Power Supply Study 2022 Results Review

Informational Update

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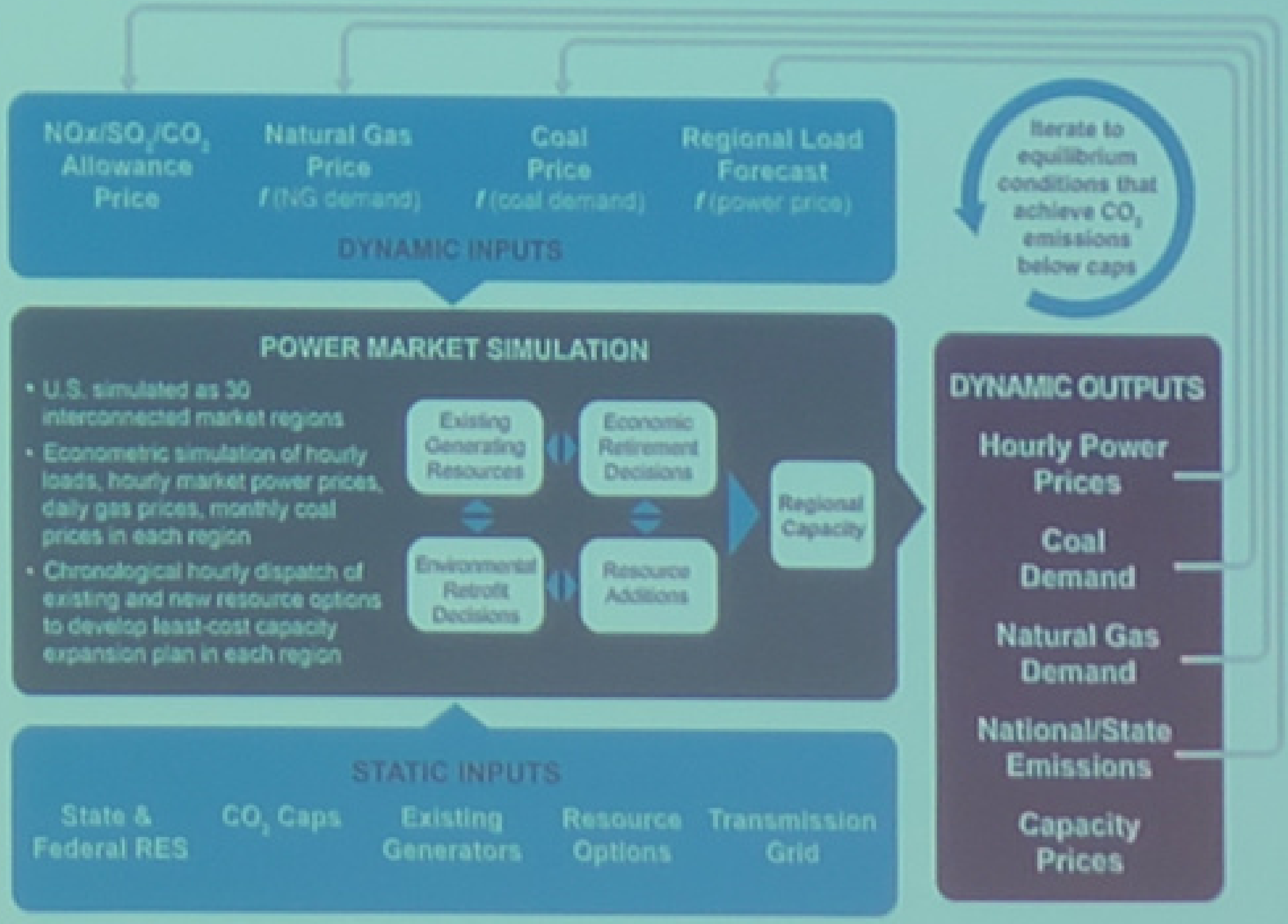
CO_2 Price Forecast Approach

Leidos Energy and Environmental Analysis (EEA) Module Flowchart

- Captures the relationship between emissions, power, gas, and other fuel demand and prices
- Generates the cost of carbon required to economically control U.S. power generation emissions to meet global targets



Assumptions Outline

- MPW load forecast
- Environmental compliance costs
- Fuel and market price forecasts
- Generation assets
    - Existing & new resource costs and performance
- Steam Sales Contract

Significant Changes Since 2019 PSS Study

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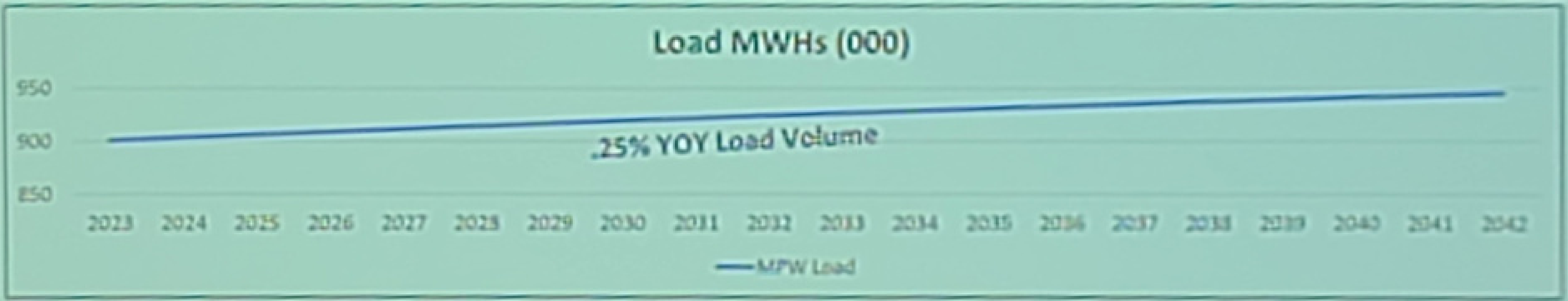
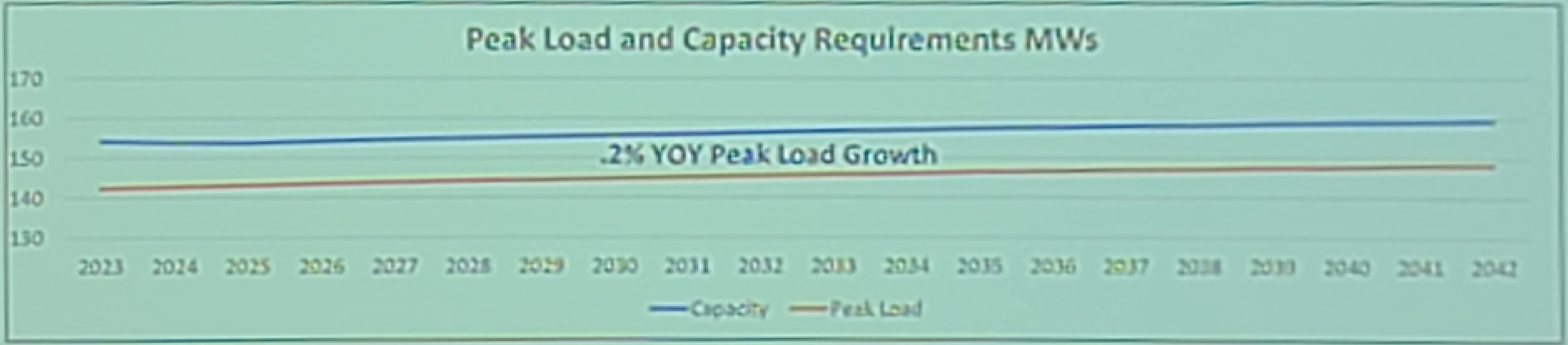
KEY AREA OF CHANGE	NOTES
Natural Gas Pricing	2022 saw return of significant volatility, which we expect to continue at times
Shifting Capacity Markets	MISO capacity prices spiked; much stronger concerns of shortages; significant changes to MISO capacity market
Inflation	Rising costs impacted commodity pricing for all assets and increased financing costs
MISO Interconnection Queue	Queue continues to grow; increasing complexity and cost to interconnect. The 2022 queue increased 127% from the previous year
MPW's Local Dispatchable Requirements	Latest T&D Reliability Study showed need for 87 MW; up from 32.5 MW in prior study
Energy Market Price Forecast	Increasing renewable energy influence starting in 2033 results in a reduction of the forecasted energy component (only) of market prices in the last half of the study by 3.75%
Combined Heat & Power Cost and Performance Inputs	Updated based on study completed with Stanley Consultants
Refined Solar Pricing	Based on recent RFP and actual PPA pricing

MPW Projected Energy and Capacity Needs





Environmental Regulations

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- Section 316(b) of the Clean Water Act (CWA)
  - Regulates cooling water intake
  - Inlet screen modifications are likely for Unit 9 and costs are included in every scenario
- Effluent Limit Guidelines (ELG) – investigation/modifications ongoing
  - Regulates power plant outfalls
  - Compliance strategy submitted to IDNR in October 2021
    - Units 7 & 8 will cease coal combustion by December 31, 2028
    - Unit 9 bottom ash compliance by use of the existing high recycle rate system
- Unit 9 FGD system investigation will begin in 2Q 2023 for Voluntary Incentive Program (VIP)
    - VIP compliance
- Carbon (CO_2) regulation/legislation – no current regulations; uncertainty regarding future
  - Included as a sensitivity, but not included in Base Case

Market Energy Price Forecast

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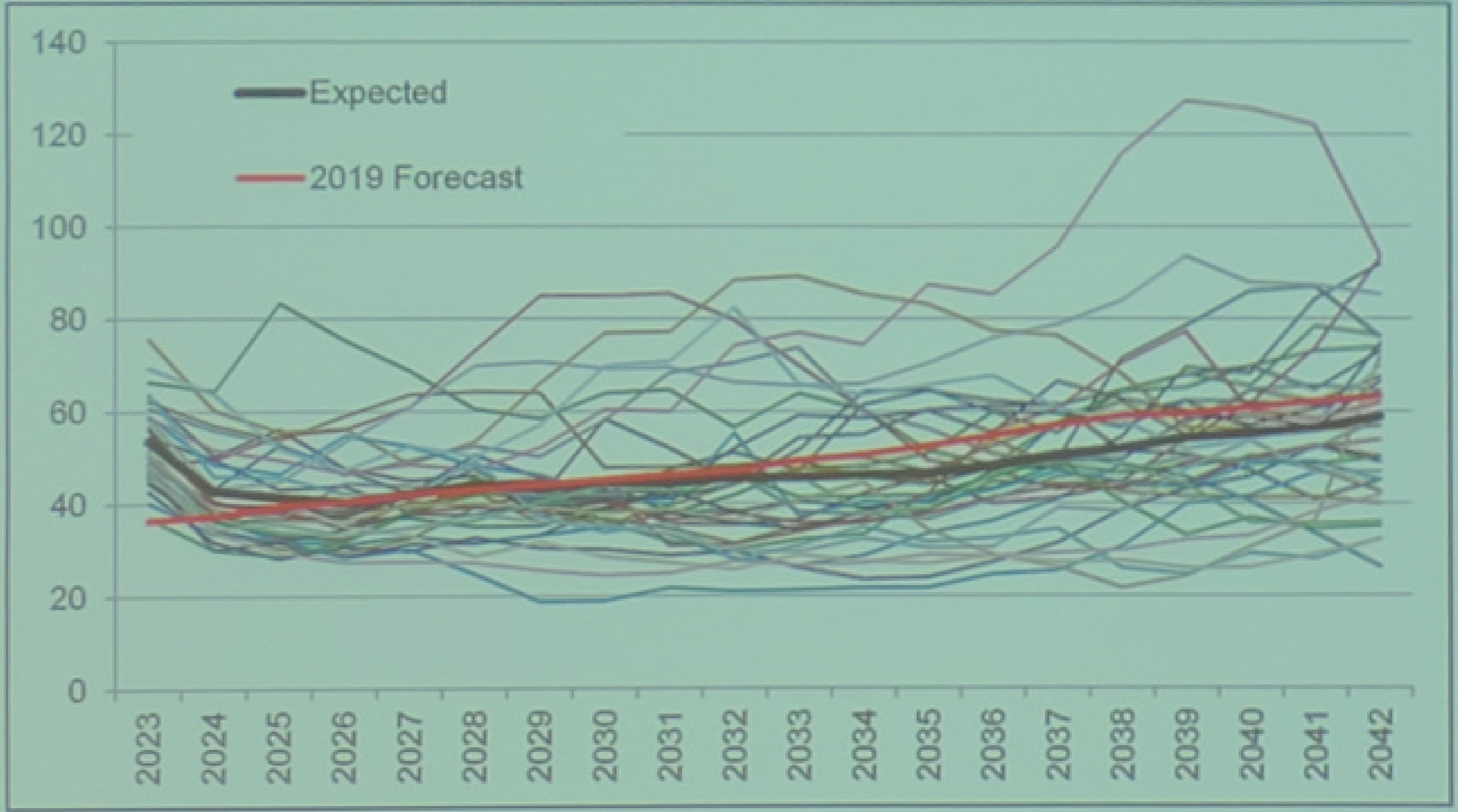
MISO West On Peak Power Price Forecast ($/MWh)



