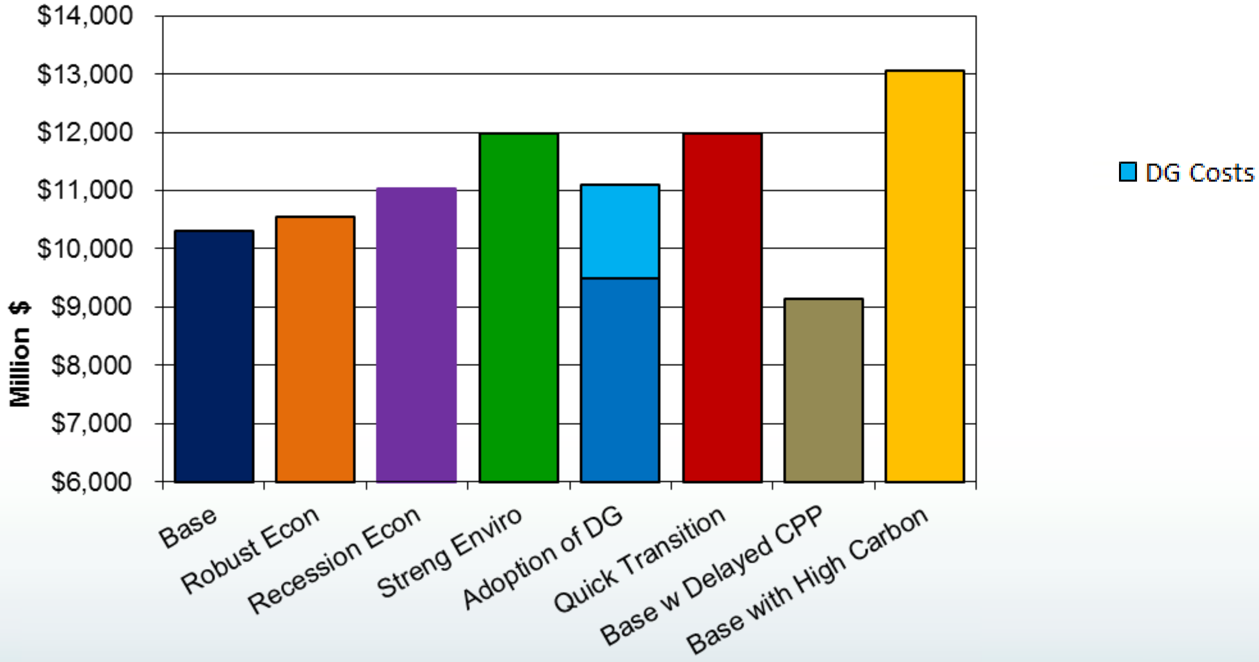
Cost Metric: PVRR

1. Present Value Revenue Requirement (PVRR):

- The total plan cost (capital and operating) expressed as the present value of revenue requirements over the study period

PVRR = Present Value of Revenue Requirements 2017-2036

PVRR for 2017-2036



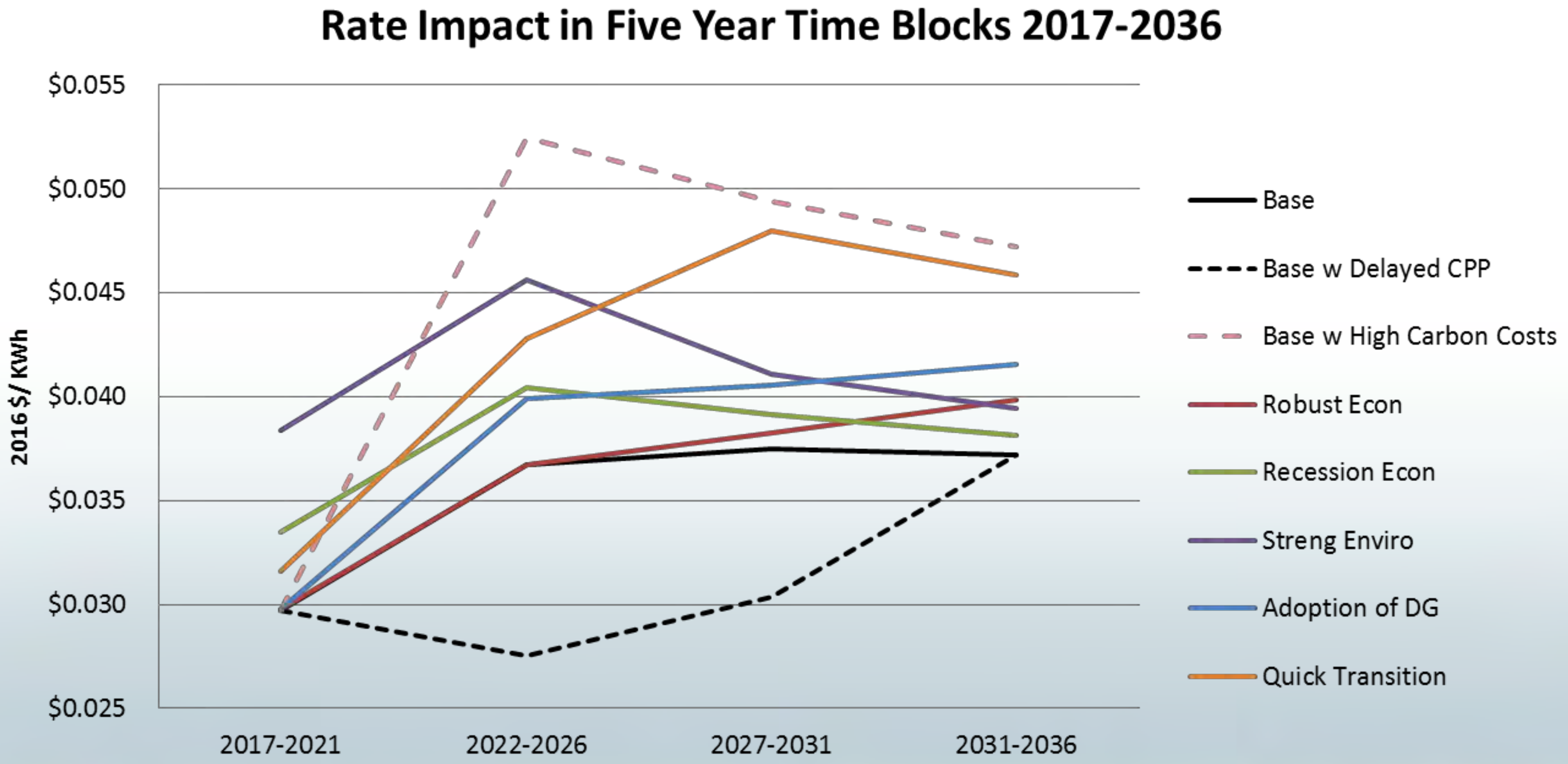
Cost metric: Rate Impact

2. Rate Impact:

- Shows the incremental impact of adding new resources to our rates
- This shows an aggregate rate impact and does not reflect rate design for different customer classes
- Expressed in terms of cents/kWh in five year time blocks
- Levelized average system cost

$$\textbf{Rate Impact} = \frac{\text{Present Value of Revenue Requirements (5 year period)}}{\text{Total kWh Sales (5 year period)}}$$

Incremental rate impact due to resource changes only



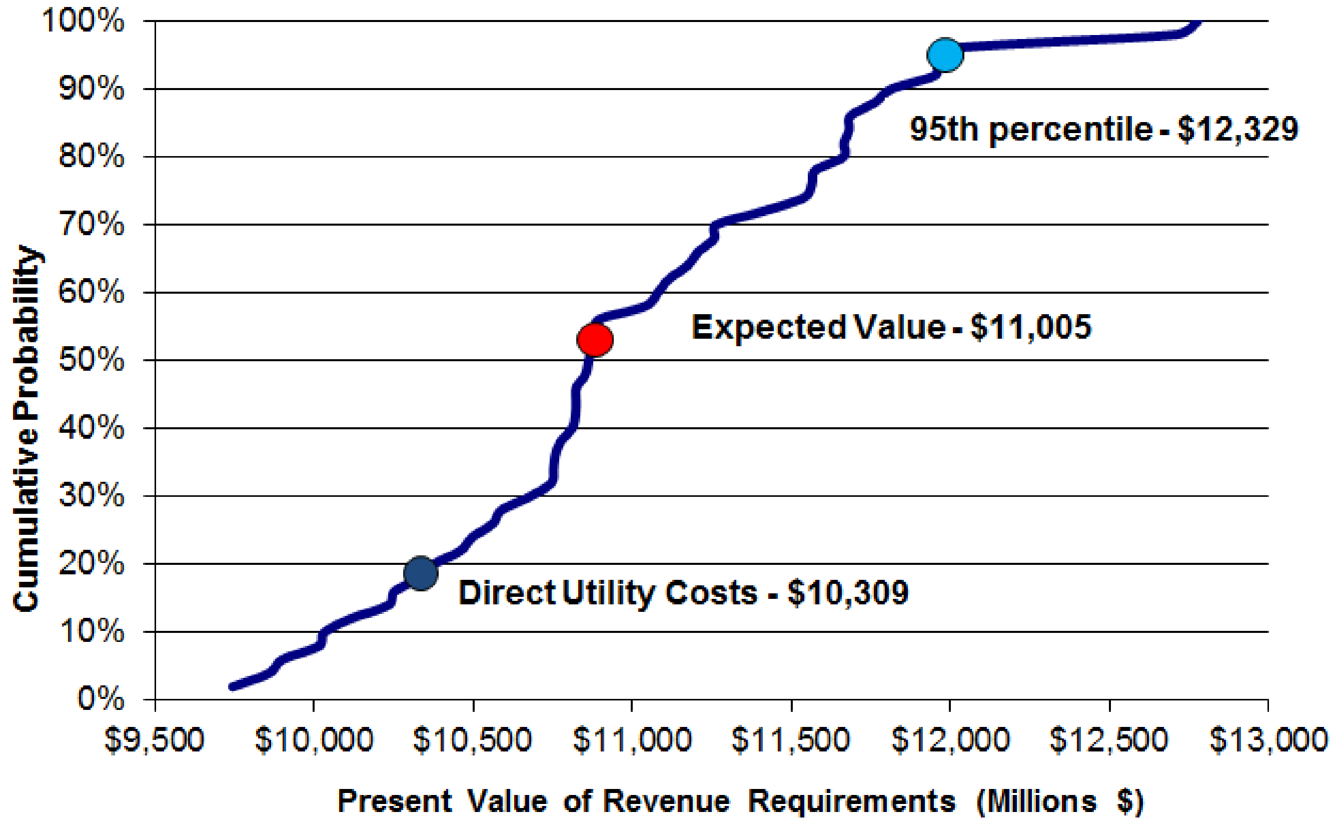
Financial Risk: Risk Exposure

3. Risk Exposure:

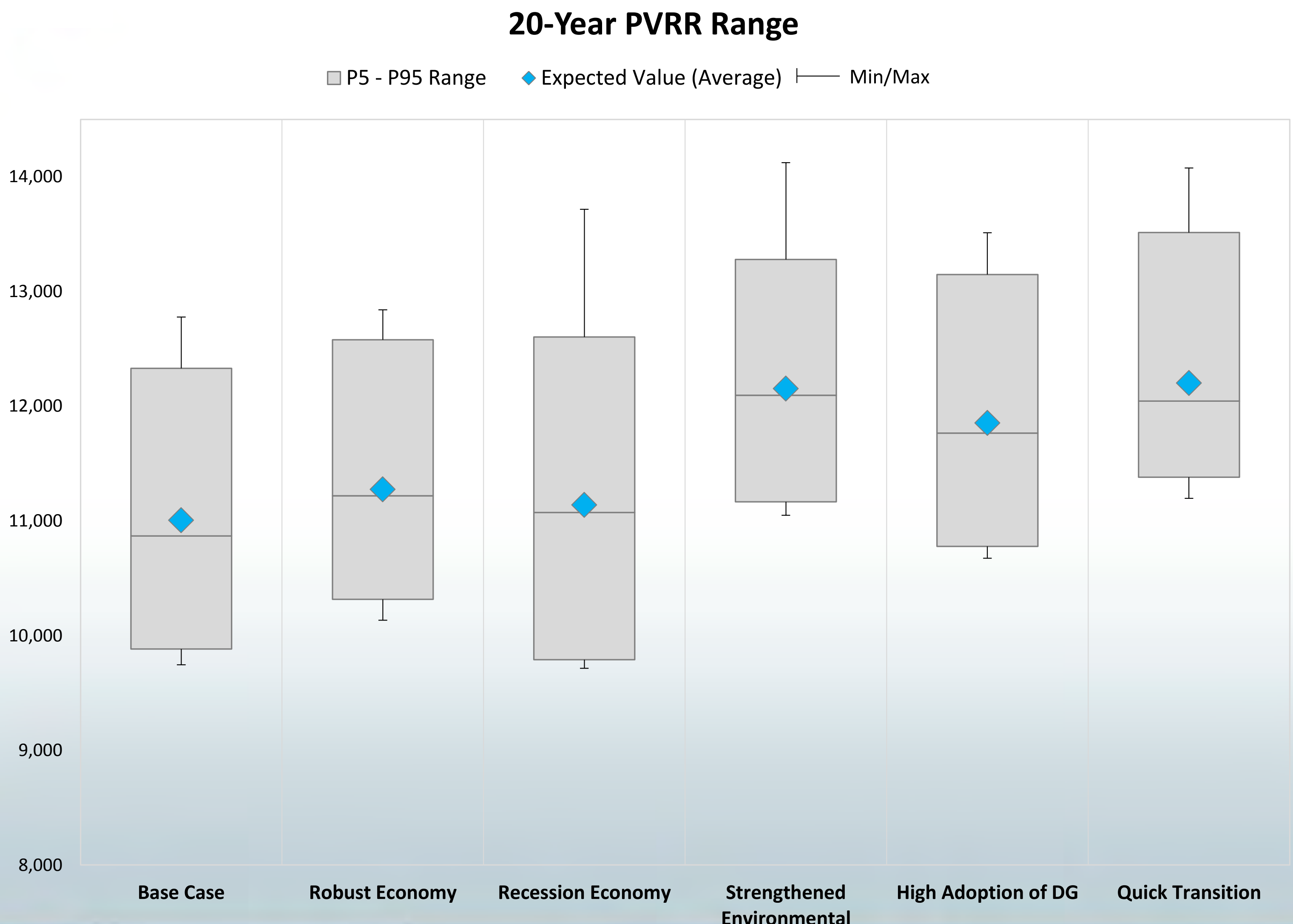
- The difference between the value at the 95th percentile of probability and the value at 50% percentile probability (expected value)
- In order to reflect risk, this metric utilizes results from stochastic modeling as opposed to deterministic results

