RATE ADVISORY COMMITTEE
GENERATION PLANNING DISCUSSION

PRESENTED BY:

John Kosub
Sr. Director, Energy Portfolio Analytics

September 9, 2021

Informational Update

OBJECTIVES & TAKEAWAYS

- **EXPLAIN GENERATION PLANNING & WHERE IT FITS IN THE FINANCIAL PLANNING PROCESS**

- **REVIEW JANUARY 2021 *FLEXIBLE PATH*[SM] RESOURCE PLAN**

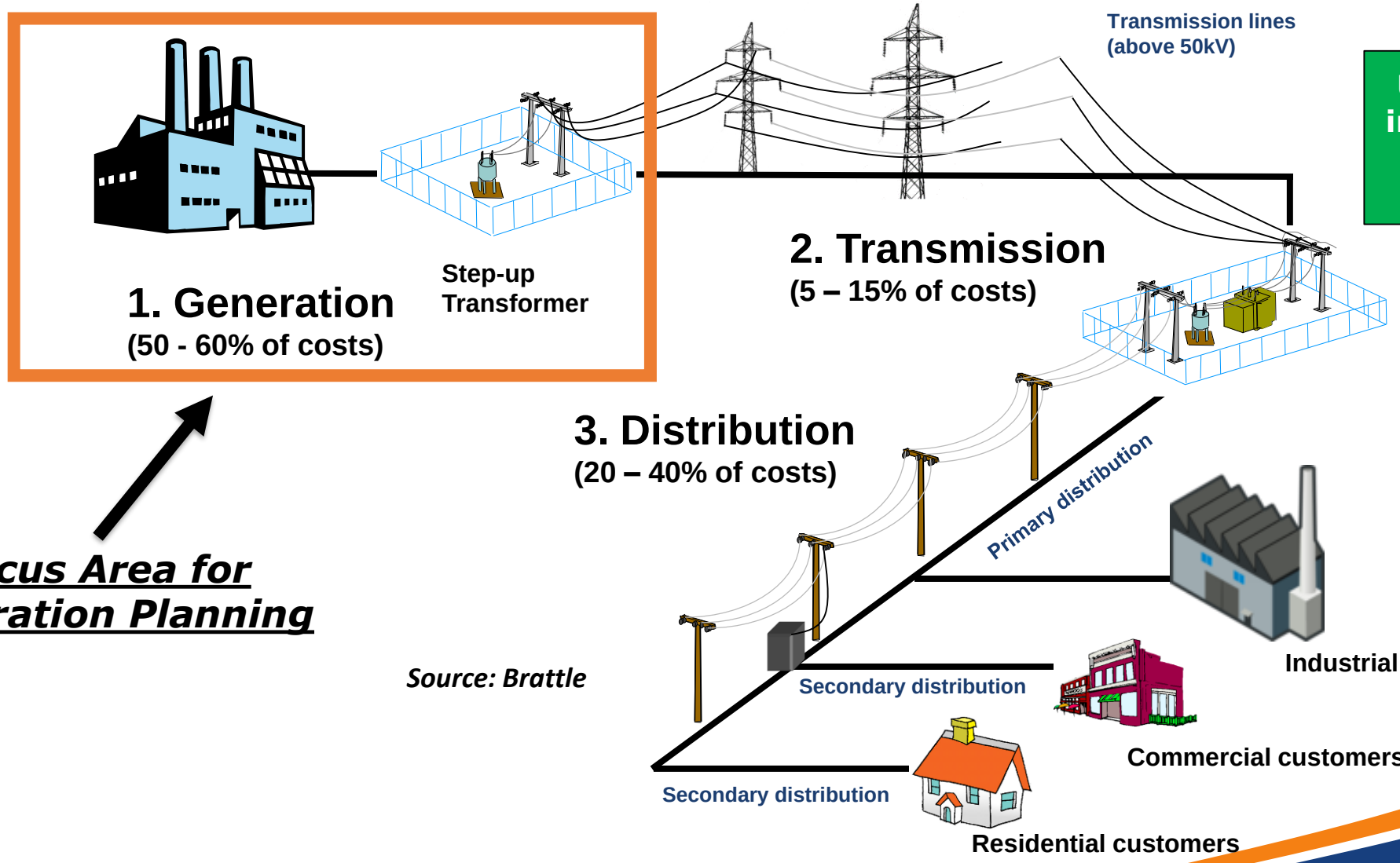
AGENDA

- **OUR *GUIDING VALUE PILLARS***
- **OUR *FLEXIBLE PATH* JOURNEY**
- **GENERATION PLANNING & RELATIONSHIP TO FINANCIAL PLANNING PROCESS**
- ***FLEXIBLE PATH* RESOURCE PLAN: FY2022 BUDGET CASE (BASELINE)**
- ***FLEXIBLE PATH* RESOURCE PLAN: FY2022 SPRUCE ALTERNATIVES**
- **KEY TAKEAWAYS**

OUR GUIDING PILLARS & FOUNDATION

All business decisions are based on our commitment to being one of the best-managed & most *Financially Responsible* utilities in the nation!

THE MAJOR PARTS OF ELECTRICITY SYSTEMS THAT GIVE RISE TO COSTS



Unless otherwise indicated, all CPSE values are for FY2017

Focus Area for Generation Planning

Source: Brattle

CAREFULLY DECARBONIZING OUR GENERATION MIX

Power Plants

Flexible Path:
Traditional + Renewables
+ Energy Storage + Smart Grid
+ Energy Efficiency




Renewables + Low/Zero Carbon Firming Capacity:

- ***Flex*POWER Bundle**SM our next step in the ***Flexible Path***

Transitioning to Innovation

Technology Drives Timing

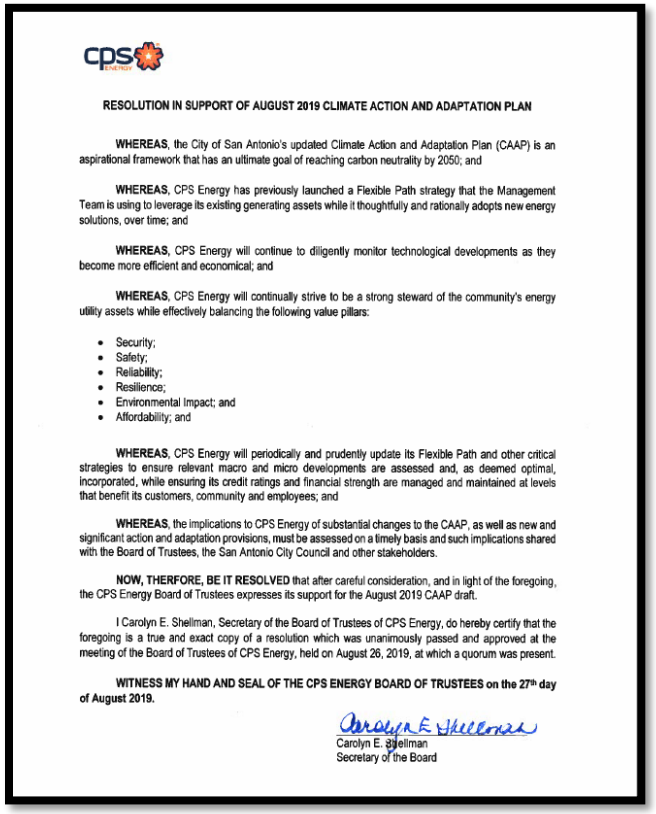
Past

Present

Future

ALIGNMENT WITH THE CAAP
CLIMATE ACTION & ADAPTATION PLAN

August 2019 Board of Trustees' Resolution of Support for Climate Action & Adaptation Plan (CAAP)



RESOLUTION IN SUPPORT OF AUGUST 2019 CLIMATE ACTION AND ADAPTATION PLAN

WHEREAS, the City of San Antonio's updated Climate Action and Adaptation Plan (CAAP) is an aspirational framework that has an ultimate goal of reaching carbon neutrality by 2050; and

WHEREAS, CPS Energy has previously launched a Flexible Path strategy that the Management Team is using to leverage its existing generating assets while it thoughtfully and rationally adopts new energy solutions, over time; and

WHEREAS, CPS Energy will continue to diligently monitor technological developments as they become more efficient and economical; and

WHEREAS, CPS Energy will continually strive to be a strong steward of the community's energy utility assets while effectively balancing the following value pillars:

- Security;
- Safety;
- Reliability;
- Resilience;
- Environmental Impact; and
- Affordability; and

WHEREAS, CPS Energy will periodically and prudently update its Flexible Path and other critical strategies to ensure relevant macro and micro developments are assessed and, as deemed optimal, incorporated, while ensuring its credit ratings and financial strength are managed and maintained at levels that benefit its customers, community and employees; and

WHEREAS, the implications to CPS Energy of substantial changes to the CAAP, as well as new and significant action and adaptation provisions, must be assessed on a timely basis and such implications shared with the Board of Trustees, the San Antonio City Council and other stakeholders.

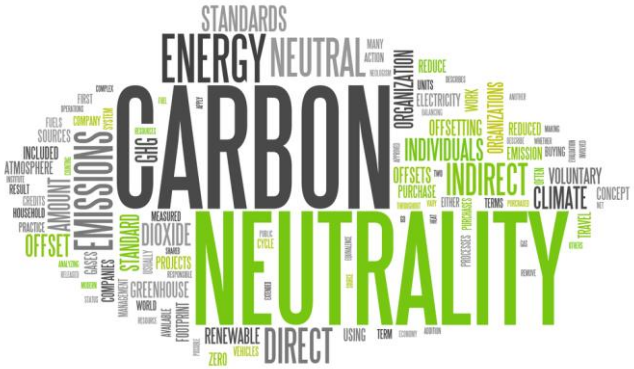
NOW, THERFORE, BE IT RESOLVED that after careful consideration, and in light of the foregoing, the CPS Energy Board of Trustees expresses its support for the August 2019 CAAP draft.

I Carolyn E. Shellman, Secretary of the Board of Trustees of CPS Energy, do hereby certify that the foregoing is a true and exact copy of a resolution which was unanimously passed and approved at the meeting of the Board of Trustees of CPS Energy, held on August 26, 2019, at which a quorum was present.

WITNESS MY HAND AND SEAL OF THE CPS ENERGY BOARD OF TRUSTEES on the 27th day of August 2019.

Carolyn E. Shellman
Secretary of the Board

Our *Flexible Path* charts a journey to reduce emissions & ultimately reach carbon neutrality by 2050.



FLEXIBLE PATH
RECENT TIMELINE / JOURNEY

We have carefully managed our strategic path forward:

