## INTEGRATED RESOURCE PLAN

Lake Worth Beach Electric Utilities (LWBEU)

Presented By: Horizons Energy June 28, 2022



#### **AGENDA**

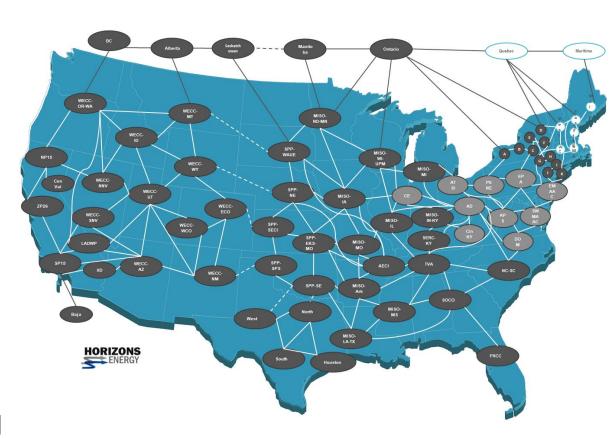


- Introduction
- Horizons Energy
- Integrated Resource Planning Process
- Lake Worth Beach 2022 IRP
- Conclusion and Question/Answer

#### HORIZONS ENERGY



- Established in 2016
- Credentials:
  - Average 25 years of experience in power market analytics
  - Contributed to over 25 integrated resource plans
  - Over 30 national clients (developers, banks, utilities)
- Services:
  - EnCompass National Database
  - North American Advisory Outlook
  - Consulting
- Utilizes the EnCompass Power Planning model from Anchor Power Solutions







Greg Turk

Principal/Project Manager

 30+ years of power planning methods, consulting, product and project management



# Kathy Jones Executive Consultant

 30+ years of analytic data development, resource screening, scenario creation, and study simulations

#### **Relevant Engagements Last 2 Years:**

- √ 2022 AES Indiana IRP
- **✓** 2021 NMPP IRP
- **✓** 2021 PNM IRP
- ✓ 2021 AECC Uncertainty Analysis
- ✓ 2020 PNM San Juan Replacement
- ✓ 2020 PCWA Hydro Stochastic Analysis
- √ 2020 KYMEA IRP

#### **Relevant Experience:**

- ✓ Southeast U.S. Lead 2006-2017
- ✓ Renewables Lead 2013-2017
- √ 25 years IRP experience
- ✓ Performed \$ billions in asset valuation
- ✓ Horizons advisory and market assessments
- ✓ Environmental compliance planning
- ✓ Uncertainty and risk assessment

#### WHAT WE DO



- EnCompass National Database
- North American Advisory Outlook
  - Fundamental forecast of energy markets
  - Nine scenarios
  - Interactive dashboard of results
- Custom Scenarios
- Consulting