Risk Exposure = The PVRR at the 95% probability – expected PVRR

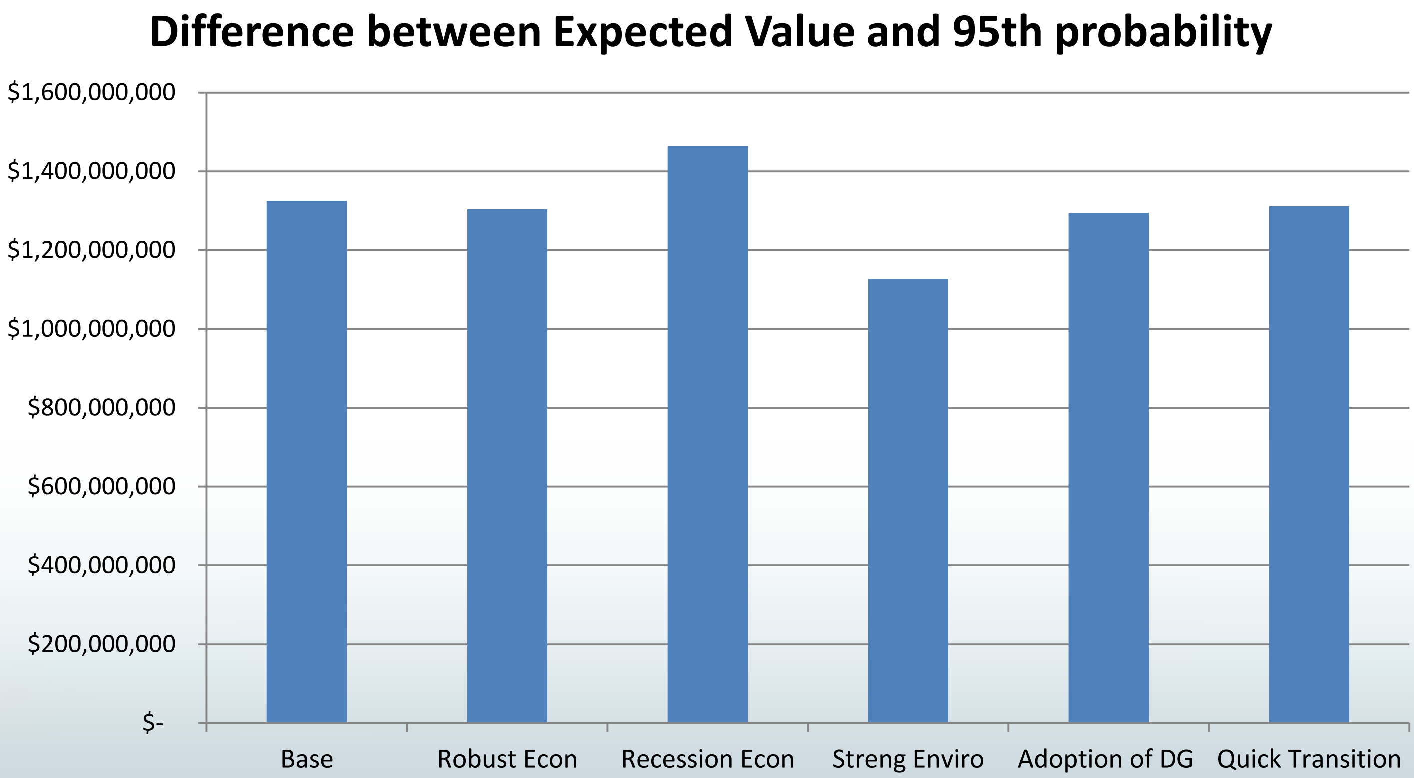
Risk Exposure – risk profile chart



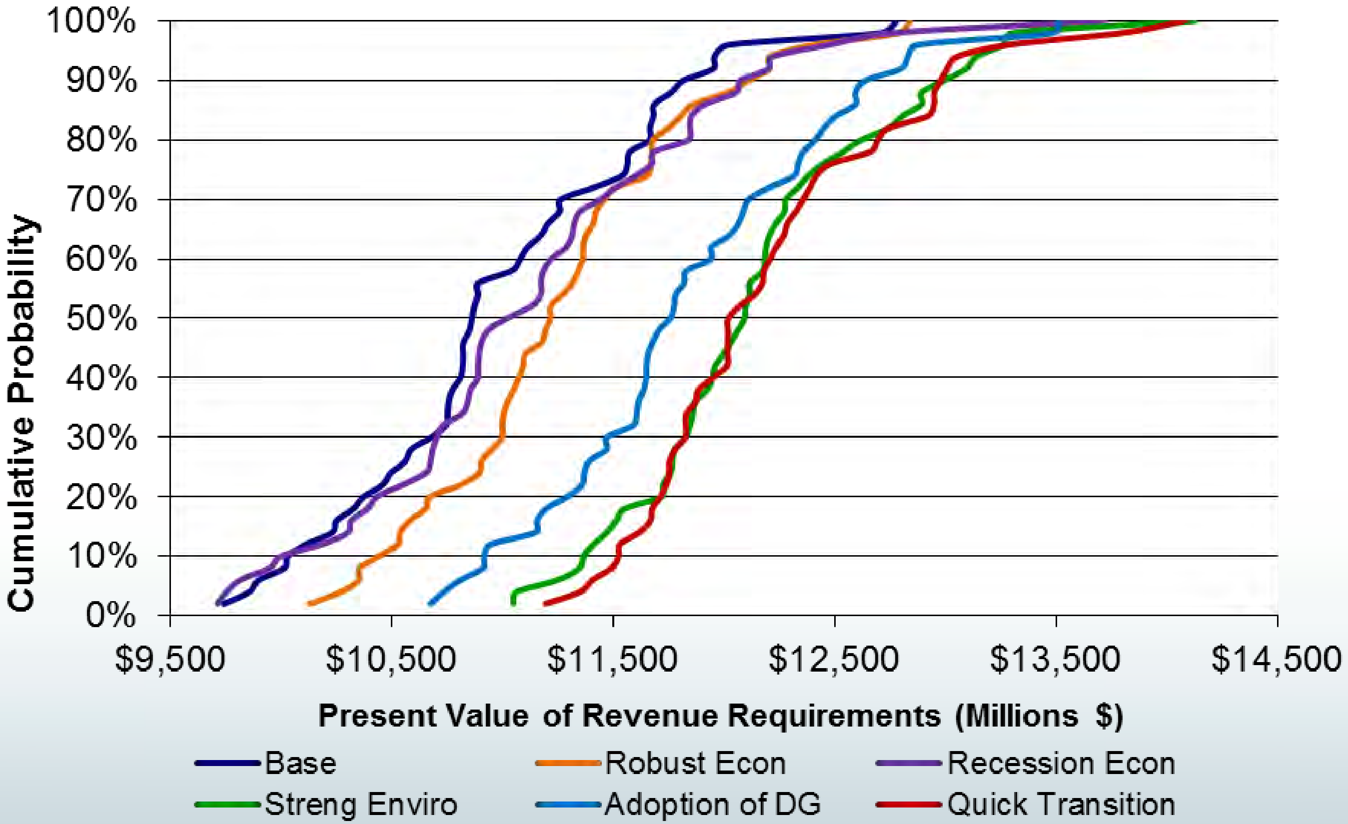
Risk Exposure range



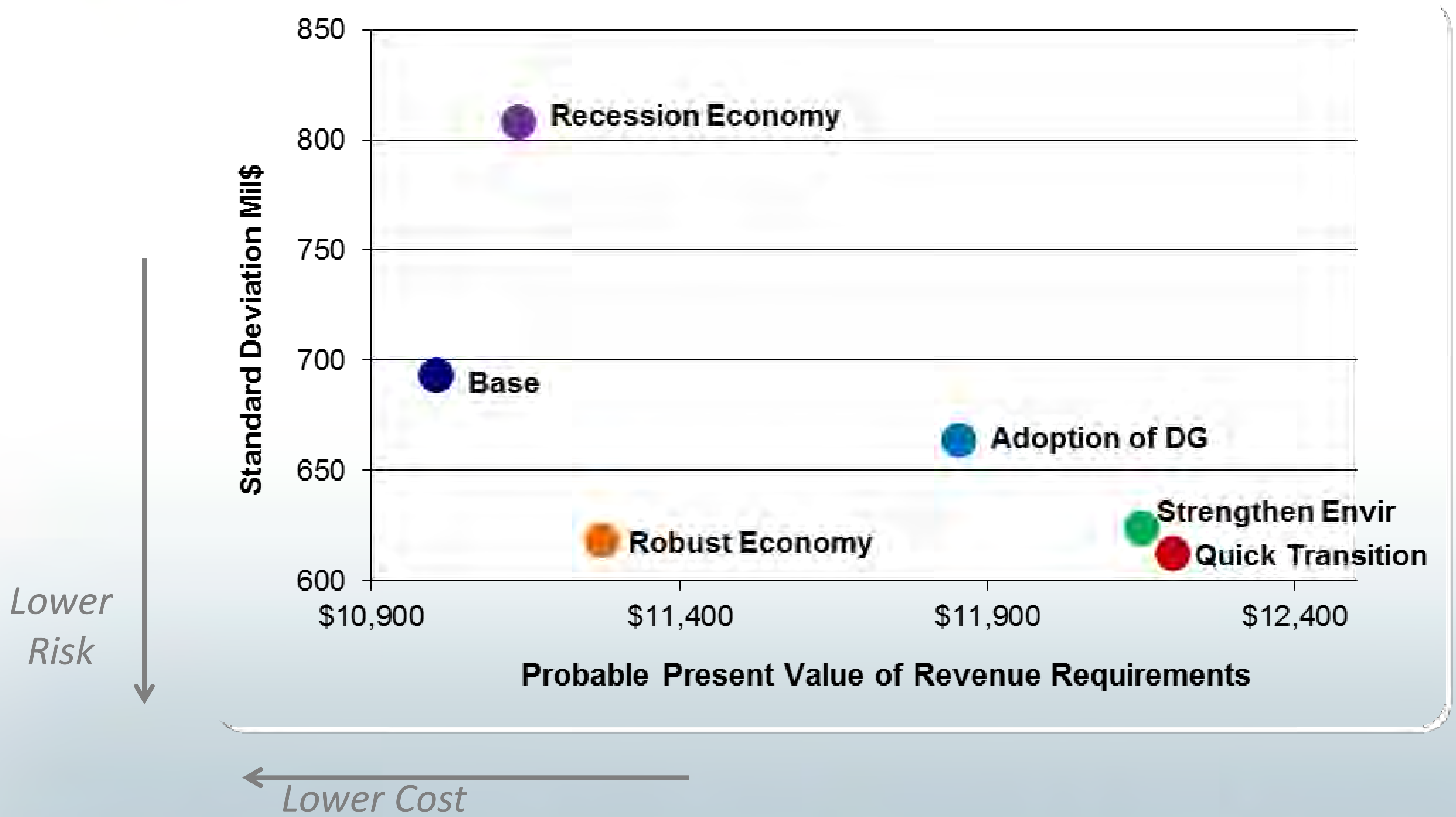
Risk Exposure



Combined Risk Profiles



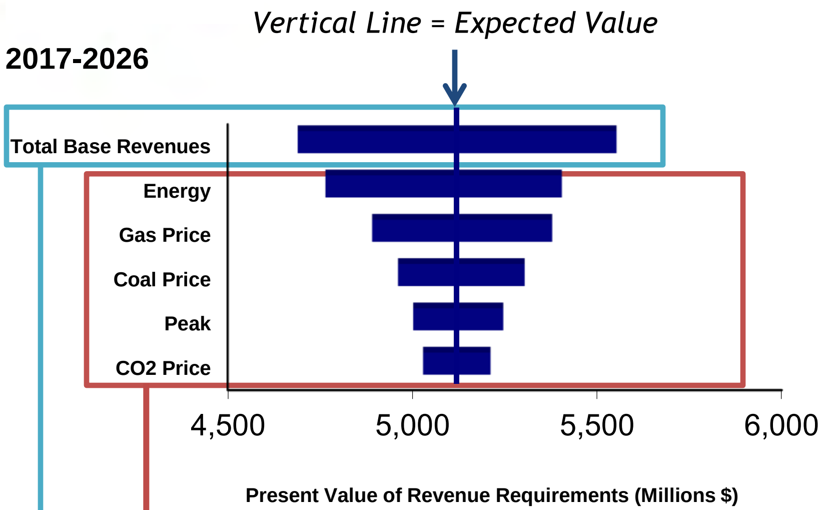
Risk trade off diagram

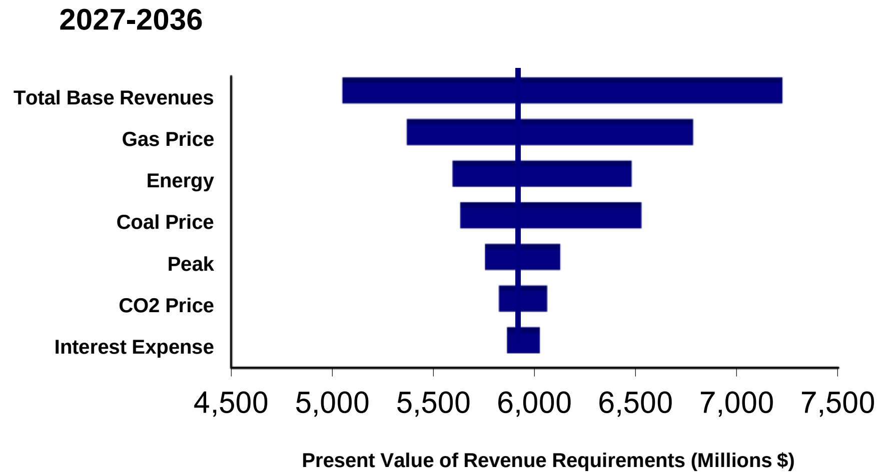


Tornado charts show impacts of drivers

- Provide information on the driving factors that influence PVRR based on stochastic modeling
- Provide insights for risk mitigation
- Charts were prepared for each scenario
- 10 year blocks were used
- Total impact is a blended view, not the sum of the ranges

Base Case Tornado Chart





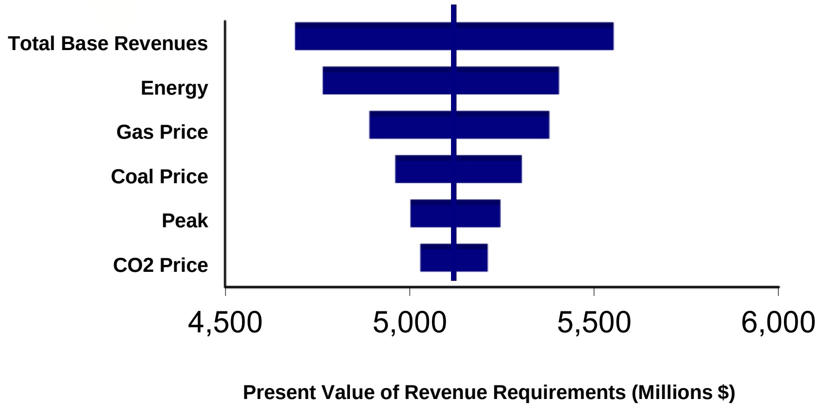
Dependent Variable:
PVRR

Independent Variables:
Which variables
are driving the
change in PVRR?