- Short Term
  - Power prices are expected to temper with the price of natural gas
- Long Term
  - Increasing renewable energy influence starting in 2033 results in a reduction of the forecasted energy component (only) of market prices in the last half of the study by 3.75%

Capacity Price Forecast

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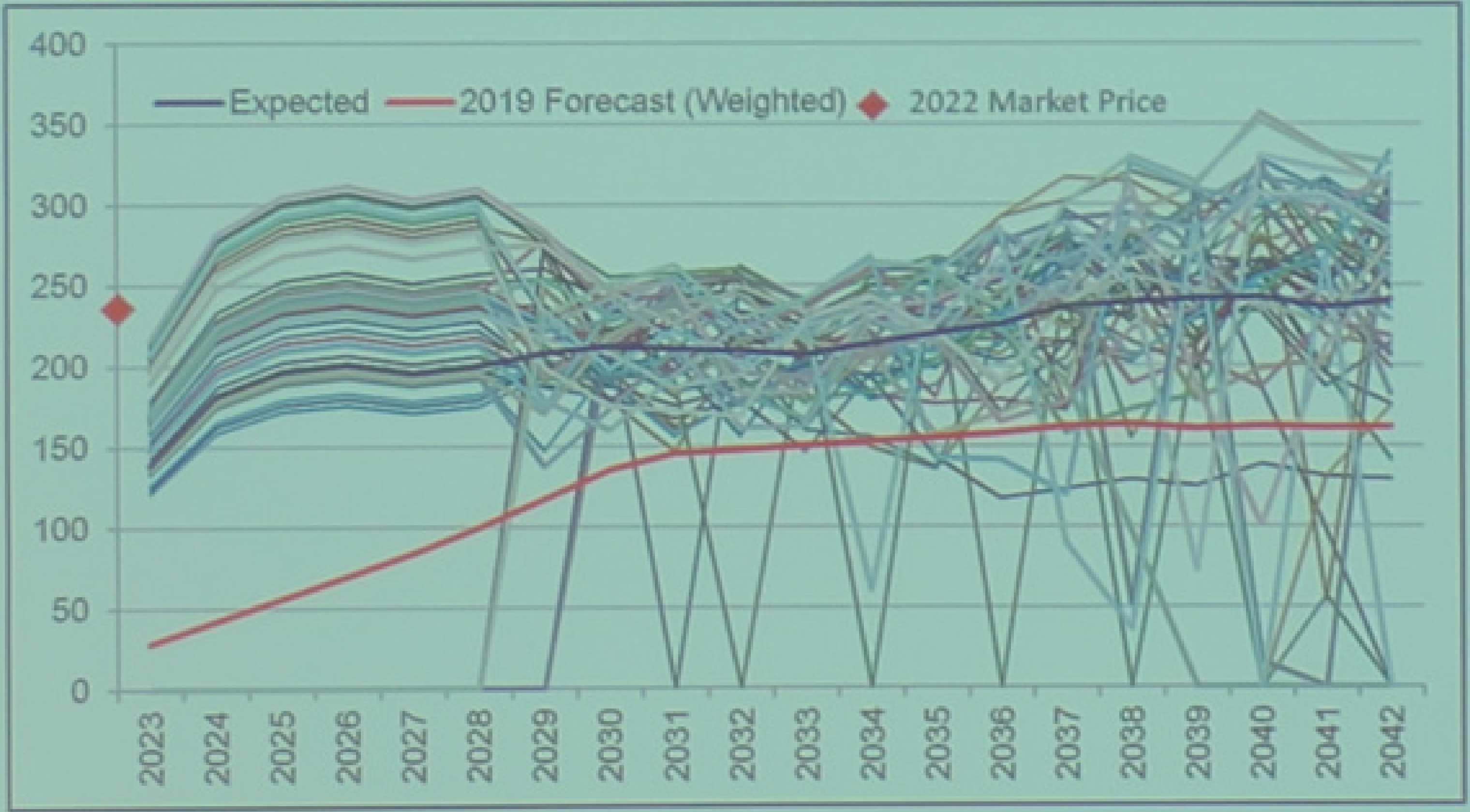
MISO West Capacity Forecast ($/MW-Day)



- MISO Capacity
  - Generally, capacity pricing is high throughout the study period
  - Upcoming changes include
    - Seasonal Capacity Market (2023)
    - Proposed Capacity Sloped Demand Curve (2024)
    - Renewable Capacity Accreditation Reductions

Fuel Price Forecast

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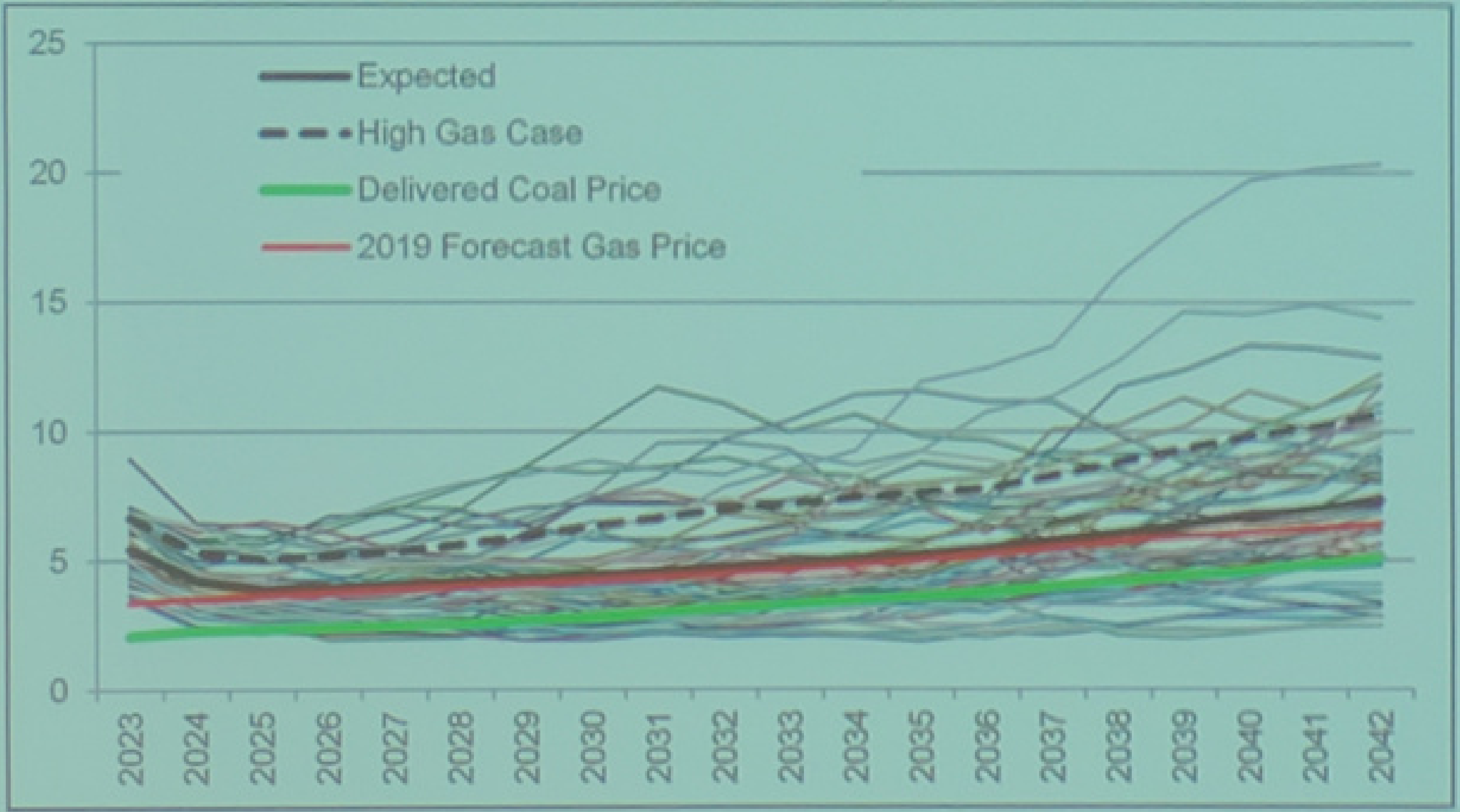
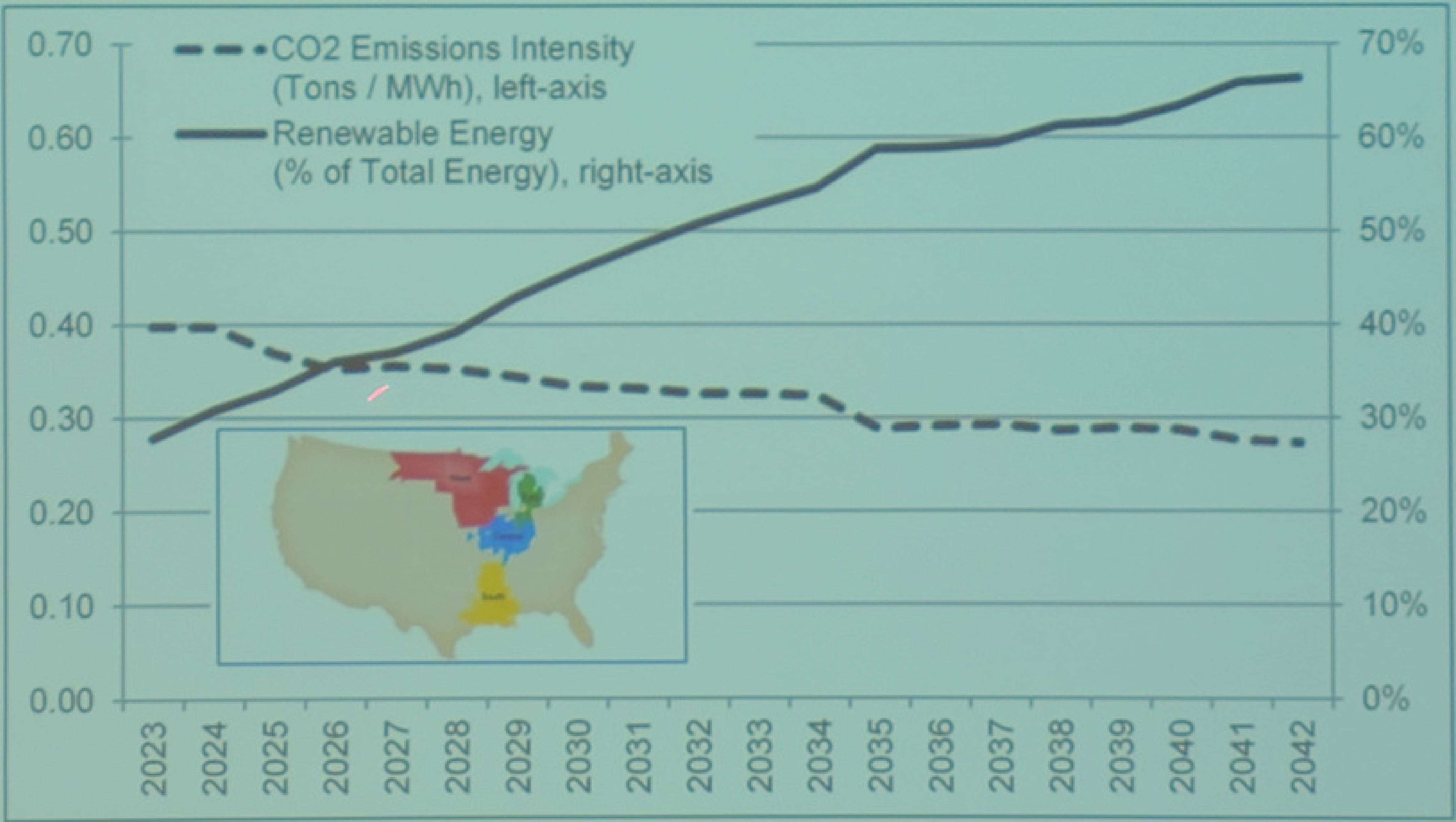
MISO West Delivered Fuel Prices ($/MMBtu)