2017

FLEXIBLE PATH℠

2018

Deely 1 & 2 Closed

2019

Board of Trustees (BoT) Endorses S.A.'s CAAP

2020

COVID-19

FLEXPOWER BUNDLE℠

2021

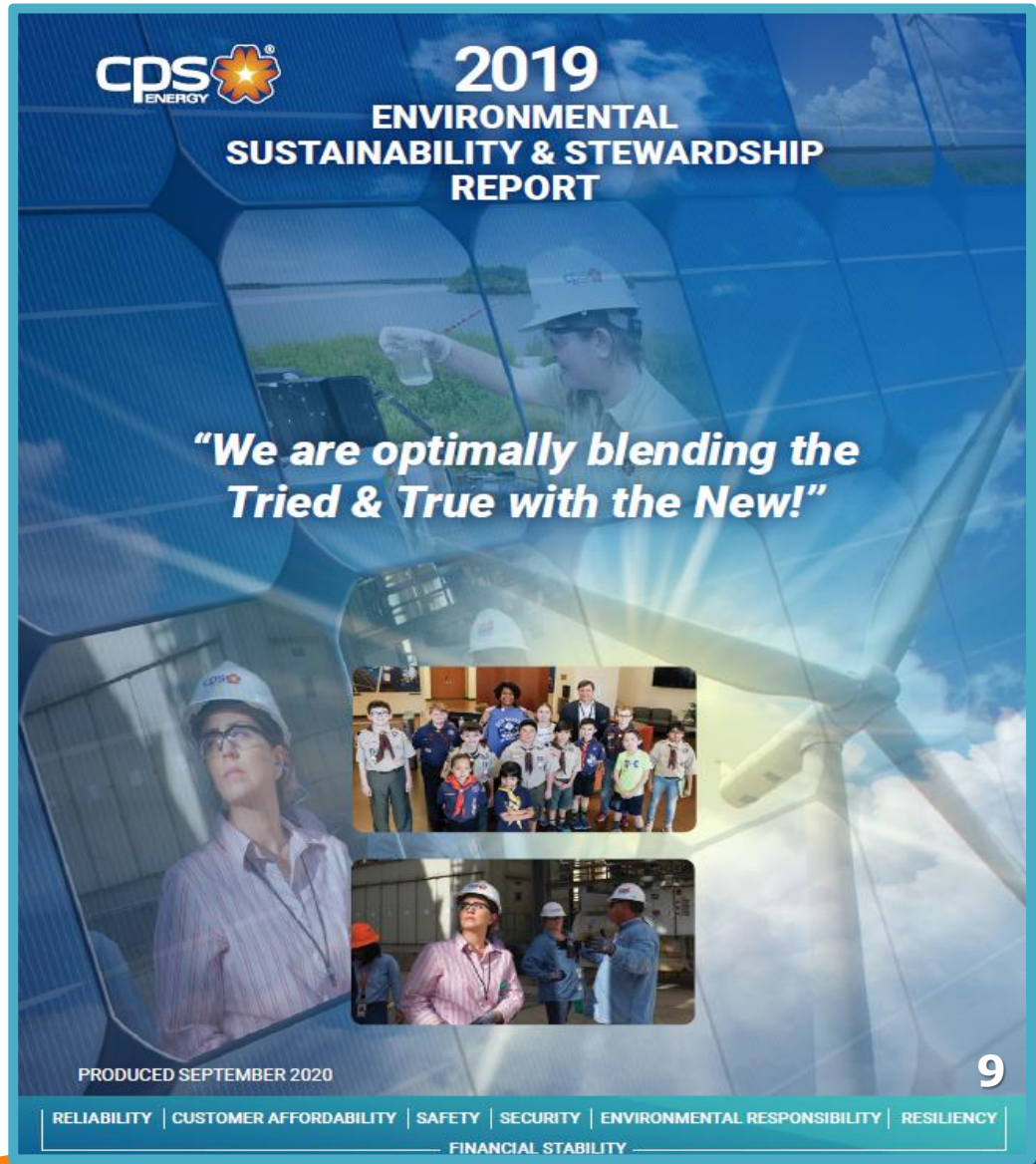
FLEXIBLE PATH℠ Resource Plan

FLEXSTEP℠

ENVIRONMENTAL RESPONSIBILITY
OUR SOLID PROGRESS TO DATE – 1 OF 2

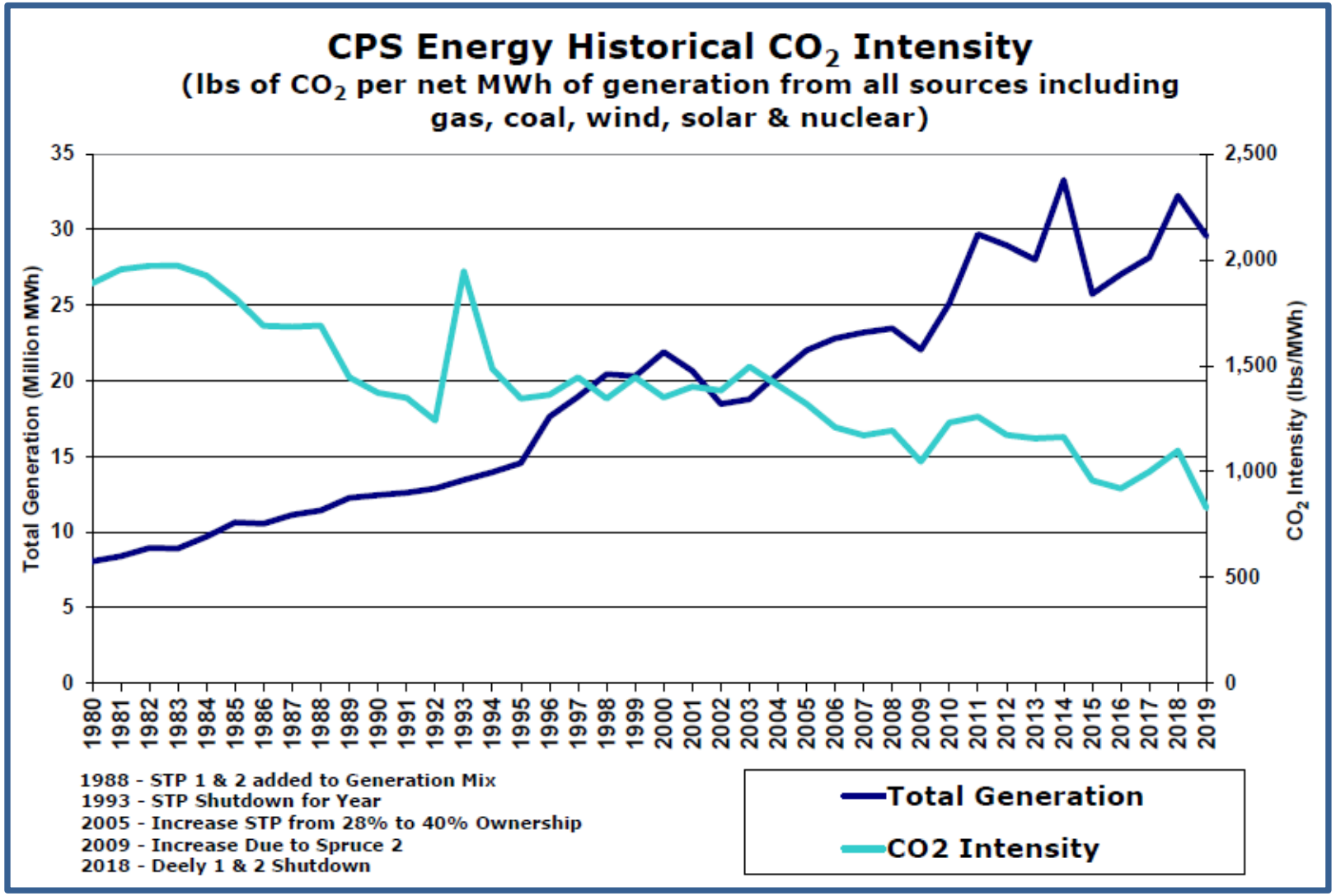
KEY SUCCESSFUL ENVIRONMENTAL COMMITMENTS TO DATE!

- **2000 → We started investing in wind.**
- **2012 → We started investing in solar.**
- **2017 → CEO created the *Flexible Path*.**
- **2018 → We closed OLDER Coal units.**
- **2019 → Via our *Flexible Path*, we are focused on 80% reductions in carbon emissions by 2040.**
- **2019 → The Board of Trustees endorsed the Climate Action & Adaptation Plan (CAAP) & we are now working towards full carbon neutrality by 2050.**
- **2019 → STEP successfully completed.**



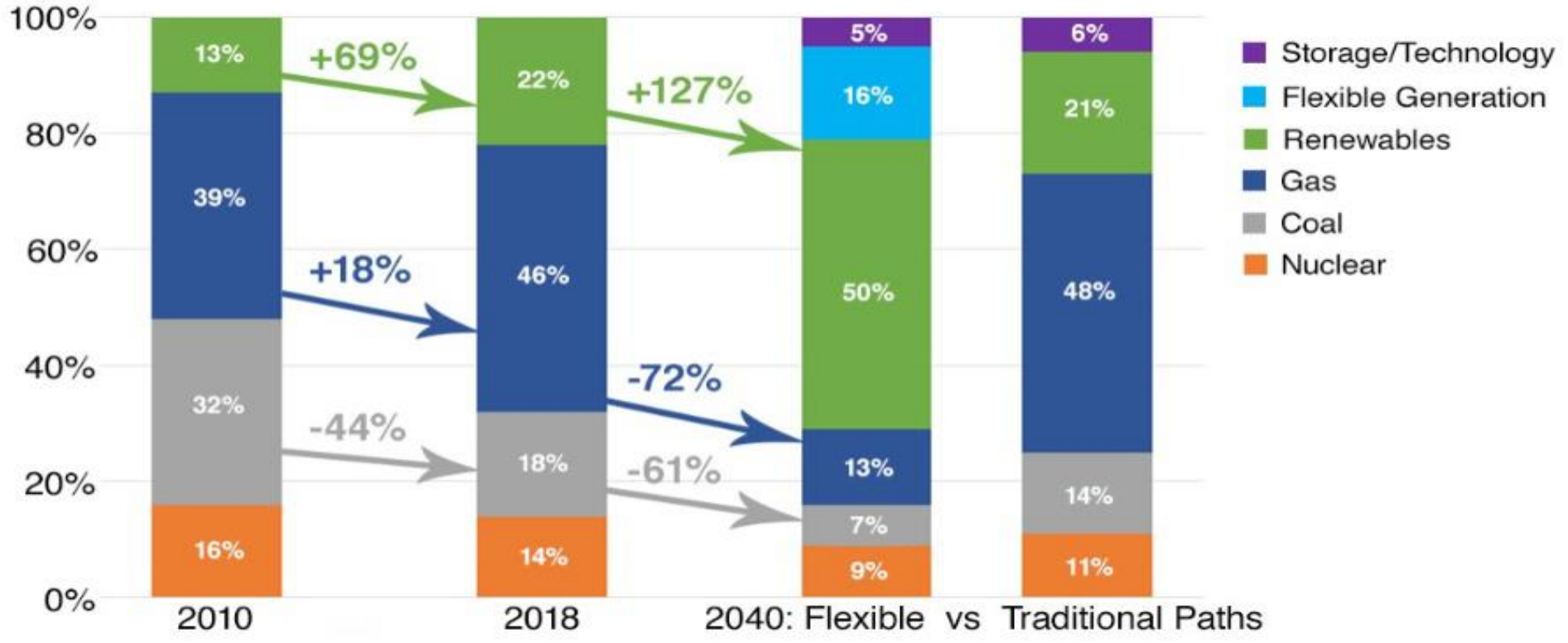
ENVIRONMENTAL RESPONSIBILITY

OUR SOLID PROGRESS TO DATE – 2 OF 2



Our carbon intensity has been on a beneficial downward trend since 1980, even though S.A.'s energy needs have increased.

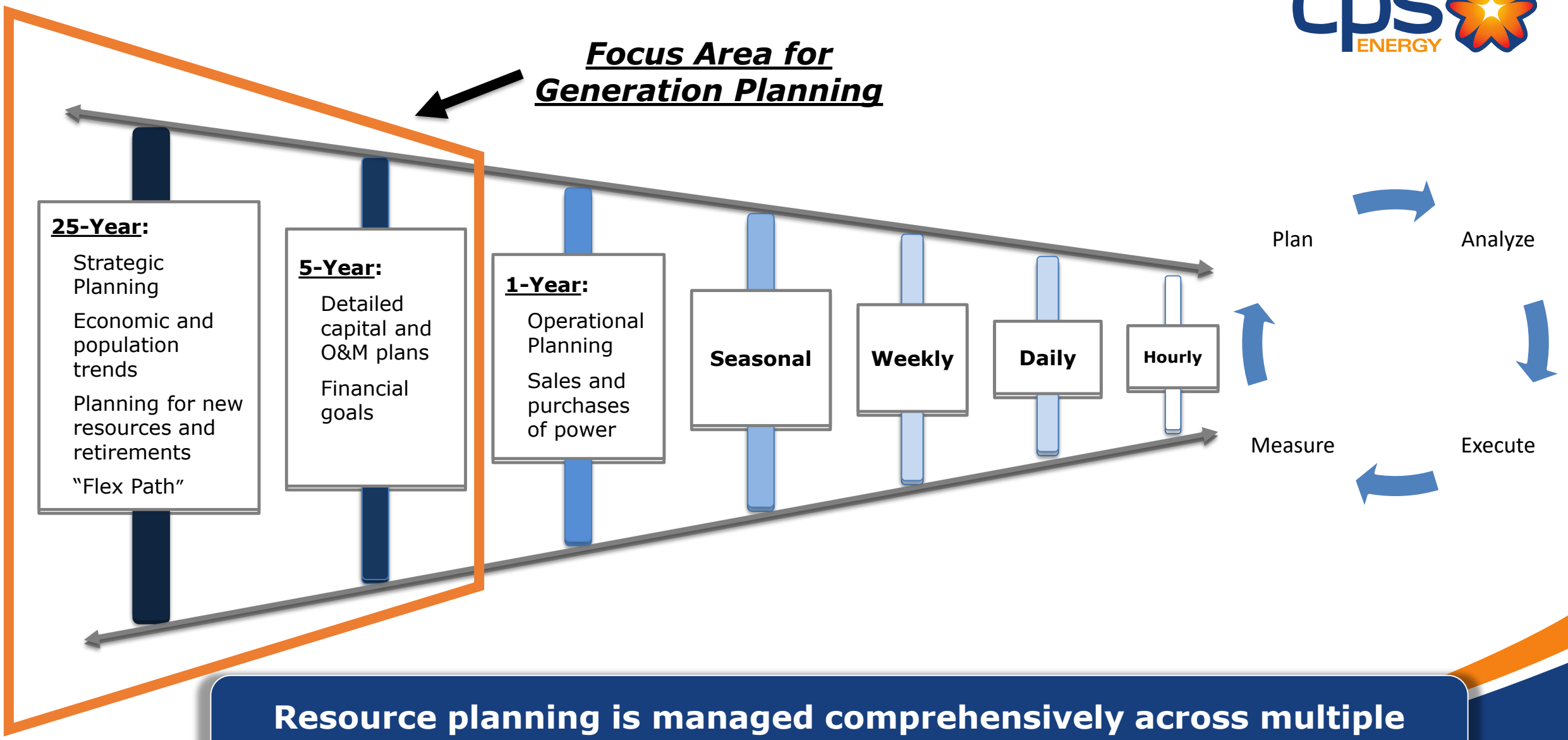
FLEXIBLE PATH
ITS BALANCED DESIGN DRIVES REAL PROGRESS



INCREASES IN RENEWABLE GENERATION AND DECREASES IN COAL AND GAS

Our generation mix has changed considerably since 2010. The positive trends will accelerate with our ***Flexible Path*** into 2040.

RESOURCE PLANNING HORIZONS



Resource planning is managed comprehensively across multiple time horizons, and with many iterations throughout the year.