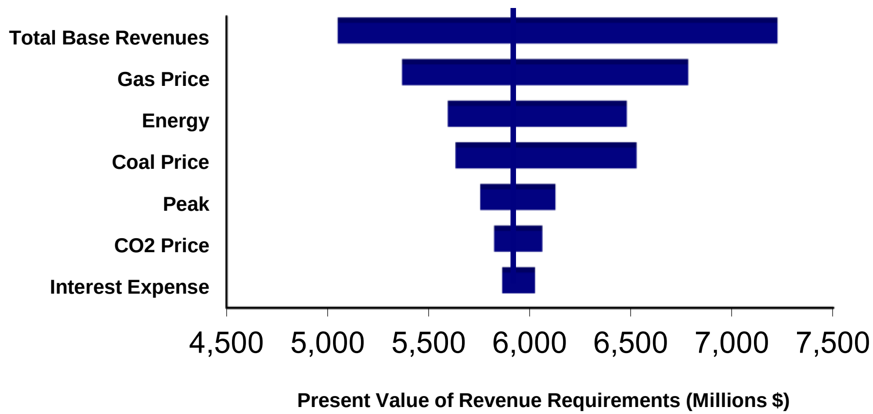
Tornado: Base Case and Robust Economy

BASE CASE

2017-2026

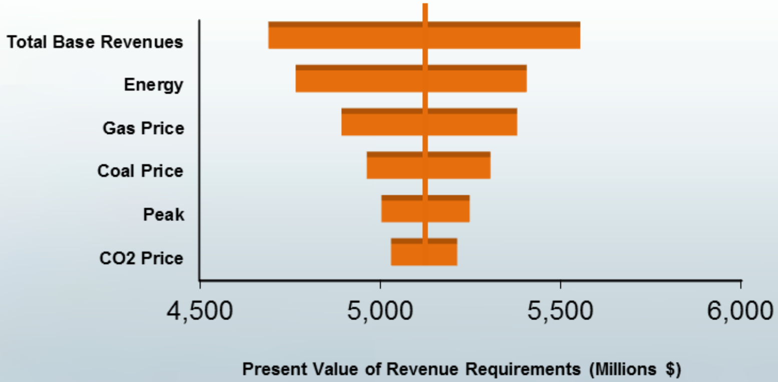


2027-2036

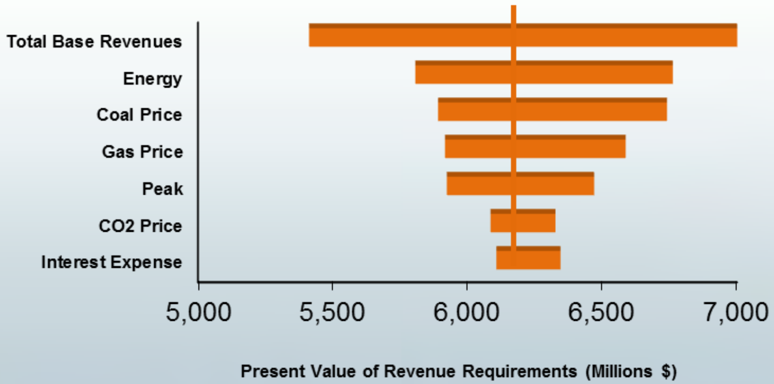


ROBUST ECONOMY

2017-2026



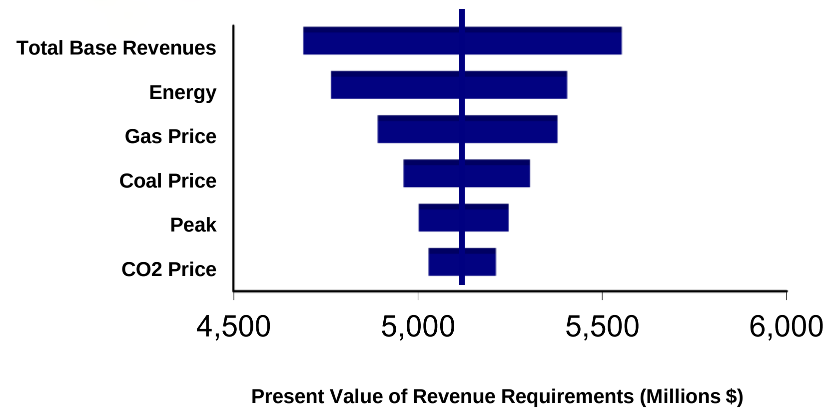
2027-2036



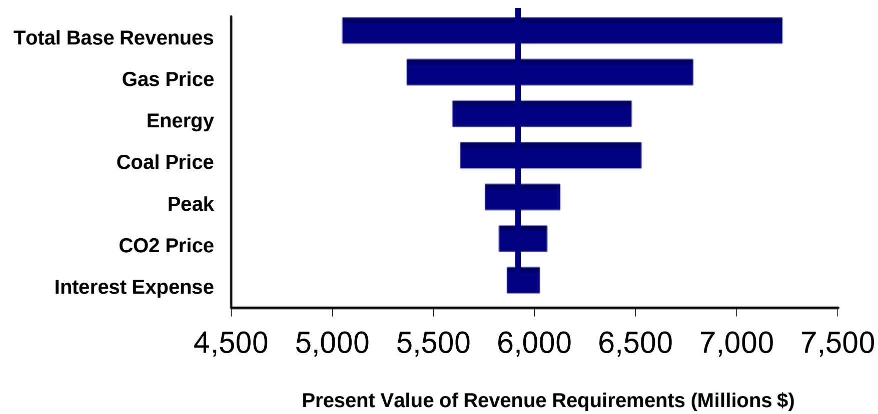
Tornado: Base Case and Recession Economy

BASE CASE

2017-2026

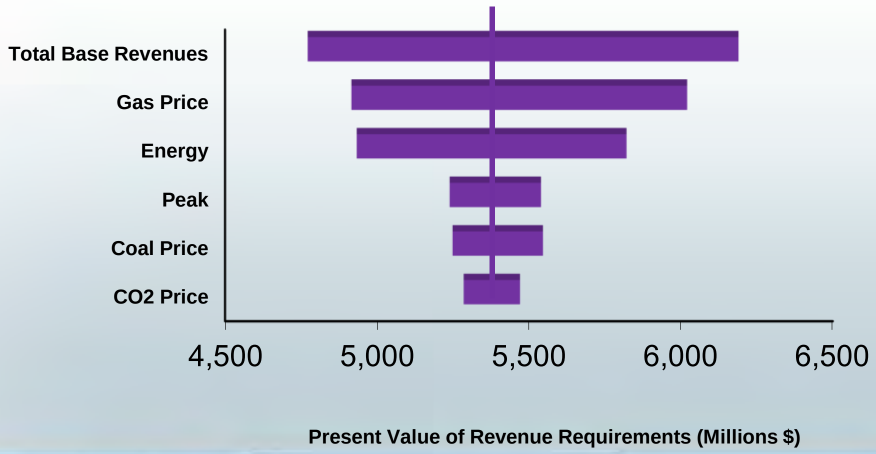


2027-2036

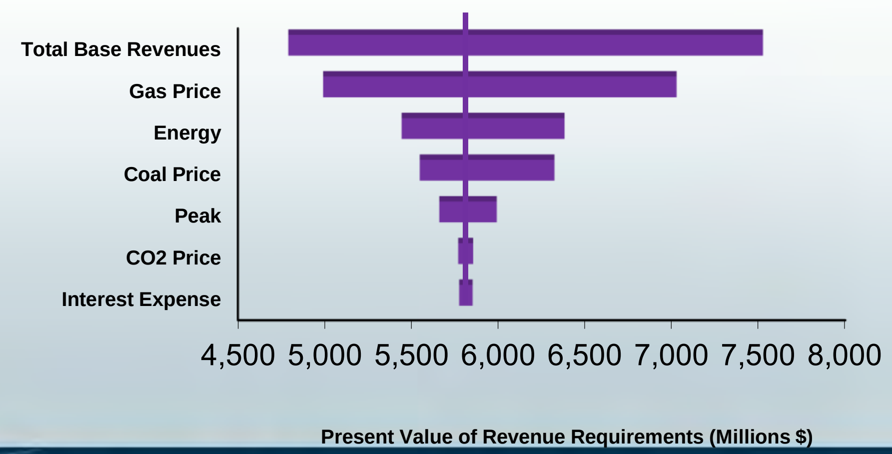


RECESSION ECONOMY

2017-2026



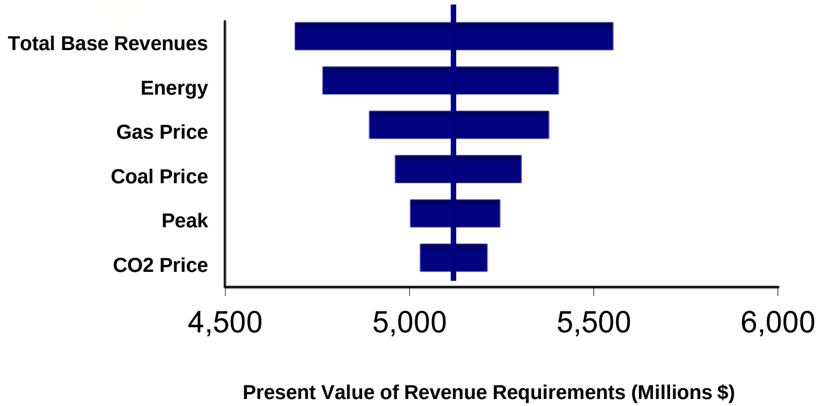
2027-2036



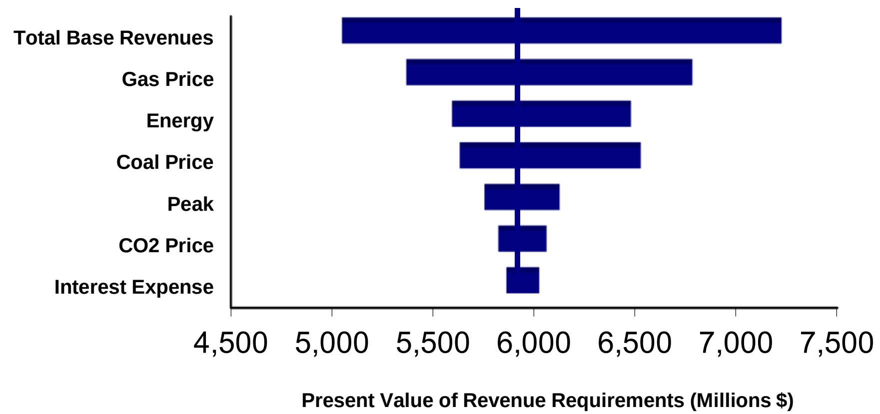
Tornado: Base Case and Strengthened Environmental