#### INTEGRATED RESOURCE PLANNING

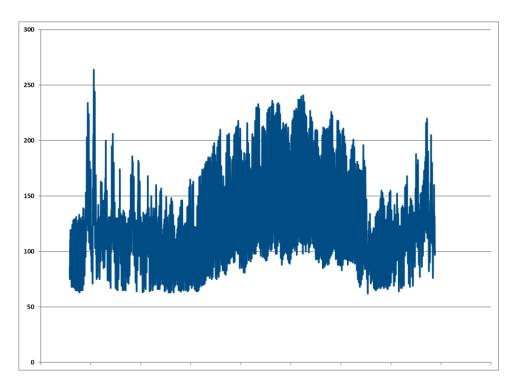


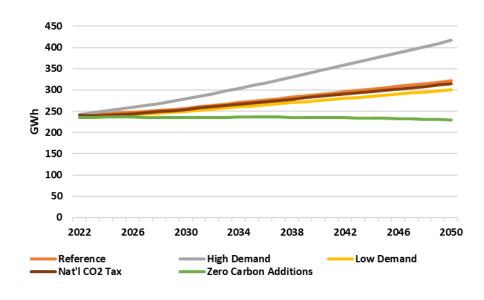
- Integrated Resource Planning or IRP is the process by which supply- and demand-side options are consistently planned, implemented, and evaluated to provide energy services at a cost that appropriately balances the interests of stakeholders
- Develop plan for LWBEU to reach its goals of low-cost, reliable and low carbon service
- Horizons Energy uses the EnCompass power planning model by Anchor Power Solutions which performs a mixed integer linear programming algorithm which:
  - Develops an outlook for supply- and demand-side options that minimize cost as well as reach carbon emission targets and maintain reliability

#### **DEMAND FORECAST**



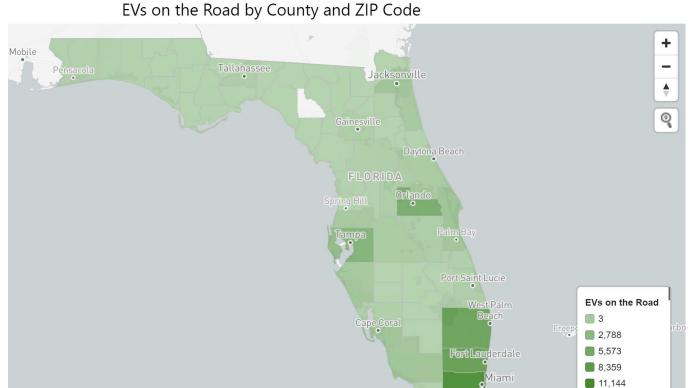
- Represent electricity customer demand
  - Hourly
  - Monthly
  - Annually





#### ELECTRIC VEHICLE OUTLOOK





**Key Statistics** 90,184 EVs on the Road 68,185 BEVs on the Road 21,980 PHEVs on the Road 3.26 BEVs per 1k People 1.05 PHEVs per 1k Peopl 47.55 BEVS per DCFC Port 16.65 EVs per Level 2 Port 35 Vehicle Makes 86

Vehicle Models

13,929

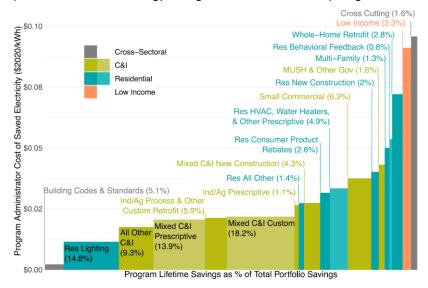
© Mapbox © OpenStreetMap Improve this map