PLANNING TERMINOLOGY

Demand

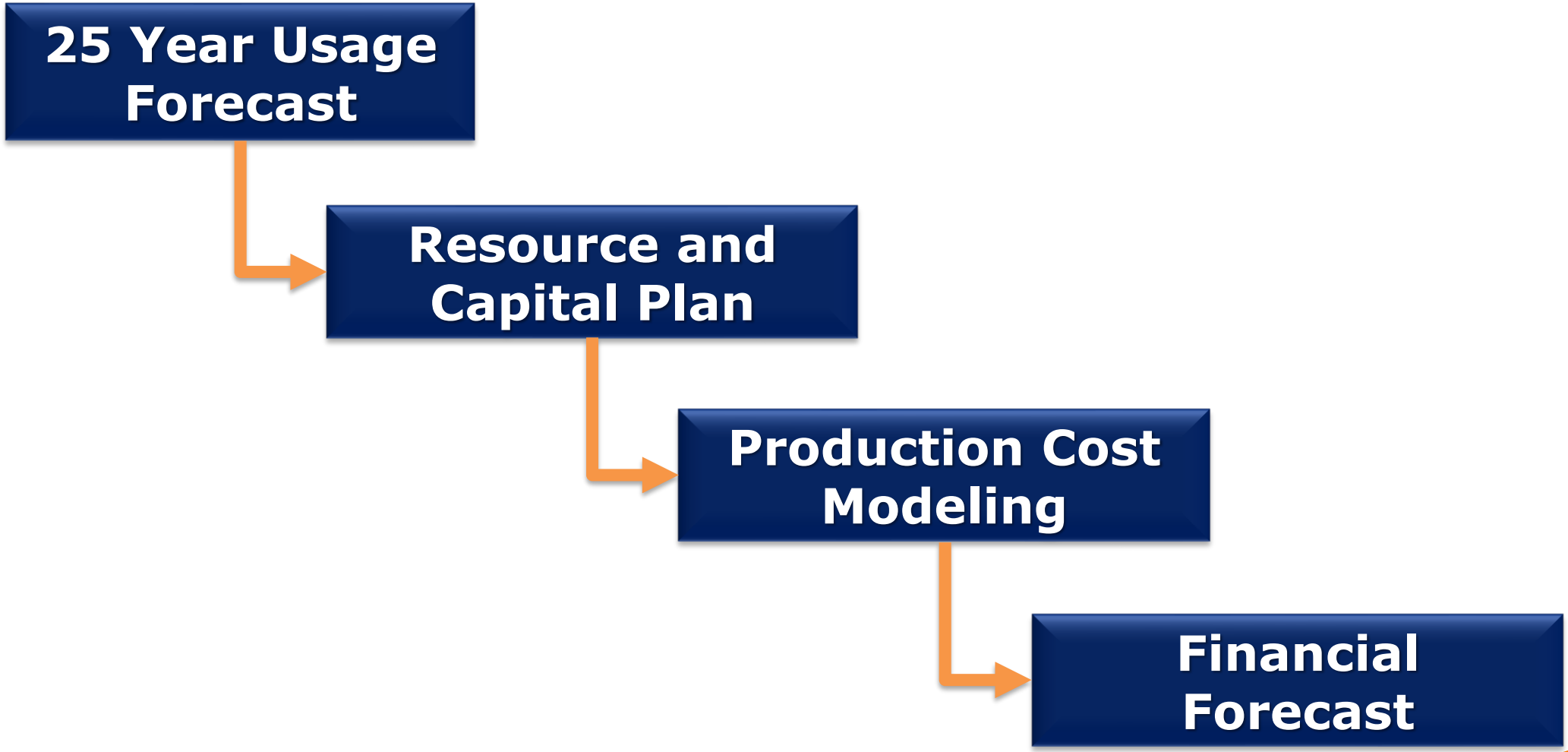
"Usage"
"Load"

Supply

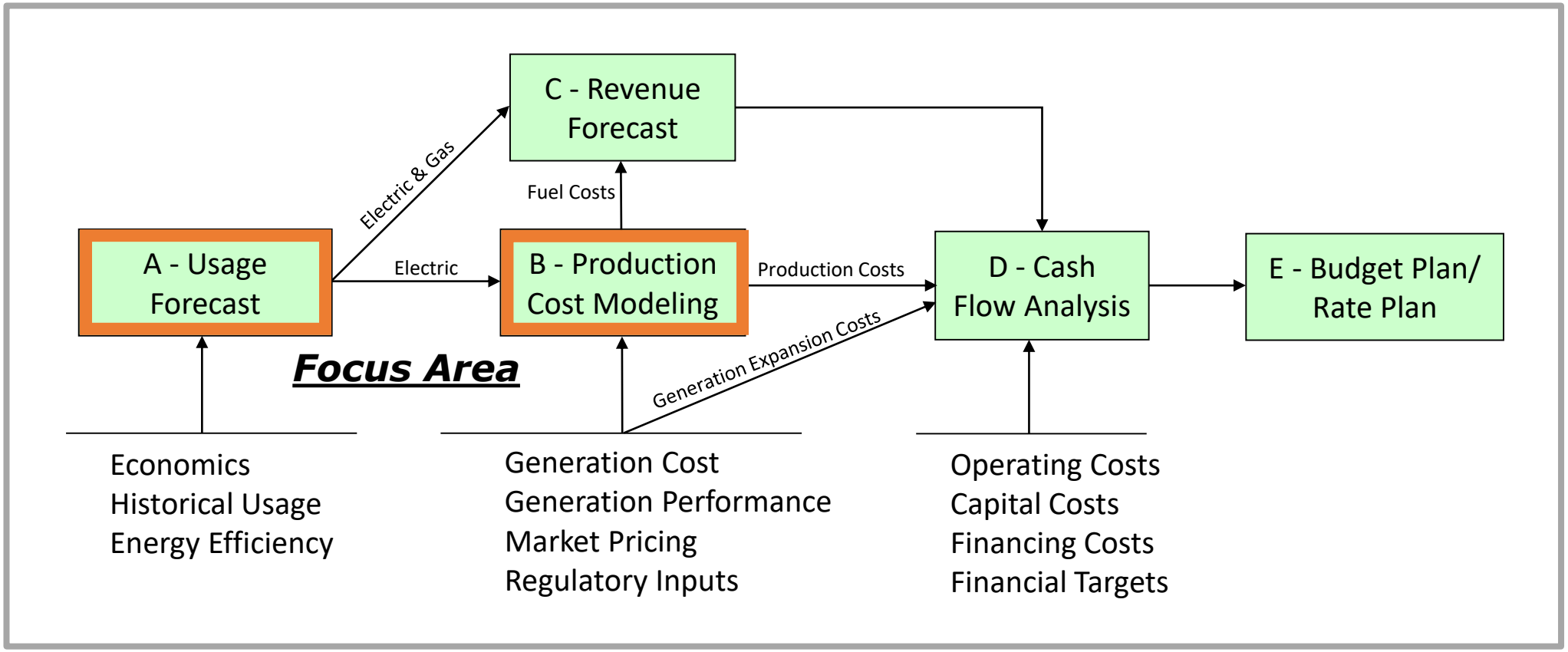
"Resources"
"Capacity"

The goal of our planning process is to ensure adequate supply is available to meet the needs of our customers.

OVERVIEW OF THE LONG-TERM PLANNING PROCESS



FINANCIAL PLANNING INPUTS



Detailed, industry-standard computer models are used for Usage and Production Cost Modeling forecasts.

FORECASTING OVERVIEW

Generation Resource = Load (Demand) + Reserve Margin

FORECAST INPUTS

- Customer Growth (Electric & Gas Sales)
- Regulatory Costs (TCOS, ERCOT)
- Fuel Cost (gas, coal, nuclear, renewables)
- Generation Resource Assumptions
- Market Power Prices
- Wholesale price, revenue & margin
- Interest Rates

WE DEPLOY AN ANNUAL UPDATE PROCESS

5-year detailed planning by business unit

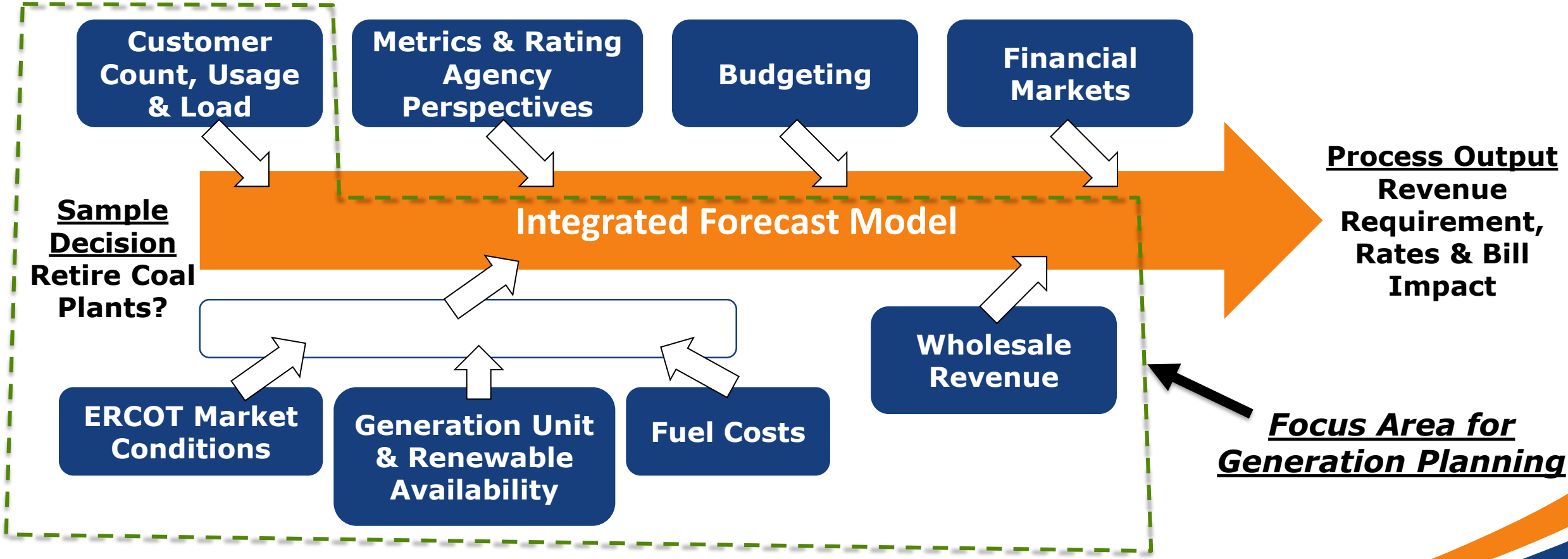
Historical & current year performance	25-Year Long Range Plan		
	1	2 – 5	6 – 25

Year 1 will be presented to Board for approval (outer years are refreshed in subsequent planning cycles, so they are considered preliminary & subject to change)

A robust long range planning process is essential for long-term resource planning & yields budget targets, financial metric performance, & revenue support requirements.

IMPACT OF STRATEGIC DECISIONS

OUR RATE MODELING PROCESS IS ALSO USED TO EVALUATE ALTERNATIVE STRATEGIES



Strategic decisions are viewed through the bill impact lens.

JANUARY 2021

FLEXIBLE PATH RESOURCE PLAN

BUDGET CASE (BASELINE)

VINTAGE: FY2022 BUDGET

DISCLAIMER

We continue to work through the unprecedented global, national, state, and local implications of COVID-19. Additionally, energy generation technologies and electric market policies continue to evolve, and the economic implications of these changes remain uncertain. Our current projections were prepared in-light of these factors for preliminary informational discussion purposes only. Due to the changing COVID-19 pandemic, technology, and policy environments, these projections are preliminary and subject to change at any time in the future. Please be assured that we worked hard to thoughtfully think through our analyses. This said, since there is tremendous uncertainty across the current economic, financial, regulatory, and legislative landscapes, the actual results over the long term could vary significantly from what we are projecting at this time.

We will continue to perform economic analyses of various generation portfolio compositions. These current analyses are preliminary and based on internal, as well as external data, and will continue to evolve as more information becomes available.

Please also note that much of the data is subject to change, thereby impacting projected outcomes. This document has therefore been prepared for informational discussion purposes only and data presented is as of the date of this document. The CPS Energy management team looks forward to community conversations that will focus on this information. CPS Energy's contributions to those discussions will l be constructive, respectful, open, and helpful.