- Natural Gas
  - After current natural gas spike, prices will temper and follow the 2019 forecast trend but slightly higher
- Coal
  - Delivered coal prices remain lower and more stable than natural gas

MISO West Renewable Forecast



Local Generation Assumptions

- Environmental regulations
  - All scenarios must comply with 316(b) regulations
- Existing local units
  - Unit 7 and Unit 8 retire in all scenarios
    - Unit shutdown costs of $2.7M
  - Unit 9 remains online and operating on coal at least through 2027
    - 316(b) compliance costs of $6.2M for Unit 9; included in all scenarios
    - $35M to convert Unit 9 to burn natural gas, including pipeline costs
    - ELG compliance costs of $33.1M for Unit 9
  - Demolition costs of $25.9M for all Units
- A minimum of 90 MW of local dispatchable generation was required in each scenario
- Muscatine Solar 1 – online Q4 2025; 30% capacity accreditation

Today's Objectives

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- Review results of 2022 Power Supply Study
- No decisions will be made today
- Not advocating for any portfolio until all information is reviewed and key questions are answered
- Our objective is to review key observations from the latest study and review the trade-offs across the portfolio alternatives
- Customer forum will be held on March 6, 2023 to get additional input

Steam Sales Contract

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- Steam Sales Contract to the adjacent industrial customer would begin in 2028
- Assumes MPW and steam customer can negotiate a contract
- Included three CHP configurations
- Subjected to all sensitivities and a loss of contract mid-term

2022 Power Supply Scenarios

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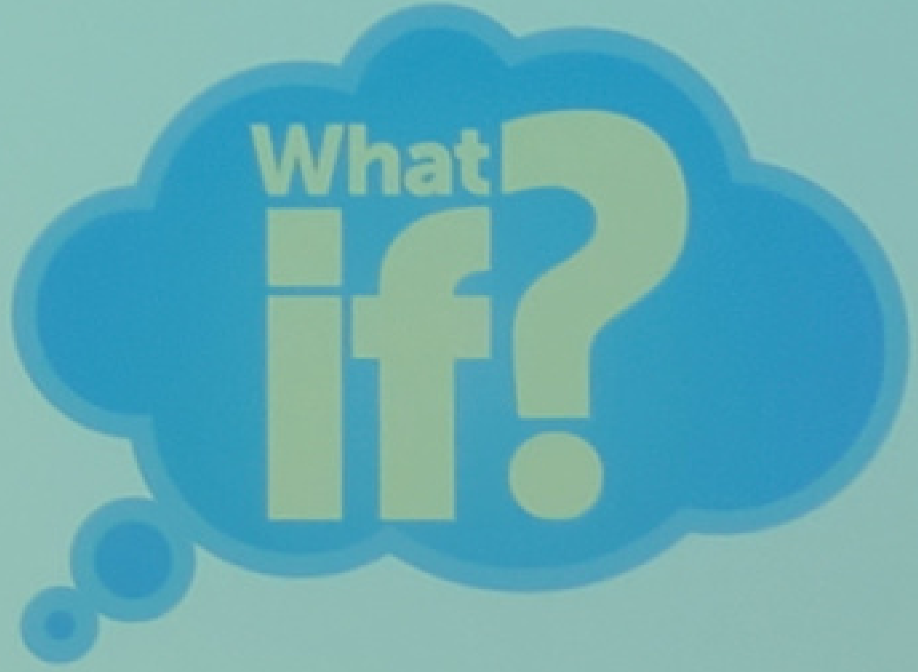
- Analyzed 19 scenarios
- Analyzed 100% renewables
- Subjected to 4 sensitivities
  - High gas
  - Co_2
  - CO_2 and high gas
  - Low-capacity pricing
- Nearly 4,000 potential outcomes



Portfolio Strategies

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- CHP
  - Strategy 1
    60 MW CHP
    (20-Year Contract)
    - 3 CHP Configs
      Various alternatives to fill out portfolio
      (9 scenarios)
  - Strategy 2
    60 MW CHP
    (10-Year Contract)
    - 3 CHP Configs
      Fill out portfolio
      (3 scenarios)
- No CHP
  - Strategy 3
    (No Steam Contract)
    - Various portfolio options
      (6 scenarios)

Generating Assets

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- Existing generation
- Combined Cycle Unit (hydrogen compatible)
- Simple Cycle Combustion Turbine (hydrogen compatible)
- Four Combined Heat and Power ("CHP") alternatives (hydrogen compatible)
- Reciprocating Engines ("recip" or "RICE")
- Wind
- Solar

Modeling Outline

- Base Case results
- 100% renewables (energy independence)
- CO_2 Trends
- Market sensitivity results
- Scenario short list
- Scenario review

		RELIABILITY			AFFORDABILITY					FLEXIBILITY			SUSTAINABILITY	
		Local Dispatchable Capacity (2030)	Fuel Availability Rank	Capacity Market Exposure (MW)	Expected 2023-42 20-Year ($/MWh)	Standard Deviation 2023-42 20-Year ($/MWh)	5% 2023-42 20-Year ($/MWh)	95% 2023-42 20-Year ($/MWh)	Capital Investment	Fuel Diversity	Renewable Fuel Flexability	Steam Sales	Carbon Reduction from 2005 by 2030 (%)	Renewable Generation % of load by 2030
00	Unit 9 Business-As-Usual Case	100%	1	0.0	53.75	4.20	46.84	60.65	39.3	No	No	No	-61%	10%
1A	70 MW 1x1 CHP with Extraction ST + 48 MW CT	74%	2	31.5	59.51	8.44	45.63	73.39	214.9	Yes	Yes	Yes	-84%	10%
1B	58 MW 1x1 CHP with Backpressure ST + 48 MW CT	66%	2	42.9	58.76	8.37	45.00	72.53	200.9	Yes	Yes	Yes	-84%	10%
1B.1	58 MW 1x1 CHP + Unit 9, 85 MW fuel conversion *(Oil or Gas)*	91%	2	4.8	63.44	8.73	49.07	77.80	158.5	Yes	Yes	Yes	-82%	10%
1B.2	58 MW 1X1 CHP + 48 MW Simple Cycle CT	66%	2	42.9	58.76	8.37	45.00	72.53	200.9	Yes	Yes	Yes	-84%	10%
1B.3	58 MW CHP + 2x31 MW CT's + 100 MW Solar	75%	2	6.1	59.14	6.95	47.70	70.57	217.9	Yes	Yes	Yes	-86%	28%
1B.4	58 MW CHP + 1x31 MW CT + 200 MW Solar	56%	2	6.5	58.73	5.22	50.14	67.31	170.8	Yes	Yes	Yes	-89%	51%
1B.5	50 MW CHP + 155 MW U9 on Coal + 100 MW Solar	136%	1	0.0	57.57	4.15	50.74	64.39	156.9	Yes	Yes	Yes	-55%	28%
1C	52 MW 1x0 CHP with Steam (no ST) + 48 MW CT	62%	2	49.0	59.50	8.72	45.15	73.84	192.9	Yes	Yes	Yes	-84%	10%
1D	90 MW 2x0 CHP with Steam (no ST) (2019 PSS Unit)	56%	2	58.3	60.83	10.14	44.16	77.50	197.6	Yes	Yes	Yes	-83%	10%
2A	70 MW 1x1 CHP with Steam extraction ST) + 48 MW CT	74%	2	31.5	60.37	8.15	46.96	73.78	214.9	Yes	Yes	Yes	-84%	10%
2B	58 MW 1x1 CHP with Steam Turbine	66%	2	42.9	59.35	8.12	46.00	72.70	200.9	Yes	Yes	Yes	-84%	10%
2C	52 MW 1x0 CHP Operating as Peaking Unit + 48 MW CT	62%	2	49.0	60.67	8.47	46.74	74.59	192.9	Yes	Yes	Yes	-84%	10%
3A	126 MW Local Combined Cycle	79%	3	23.3	60.36	6.94	48.94	71.77	222.7	Yes	Yes	No	-85%	10%
3B	180 MW Local Combined Cycle	112%	3	0.0	54.86	6.57	44.05	65.67	290.9	Yes	Yes	No	-81%	10%
3C	97 MW Local Combustion Turbines	60%	4	52.2	57.31	7.60	44.82	69.81	144.2	Yes	Yes	No	-85%	10%
3D	143 MW U9 Converted to Oil/ Gas for Local Reliability	90%	4	6.1	55.95	8.15	42.54	69.37	46.8	No	No	No	-82%	10%
3E	155 MW U9 (BAU) + 200 MW Solar	100%	1	0.0	54.20	4.75	46.38	62.01	39.3	No	No	No	-64%	51%
3F	143 MW U9 on Gas + 400 MW Solar	90%	4	0.0	57.58	3.51	51.80	63.35	46.8	No	No	No	-90%	99%

Base Case Results – Key Observations

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- Scenario 00 (BAU) and Scenario 3E (BAU + Solar) had the lowest combination of 20-year NPVs and risk profiles
- The best performing CHP Scenario is 1B.5, which includes a 1x1 CHP Unit with a Back Pressure ST, Unit 9 operating on coal and 100 MW of Solar PV
- The best performing natural gas-fired alternative is Scenario 3B (larger local CC) due to the lower capital cost assumption/MW and better heat rate
- The higher levels of fixed price solar PPAs in these scenarios result in a small increase in the 20-year NPV costs but result in less variability in power supply costs and lower net CO_2 emissions

100% Renewable (Energy Independence)

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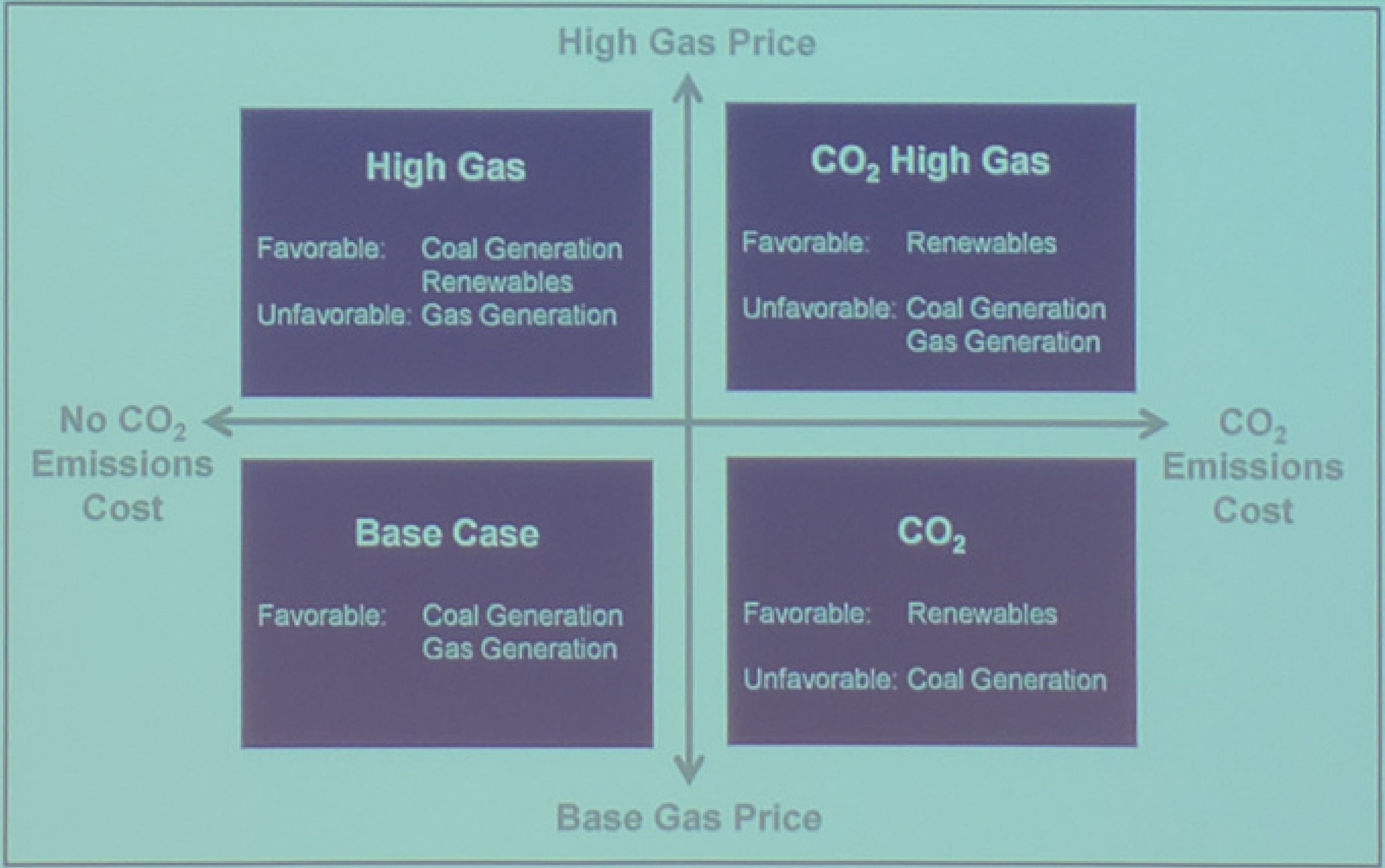
Summary Results for 100% Renewable Strategies