BASE CASE

2017-2026

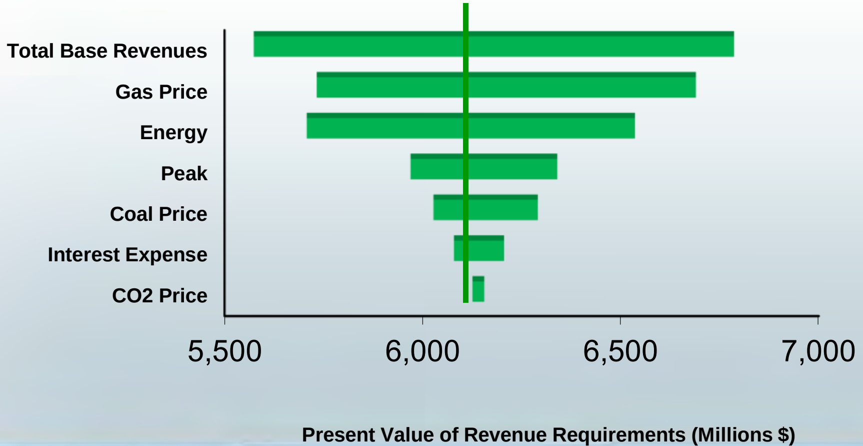


2027-2036

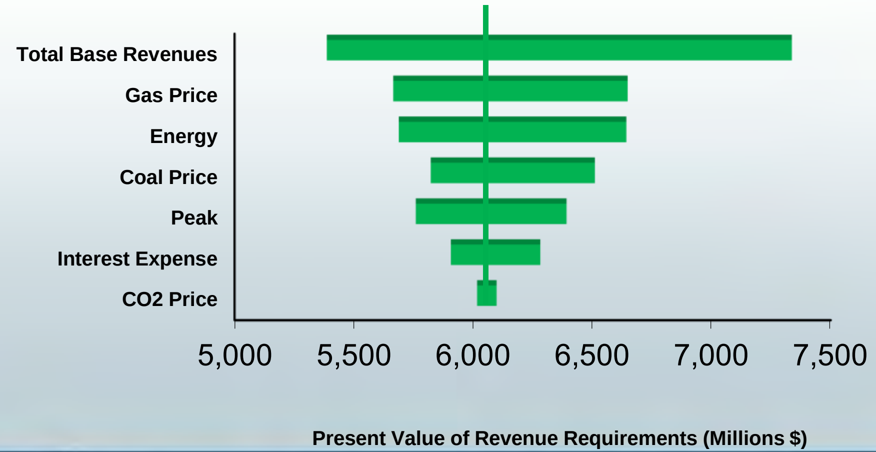


STRENGTHENED ENVIRONMENTAL

2017-2026



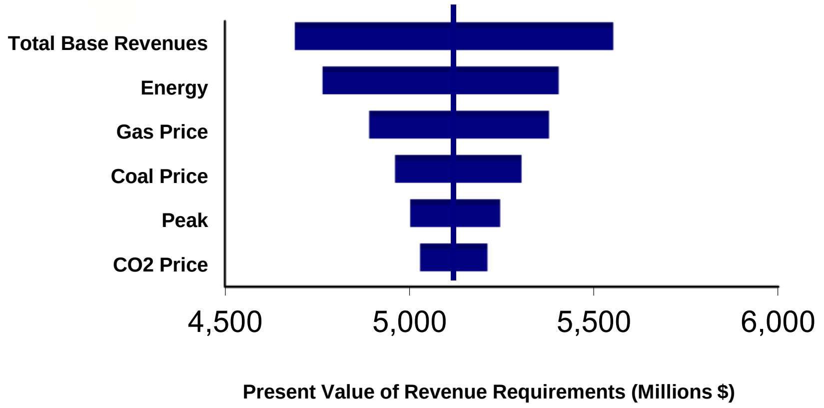
2027-2036



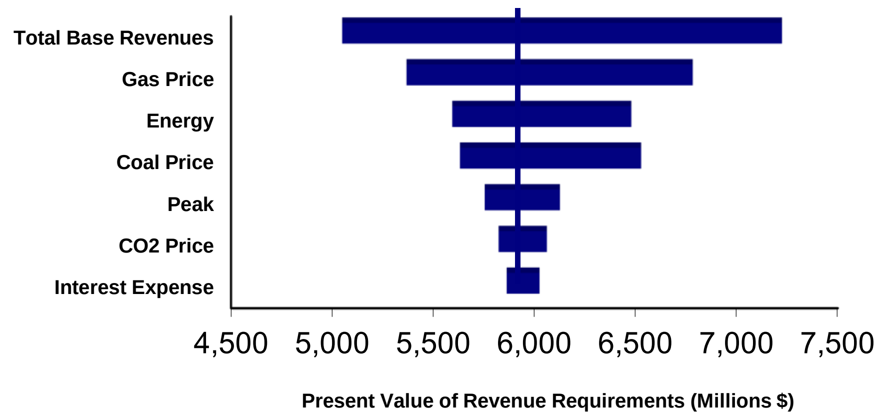
Tornado: Base Case and Adoption of DG

BASE CASE

2017-2026

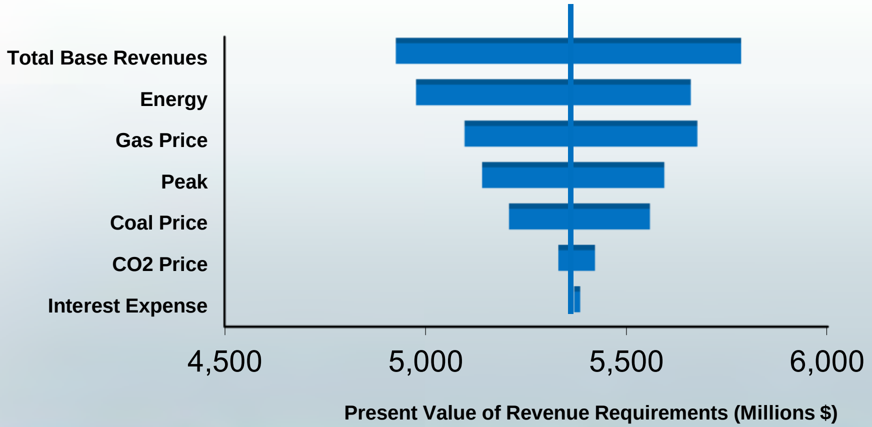


2027-2036

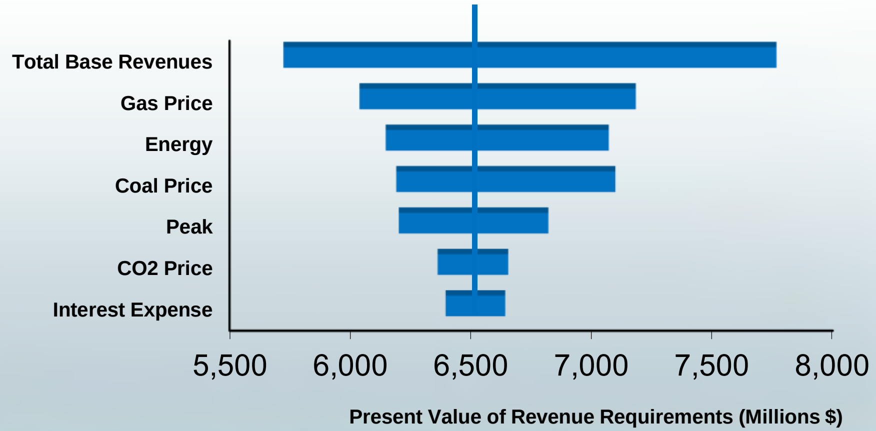


ADOPTION OF DG

2017-2026



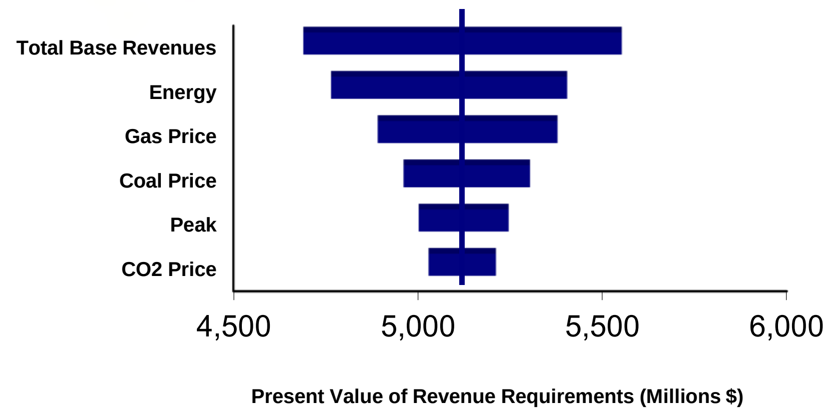
2027-2036



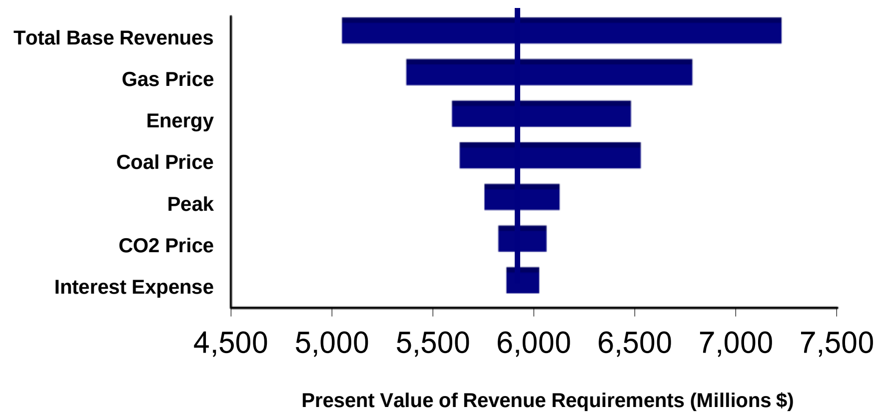
Tornado: Base Case and Quick Transition

BASE CASE

2017-2026

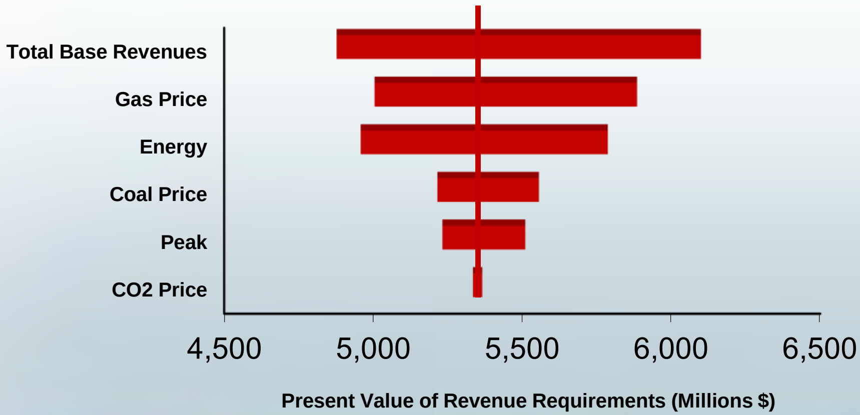


2027-2036

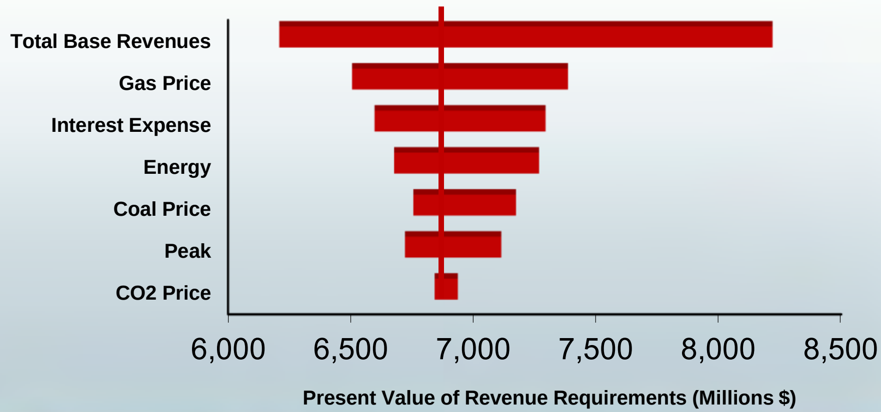


QUICK TRANSITION

2017-2026



2027-2036



Environmental Metrics: CO_2, SO_2, NOx

3. Average annual CO_2 emissions (tons)

$$\text{Annual Average } CO_2 \text{ Emissions} = \frac{\text{Sum of } CO_2 \text{ tons emitted}}{\text{\# of years in the study period}}$$

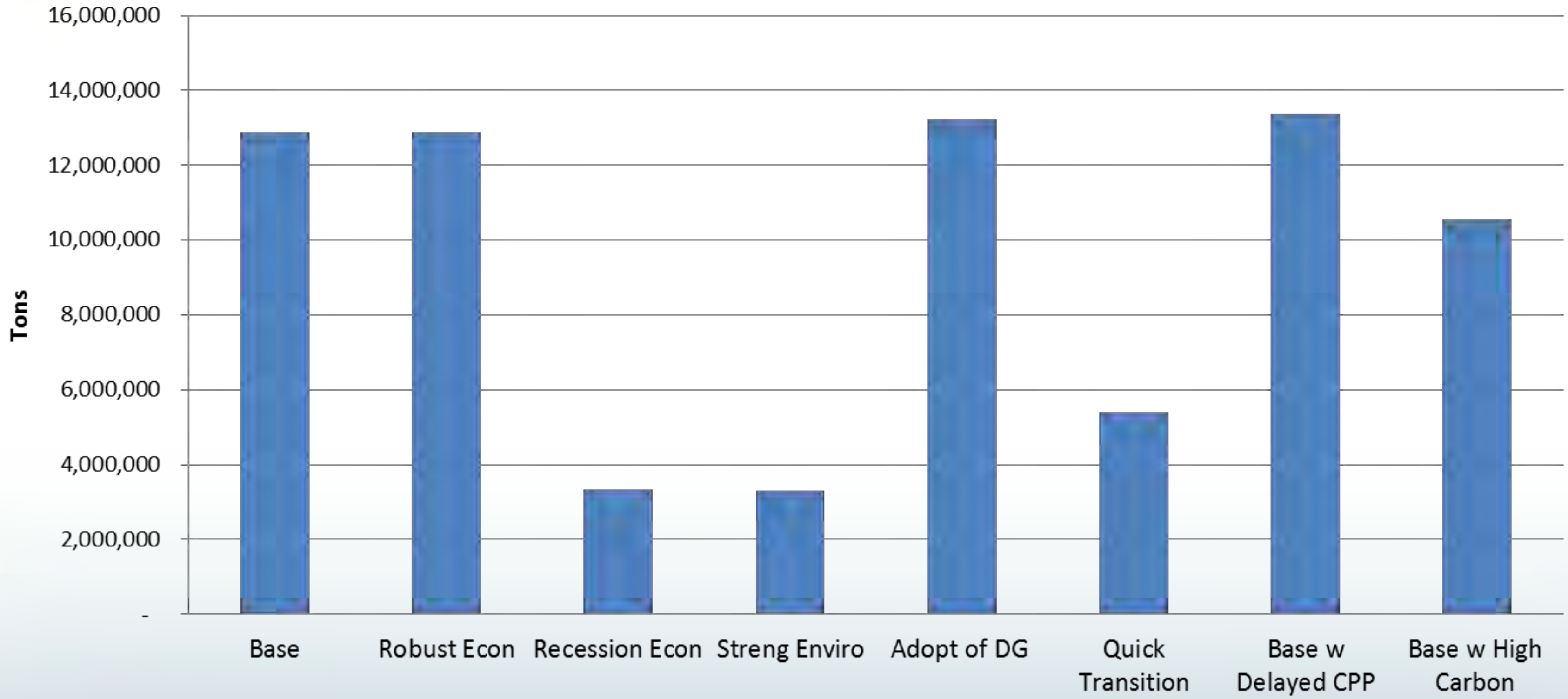
4. Average annual SO_2 emissions (tons)

$$\text{Annual Average } SO_2 \text{ Emissions} = \frac{\text{Sum of } SO_2 \text{ tons emitted}}{\text{\# of years in the study period}}$$

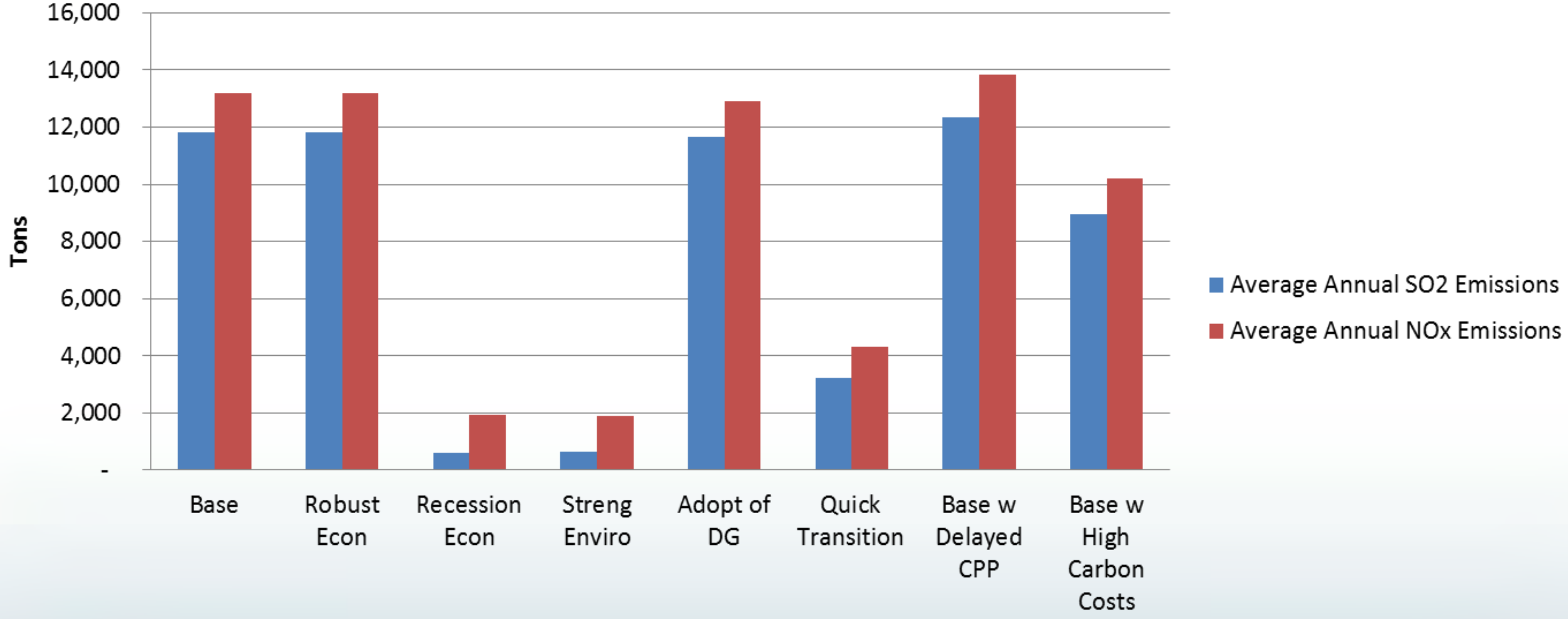
5. Average annual NO_x emissions (tons)

$$\text{Annual Average NOx Emissions} = \frac{\text{Sum of } NO_x \text{ tons emitted}}{\text{\# of years in the study period}}$$

Average annual CO_2 emissions (tons)



Average annual NO_x and SO_2 emissions

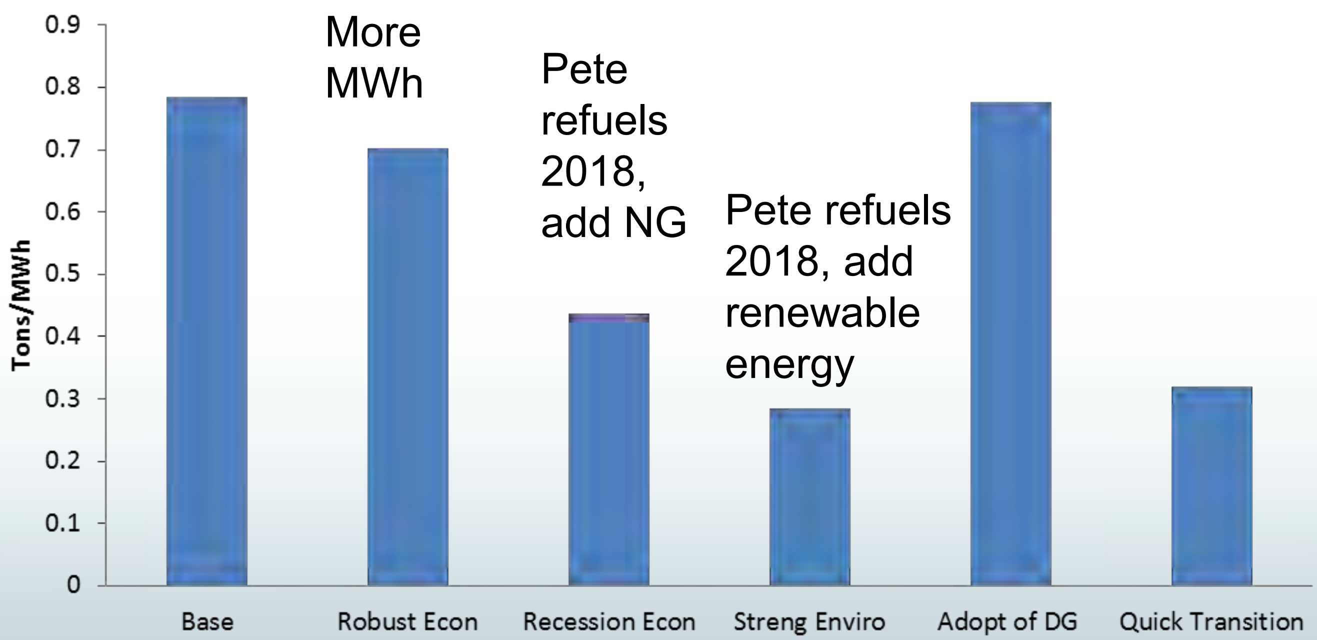


Environmental Metrics: CO_2 intensity

6. CO_2 intensity (tons/MWh)

CO_2 Intensity for study period = $\dfrac{\text{Sum of } CO_2 \text{ tons emitted}}{\text{MWh energy generated}}$

CO_2 intensity for study period



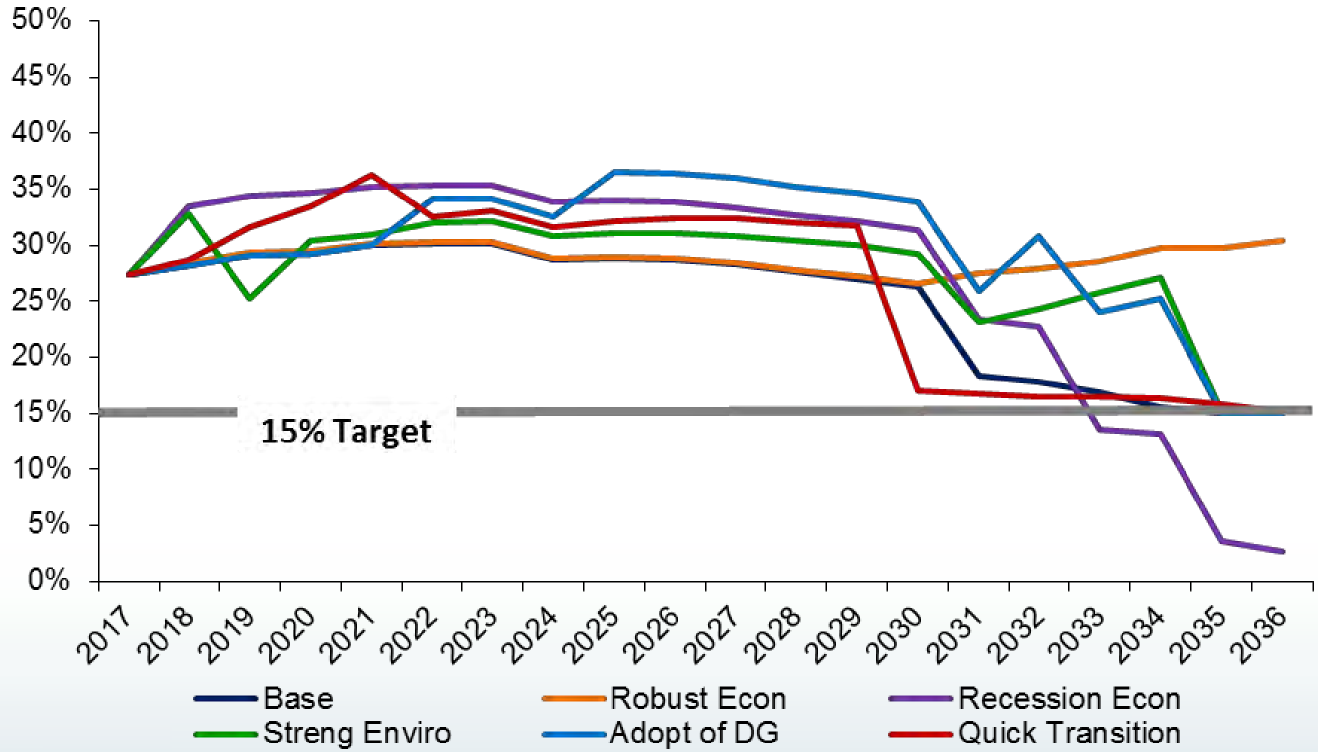
Reliability Metric: Planning Reserves

7. Planning Reserves

- Planning reserves are the MW of supply above peak forecast

Planning Reserves as a percent of load forecast = $\frac{\text{IPL's resources (MW)} - \text{peak utility load forecast (MW)}}{\text{utility load forecast}}$

Planning Reserves



- This graph shows the Reserve Margin for all plans *utilizing the base load assumption*
- All portfolios optimized for the load forecast of the specific scenario
  - Example: Low load forecast was a driver in Recession Economy scenario. This chart shows the reserve margin if IPL planned for a low load forecast and the base load forecast materialized.