BUDGET CASE (BASELINE)

- Budget Case (Baseline):
  - Assumptions for the 25-year budget
  - Updated at least once per year
  - Alternatives are assessed by comparing to the Budget Case (Baseline)
  - FY2022 Budget Case is the assumption set for the *January 2021* ***Flexible Path*** Resource Plan

FLEXIBLE PATH RESOURCE PLAN

PUBLIC RELEASE OF INFORMATION

Focus Area for Generation Planning

CEO LETTER TO SAN ANTONIO
High-Level Context

PART 1 OF 2 – TECHNICAL VIEW:

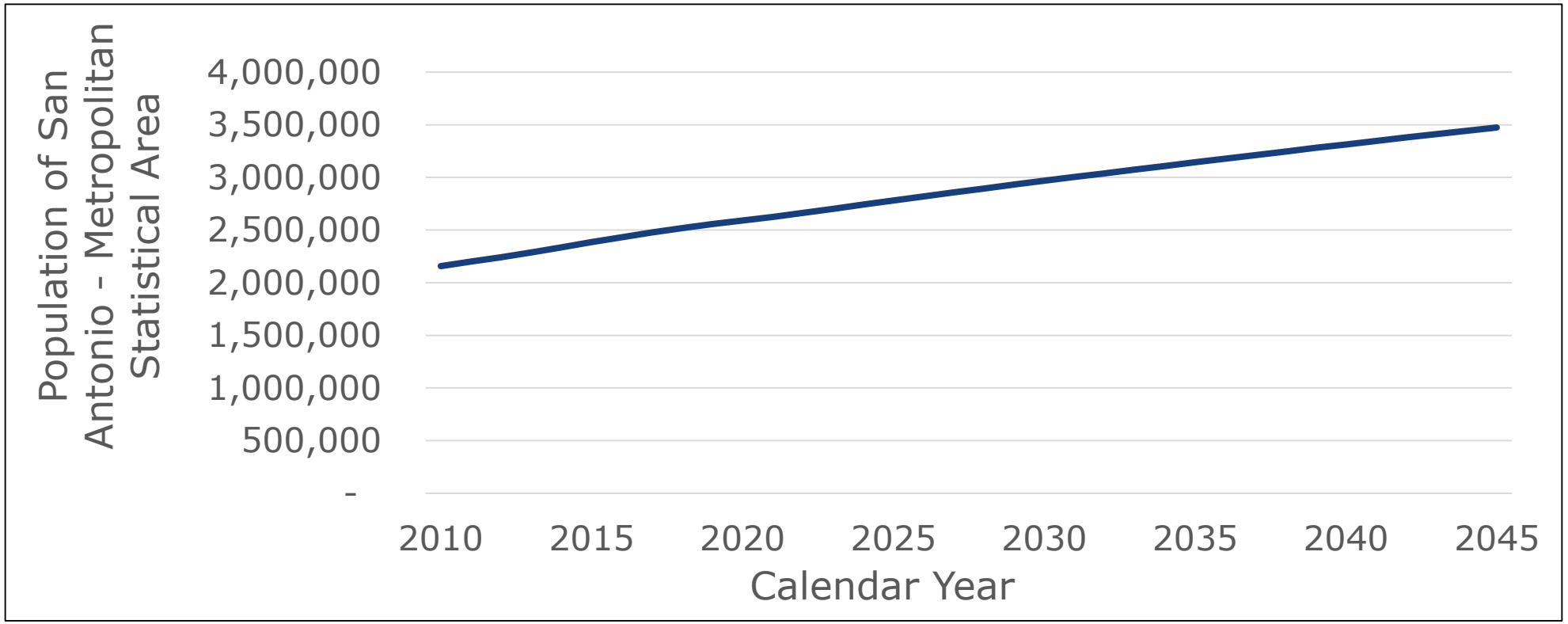
- Customer Demand Forecast
- Energy Efficiency & Conservation Contributions
- Generation Planning Assumptions

PART 2 OF 2 – FINANCIAL & OTHER KEY INFORMATION:

- Bill Impact Estimates
- Metrics
- Financial Assumptions
- Workforce Transitions
- Risk Overview

Our team is looking forward to conversations about all of this information.

PROJECTED POPULATION GROWTH



Notes: Data source is IHS Markit. San Antonio Metropolitan Statistical Area is made up of 8 counties: Atascosa, Bandera, Bexar, Comal, Guadalupe, Kendall, Medina, & Wilson

In spite of the pandemic, projections have the area gaining approximately 1 million residents over the next 20 to 30 years.

PROJECTED CUSTOMER GROWTH
KEY DRIVERS – FY2022 BUDGET

Customer usage growth:

- Driven by population growth
- Offset by energy efficiency & conservation (***FlexSTEP***^{SM})
- Results in annual growth projection of approximately 1.5% in peak usage needs over the next 5 years

ENERGY EFFICIENCY & CONSERVATION

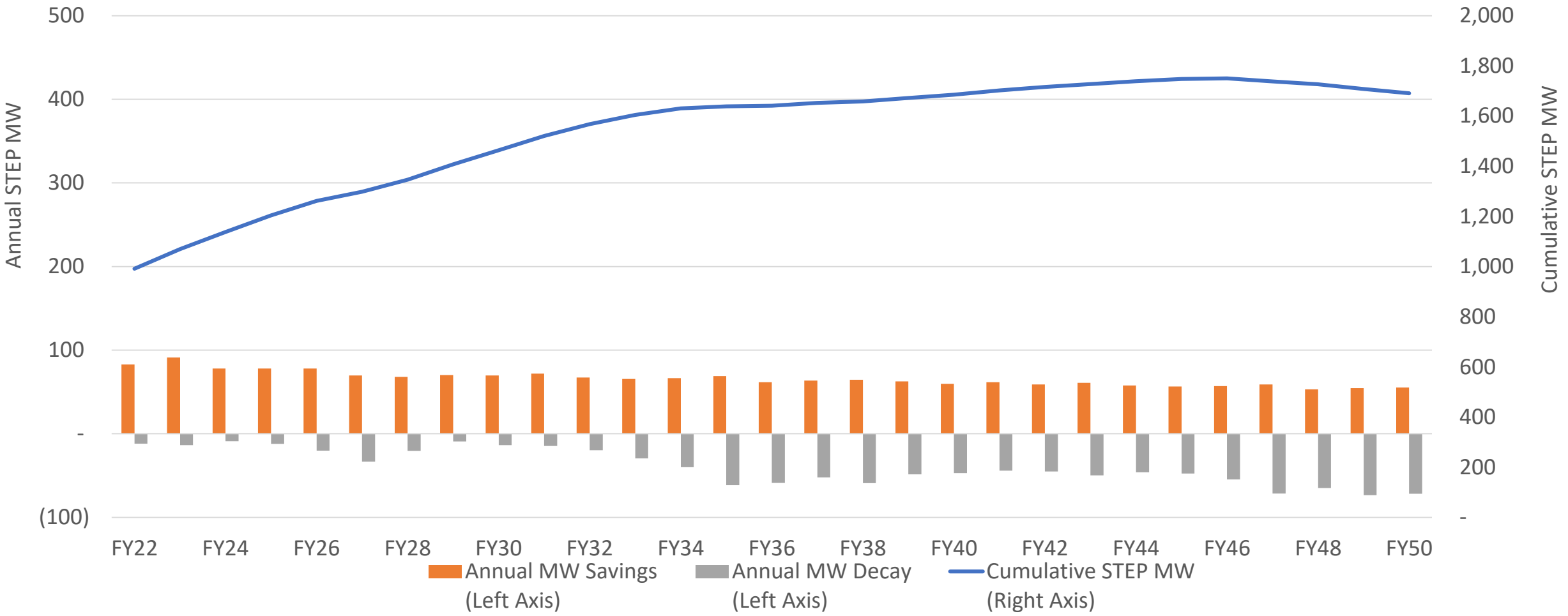
- ***Flex*STEP**SM
  - Placeholder Assumption similar to current STEP Bridge levels
  - Placeholder Usage reductions included in usage forecast

- Customer solar adoption is projected to continue

- Energy Information Administration (EIA) information
  - Captures projected household lighting and appliance energy levels

Customer usage growth offset by energy efficiency & conservation (*Flex*STEP^{SM}).

STEP/*FLEX*STEP FORECAST
FY2022 BUDGET



Forecast assumes STEP expenditures of $70M per year over the forecast horizon.
Decay represents MWs discounted due to previously adopted savings measures reaching the end of their useful life.

OUR FLEET TODAY

DELIVERING OPERATIONAL EXCELLENCE

We have diverse generation resources to serve our customers.

South Texas Project
1,029 MW
Nuclear

Wind Farms
1,049 MW
Wind

Solar Plants
552 MW
Solar

Braunig Plants
859 MW
Gas

Commerce Battery Energy Storage System
10 MW / 10 MWH
Storage

Milton B Lee Plants
375 MW
Gas

Spruce Plants
1,345 MW
Coal

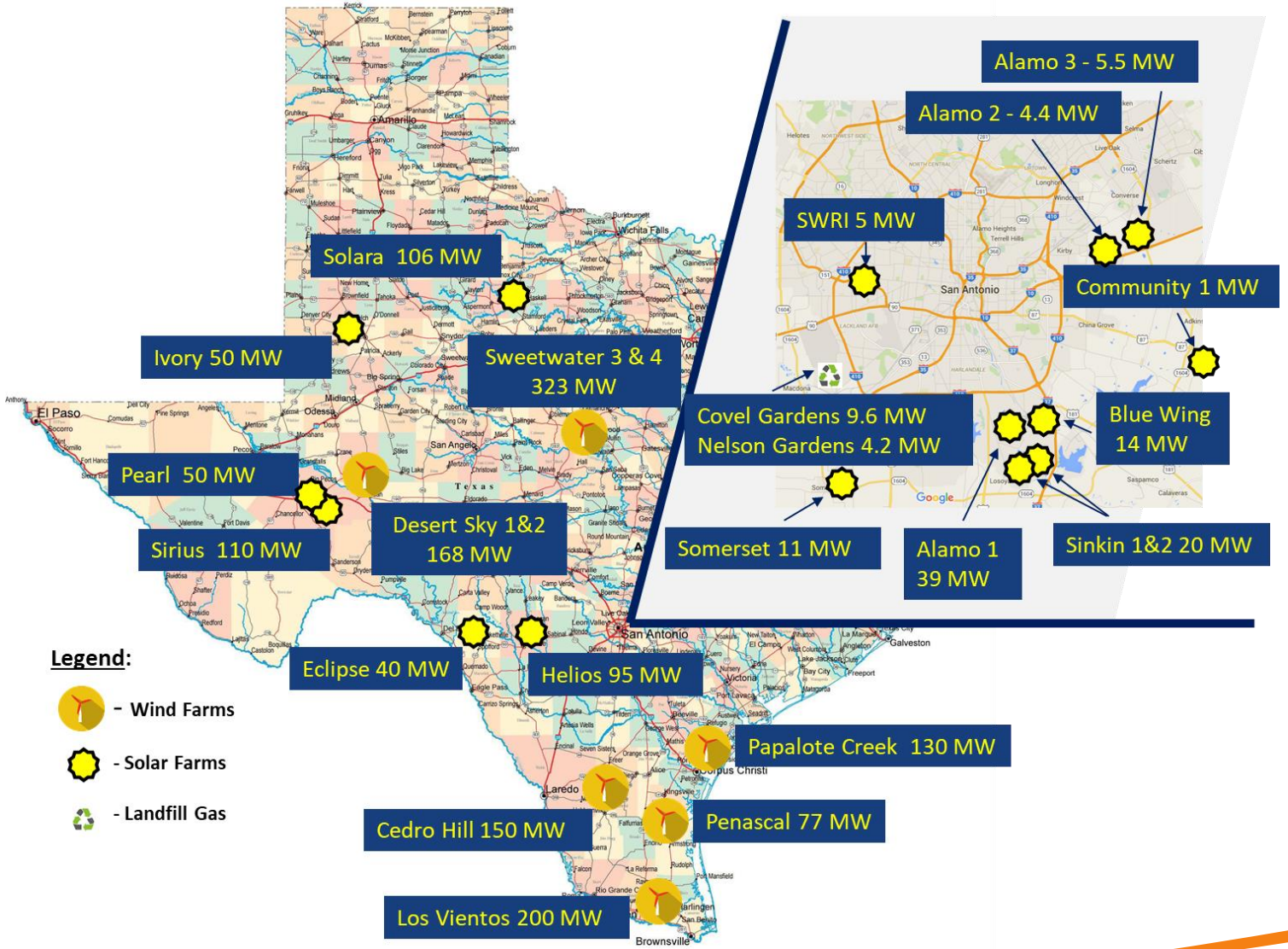
Rio Nogales Plant
777 MW
Gas

AvR Plant
518 MW
Gas

Sommers Plants
830 MW
Gas

OUR RENEWABLE PORTFOLIO

Over 20% of our capacity is from renewable resources



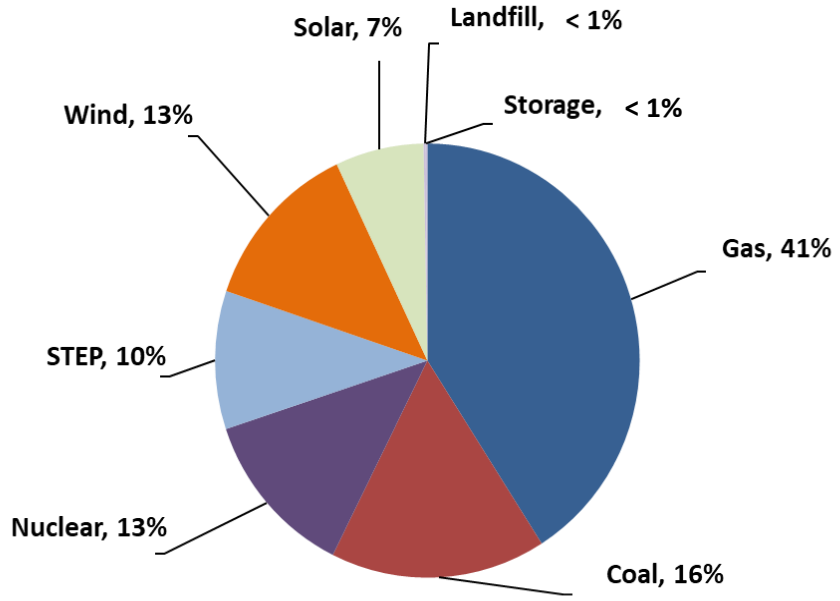
Diversifying with renewables is beneficial, but comes with the challenges of:

- ***Intermittency***
- ***Congestion***
- ***Forecasting***

FLEXIBLE PATH RESOURCE PLAN

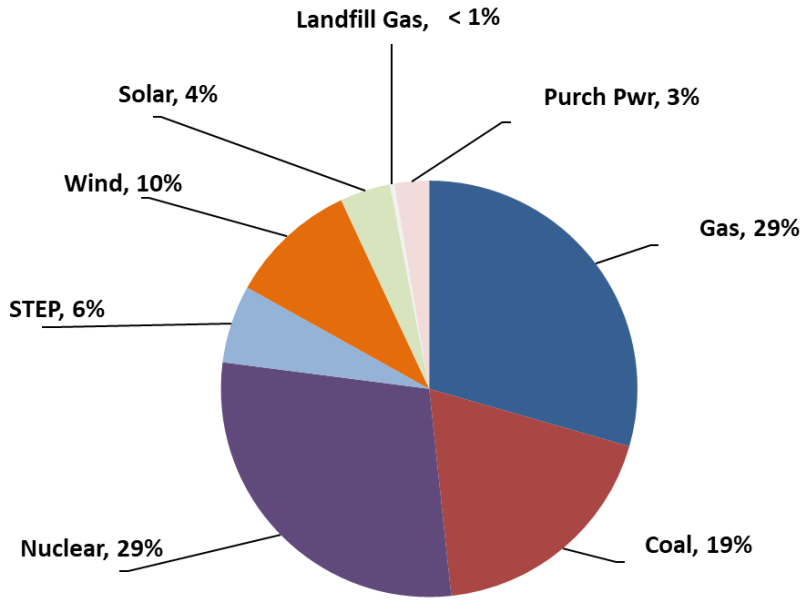
STRONG DIVERSIFICATION

MAXIMUM CAPACITY (MW) AS OF 1/31/2021



Total Capacity 8,202 MW

FY2021 Generation (MWh)



Total Generation 30,638,907 MWh

S.A. is well-served by a wide variety of owned assets, Purchased Power Agreements (PPAs), and energy efficiency & conservation solutions[1].