	Battery Strategy	Clean CT Strategy
Installed Capacity (MW)		
Solar	480	130
Wind	200	140
Battery (12-Hour Duration)	340	-
Clean CT	-	125
Total	1,020	395
Power Supply Costs ($ per MWh)	$253	$142
Select Operational Results		
Peak Demand – MW (2010-2022 Average)	139	139
Clean CT Capacity Factor	-	24%
Surplus Energy (GWh)	784	135
Surplus Energy % of Total Renewable Energy	47%	18%

Expected 2023-42 20-Year ($/MWh)
53.75
59.14
[illegible]
57.57
54.86
57.31
54.20
57.58

- Actual 4-day Low wind and MPW load
  - Solar based on typical weather year in Muscatine County
- **$887 Million** in Battery capital costs
  - **$97 million** in annual costs for debt service and Fixed O&M for just the battery system!
  - 12-Hour battery not commercially available
- Installed Capacity of 3 to 7 times MPW's Peak demand
- Clean CT Scenario assumes a reliable supply of green hydrogen available when needed
- Costs for both are significantly higher than BAU
- Assumes excess energy could be delivered and sold to market
  - Could require significant transmission improvement costs

Market Sensitivity Cases



Sensitivity Result Observations

- Diverse portfolios hold up better across all scenarios
- The Unit 9 on Coal Scenarios performed well across all sensitivities, even the CO_2 Sensitivities
- The relative lower performance of the CHP Scenarios are a change from the 2019 PSS
  - Higher CHP Costs and Changes to the Market Resulted in Lower Energy Prices that Negatively Affect the Margins of Must-run Units like CHPs
  - Scenarios that include CHP have multiple local units to dispatch providing some resiliency to the local system in the event of an unplanned outage on one unit
  - The Inflation Reduction Act ("IRA") includes incentives for CHP units below 50 MW of capacity, which could lower the capital costs if a unit of that type is pursued at this time
- Scenario with high levels of solar capacity additions (1B.5, 3E and 3F) generally perform well in terms of both cost and CO_2 emissions and are notably better in High Gas and CO_2 Sensitivities

Current Position

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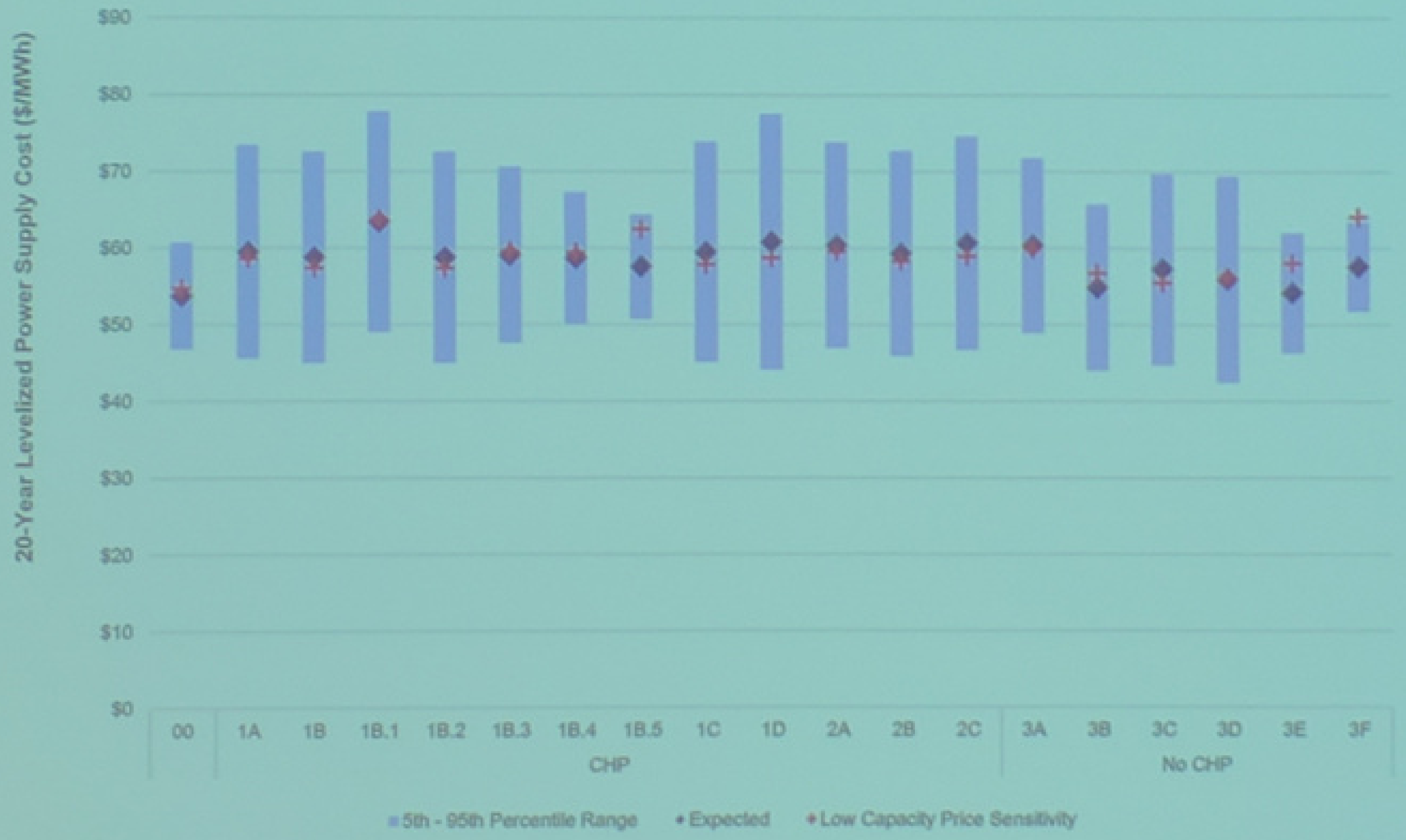
- Continued operation of Unit 9
  - Meets MPW's capacity requirements
  - Hedge on energy market pricing
- Units 7 & 8 operating as peaking units
  - Unit 8A Steam Sales Contract complete and decommissioning has begun
- South Fork Wind in-service; PPA ends in 2036
- Muscatine Solar 1 PPA is signed; projected online Q4 2025

Low-Capacity Price Impacts



- Key Observations
  - When load and capacity are closely balanced, market capacity price has minimal impact
  - Scenarios that are long on capacity are much more sensitive to market capacity revenues
    - For example, 3F (with 400 MW of Solar) performs significantly worse when capacity prices are low

"Short List" of Scenarios

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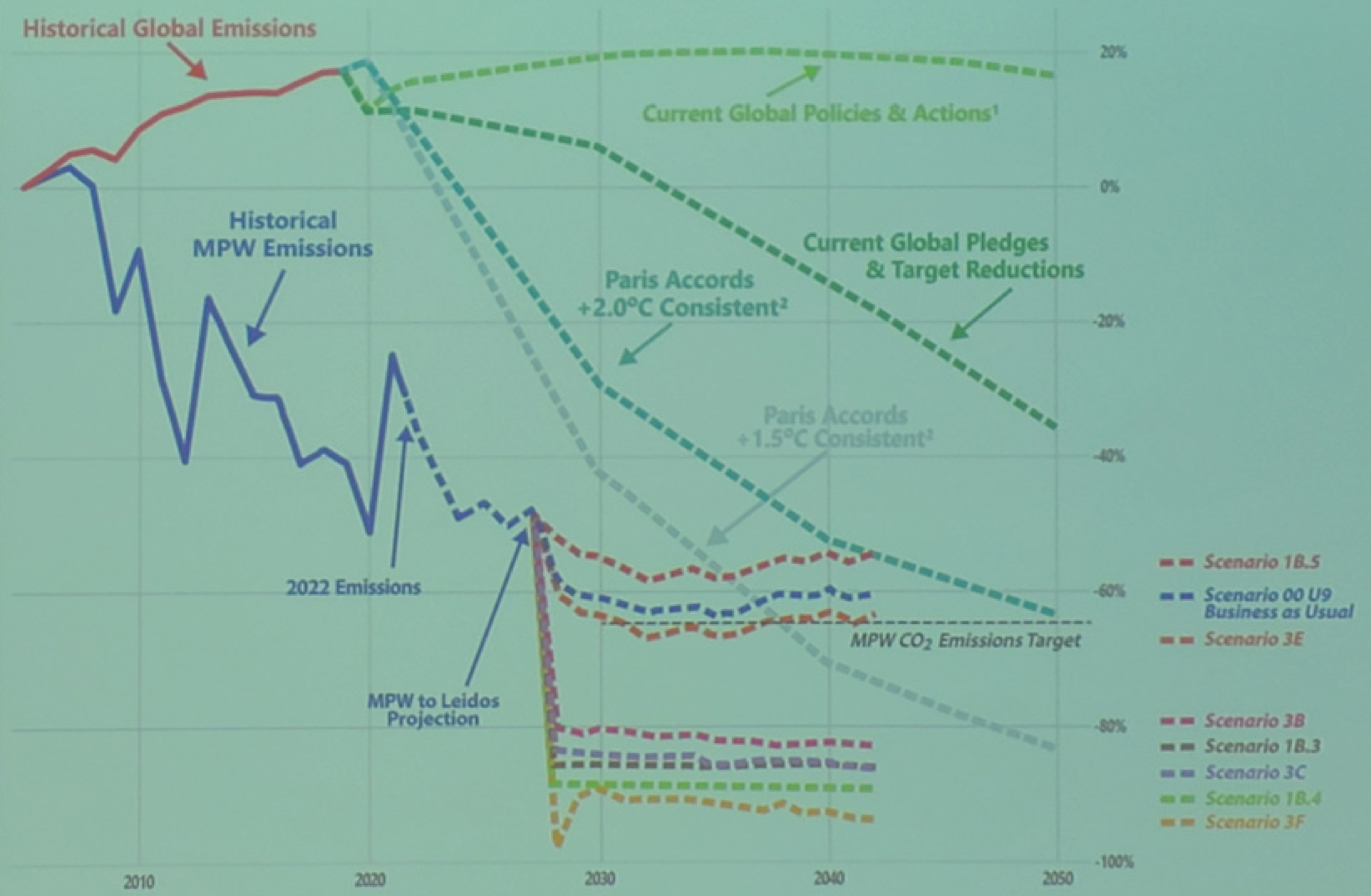
MPW

Projected Carbon Dioxide Emission Reductions



1 Global emissions data sourced from Climate Action Tracker: Global emissions time series, published 11/6/21. Values represent percent reduction from calendar year 2005 baseline emissions.

2 Values represent reduction in global emissions consistent with the Paris Agreement's goal to hold the increase in global average temperature to below 2.0°C above pre-industrial levels and pursuing efforts to limit temperature increase to 1.5°C. Data sourced from Climate Action Tracker, Climate Analytics and NewClimate Institute.