Reliability metric: DG Penetration

8. DG Penetration

- Percent of IPL's resources that is distributed generation
- Includes IPL's existing 96 MW of solar and all new solar additions
- Shown in 5 year time blocks

$$\textbf{DG Penetration} = \frac{\text{distributed generation supply (MW)}}{\text{IPL resources (MW)}}$$

Reliability metric: DG penetration

In terms of Capacity

Scenario	2017-2021	2022-2026	2027-2031	2032-2036
Base	2%	2%	2%	4%
Robust Econ	2%	2%	2%	13%
Recession Econ	2%	2%	2%	3%
Strengthened Environmental	5%	9%	9%	8%
Adoption of DG	3%	8%	10%	10%
Quick Transition	2%	2%	6%	17%

Reliability Metric: market reliance

9. & 10. Market reliance - Energy and Capacity

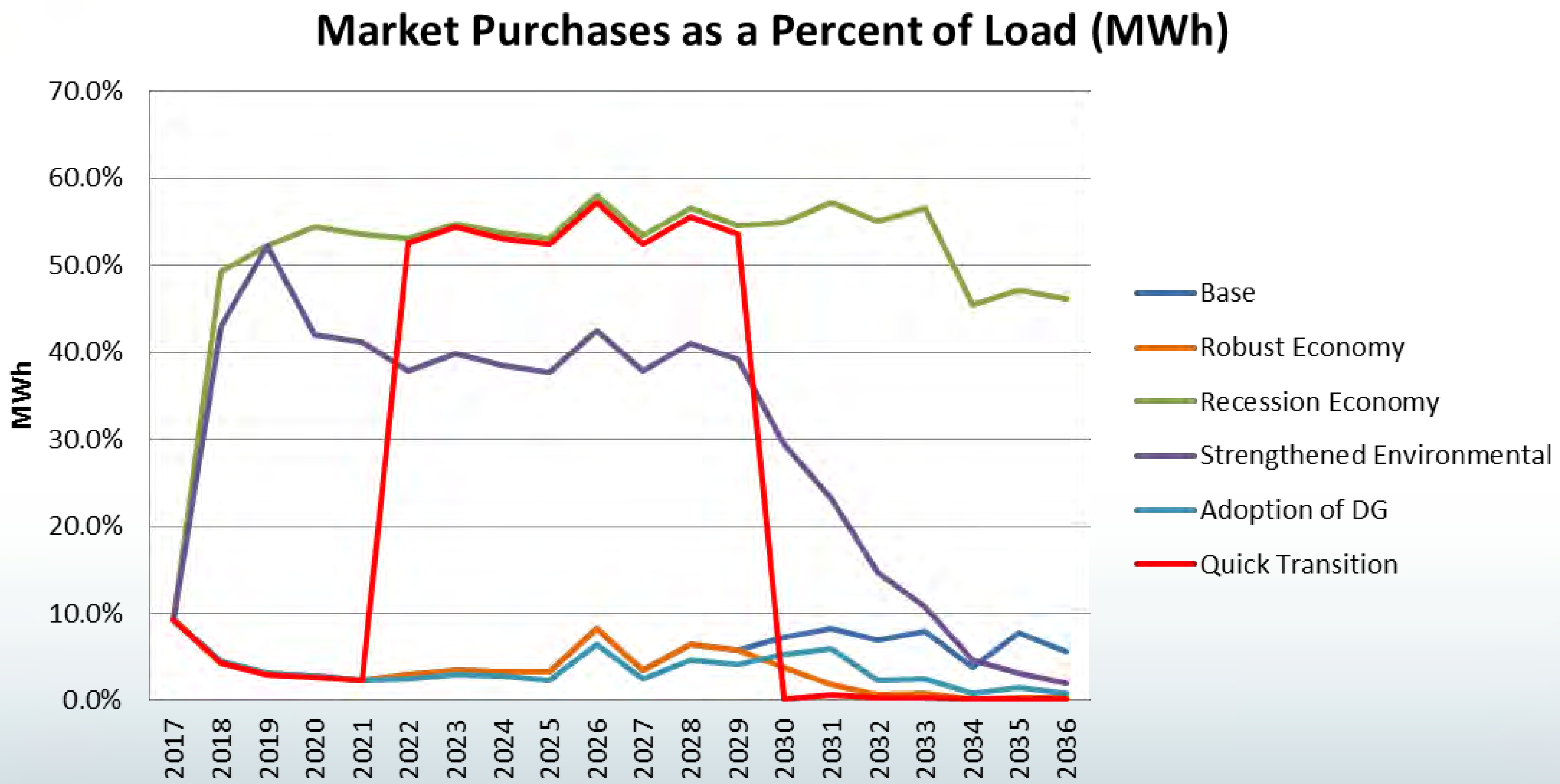
- Market reliance for energy: Percent of load met with market purchases

$$\textbf{Market Reliance for energy} = \frac{\text{MWh of market purchases}}{\text{MWh of customer demand}}$$

- Market reliance for capacity: Total MW of capacity purchased from MISO capacity auction to meet peak demand plus 15% reserve margin

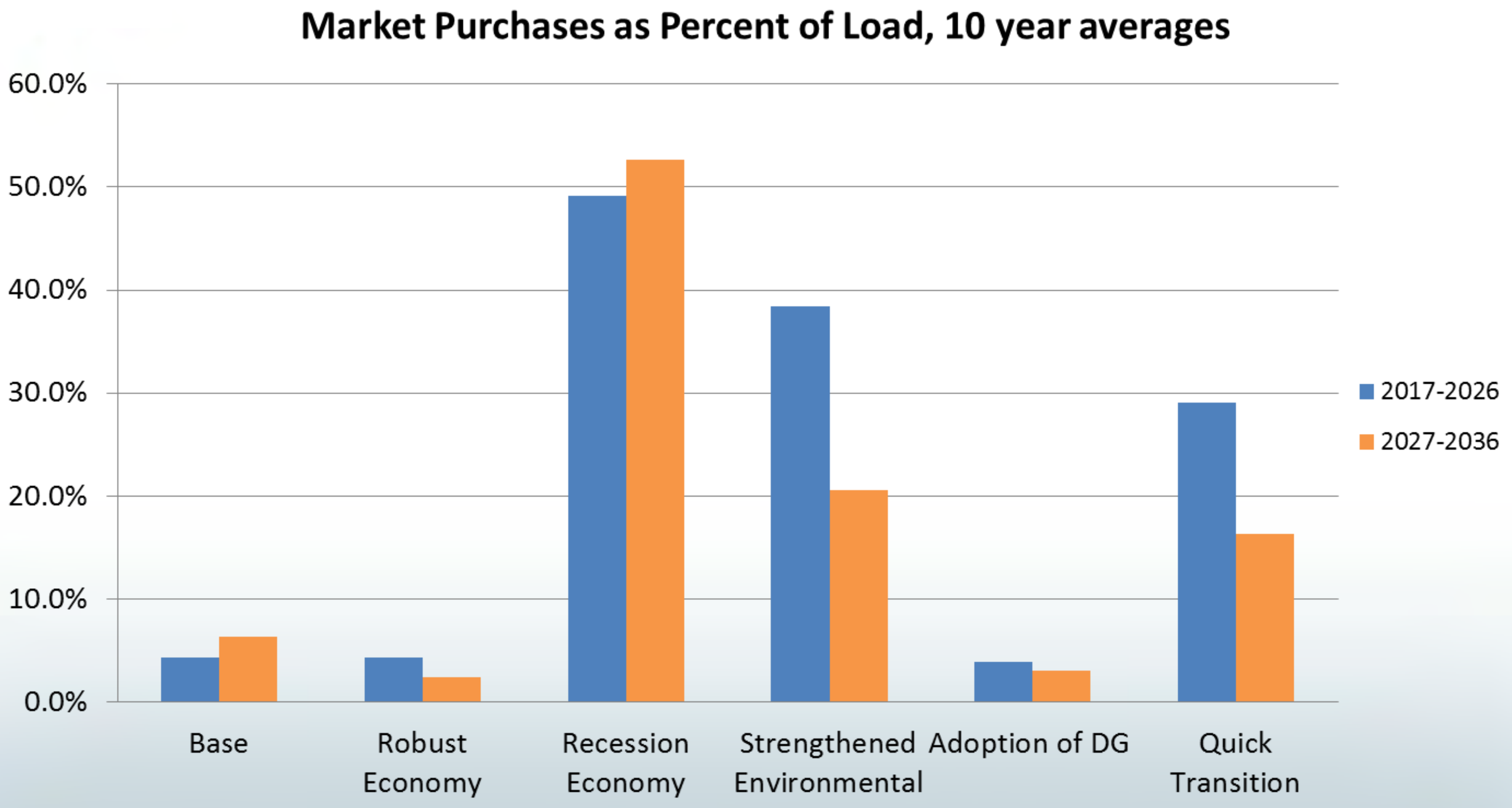
Market Reliance for capacity = total capacity purchases

Market Reliance



* Each scenario's portfolio is modeled with the Base Case load

Market Reliance - Energy



* Each scenario's portfolio is modeled with the Base Case load

Market Reliance – Capacity

	Base	Robust Economy	Recession Economy	Strengthened Environmental	Adoption of DG	Quick Transition
2017						
2018						
2019						
2020						
2021						
2022						
2023						
2024						
2025						
2026						
2027						
2028						
2029						
2030						
2031		200 MW				
2032						
2033	50 MW					
2034						
2035	150 MW	50 MW		50 MW	50 MW	
2036						

Metrics Summary

Scenarios	Cost		Financial Risk	Environmental Stewardship				Resiliency			
	20 yr PVRR ($ MN)	Rate Impact, 20 yr average ($/kWh)	Risk Exposure ($)	Average annual CO2 emissions (tons)	Average annual NOx emissions (tons)	Average annual SOx emissions (tons)	Total CO2 intensity (tons/MWh)	Planning Reserves (lowest amount over 20 yrs)*	Distributed Generation (Max DG as percent of capacity over 20 yr)	Market Reliance for Energy (Max over 20 yrs)	Market Reliance for Capacity (Max MW over 20 yrs)
Base	$ 10,309	$ 0.035	$ 1,461,856,693	12,883,603	13,181	11,808	0.510	15%	2%	9%	150
Robust Econ	$ 10,550	$ 0.036	$ 1,361,308,495	12,883,183	13,181	11,808	0.410	27%	2%	9%	200
Recession Econ	$ 11,042	$ 0.038	$ 1,529,366,806	3,334,067	1,925	593	0.284	3%	3%	58%	0
Streng Enviro	$ 11,990	$ 0.041	$ 1,183,639,662	3,309,326	1,910	629	0.150	15%	2%	52%	50
Adopt of DG	$ 11,092	$ 0.038	$ 1,382,467,346	13,159,800	13,332	11,808	0.459	15%	11%	9%	50
Quick Transition	$ 11,988	$ 0.042	$ 1,469,716,821	5,403,645	4,320	3,243	0.173	15%	3%	57%	0

* this Planning Reserves metric compares each scenario's resources to the Base Case peak load forecast.

Questions?

Lunch Break

Analysis Observations

Joan Soller, Director of Resource Planning

As proposed in meeting #1…

	2014 IRP Feedback	IPL Response/Planned Improvements
1	Constrained Risk Analysis	Stakeholder discussion about risks will occur early in the 2016 IRP process.
2	Load Forecasting Improvements Needed	IPL is reviewing load forecast to enhance data in the 2016 IRP.
3	DSM Modeling not robust enough	IPL has piloted modeling DSM as a selectable resource and will discuss this in public meetings.
4	Customer-Owned and Distributed Generation lacked significant growth	IPL will develop DG growth sensitivities to understand varying adoption rate impacts.
5	Incorporation of Probabilistic Methods	IPL will incorporate probabilistic modeling in 2016 IRP.
6	Enhance Stakeholder Process	IPL participated in joint education session with other utilities to develop foundational reference materials. We will incorporate more interactive exercises in 2016.

Analyses Observations

- Stakeholder input has shaped modeling process
- Metrics have informed discussions
- Scenario development and related economic modeling results produced varying portfolios
- The future may vary from this snapshot
- Transmission voltage stability analyses will continue

Analyses Observations (cont’d)

- The ultimate resource portfolio may differ from model results should assumptions vary from the Base Case (e.g. Strengthened Environmental with ~40% market reliance)
- Resources perform to meet the scenario parameters with varying capacity factors
- Wholesale energy & capacity sales offset revenue requirements
- More analysis of batteries with renewables is expected

Questions?

Discussion of Results

Reference handout for small group questions.

Short Term Action Plan

Joan Soller, Director of Resource Planning

Short Term Action Plan Criteria Proposed in 170 IAC* 4-7

- Explanation of the previous short term action plan and differences based on what actually transpired
- 3 year view (2017 through 2019)
- Includes resource changes and major projects
- Description of preferred resource portfolio elements
- Implementation schedule

*IAC – Indiana Administrative Code

Status of 2014 IRP Short Term Action Plan (for 2015-2017)

- Completed Items
  - Retired Eagle Valley (EV) coal Units 3-6
  - Refueled Harding Street Station (HSS) units 5, 6 and 7 from coal to natural gas
  - Retrofitted Petersburg units for Mercury and Air Toxics Standards (MATS) regulation
  - Secured market capacity purchases for 2015-2017
  - Built HSS 20 MW Battery Energy Storage System

Status of 2014 Short Term Action Plan (cont'd)

- In progress
  - Implement DSM for 2015-2017
  - Construct EV Combined Cycle Gas Turbine (CCGT)
  - Retrofit Pete and HSS for National Pollutant Discharge Elimination System (NPDES) permit compliance
  - Complete transmission projects for EV CCGT
  - Support Blue Indy electric car sharing program (74 of 200 locations complete)

2016 Short Term Action Plan Items (2017-2019)

Resource Changes	2017	Implement DSM proposed for 2017, draft and seek approval for 2018-2020 DSM action plan
	2017	Complete EV CCGT Construction
	2018	Complete CCR/NAAQS-SO2 Pete upgrades
Transmission	2017	Upgrade (1) 138 kV line, replace (1) auto-transformer
	2018	Upgrade 3 substations, (3) 138 kV lines, and replace breakers at 2 substations
	2019	Implement projects identified in 2017 & 2018

Questions?

IRP Process Feedback

Dr. Marty Rozelle, Facilitator

Joan Soller, Director, Resource Planning

IPL's planned improvements to 2019 IRP process

1. Analyze smart meter data for more granular load forecasting
2. Refine Demand Side Management (DSM) modeling
3. Research MISO transmission congestion forecasts
4. Assess 138 kV voltage stability options
5. Refine frequency & reactive support requirements of new wind assets
6. Study firming benefits of batteries with renewables

Stakeholder process feedback

- Reference handout for large group questions.

Questions?