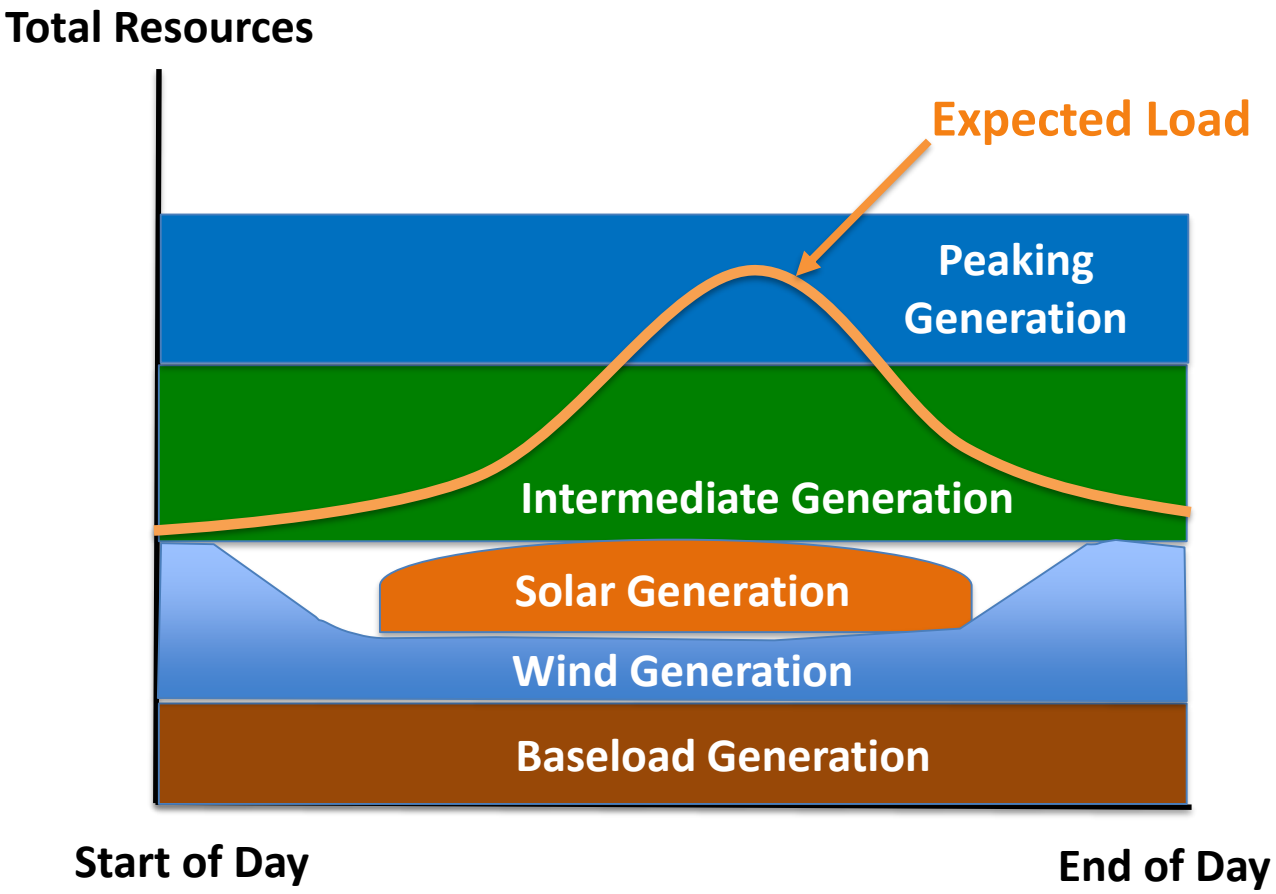
[1] Save for Tomorrow Energy Plan (STEP)

Note: Values in charts do not add to 100% due to rounding.

GENERATION RESOURCES

In general, four different types of resources are utilized:

- **Peaking Generation**: To minimize capacity shortages and costs over short periods of time
- **Intermediate Generation**: To balance the resource needs of the system between peak and baseload on a daily basis.
- **Renewable Generation**: To minimize emissions & energy costs over long periods of time
- **Baseload Generation**: To minimize fuel & energy costs over long periods of time



RESERVE MARGIN – BACKGROUND

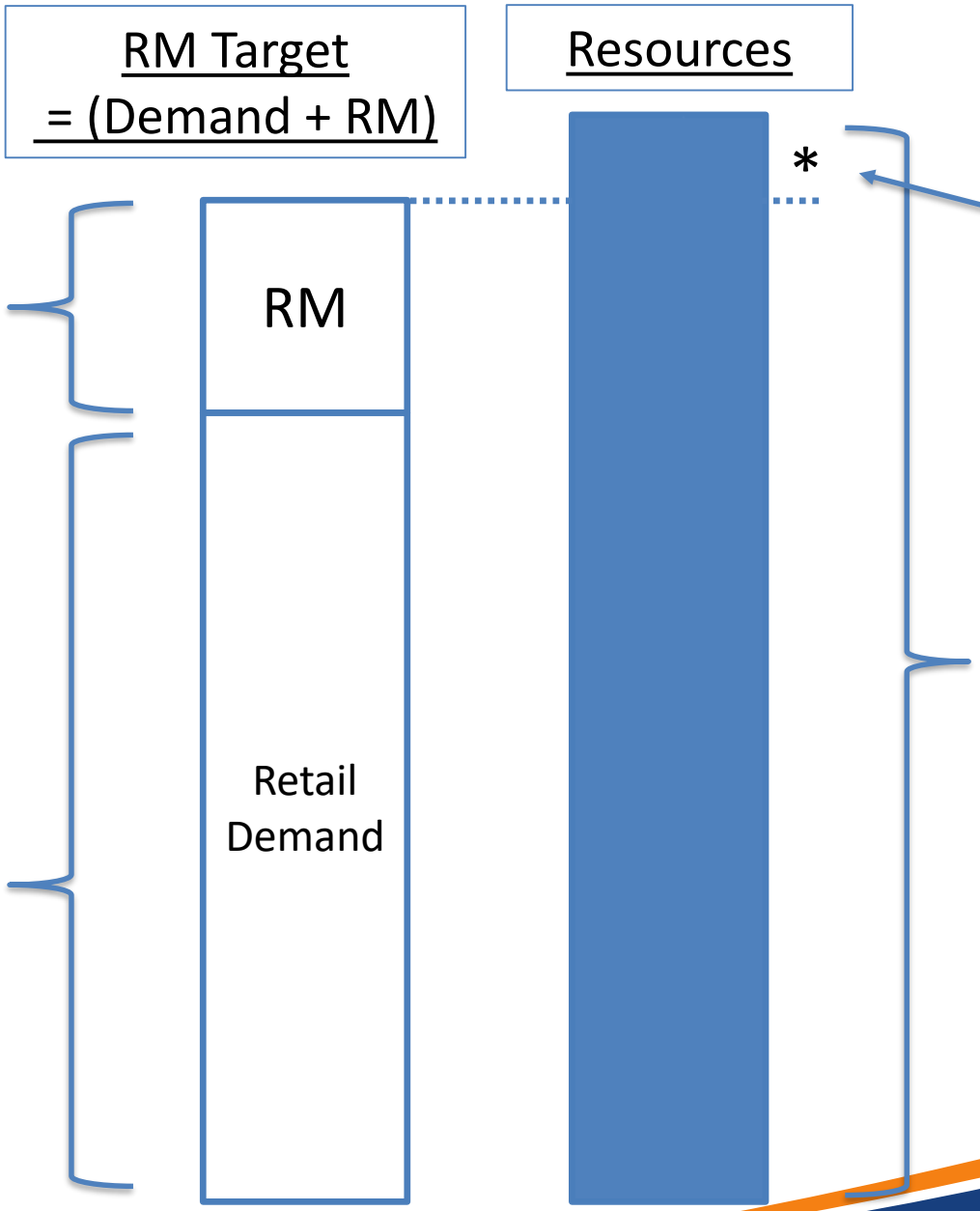
- ***Reserve margin*** is the extra capacity needed to meet customer demand if power plants generate less than expected, or customer demand increases more than expected
- Reserve margin is a metric used in long-range planning to quantify a reliable system
- Reserve margin methodology is being reviewed due to:
  - Loss of conventional coal & gas resources
  - Substantial renewable additions (i.e. output is not "controllable")
  - Potential for failures, such as a system-wide lack of natural gas
  - Extreme weather risk
- As a member of an industry coalition, we will study & implement capacity planning improvements to make electric service more ***resilient***

Maintaining *Resiliency, Reliability,* & *Customer Affordability* is essential as we update our peak planning process.

RESERVE MARGIN – FY2022 BUDGET

Reserve Margin (RM):
- Minimum 13.75% adder to retail demand
- 13.75% is same as ERCOT target
- RM risk factors: Forced outages, weather, and wind generation

Retail Demand:
- Retail demand is "after demand response"
- +5.5% Retail T&D losses
- Summer Avg. Peak
- Temperature is ~102 deg. F

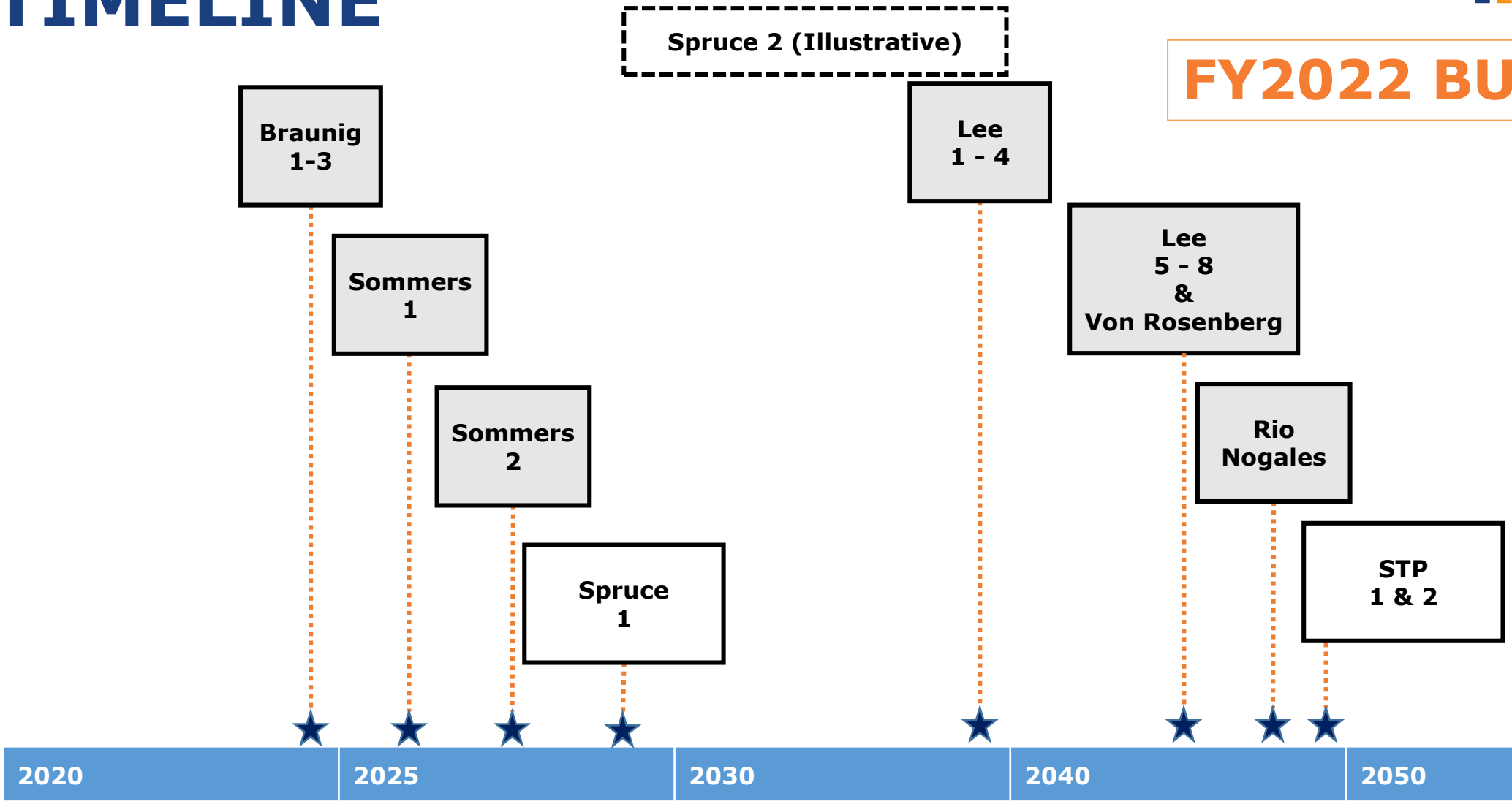


** Potential wholesale opportunity*

Long Term Generation Planning Resources:
- Summer net capacity for conventional gen.:
  - Nuclear, Coal, Gas, & Storage: 100%
- Renewables at Summer Peak Hour Ending 1900:
  - Coastal Wind: 63%
  - West Wind: 16%
  - Solar: 50%