Scenario 00
Unit 9 (Business As Usual)

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Total 196.8 MW
Required 155.6 MW

Total 165.1 MW
Required 155.6 MW

Total Generation 743.4 GWh
Native Load 919.4 GWh

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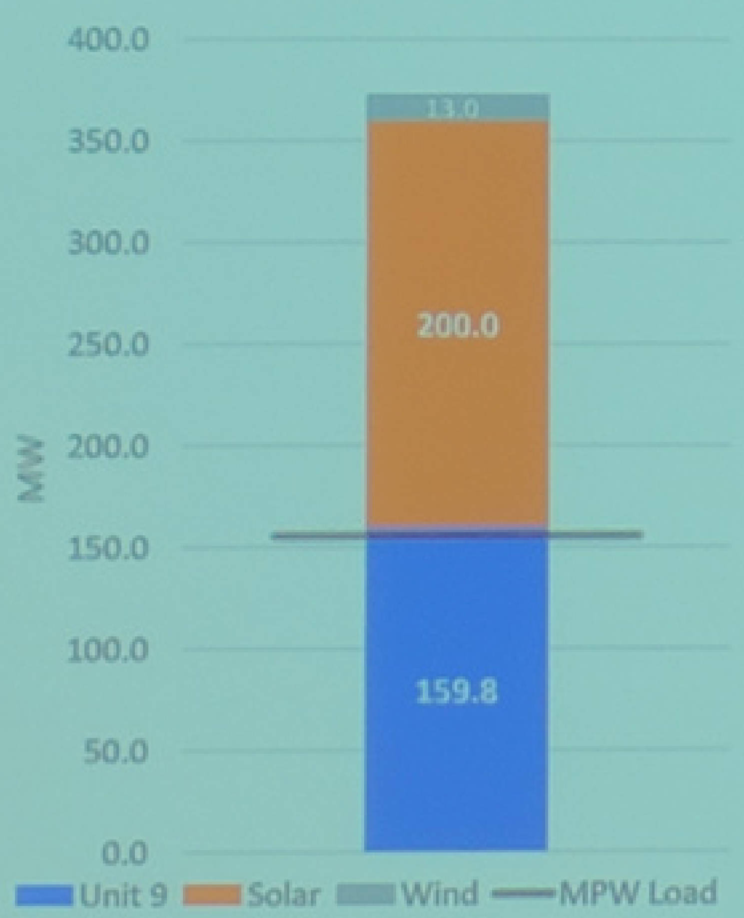
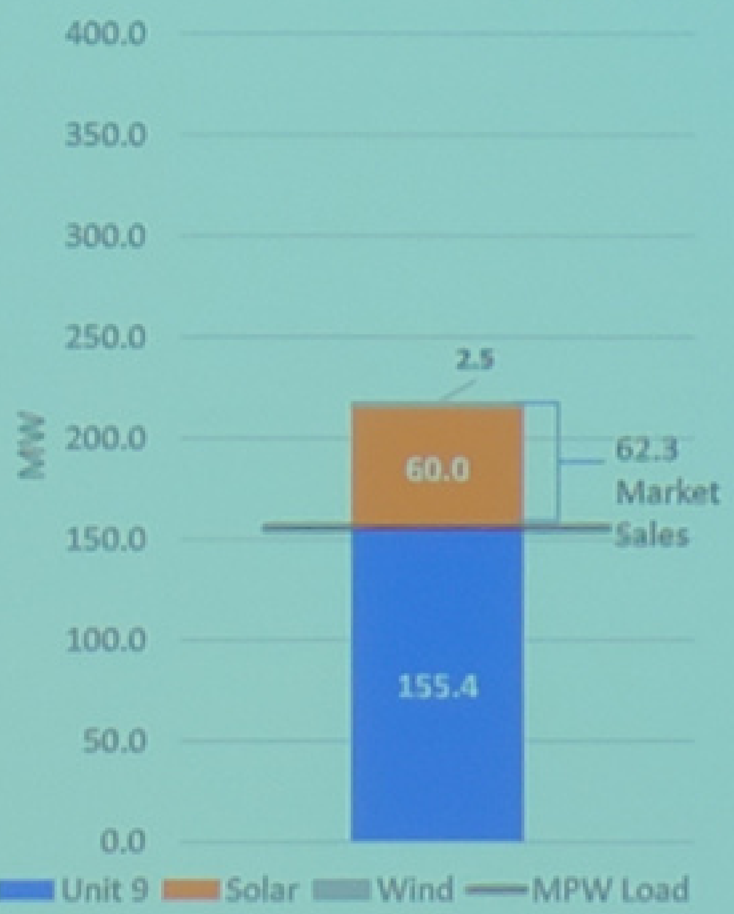
Scenario 3E
Unit 9 (BAU) + 200 MW Solar

Nameplate Capacity



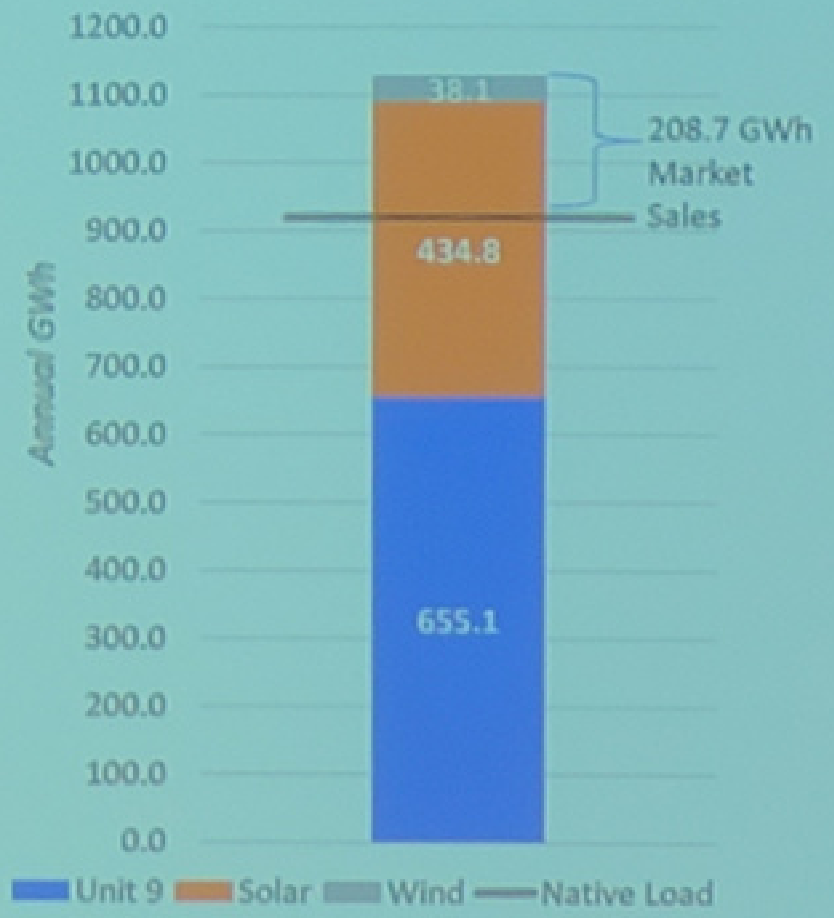
Total 372.8 MW
Required 155.6 MW

Accredited Capacity



Total 217.9 MW
Required 155.6 MW

Annual Energy



Total Generation 1128.1 GWh
Native Load 919.4 GWh

Scenario 3B
Local Combined Cycle – 180 MW

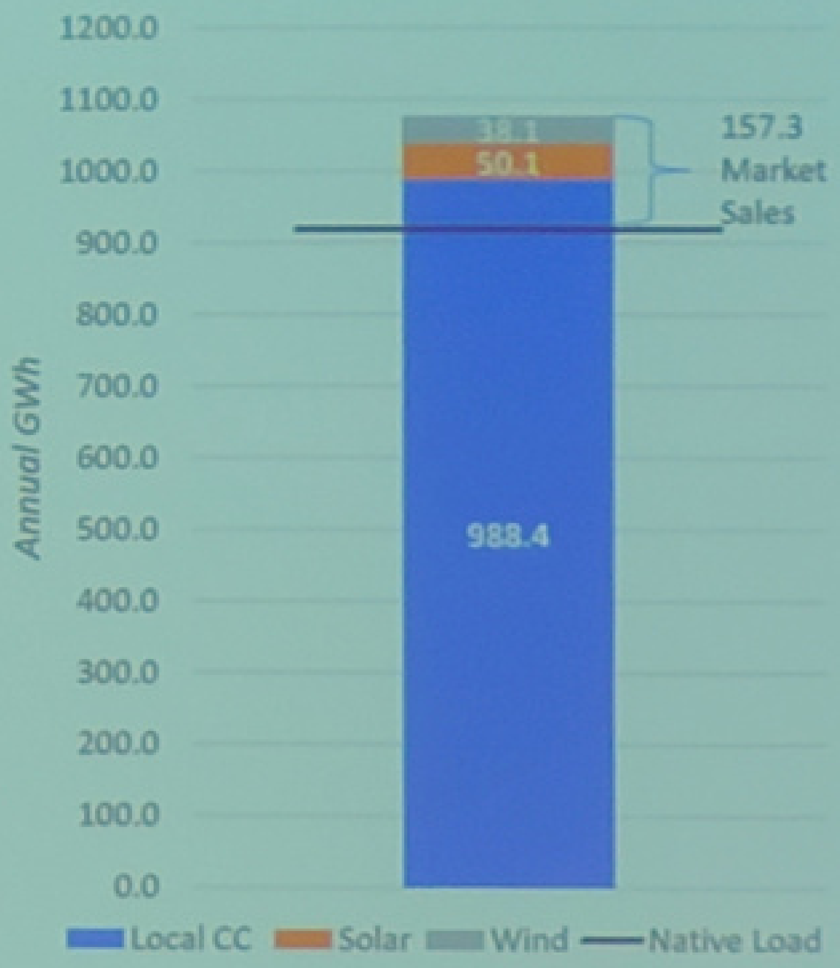
Nameplate Capacity

Total 228 MW
Required 155.6 MW

Accredited Capacity

Total 183.8 MW
Required 155.6 MW

Energy



Total Generation 1076.7 GWh
Native Load 919.4 GWh

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Scenario 3B
Local Combined Cycle – 180 MW

Total 228 MW
Required 155.6 MW

Total 183.8 MW
Required 155.6 MW

Total Generation 1076.7 GWh
Native Load 919.4 GWh

Scenario 3C
Local Combustion Turbines – 97 MW

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Total 142.0 MW
Required 155.6 MW

Total 103.4 MW
Required 155.6 MW

Total Generation 344.5 GWh
Native Load 919.4 GWh

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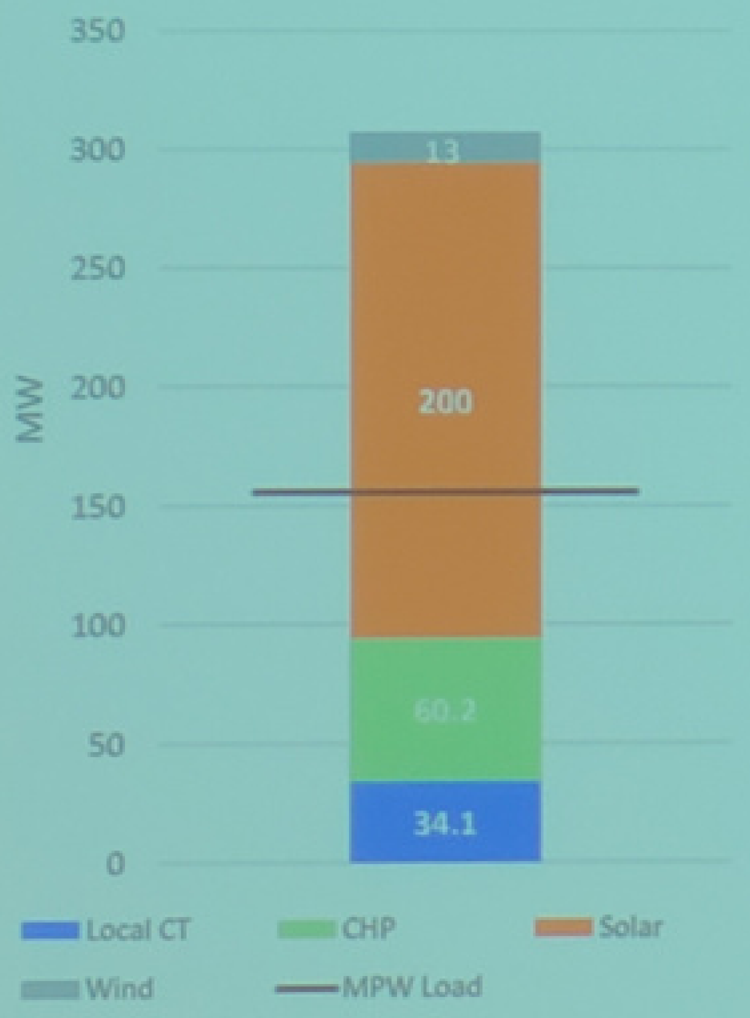
CHP Assumption Changes