#### **RESOURCES: DEMAND SIDE OPTIONS**

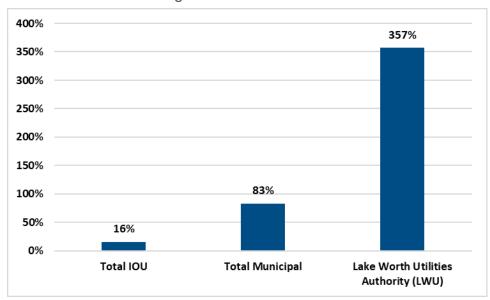


- Demand response
- Energy efficiency
- Behind the meter

#### Composite Cost Curve for Energy Savings From Electric Efficiency Programs: 2010-2018



#### Percent change in BTM Generation since 2017



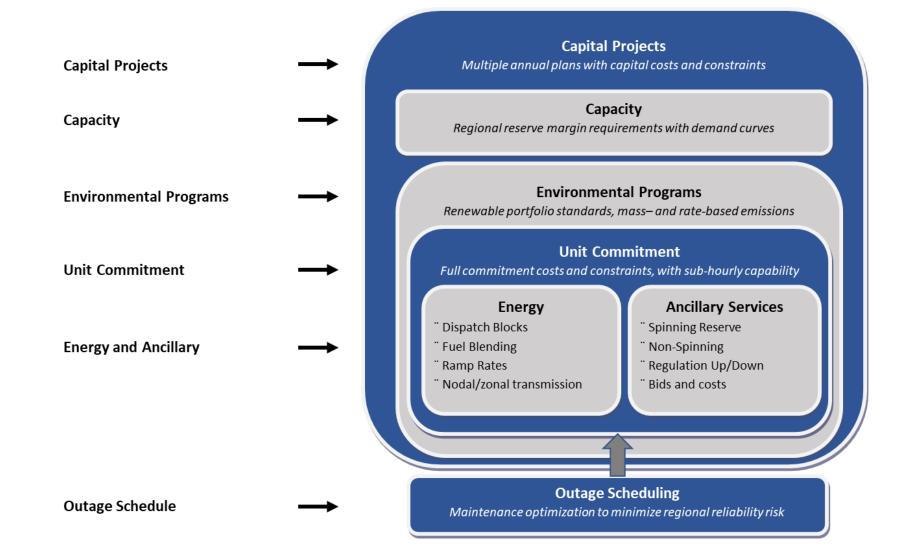
#### **RESOURCES: SUPPLY SIDE OPTIONS**



- Existing generation and contracts
  - Tom G. Smith
  - Stanton
  - St. Lucie
  - Solar
- New options
  - Solar
  - Batteries
  - Combustion turbines
  - Purchase power agreements (PPA)