TENTATIVE PLANT RETIREMENT TIMELINE

FY2022 BUDGET



- *Retirement Timing is Driven by End of Design Life*

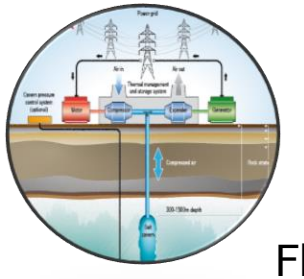
TECHNOLOGY RESEARCH

Solar

Wind

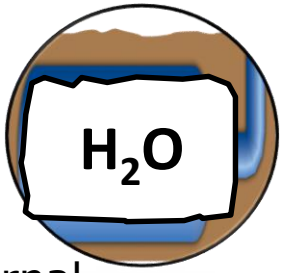
Battery Storage

Compressed Air Energy Storage



Liquid Air Energy Storage

Underground Pumped Hydro

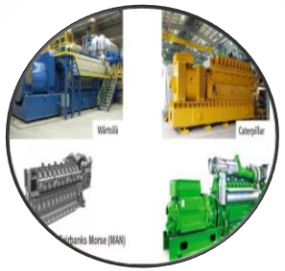


Hydrogen

Flow Battery

Geothermal

Reciprocating Internal Combustion Engine



Advanced Combined Cycle

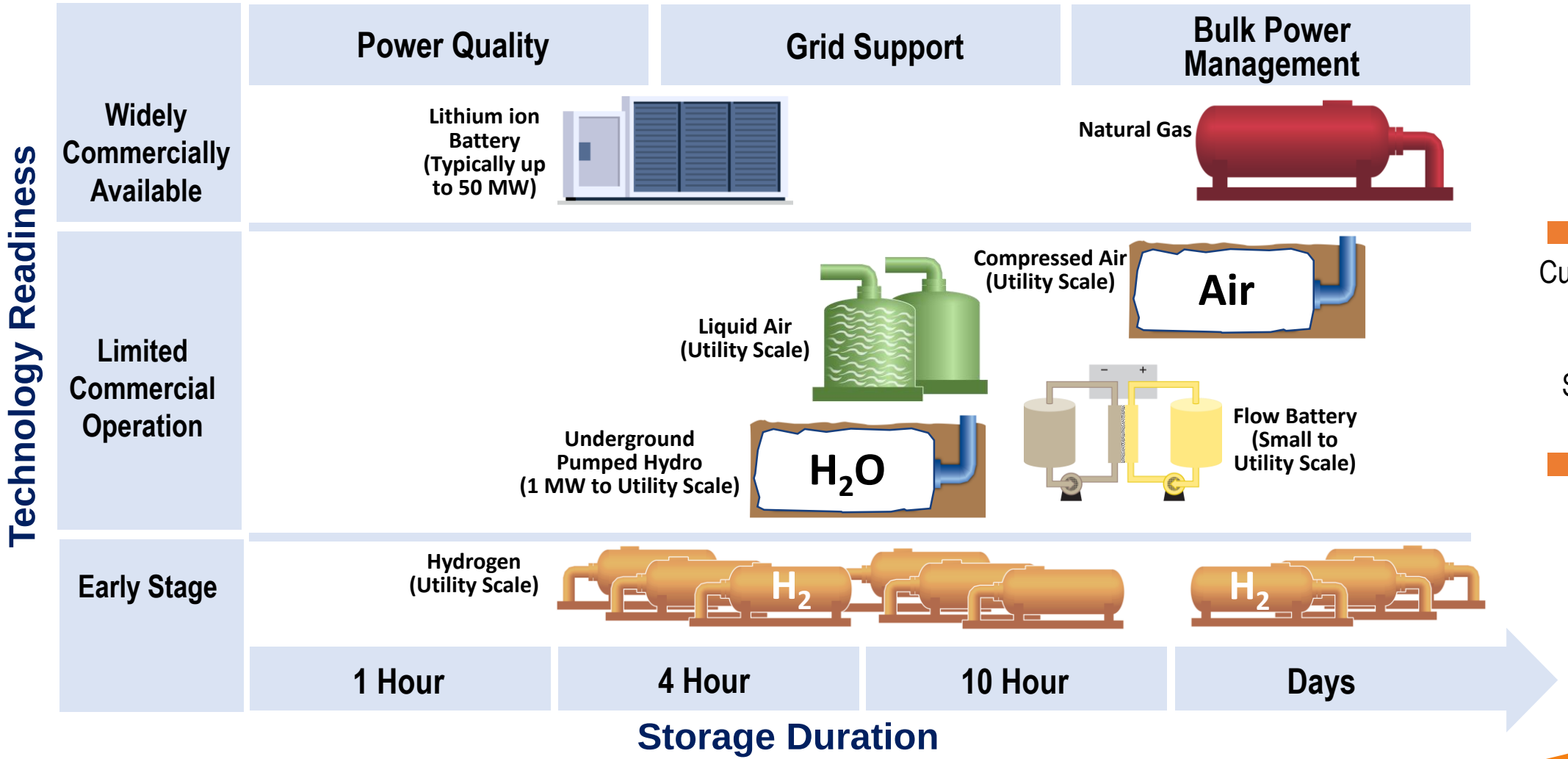
Small Modular Reactor

©NuScale Power, LLC

EPRI/gti Low-Carbon Resources Initiative

We monitor the technology landscape assessing cost, performance, & commercial availability.

STORAGE TECHNOLOGY READINESS
MEETING THE CHALLENGE OF LONG DURATION STORAGE



Current position from a Technology Readiness & Storage Duration perspective

Source: Black & Veatch & CPS Energy analysis of industry & RFI information

NEW RESOURCE OPTIONS
FY2022 BUDGET

Intermediate – 1 x 1 Combined Cycle
- H Class CT, 1 X 1
- 616 MW net (including duct firing)
- 100% natural gas
- DLN Combustor, SCR
- Inlet evaporative cooler

Peaking:
- Reciprocating internal combustion engine
- 18.3 MW per unit
- 202 MW plant (11 x 18.3 MW)
- 100% natural gas
- 5 minutes to full load
- SCR

STP1
- STP1 HP Turbine Uprate
- On line April 2020
- 5.3 MW winter capacity improvement (40% share)

Advanced Gas Path (AGP) Upgrade:
- Replacement of each hot gas path section of each CT at AVR & RNG
- Approximately 24 MW improvement in capacity to AVR
- Approximately 1.5% heat rate improvement to AVR
- Approximately 71 MW improvement in capacity to RNG
- Approximately 2% heat rate improvement to RNG

NGCC Extension:
- 11 years added to AVR and Rio Nogales combined cycle plants
- All performance characteristics are unchanged

Renewables – Contribution to Peak
- Coastal Wind – 53%
- Other Wind – 16%
- Solar – 50%

NGCC Extension:
- 11 years added to AVR and Rio Nogales combined cycle plants
- All performance characteristics are unchanged

Battery Energy Storage System:
- 100 MW, 4-hour duration
- 400 MWh energy
- Lithium-ion technology

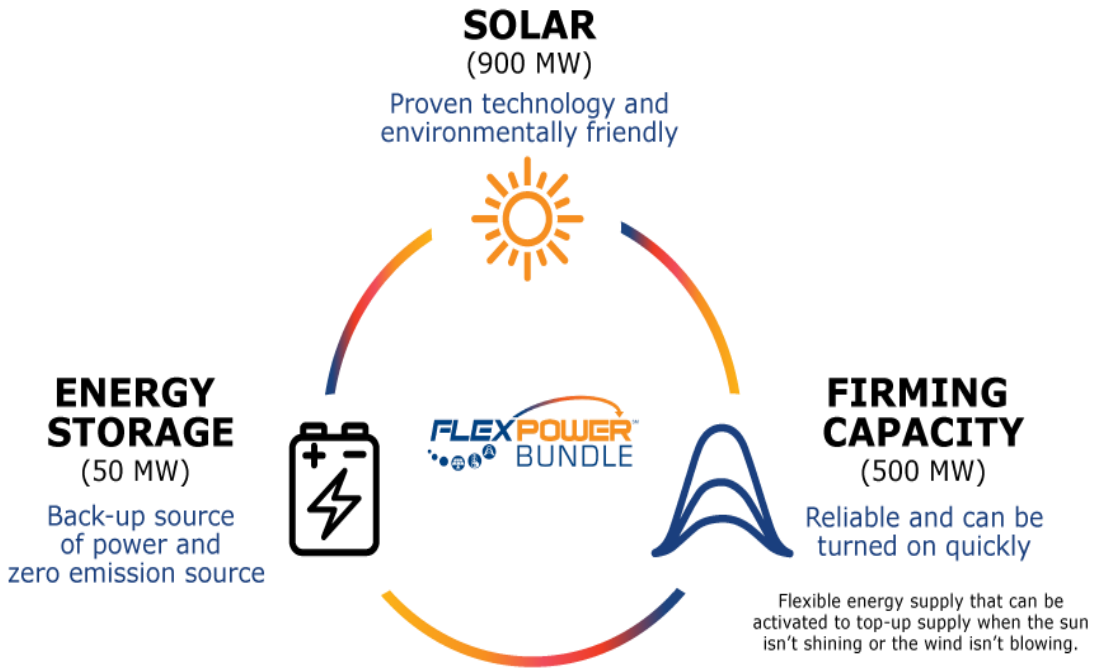
***Flex*POWER Bundle**[SM]
- 900 MW Solar PV
- 50 MW, 4-hour duration BESS
- 500 MW Firming

New technologies & innovative approaches proposed to replace units & meet customer usage growth.

*FLEX*POWER BUNDLE℠
SUPPLEMENTING AGING GAS PLANTS

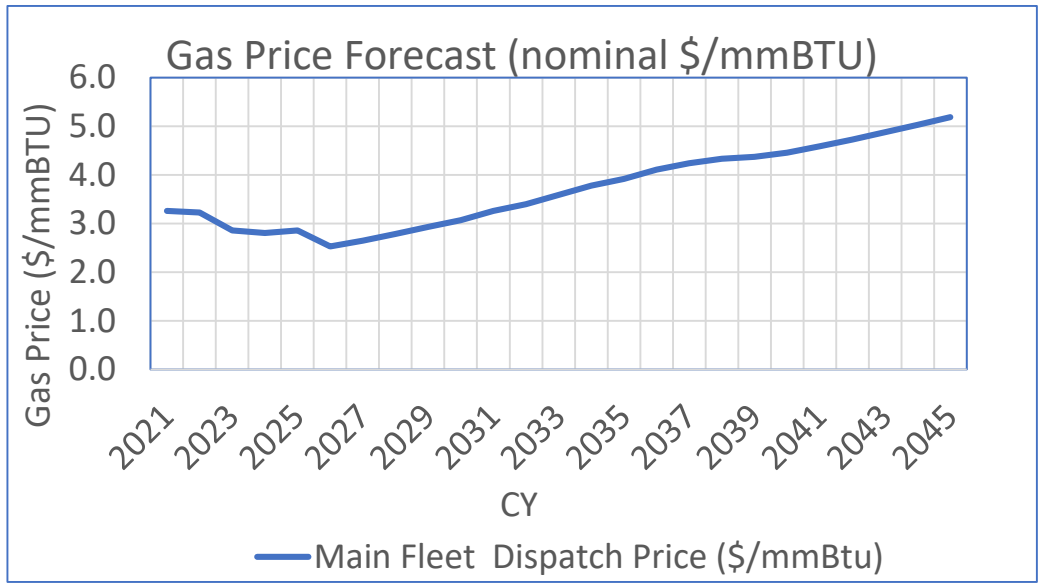
Braunig 1, 2 & 3 Gas Power Plants
Built in 1966, 1968, 1970
859MW

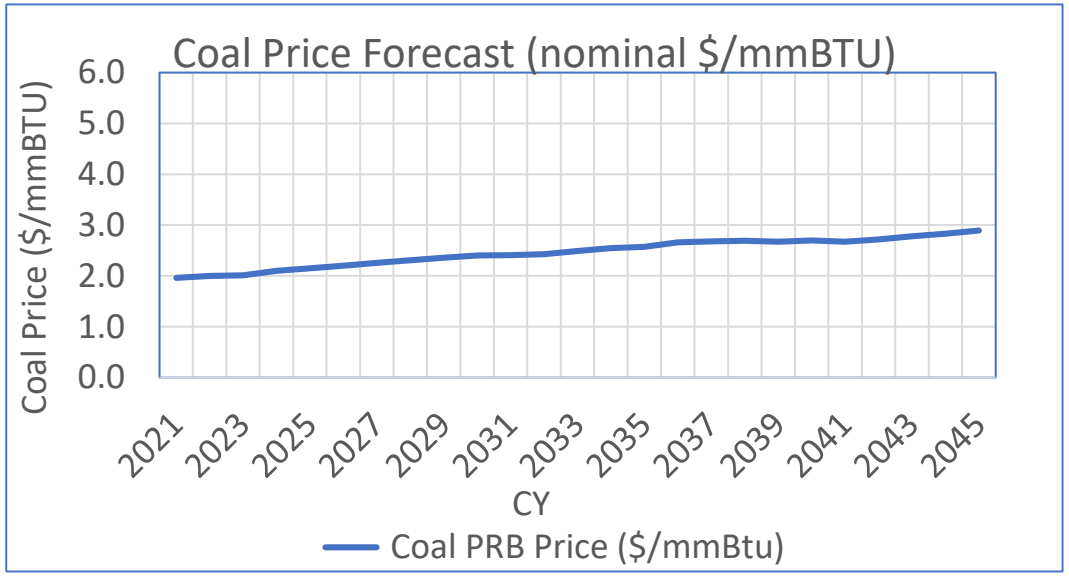
An integrated *Flex*POWER Bundle aimed at transitioning to a cleaner generation mix