- 2019 CHP performance and steam production were based on planning level estimates
  - CHP investigation with Stanley (+/-30%)
  - Smaller units
  - Long-Term Service Agreement (LTSA) costs
  - Insurance
  - Increased heat rate
  - Higher capital costs
  - Reduction of forecasted energy prices

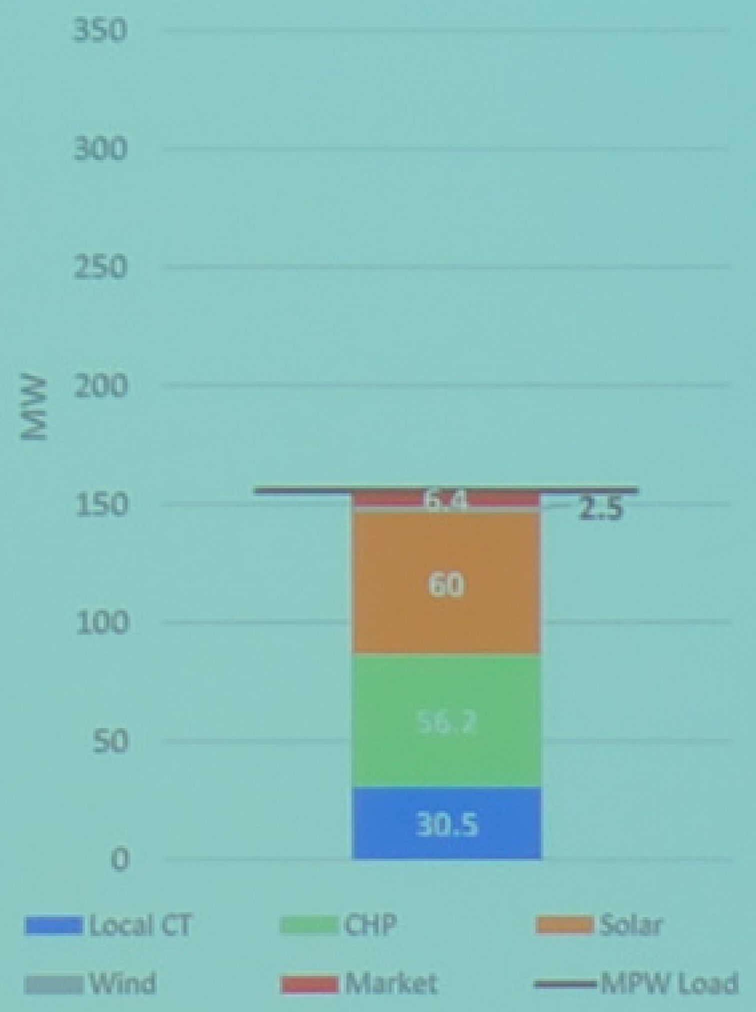
Scenario 1B.4
58 MW CHP + 1x31 MW CT + 200 MW Solar

Nameplate Capacity



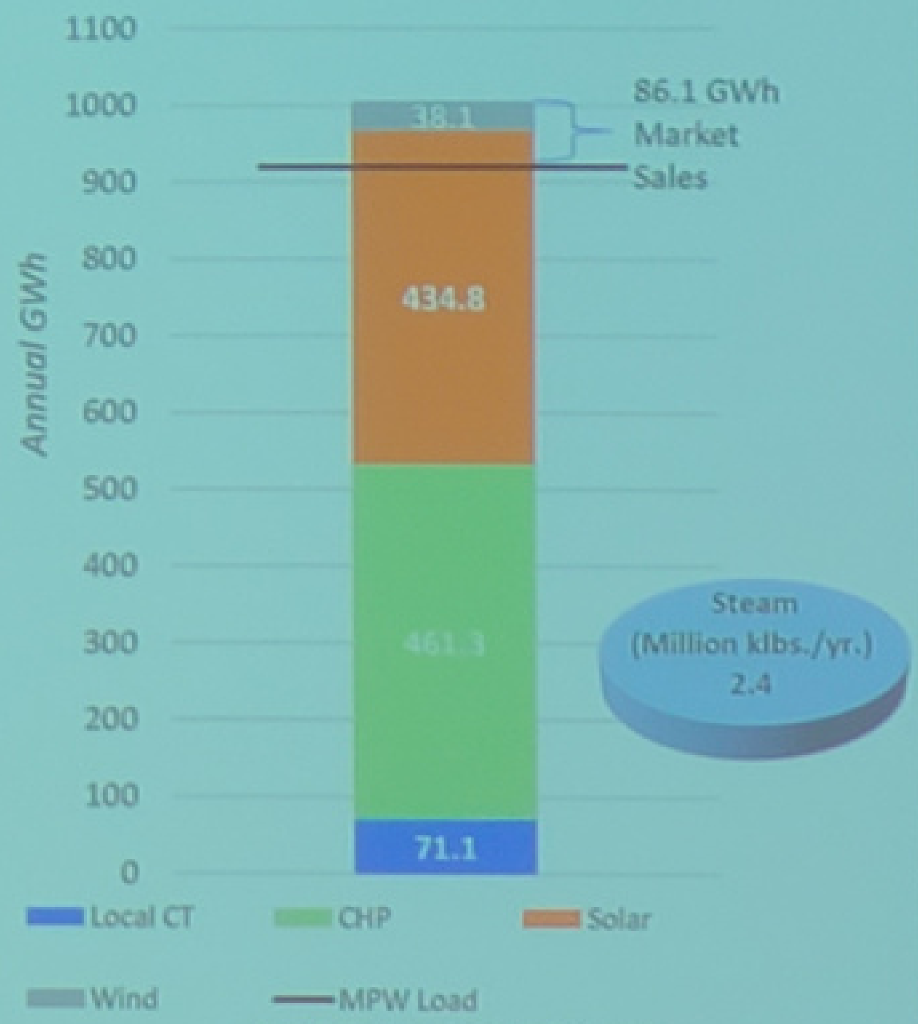
Total 307.3 MW
Required 155.6 MW

Accredited Capacity



Total 149.2 MW
Required 155.6 MW

Annual Energy



Total Generation 1005.5 GWh
Native Load 919.4 GWh

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2019 PPS Recommendations

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- ✓ Explore the addition of local solar PV
- ✓ Evaluate the economics of a new CHP resource and steam sale extension
- ✓ Manage market risk
- ✓ Investigate regional combined cycle pricing
- ✓ Tentatively plan for Unit 9 retirement by 2028
- ✓ Units 7, 8 & 8A retirement planning for 2023

Scenario 3F
Unit 9 on Gas + 400 MW Solar

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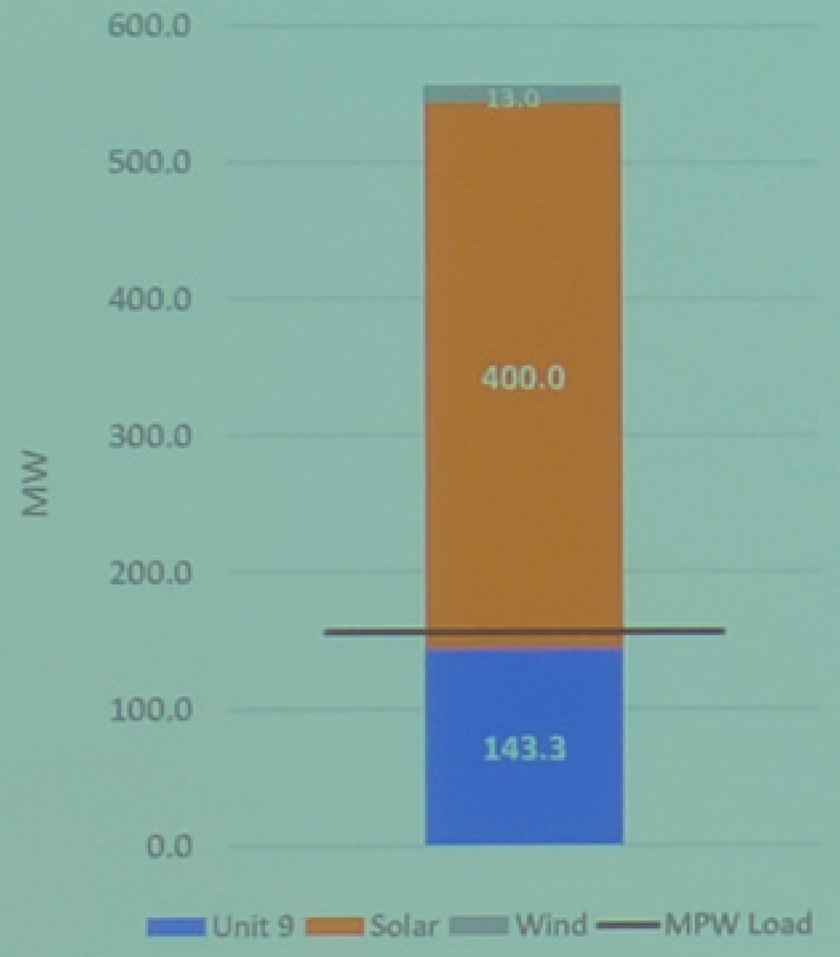
Nameplate Capacity

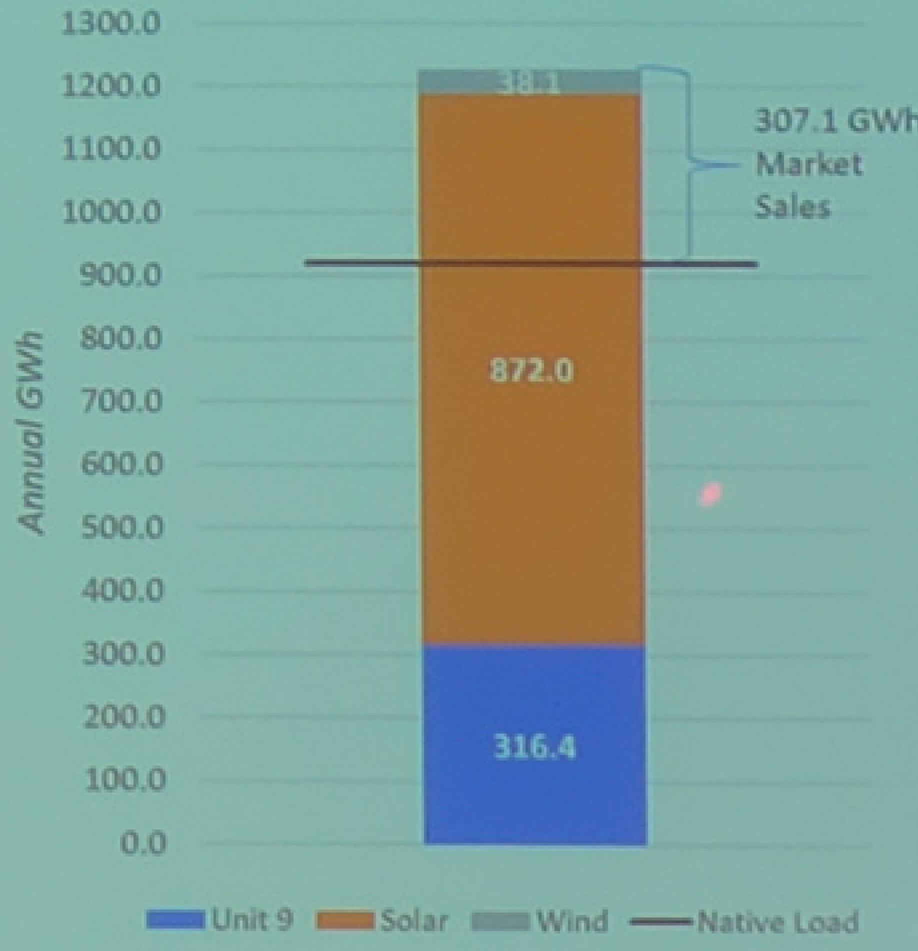


Total 556.9 MW
Required 155.6 MW

Accredited Capacity

Total 262.4 MW
Required 155.6 MW

Annual Energy



Total Generation 1226.5 GWh
Native Load 919.4 GWh

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Scenario 1B.5 *(Under investigation)*
Unit 9 (BAU) + 50 MW CHP + 100 MW Solar