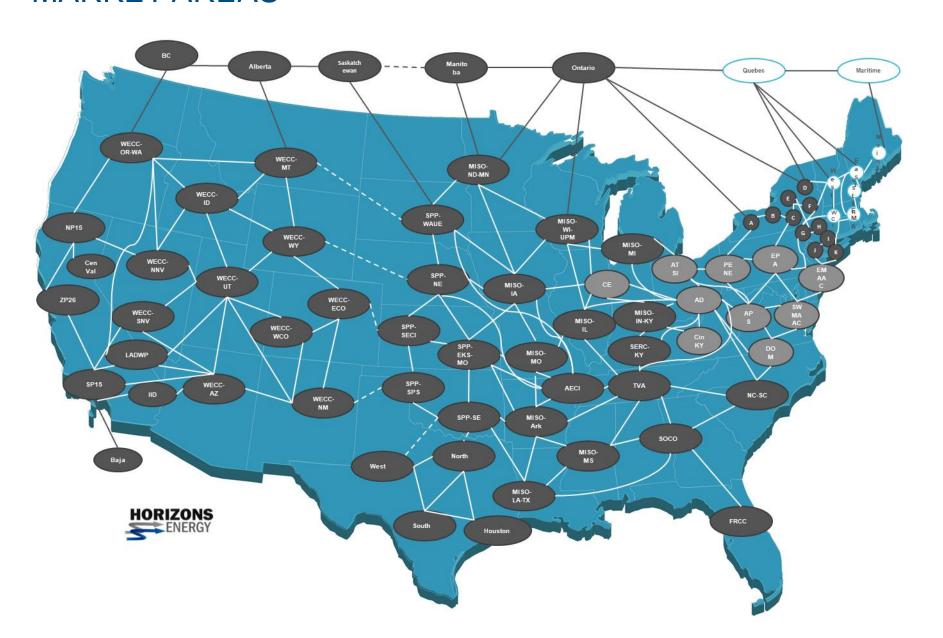
# ENCOMPASS POWER PLANNING MODEL





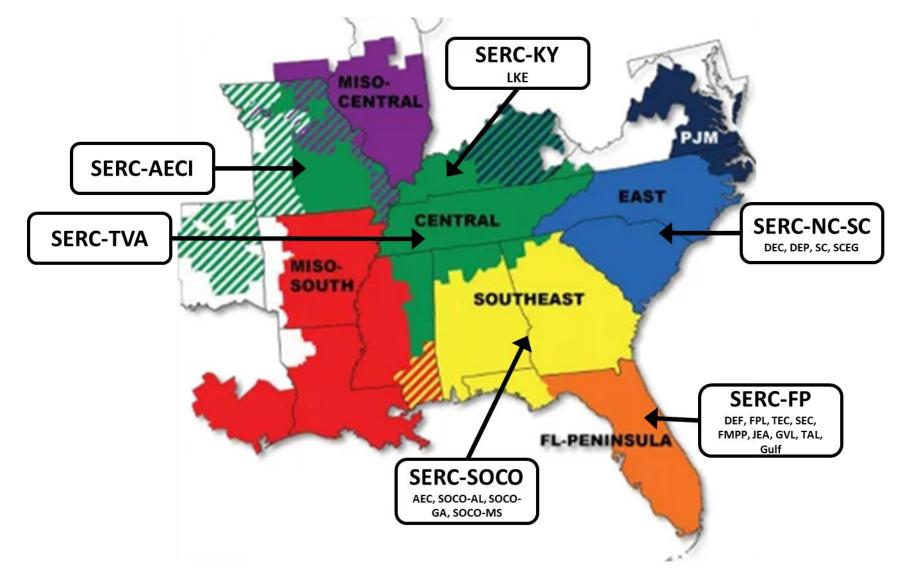
#### **MARKET AREAS**





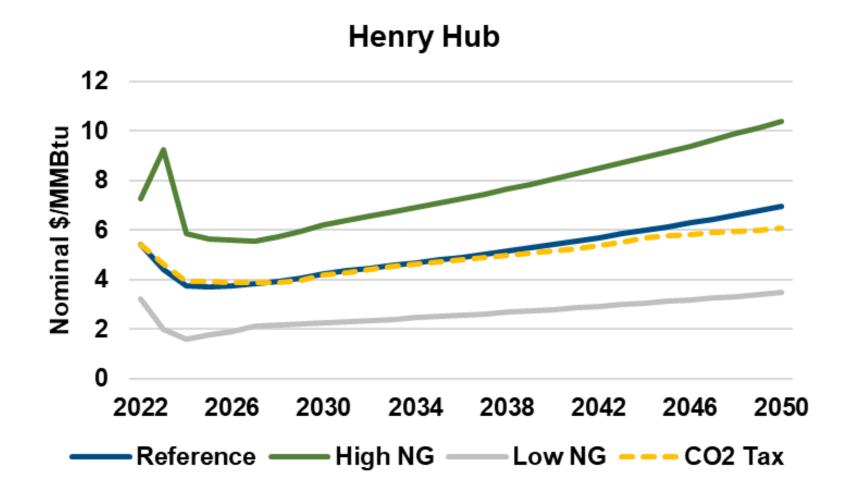
#### SERC/FLORIDA





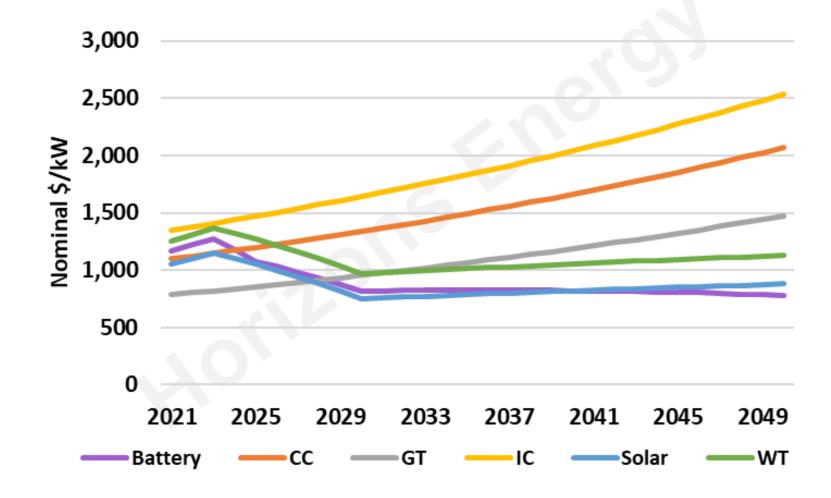
#### NATURAL GAS PRICES





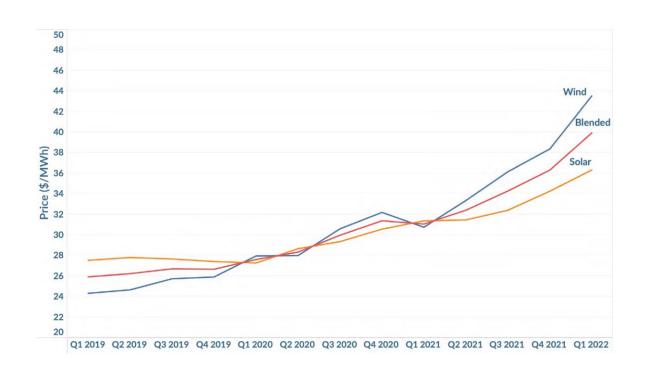
#### **OVERNIGHT CAPITAL COST**





#### **PPA PRICES**







#### HORIZONS SCENARIOS



- Base
- High Natural Gas
- Low Natural Gas
- High Demand
- Low Demand
- Carbon Limit with High Natural Gas
- Carbon Limit with Low Natural Gas
- National Carbon Tax
- Zero Carbon Additions Only (equivalent of Cheap Renewables)