Concluding Remarks & Next Steps

Marty Rozelle, Meeting Facilitator

Joan Soller, Director of Resource Planning

Next Steps

2016 IPL IRP Schedule	
September 23, 2016	Stakeholder comments due to IPL (ipl.irp@aes.com)
October 7, 2016	IRP Public Advisory Meeting #4 Notes and responses posted to IPL IRP Webpage
November 1, 2016	IPL files 2016 IRP with the IURC
90 days after filing: February 1, 2017	Interested Party Deadline to Submit Comments to the IURC. See 170 IAC 4-7-2* for details
120 days after filing: March 1, 2017	IURC Director's Draft Report publication expected

IAC – Indiana Administrative Code
*The draft proposed rule is available at: http://www.in.gov/iurc/2674.htm

Questions?

Thank you!

We value your input and appreciate your participation. Please submit your feedback form and recycle your nametag at the registration table as you leave the meeting today.

Appendix

Recession Economy summary

Resource changes (2017 to 2036)

- Refuel 1629 MW Pete 1-4 to NG
- Implement 208 MW DSM
- Retire (32 MW) HS GT
- Retire (628 MW) HSS 5, 6, 7
- No capacity purchases
- No wind, solar, or battery additions
- Add 450 MW CCGT

Robust Economy Summary

Resource changes (2017 to 2036)

- Upgrade Pete units for NAAQS-SO_2 and CCR
- Implement 218 MW DSM
- Retire (32) HS GT 1&2
- Retire (628 MW) HSS 5, 6, 7
- Retire (651 MW) Pete 1 & 2
- Purchase 250 MW capacity
- Add 3500 MW wind, 1006 MW Solar, 300 MW Battery
- Add 450 MW CCGT

Strengthened Environmental Summary

Resource changes (2017 to 2036)

- Retire (224 MW) Pete 1
- Refuel 1403 MW Pete 2-4
- Implement 218 MW DSM
- Retire (32 MW) HS GT 1&2
- Retire (628 MW) HSS 5, 6, 7
- Purchase 50 MW capacity
- Add 4100 MW wind, 549 MW Solar
- Add 450 MW CCGT

High Customer Adoption of DG Summary

Resource changes (2017 to 2036)

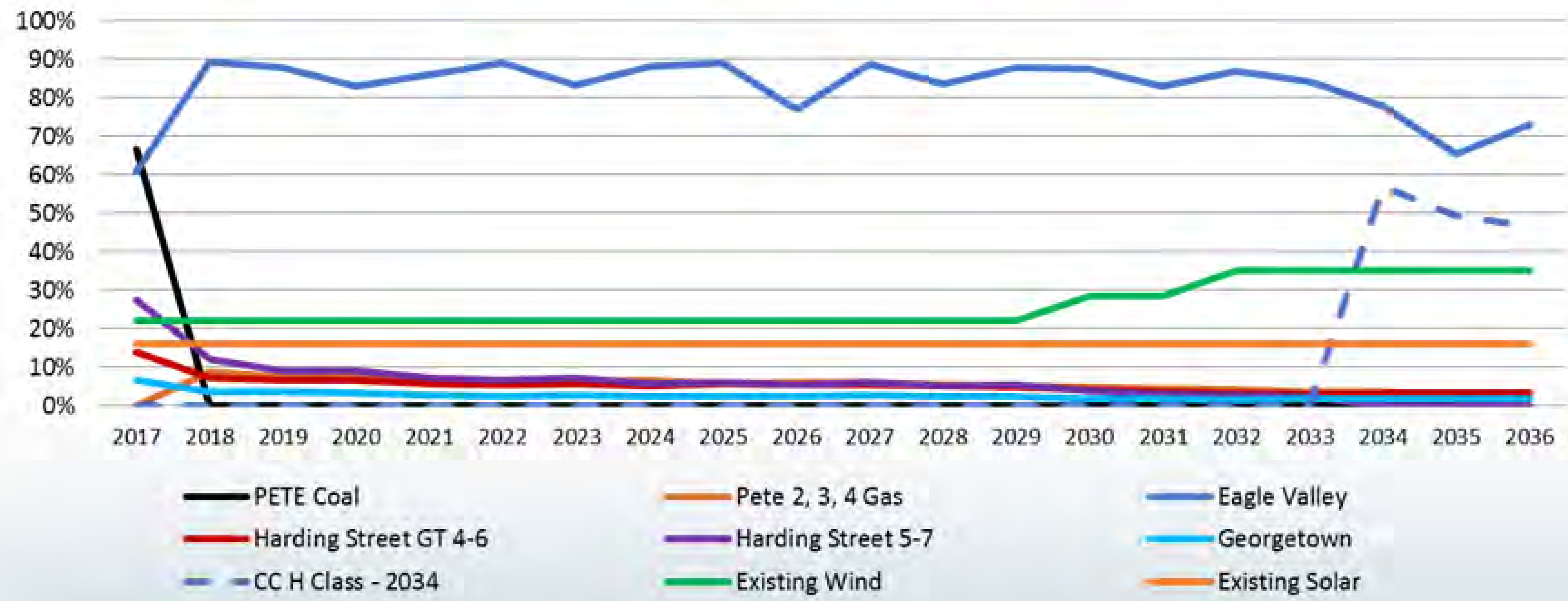
- Upgrade Pete units for NAAQS-SO_2 and CCR
- Implement 208 MW DSM
- Retire (32 MW) HS GT 1&2
- Retire (628 MW) HSS 5, 6, 7
- No capacity purchases
- Add 30 MW DG wind, 195 MW DG solar, 225 DG CHP
- Add 2500 MW utility wind, 157 MW utility solar, 50 MW battery
- Add 450 MW CCGT

Quick Transition Summary

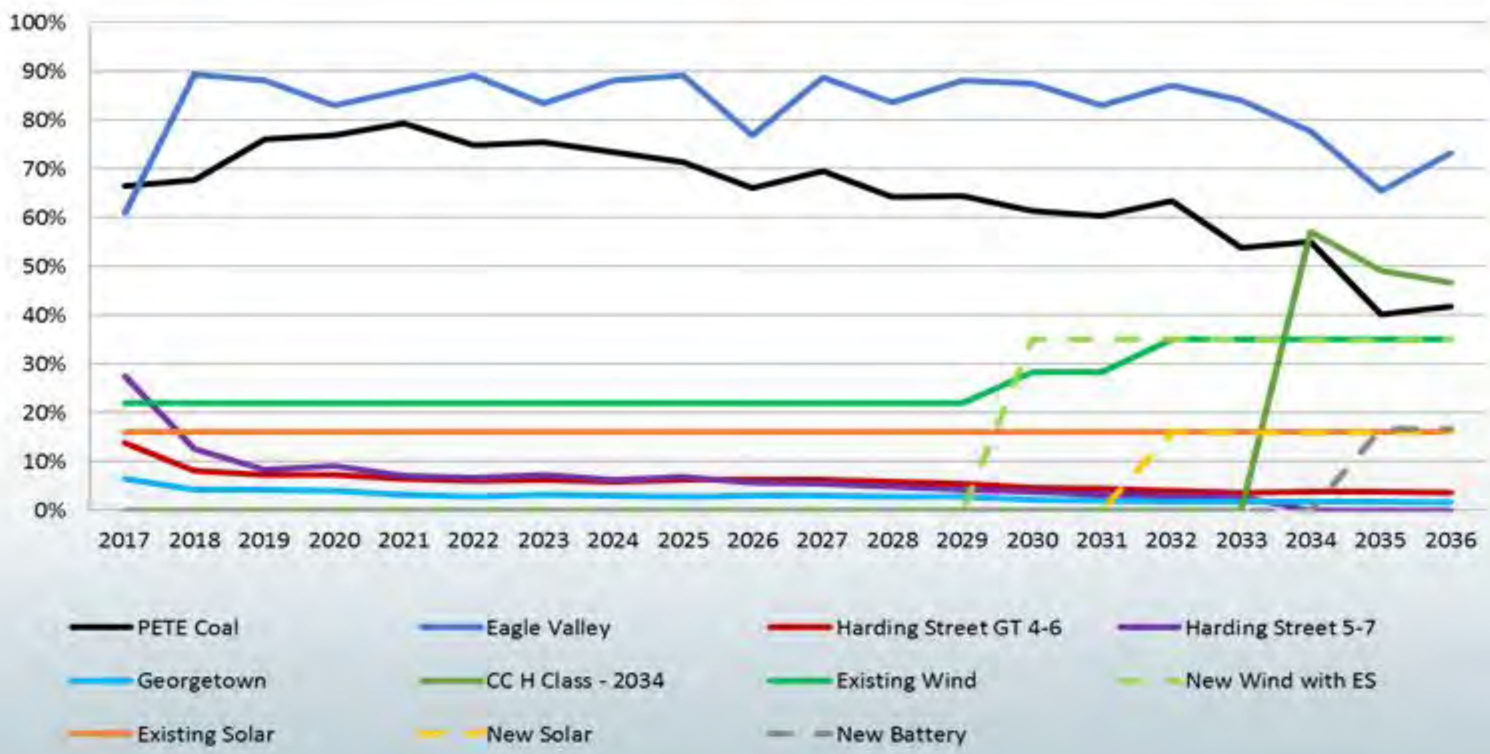
Resource changes (2017 to 2036)

- Retire (224 MW) Pete 1
- Refuel 1403 MW Pete 2-4 to NG
- Implement 458 MW DSM
- Retire (32 MW) HS GT 1&2
- Retire (628 MW) HSS 5, 6, 7
- No capacity purchases
- Add 6000 MW wind, 1146 MW solar, 600 MW battery
- Add 450 MW CCGT

Capacity Factors for Recession Economy



Capacity Factors for Robust Economy



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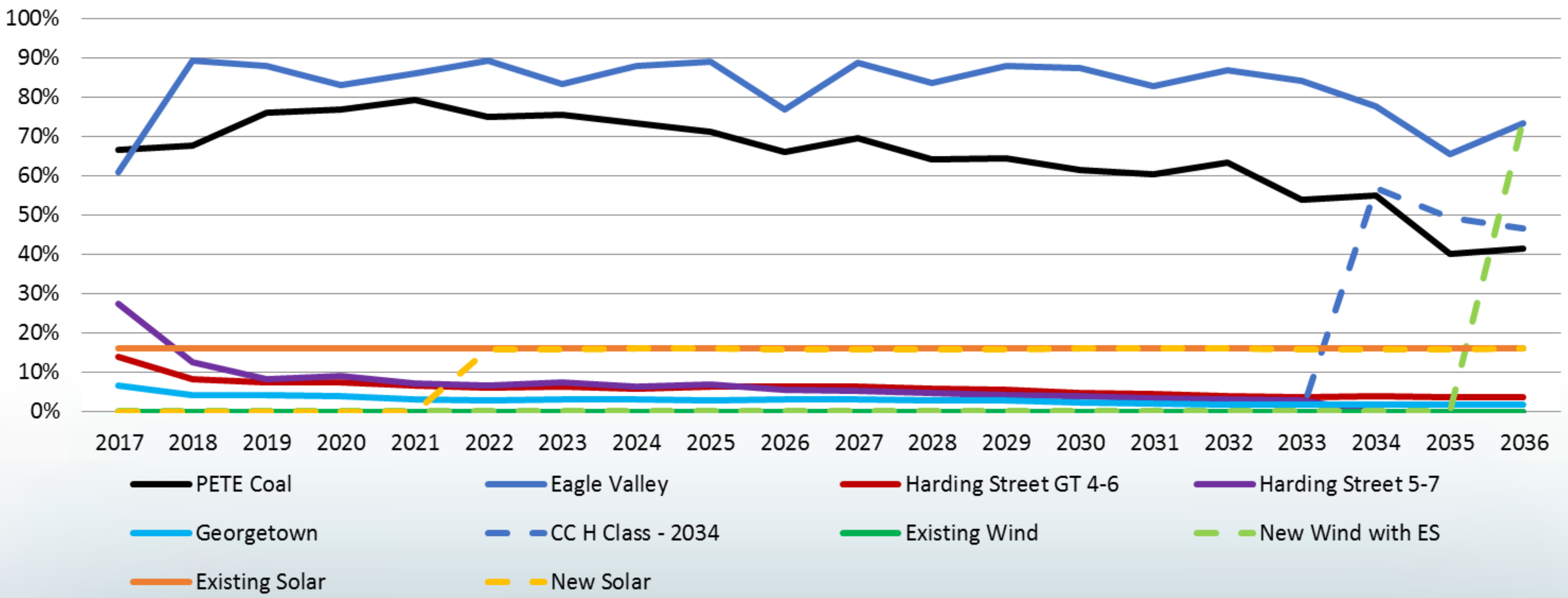
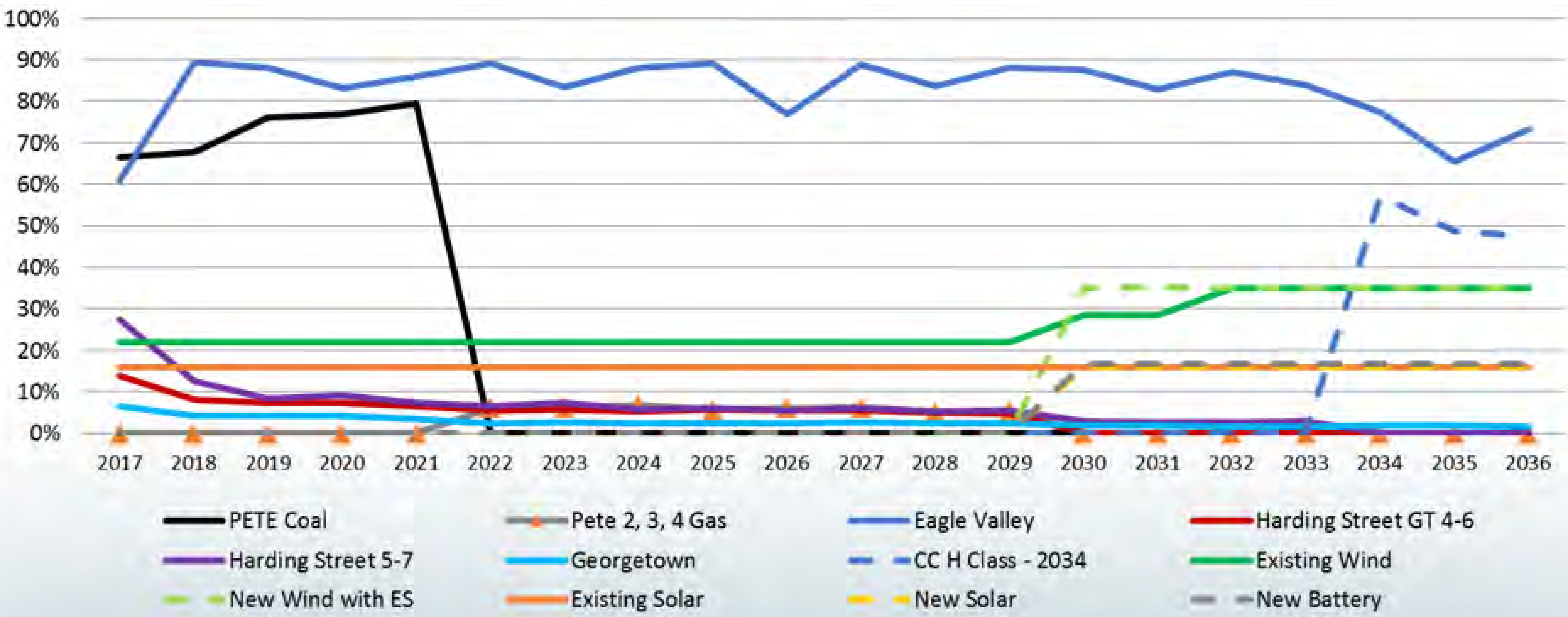
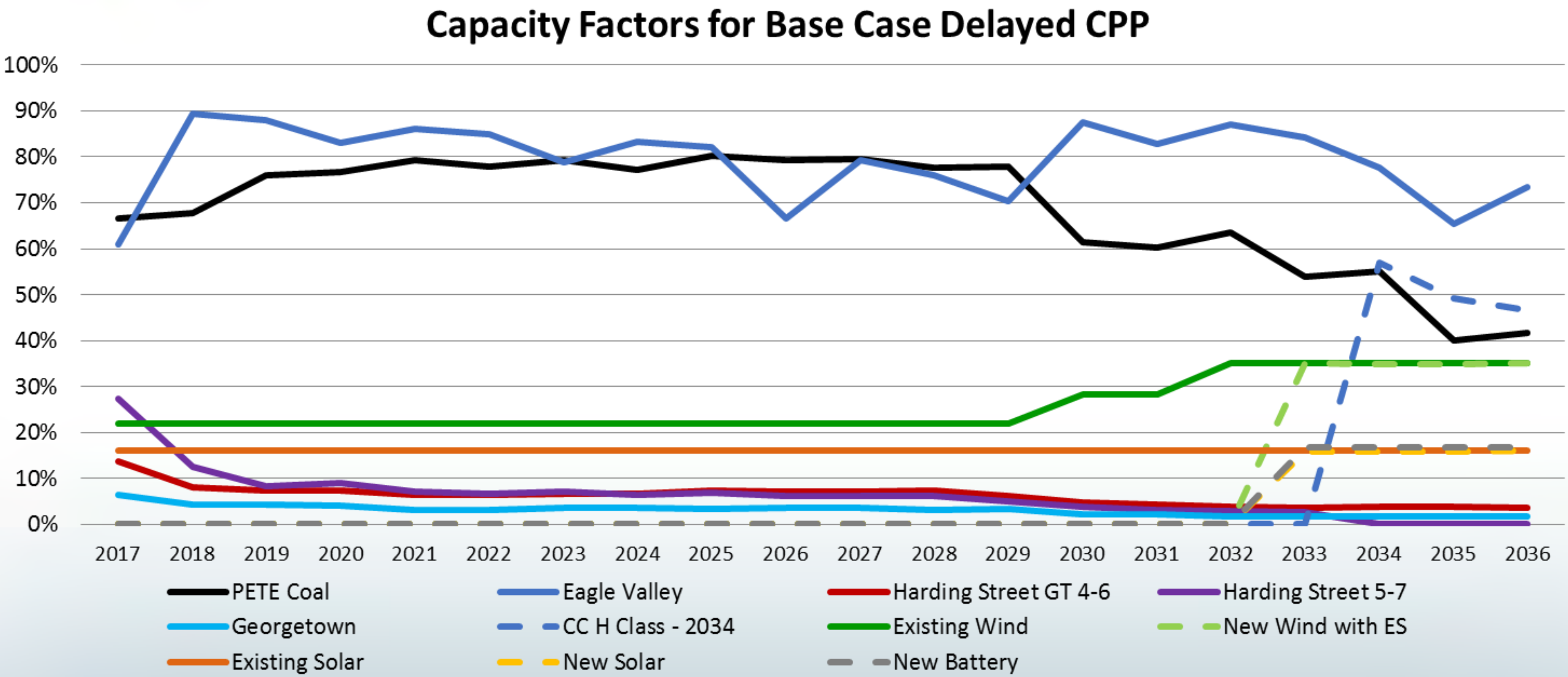
Capacity factors for High Customer Adoption of DG