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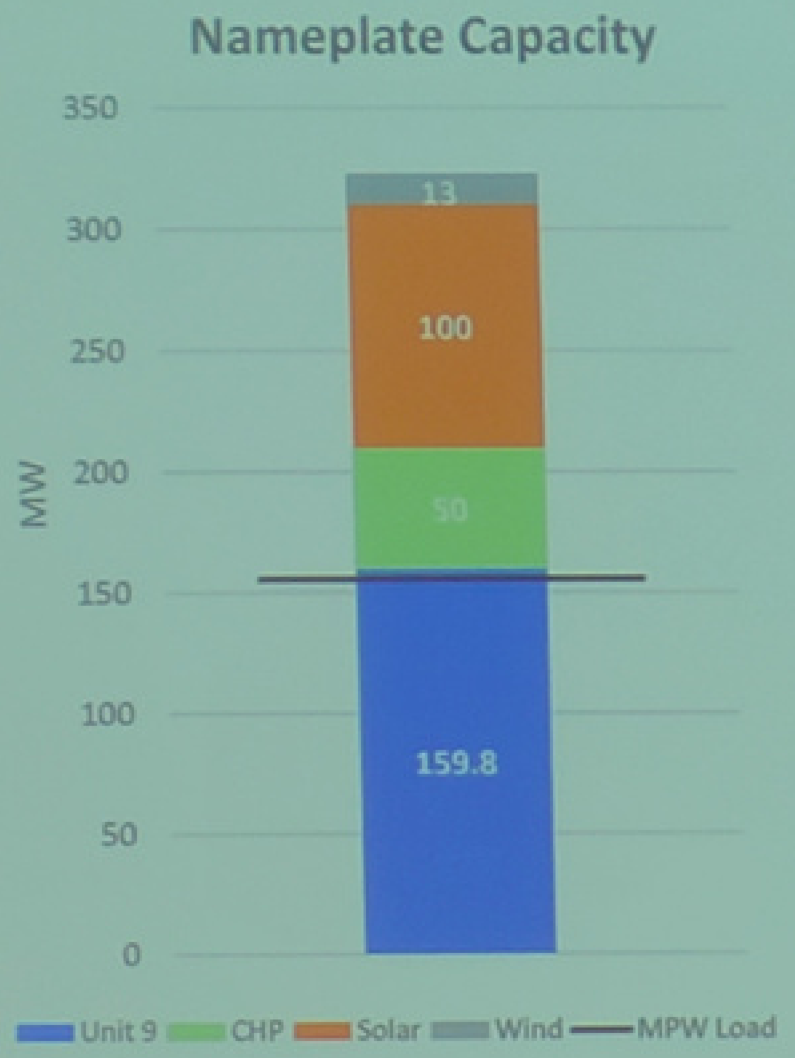
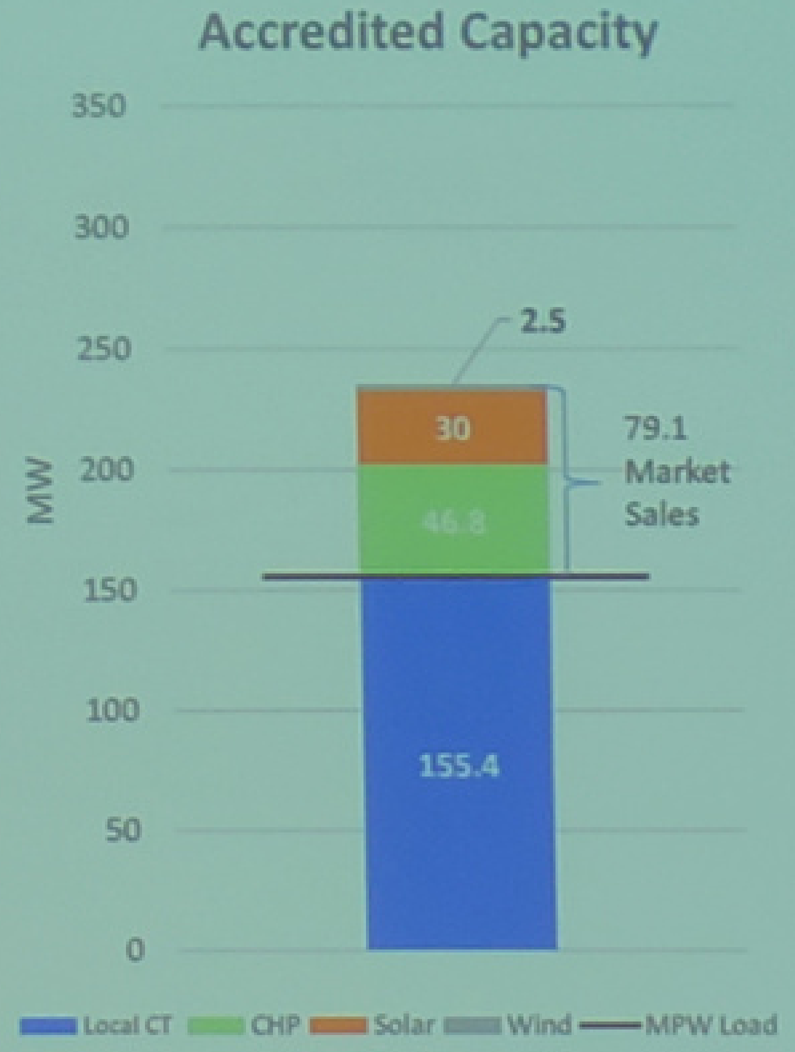


Total 322.8 MW
Required 155.6 MW

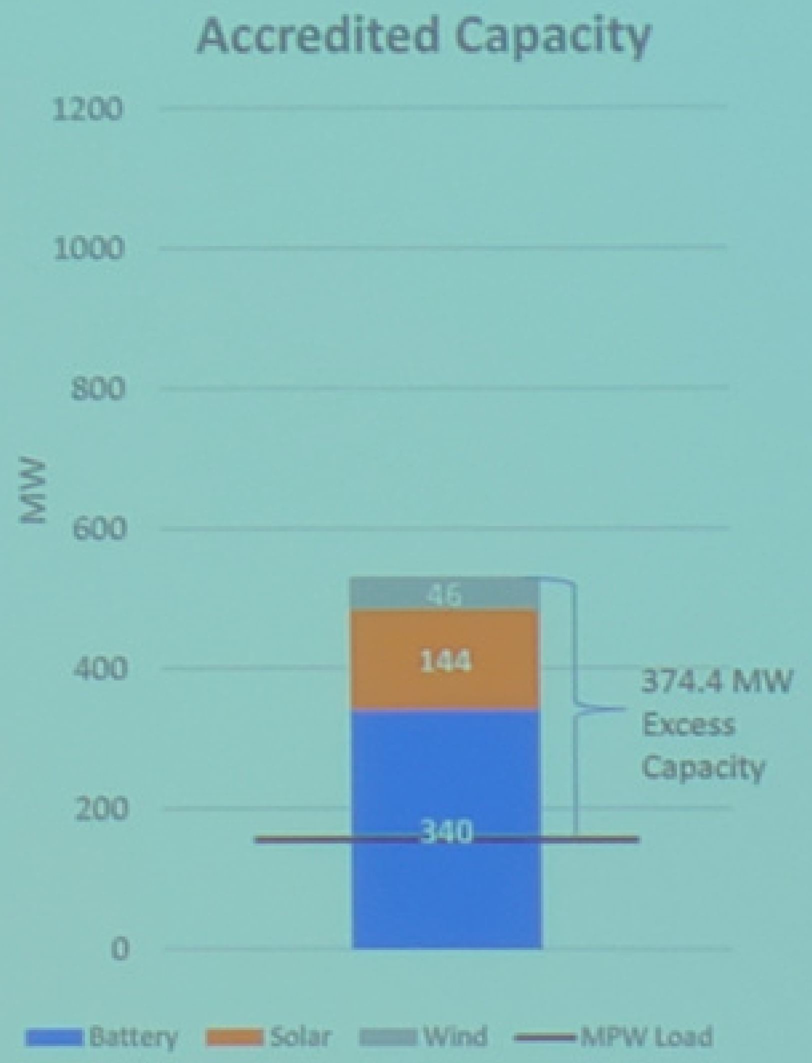


Total 234.7 MW
Required 155.6 MW

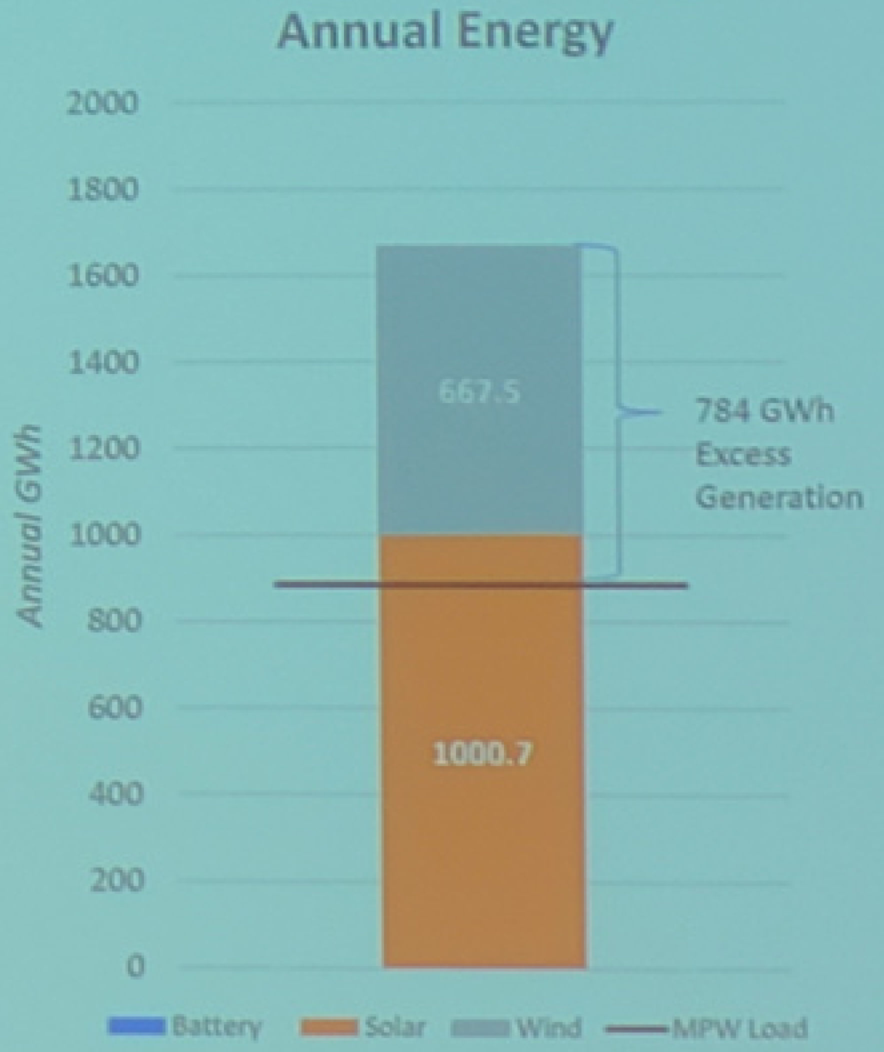
Total Generation 1293.8 GWh
Native Load 919.4 GWh

100% Renewable w/ Battery (Energy Independence)

Total 1020 MW
Required 155.6 MW



Total 530 MW
Required 155.6 MW



Total Generation 1668.3 GWh
Native Load 884.3 GWh (Based on Historical Data)