### SCENARIO MATRIX

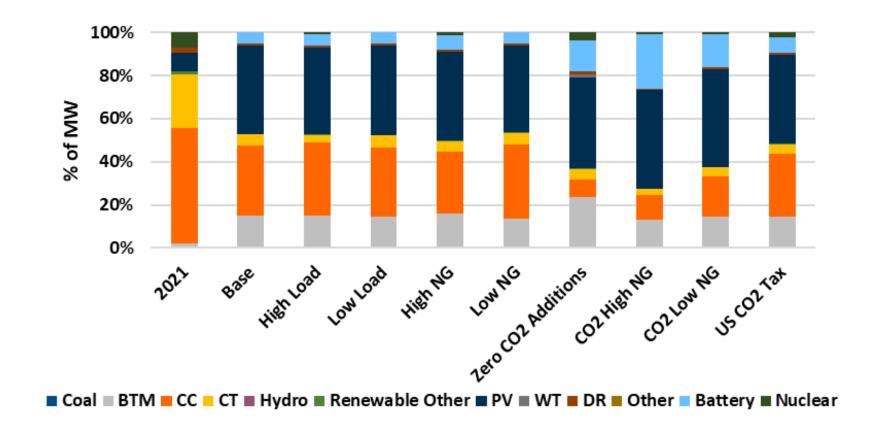


						Scenarios					
		Reference	High NG	Low NG	High Demand	Low Demand	Nat'l CO2 Tax	CO2 Limit High NG	CO2 Limit Low NG	Zero Carbon Additions	
	Load	<b>→</b>	<b>→</b>		•	21	<b>→</b>	<b>→</b>		•	
М	Natural Gas Price	<b>→</b>	•	•	<b>→</b>	<b>→</b>	<b>→</b>	•	•	-	
а	Coal Price	→	•	2	<b>→</b>	<b>→</b>	•	•	21	-	
r k	Technologies										
к e	Nuclear Economic Retirements	Staggered beg. 2024						None			
t	Nuclear License	60 Years 80 Years						60 Years		80 Years	
	Coal Economic Retirements	Staggered beg. 2024 A						ll eligible beg. 20	Unlimited		
D	Natural Gas Additions			CA, DE, MD, NN	1, OR, VA Limited	l		Limited a	after 2030	Limited	
r i	Natural Gas Retirements	All eligib Staggered beg. 2024 202						All eligible beg. 2024		Unlimited	
v e	Hydro	Existing									
r	Geothermal	Existing									
s	Other Renewables	Existing									
	Carbon	60% reduction from 2019 no carbon price except State/Province Tax							Limit	State/Province	
	% of Generation Additions										
	Solar	45.4%	<b>→</b> 45%	<b>→</b> 44%	40%	<b>48%</b>	<b>46%</b>	48%	<b>47</b> %	<b>1</b> 48%	
В	Wind	23.2%	<b>25%</b>	<b>4</b> 22%	23%	<b>4</b> 23%	<b>25%</b>	<b>24%</b>	<b>1</b> 26%	<b>1</b> 26%	
u	GT	3.8%	<b>→</b> 4%	<b>4%</b>	7%	→ 3%	<b>万</b> 5%	<b>↓</b> 0%	≥ 2%	<b>↓</b> 0%	
	сс	13.1%	→ 9%	18%	15%	<b>7</b> 12%	→ 8%	<b>↓</b> 2%	≥ 4%	<b>↓</b> 0%	
d	IC	1.3%	<b>→</b> 1%	7 1%	2%	→ 1%	→ 1%	<b>↓</b> 0%	<b>↓</b> 0%	<b>↓</b> 0%	
s	Storage	13.2%	<u>\( \) 16% </u>	<b>4</b> 11%	13%	<b>4</b> 13%	<u>16%</u>	25%	<b>21%</b>	<b>1</b> 25%	
	Distributed Generation	<b>&gt;</b>	<b>2</b> N	•	<b>^</b>	•	<b>7</b>	<b>7</b>	<b>7</b> 1	<b>^</b>	
	Transmission Additions			К	nown/under con	struction addition	ons			Economic	



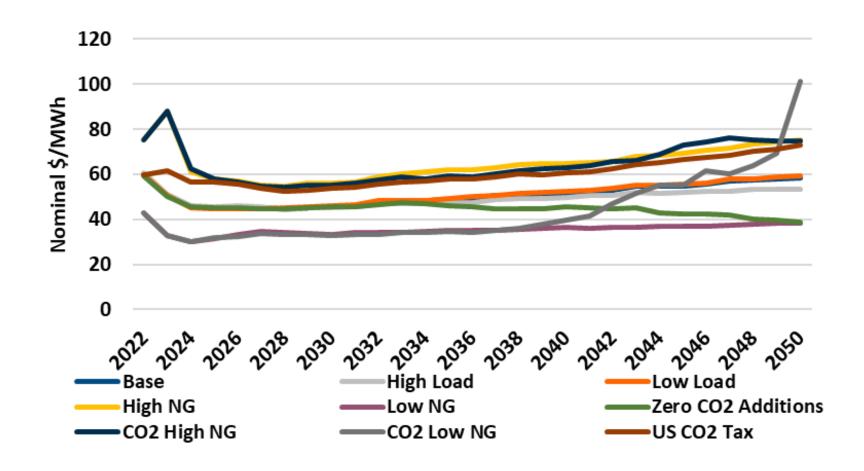
#### HORIZONS FLORIDA RESOURCE MIX - 2050