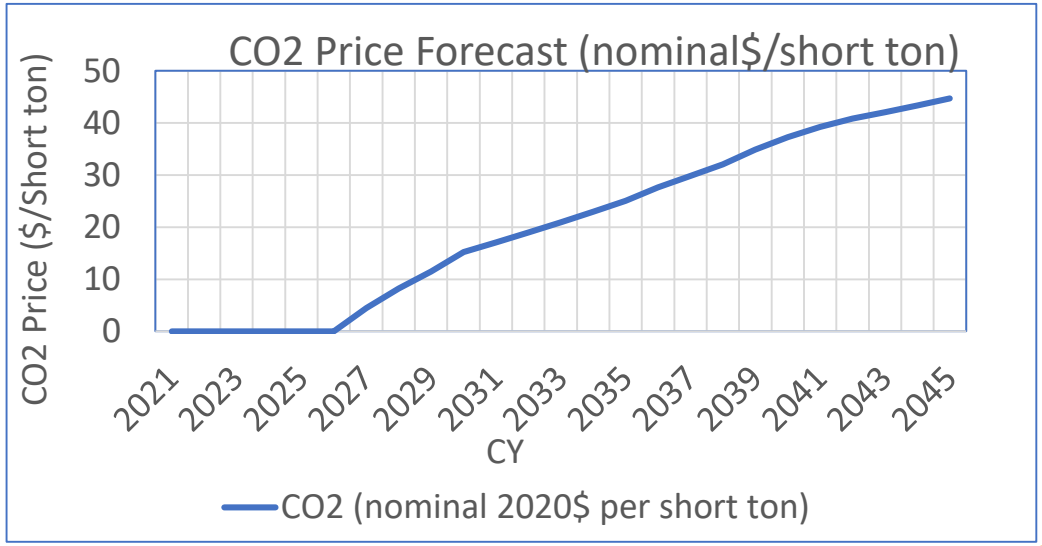


The *Flex*POWER Bundle is the next step in our *Flexible Path* strategy to replace our aging Braunig gas plants.

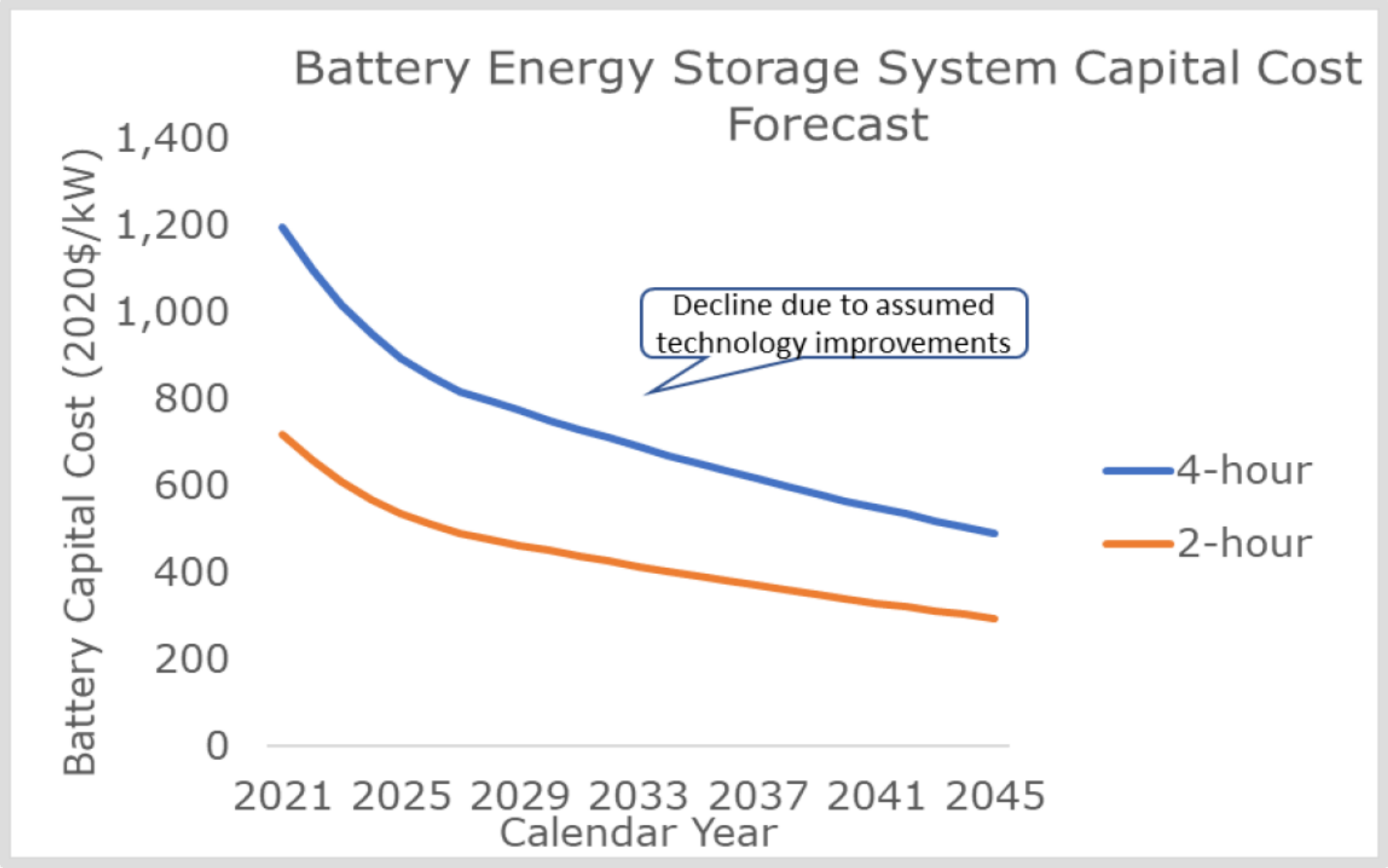
PRICE FORECASTS
GAS, COAL, & CO2



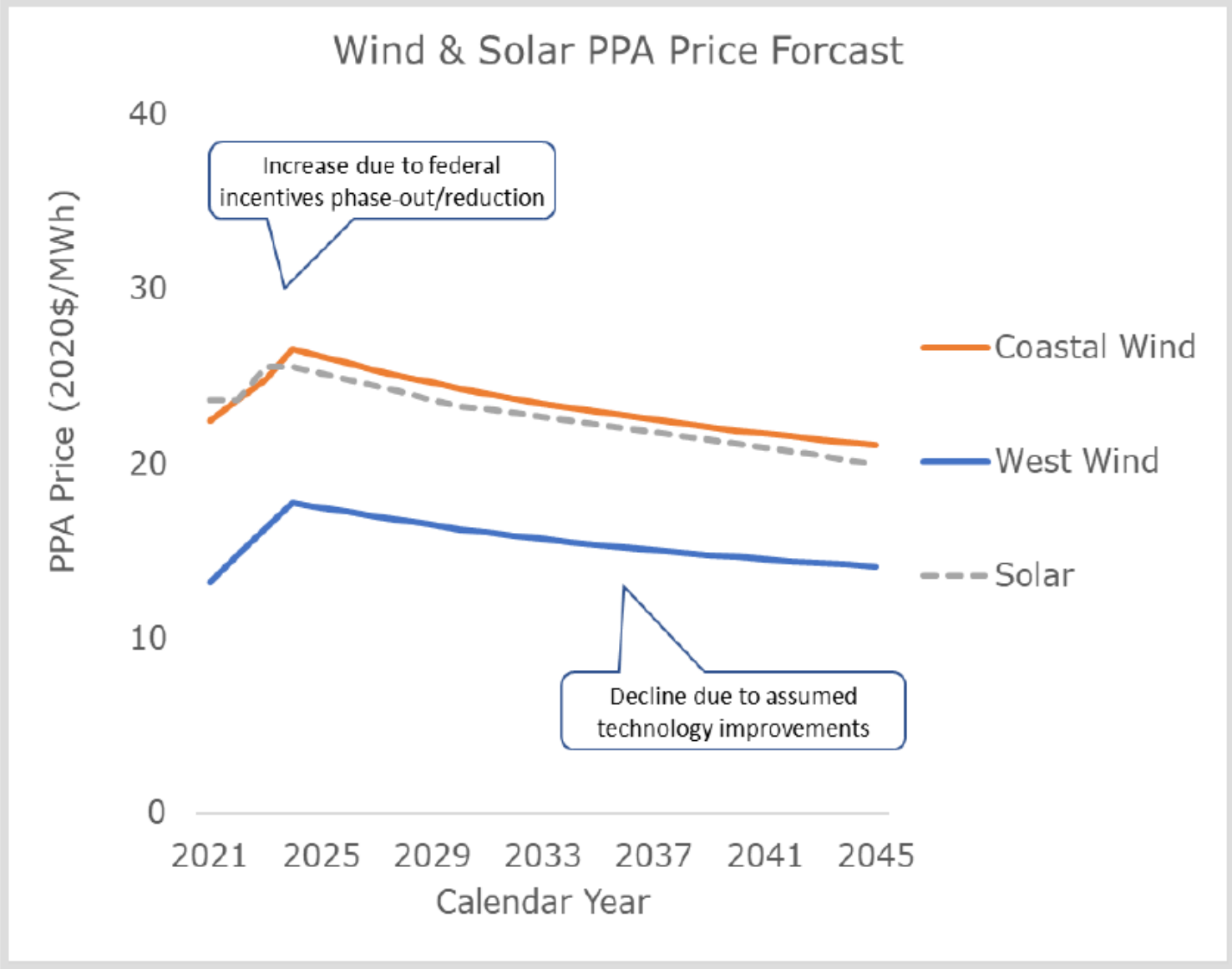




ENERGY STORAGE CAPITAL COST FORECAST

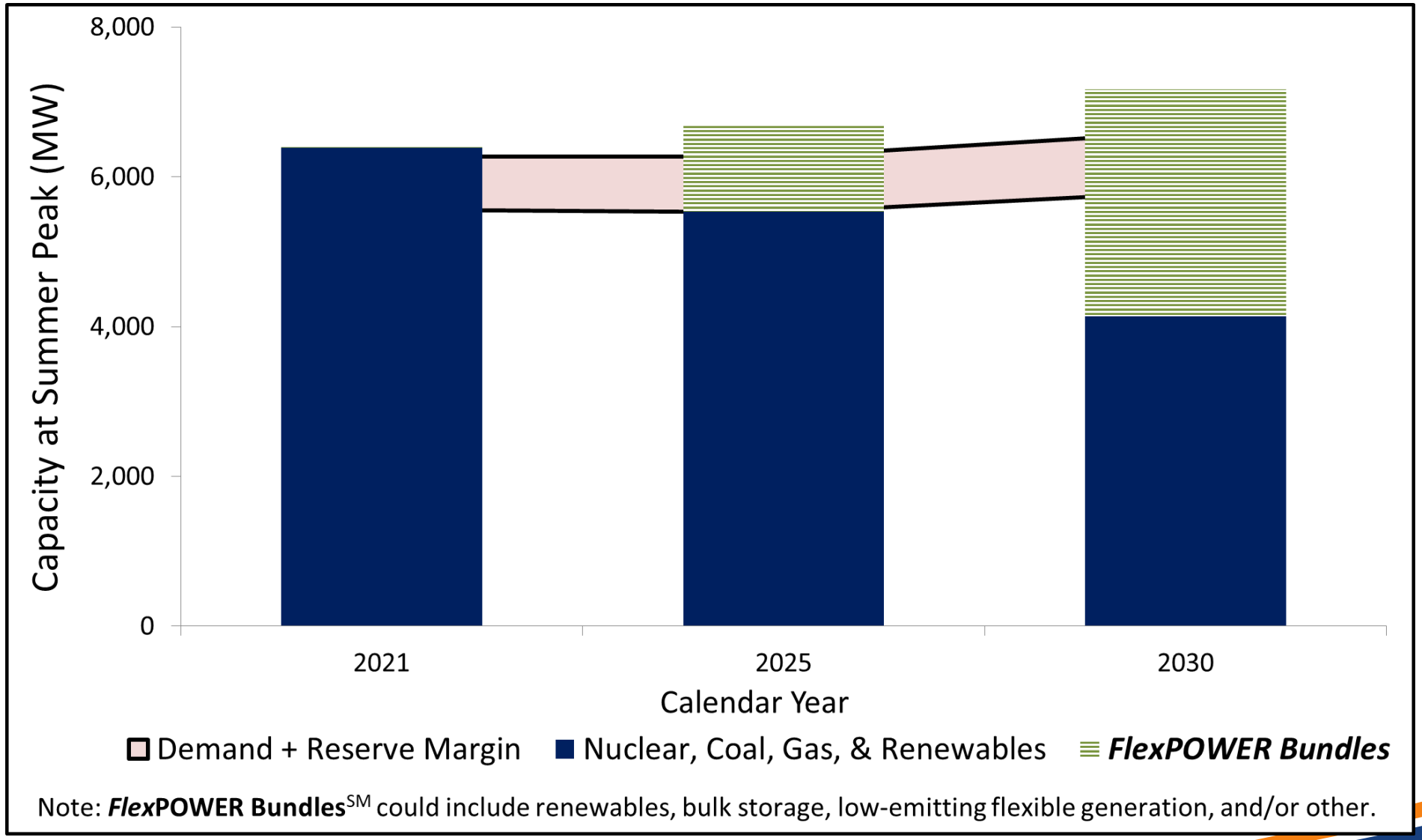


WIND & SOLAR PPA PRICE FORECAST



ENERGY CAPACITY

WE MUST CAREFULLY COVER S.A.'S NEEDS



Note: ***Flex*POWER Bundles**[SM] could include renewables, bulk storage, low-emitting flexible generation, and/or other.