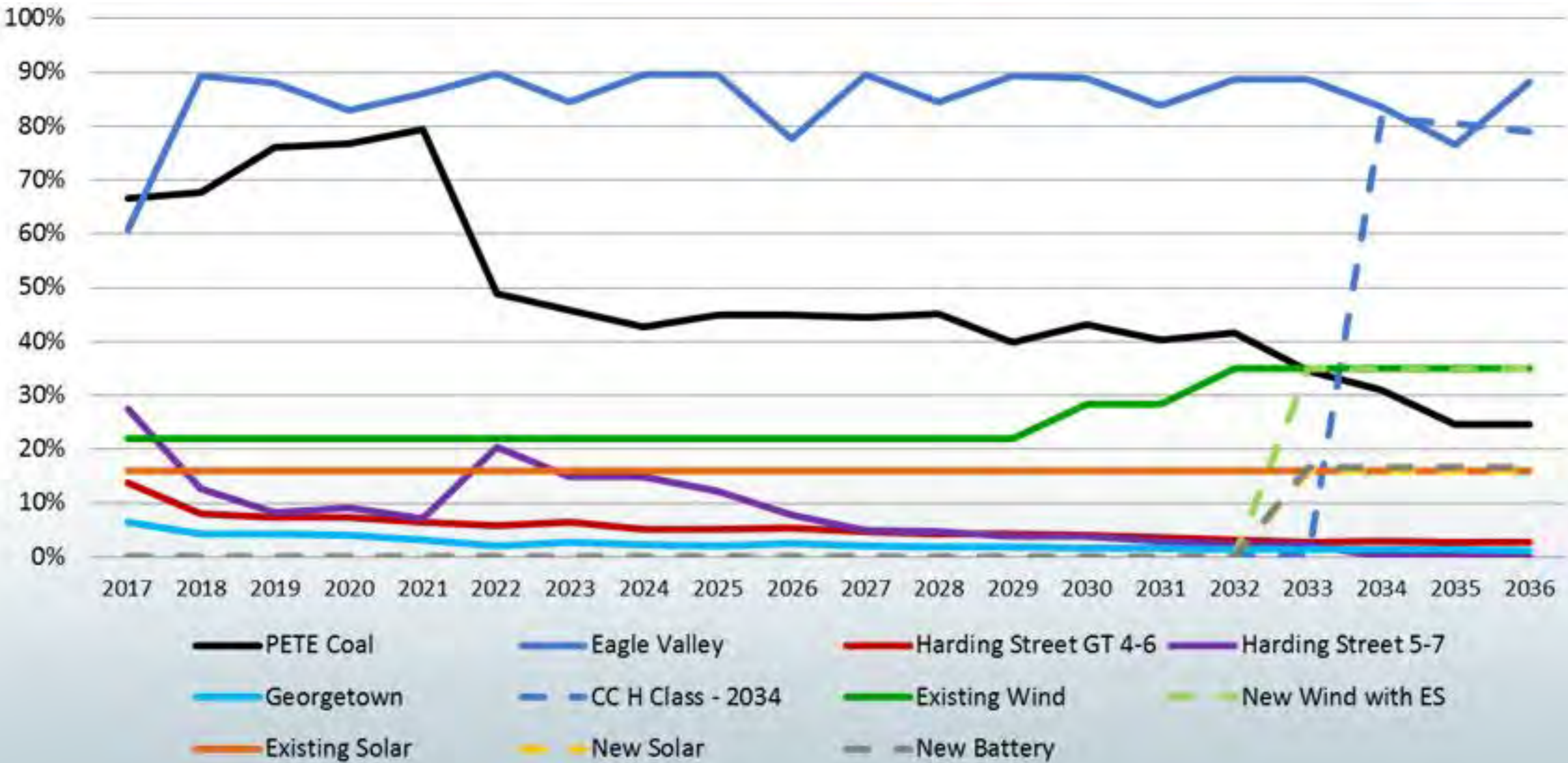
Capacity factors for Quick Transition



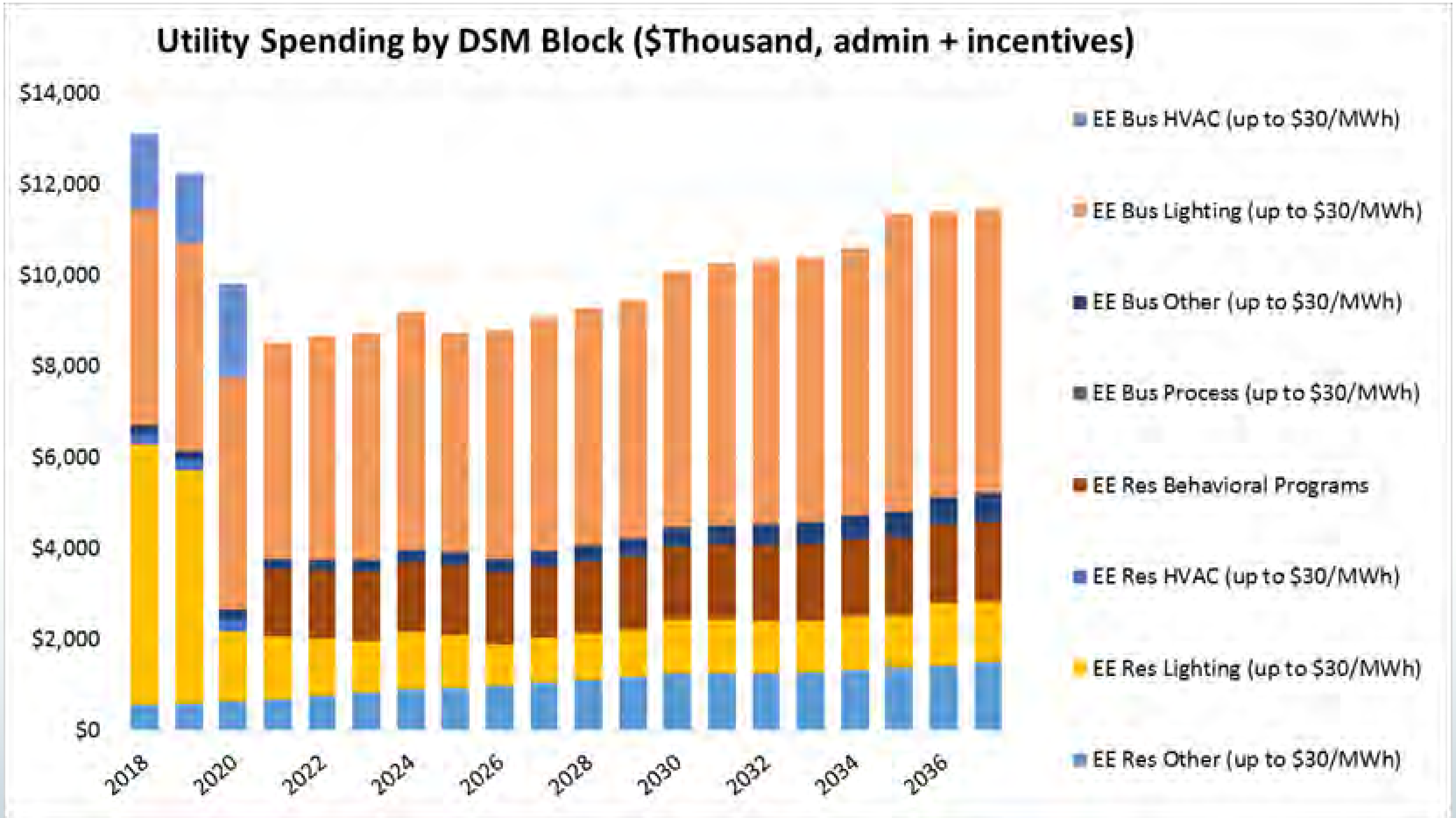
Capacity factors for Base Case Delayed CPP



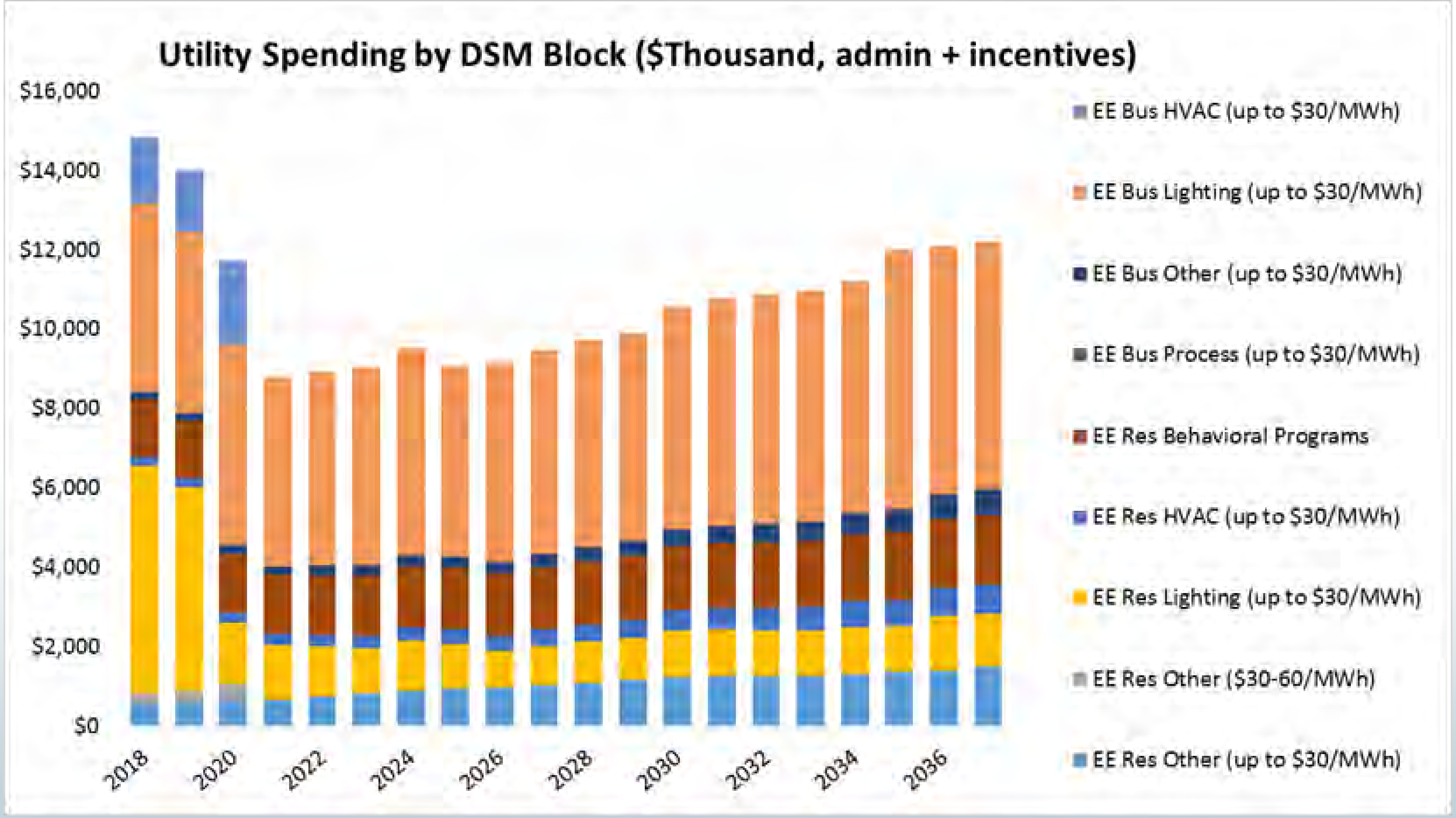
Capacity Factors for Base Case High Costs of Carbon