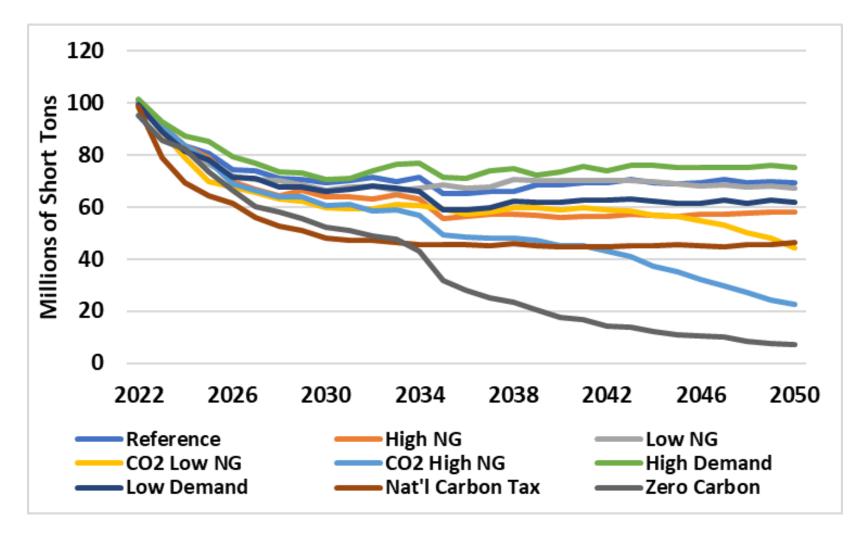
#### FLORIDA ENERGY PRICES





#### FLORIDA CARBON EMISSIONS





### 2018 PLANNING EFFORT



Repower / Retire Existing Resources  Extend / Cancel Power Contracts  Power Contract Prices  Develop In-city Generation  Technology Costs  Power Contract Prices  Least cost outcome in the contract of the co	Across a range of
Repower / Retire Existing Resources  Extend / Cancel Power Contracts  Power Contract Prices  Develop In-city Generation  Technology Costs  Power Contract Prices  Least cost outcome in the contract of the co	resource plans Across a range of
Extend / Cancel Power Contracts  Power Contract Prices  Least cost outdens in the contract of	
Develop In-city Generation  Distributed Generation  • Identify and marrisks	
	Identify and manage
	To produce a robust
Off-shore Wind Other	resource strategy

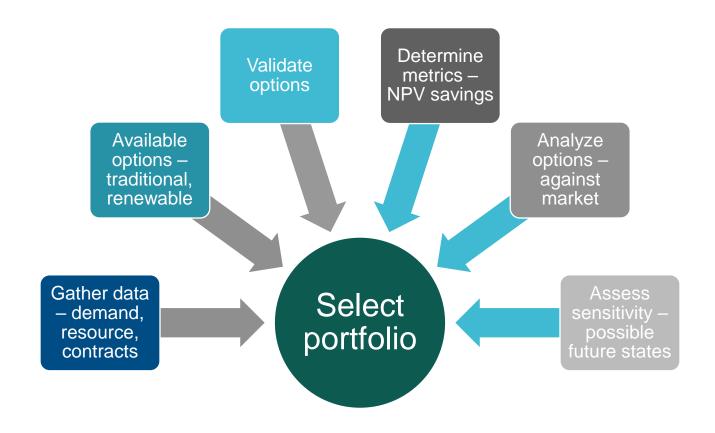
### 2022 PLANNING EFFORT



Resource Decisions	Uncertainties	Solution	
Retire Existing Resources	Technology Costs	Optimized long-term resource plans	
Demand Side Management	PPA Prices	Across a range of uncertain futures	
Distributed Generation	CO2 Emissions	<ul> <li>Least cost outcomes</li> <li>Identify and manage</li> </ul>	
Solar, Storage, Other Renewable	Load Growth	risks To produce a robust	
Environmental footprint	Other	resource strategy	

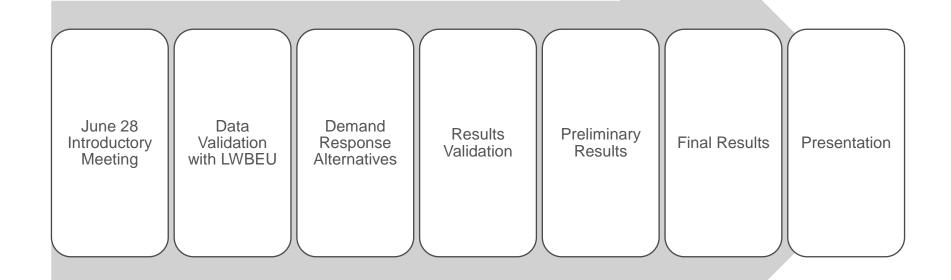
### **PROCESS**





#### **TIMELINE**





# QUESTIONS?