Our approach is to add new innovative technologies to replace older units, while *reliably* meeting our customers' energy needs.

JANUARY 2021

FLEXIBLE PATH RESOURCE PLAN

SPRUCE ALTERNATIVES

VINTAGE: FY2022 BUDGET

FLEXIBLE PATH RESOURCE PLAN
SPRUCE ALTERNATIVES

Note: The Board has taken no official action at this time to close the coal units. Scenarios involving the Spruce units have been developed for community discussion purposes.

- Spruce Alternatives Cases:
  - Applicable assumptions are developed for 25-years
  - Spruce Alternative Cases are assessed by comparing to the FY2022 Budget Case (Baseline)
  - FY2022 Budget Case (Baseline) is the assumptions set for ***January 2021 Flexible Path* Resource Plan**

FOCUS ON AGING GAS & COAL PLANTS

OVER 3,000 MW OF GENERATION CAPACITY

Braunig 1, 2 & 3 Gas Plant
Built in 1966, 1968, 1970
859 MW

Sommers 1 & 2 Gas Plant
Built in 1972 & 1974
830 MW

Spruce 1 & 2 Coal Plant
Built in 1992 & 2010
1345 MW

The Braunig & Sommers units are reaching their end of design life. We must thoughtfully sequence the order of plant changes to maintain *Reliability* & *Customer Affordability*.

POTENTIAL STRANDED COST
OUR COMMUNITY'S INVESTMENT IN SPRUCE

The community has made a significant investment in constructing the Spruce plant, including extensive environmental controls.

- Both Spruce units are ***Reliable*** resources
- 19% of our total generation in FY2021

Unit	Capacity	Year On Line	Age	Environmental Controls
Spruce 1	560 MW	1992	28	Scrubber, Baghouse, Mercury Control, Ash Recycled
Spruce 2	785 MW	2010	10	Scrubber, Baghouse, Mercury Control, SCR*, Ash Recycled

* SCR is a Selective Catalytic Reduction system that reduces nitrogen oxides

Est. Net Book Value @1/31/21	**$1.255B**
Designed/Original Service Life:	55 years
Possible Accelerated Service Life:	40 years
Remaining Debt Service:	
Principal	**$1.148B**
Interest	.638B
	$1.786B

The Spruce Investment represents ~11% of San Antonio's assets.

COAL ENVIRONMENTAL COMPLIANCE

SIGNIFICANT INVESTMENTS EXPECTED

Coal Ash Regulation

$32 million dollar investment to preserve unit operations. Cash flow started in 2018.

Assumed implementation date for CO2 Tax

Spruce 1 NOx Regulation

$150 million dollar investment

Calendar Year

- **Provide EPA Notice of Intent to discontinue coal operations (12/31/2028 shut down)**
- **Required to continue coal operation beyond 12/31/2025 without SO2 Scrubber Water Project**

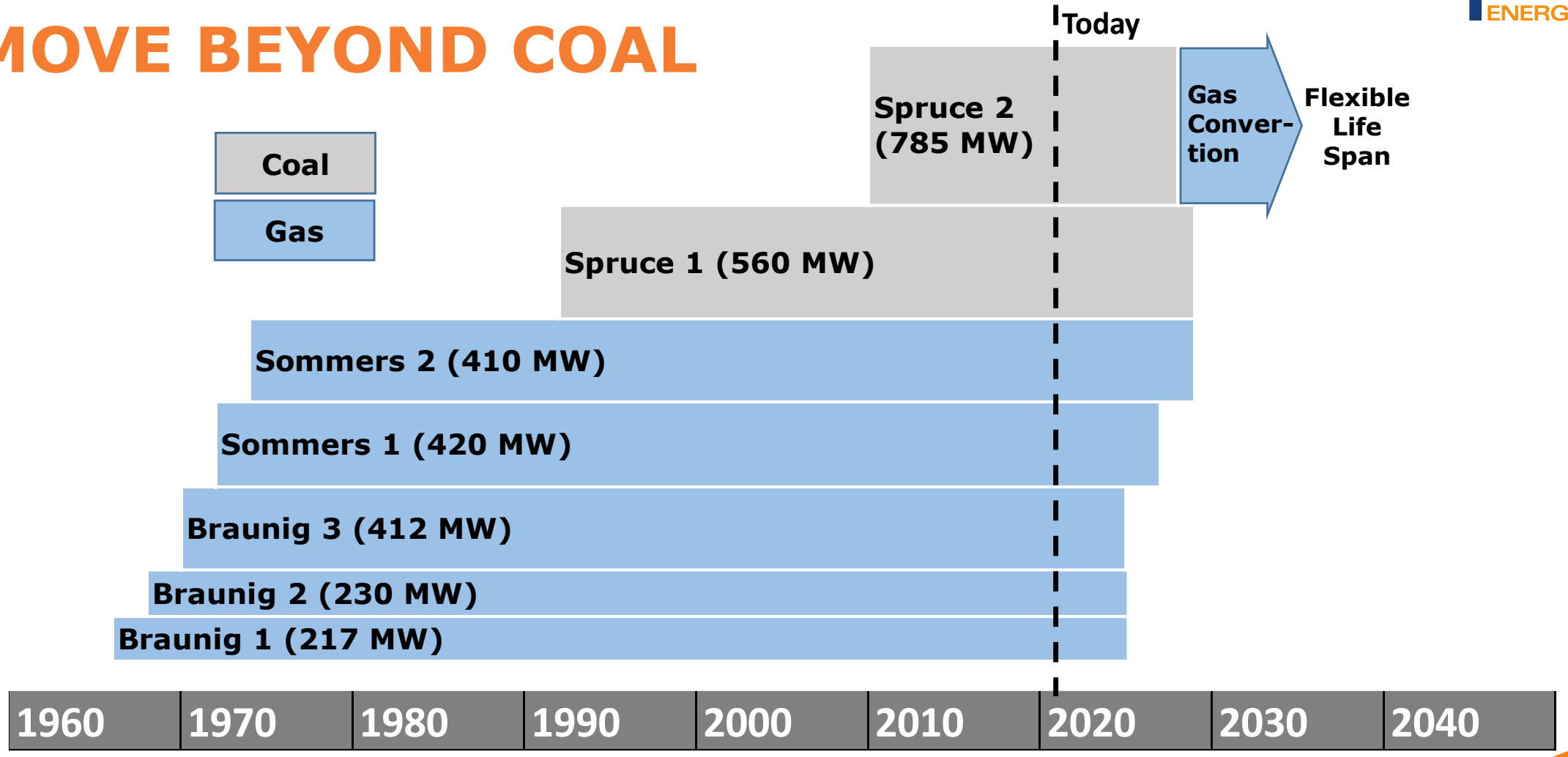
SO2 Scrubber Water Regulation

$58 million dollar investment.

Investments beyond the on-going annual capital / O&M spend are expected for continued environmentally compliant coal operations.

POTENTIAL APPROACH

TIMING TO REPLACE AGING GAS UNITS & MOVE BEYOND COAL



New technologies & lower emission resources are being considered in potential transition of aging gas units & coal.

FLEXIBLE PATH RESOURCE PLAN

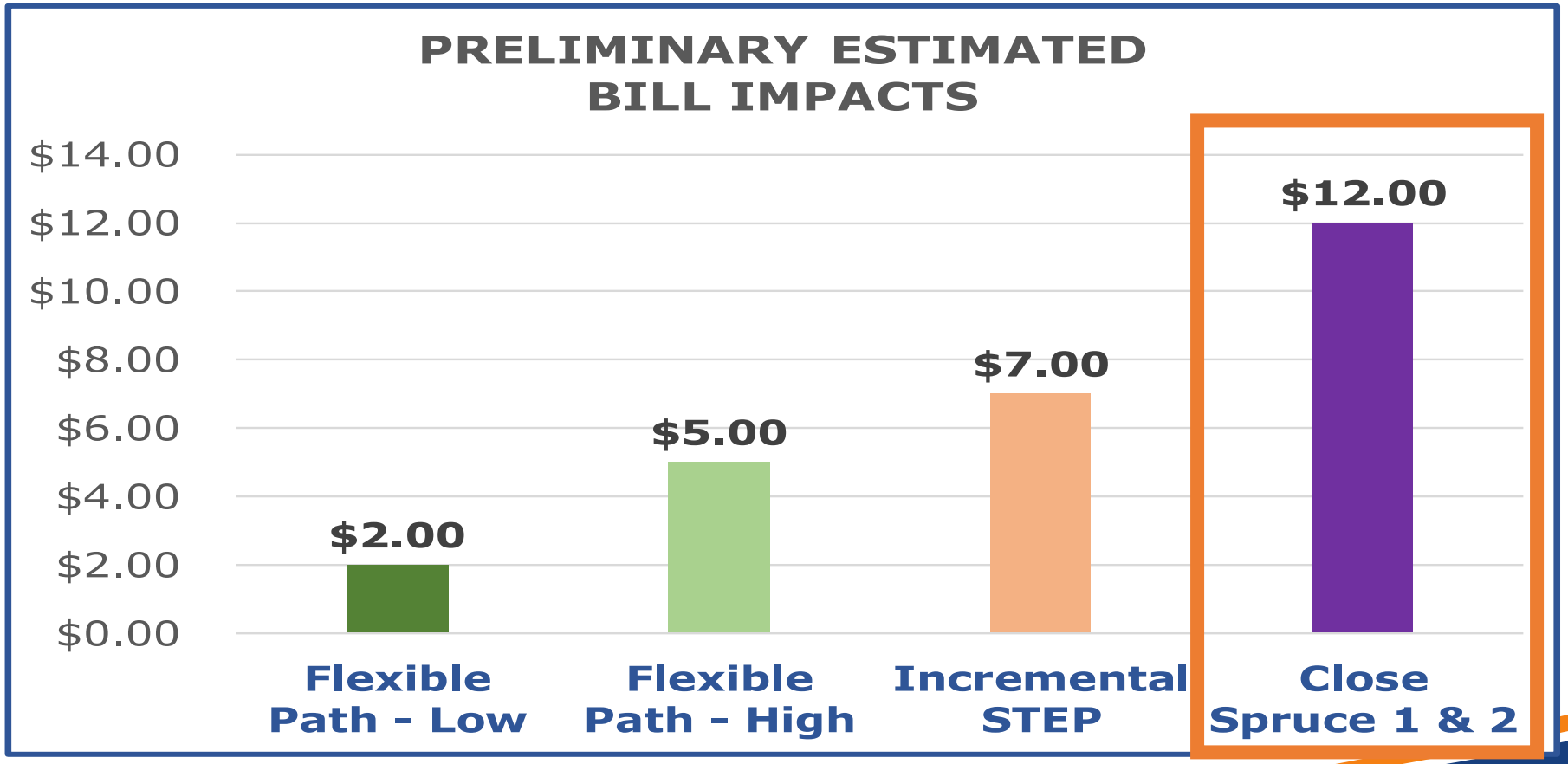
SPRUCE ALTERNATIVES KEY OBSERVATIONS

BASELINE CASE: • **Spruce 1 – Replace with an Additional *Flex*POWER Bundle℠ offering in 2029** • **Spruce 2 – Continue to Operate as a Coal Plant**	**REPLACE SPRUCE 1 & 2 COAL UNITS:** • **With Renewables & Batteries**	**REPLACE & CONVERT:** • **Spruce 1 – Replace with an Additional *Flex*POWER Bundle℠** • **Spruce 2 – Convert to Natural Gas**
• Complies with $58M coal effluent limitation guideline (ELG) upgrade	• Avoids ELG $58M investment • Avoids $35M for Spruce 2 gas conversion	• Avoids ELG $58M investment • $35M for Spruce 2 gas conversion
• Low number of exposure hours to ERCOT market interactions (i.e. high prices)	• Increased exposure hours to ERCOT market interactions (i.e. high prices)	• Low number of exposure hours to ERCOT market interactions (i.e. high prices)
• Baseline emissions results	• Emissions reduced as compared to Baseline Case	• Emissions reduced as compared to Baseline Case
• Baseline bill impact results	• Accelerated depreciation (stranded costs for early retirement of the coal assets) of $1.26B is included in the bill impact results.	• Accelerated depreciation (stranded costs for early retirement of the coal assets) of $450M (out of $1.26B) is included in the bill impact results.

AFFORDABILITY - BILLS

THERE IS A COST TO EVERY PROGRAM

FUTURE COMMUNITY DECISIONS:
These are rough estimates that give good context & will help constructive community discussions.



Does not include any amount for maintaining operations or growth in S.A. & our region.

GENERATION PLANNING
KEY TAKEAWAYS

- We must meet our community's projected increase in peak usage
- We must prioritize plants that are approaching the end of their design life
- Community discussions are continuing about potential options for our two coal units
- Sequencing is critical
- Velocity matters

Maintaining *Reliability* & *Customer Affordability* is essential as we transition our generation fleet.

Thank You