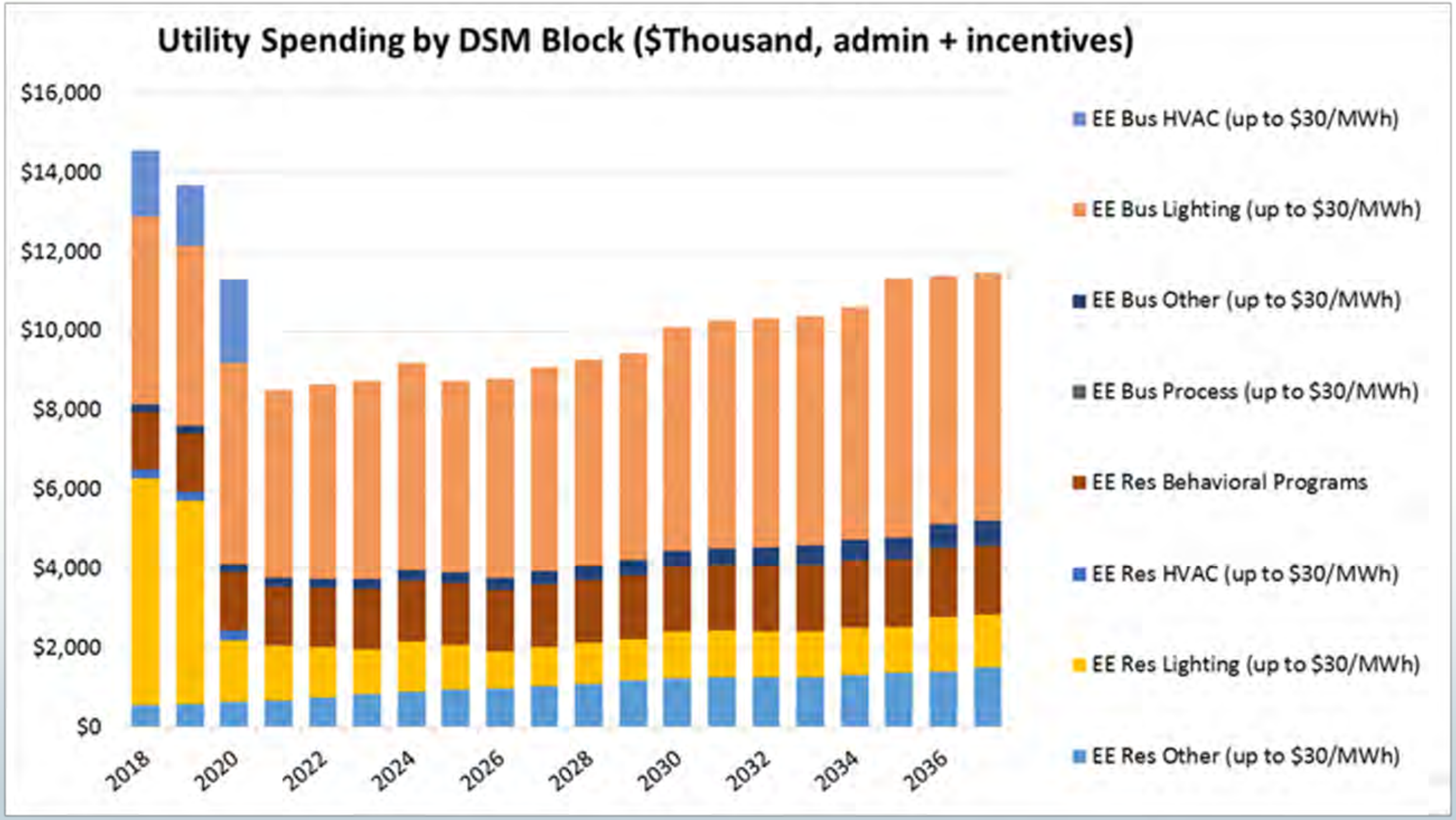
Base case


Utility Spending by DSM Block ($Thousand, admin + incentives)
$14,000
$12,000
$10,000
$8,000
$6,000
$4,000
$2,000
$0
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
EE Bus HVAC (up to $30/MWh)
EE Bus Lighting (up to $30/MWh)
EE Bus Other (up to $30/MWh)
EE Bus Process (up to $30/MWh)
EE Res Behavioral Programs
EE Res HVAC (up to $30/MWh)
EE Res Lighting (up to $30/MWh)
EE Res Other (up to $30/MWh)

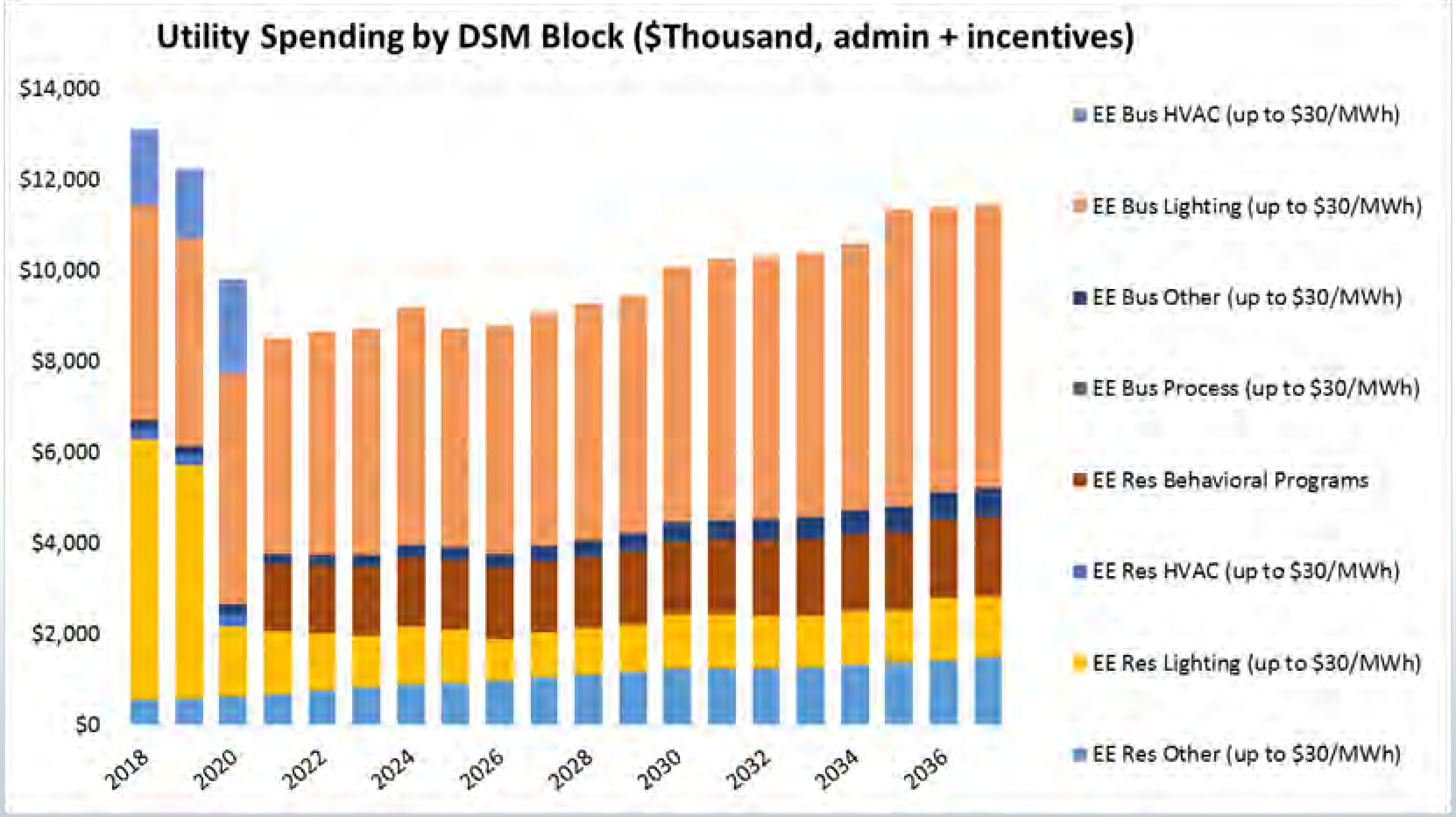
Robust economy



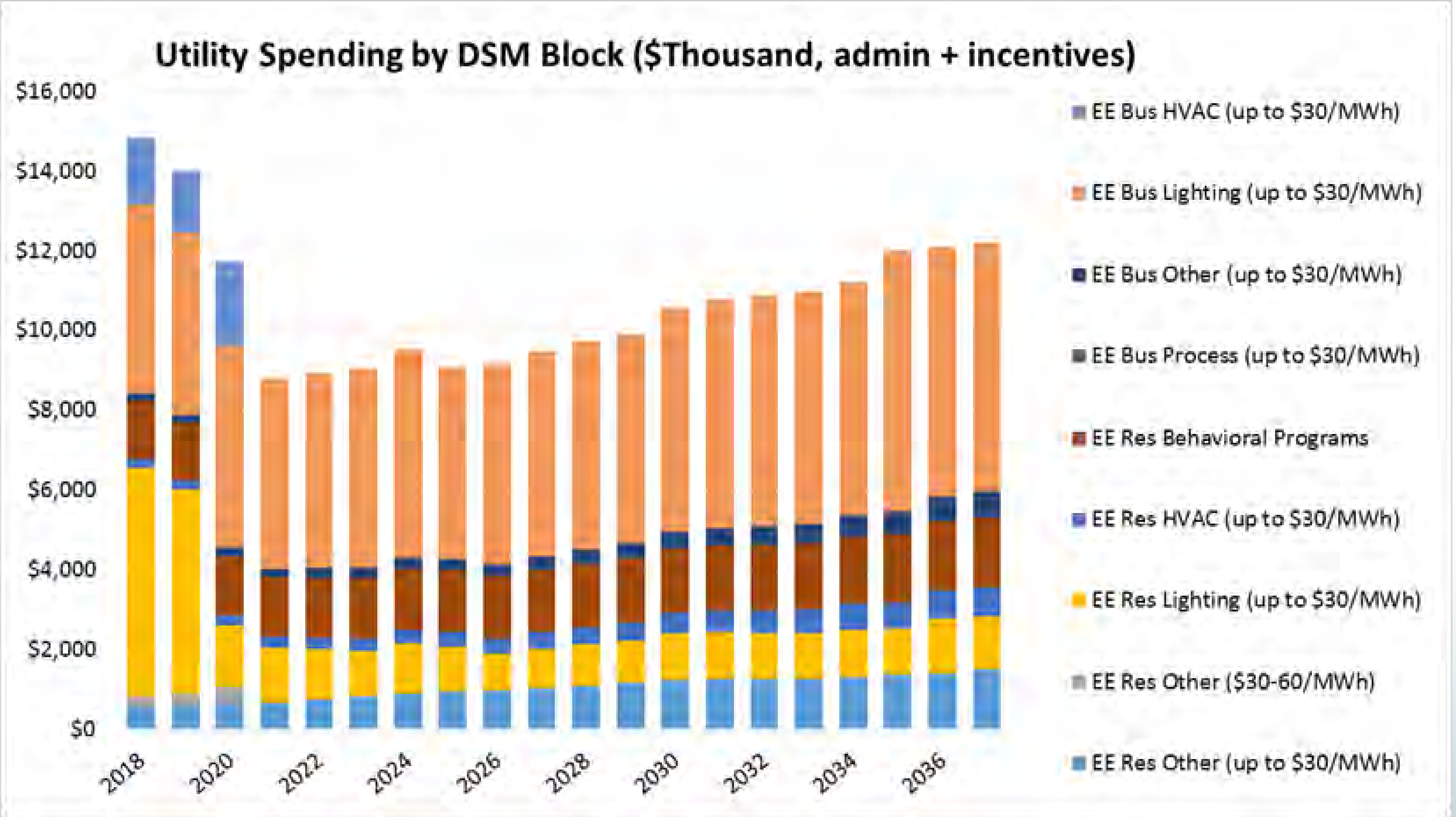
Recession economy



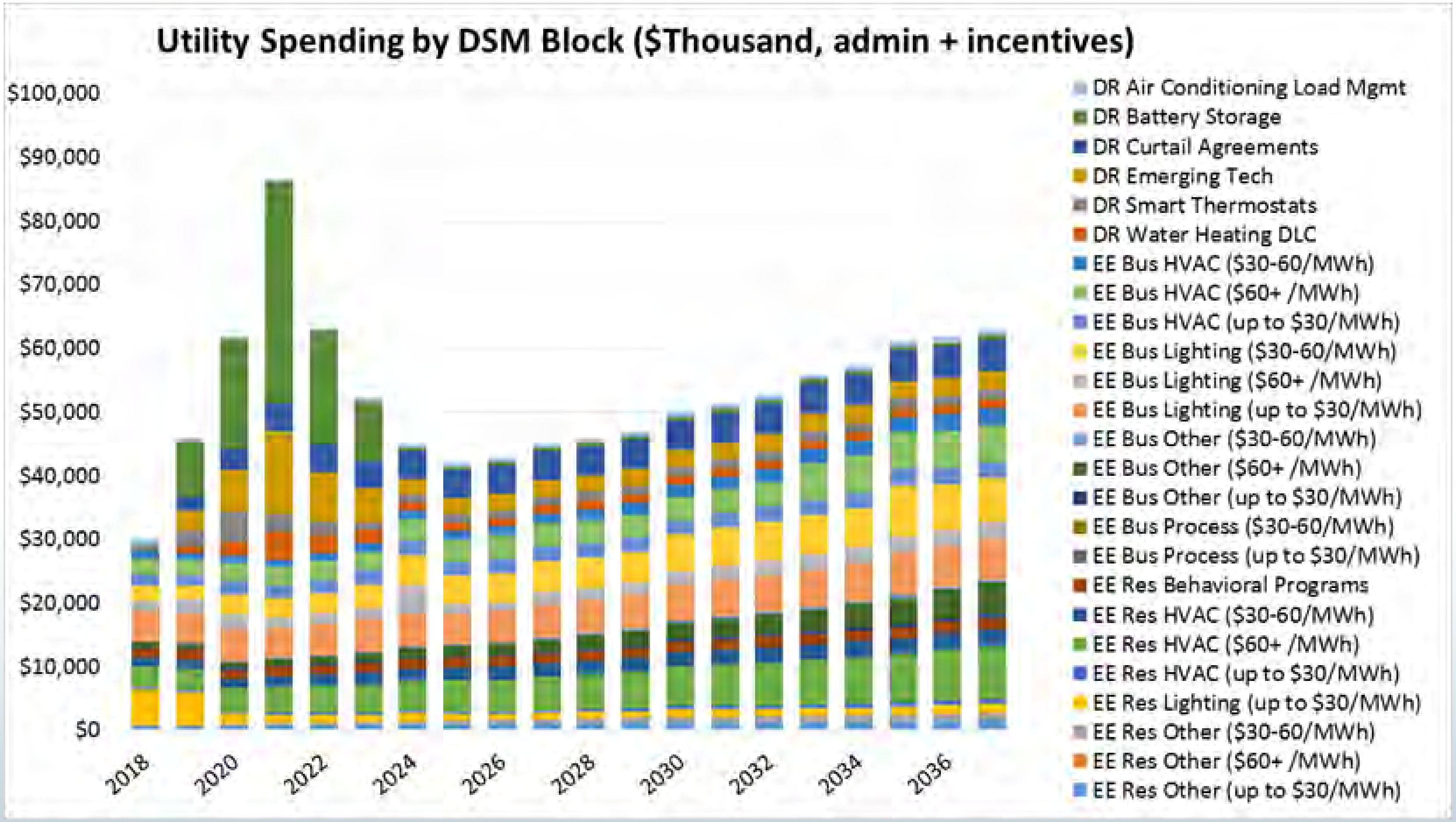
Adoption of distributed generation



Strengthened environmental



Quick transition



DSM building blocks selected

(based upon maximum achievable)

DSM Blocks Selected	Final Base Case	Robust Economy	Recession Economy	Strengthened Environmental	Distributed Generation
Res Other up to $30MWh 2018-2020	X	X	X	X	X
Res Other $30-60MWh 2018-2020		X		X	
Res Lighting up to $30MWh 2018-2020	X	X	X	X	X
Res HVAC up to $30MWh 2018-2020	X	X	X	X	X
Res Behavioral Program 2018-2020		X	X	X	
Bus Other up to $30MWh 2018-2020	X	X	X	X	X
Bus Lighting up to $30MWh 2018-2020	X	X	X	X	X
Bus HVAC up to $30MWh 2018-2020	X	X	X	X	X
Res Other up to $30MWh 2021+	X	X	X	X	X
Res Lighting up to $30MWh 2021+	X	X	X	X	X
Res HVAC up to $30MWh 2021+		X		X	
Res Behavioral Programs 2021+	X	X	X	X	X
Bus Process up to $30MWh 2021+	X	X	X	X	X
Bus Other up to $30MWh 2021+	X	X	X	X	X
Bus Lighting up to $30MWh 2021+	X	X	X	X	X

Quick Transition DSM

DSM Blocks	2018-2020	2021-2037
EE Res Other (up to $30/MWh)	X	X
EE Res Other ($60+ /MWh)	X	X
EE Res Other ($30-60/MWh)	X	X
EE Res Lighting (up to $30/MWh)	X	X
EE Res HVAC (up to $30/MWh)	X	X
EE Res HVAC ($60+ /MWh)	X	X
EE Res HVAC ($30-60/MWh)	X	X
EE Res Behavioral Programs	X	X
EE Bus Process (up to $30/MWh)	X	X
EE Bus Process ($30-60/MWh)	X	X
EE Bus Other (up to $30/MWh)	X	X
EE Bus Other ($60+ /MWh)	X	X
EE Bus Other ($30-60/MWh)	X	X
EE Bus Lighting (up to $30/MWh)	X	X
EE Bus Lighting ($60+ /MWh)	X	X
EE Bus Lighting ($30-60/MWh)	X	X
EE Bus HVAC (up to $30/MWh)	X	X
EE Bus HVAC ($60+ /MWh)	X	X
EE Bus HVAC ($30-60/MWh)	X	X
DR Water Heating DLC	X	X
DR Smart Thermostats	X	X
DR Emerging Tech	X	X
DR Curtail Agreements	X	X
DR Battery Storage	X	X
DR Air Conditioning Load Mgmt	X	X