100% Renewable w/ Clean CT
(Energy Independence)

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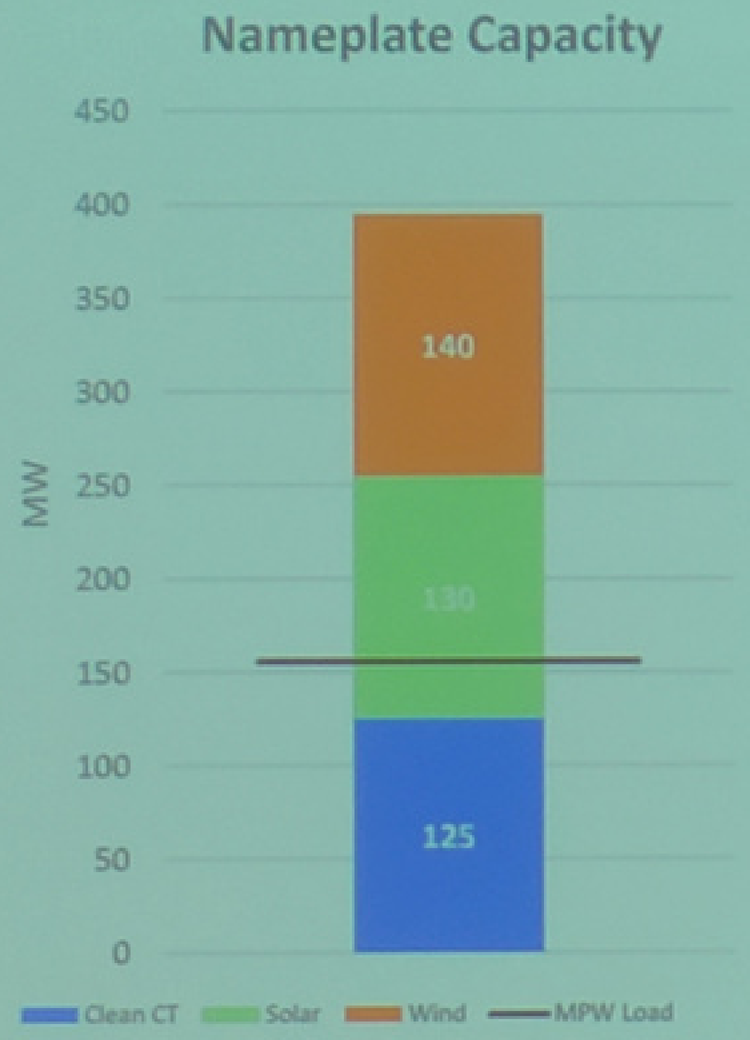
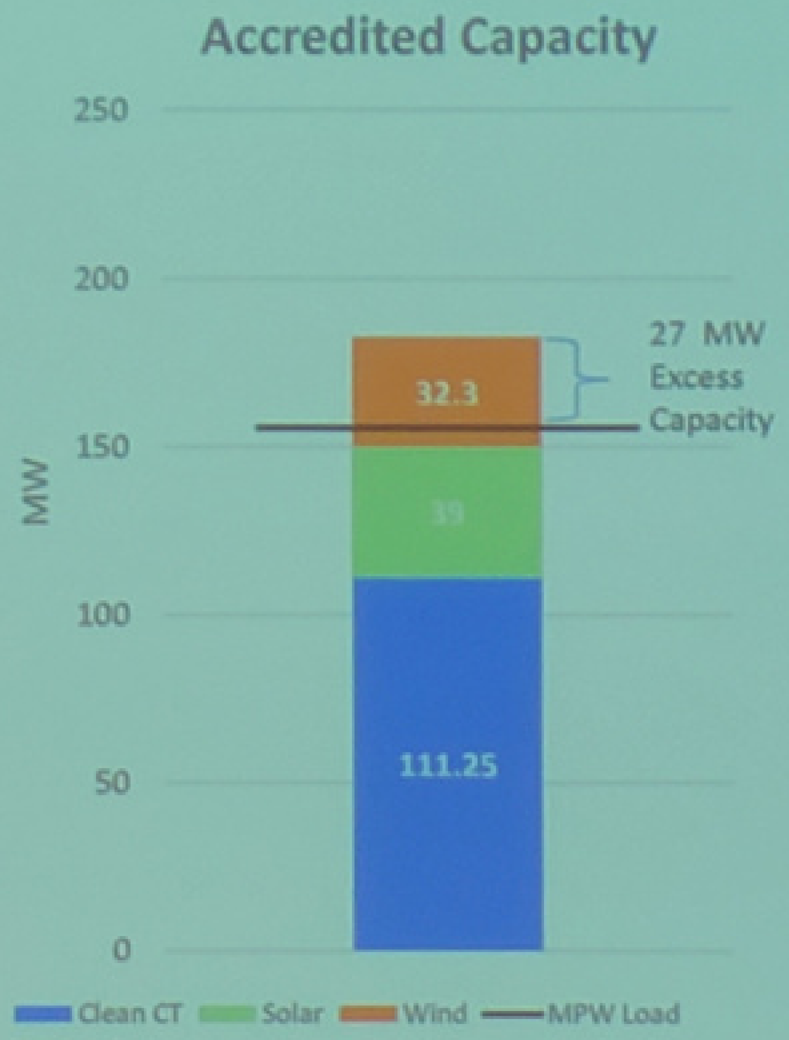
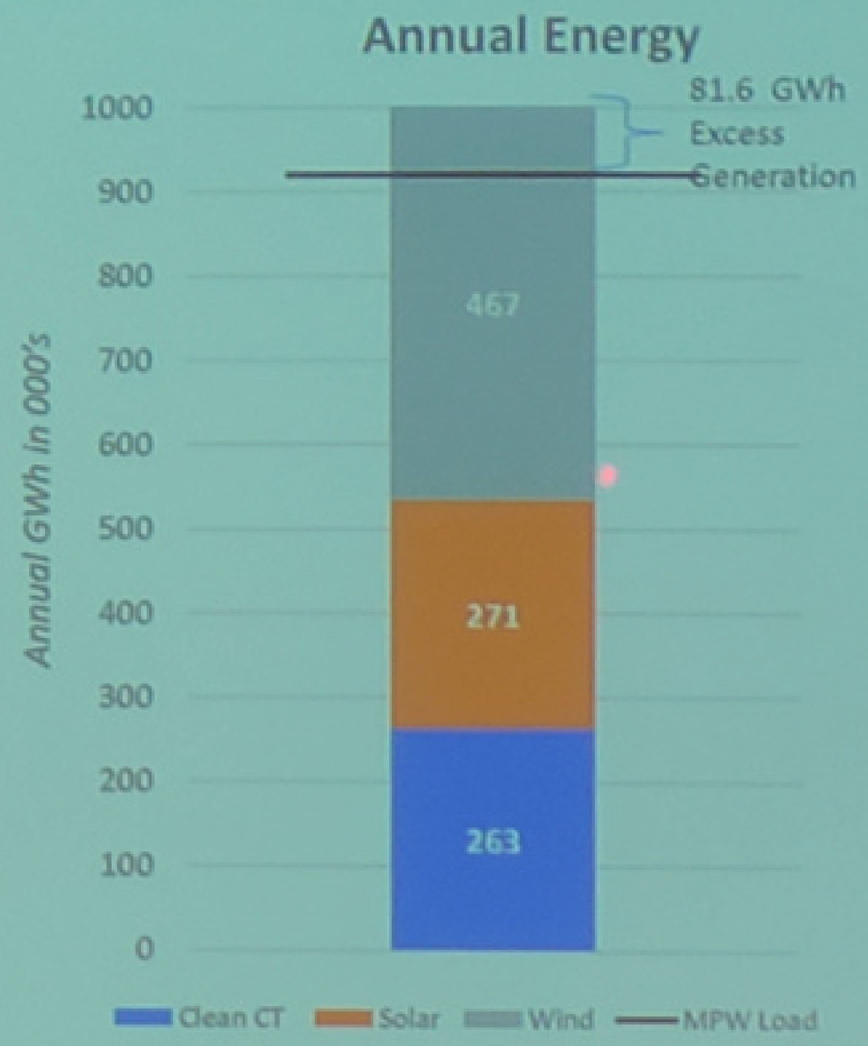


Total 395 MW
Required 155.6 MW



Total 182.6 MW
Required 155.6 MW



Total Generation 1001 GWh
Native Load 919.4 GWh

Balanced Scorecard Analysis

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Description		RELIABILITY		AFFORDABILITY				FLEXIBILITY				SUSTAINABILITY	
		Local Dispatchable	Fuel Availability	Cost per kWh	Rate Stability	Capital Cost	Capex per Unit of Capacity	Future Transition Flexibility	Diversity of Resources	Hydrogen Fuel Capability	Steam Sales	CO_2 Reduction	Renewable Energy Share
00	Unit 9 Business-As-Usual Case	🟢	🟢	🟢	🟢	🟢	🟢	🟡🟢	🔴	🔴	🔴	🟡	🔴🟡
1B.3	58 MW CHP + 2x31 MW CT's + 100 MW Solar	🟡🟢	🟡	🟡	🟡	🔴🟡	🟡	🟡	🟡🟢	🟢	🟢	🟡🟢	🟡
1B.4	58 MW CHP + 1x31 MW CT + 200 MW Solar	🟡	🟡	🟡	🟡🟢	🟡	🟡🟢	🟡	🟡🟢	🟢	🟢	🟢	🟡🟢
1B.5	50 MW CHP + 155 MW U9 on Coal + 100 MW Solar	🟢	🟢	🟡	🟢	🟡🟢	🟢	🟡🟢	🟢	🟢	🟢	🟡	🟡
3B	180 MW Local Combined Cycle	🟢	🟡	🟡🟢	🟡🟢	🔴	🔴🟡	🔴	🔴	🟢	🔴	🟡🟢	🔴🟡
3C	97 MW Local Combustion Turbines	🔴🟡	🔴	🟡🟢	🟡	🟡🟢	🟡	🔴🟡	🔴🟡	🟢	🔴	🟡🟢	🔴🟡
3E	155 MW U9 (BAU) + 200 MW Solar	🟢	🟢	🟢	🟢	🟢	🟢	🟡🟢	🟡	🔴	🔴	🟡	🟡🟢
3F	143 MW U9 on Gas + 400 MW Solar	🟡🟢	🔴	🟡🟢	🟡	🟢	🟢	🟡	🟡	🔴	🔴	🟢	🟢

A Few Key Observations

KEY OBSERVATION	NOTES
100% Renewable remains Infeasible at this time	Cost of both options are still out of range. Many other feasibility questions still remain
Installed Capacity Remains Valuable	2022 was a stark reminder of the volatility of the market and risk of reliance on external factors
Keeping Unit 9 in Service is the Lowest Cost Capacity Option	Either ELG compliance or gas conversion provide capacity at much lower cost per kW than new options
Unit 9 on Coal Performs Well	Stable fuel costs and ability to keep inventory onsite provides many benefits
Gas Availability is Significant Concern	Gas supply gets very tight during major winter events, which could limit or sideline gas units when needed most; especially peaking units
Unit 9 on Coal Could Save Larger Investment in Gas Assets	Keeping Unit 9 on coal for now provides an opportunity to skip/limit gas as a bridge fuel; although f skipping gas is still unlikely in the next 10 years
CHP Unit Provides Operational Benefits	Having an additional local unit provides redundancy Stable operation allows for hedging gas supply
IRA Provides Opportunities	CHP – Specific incentives included in IRA, but timeline is short Solar, Wind – Incentives will hopefully bring prices back down, but not as dramatically as some

A Few Key Risk Considerations

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KEY RISK	NOTES
Fuel Availability	Access to natural gas during winter storms is becoming a major concern
Fuel and Market Pricing	Volatility will largely follow natural gas price volatility
Capacity Pricing	MISO auction results have been extremely volatile, which can swing financial results depending on net capacity position. Sloped demand curve will help
Environmental Regulation Uncertainty	Uncertainty will continue, which makes large investments inherently riskier
Renewable Growth	Will lower marginal energy costs in market due to offer structure, but increase reliability risk
Steam Sales Contract Risk	Long-term contract carries financial risk, depending on how terms are structured
Electrification Load Growth	Aggressive electrification trends could increase capacity needs significantly – both total capacity and local dispatchable req's
Regional Price Separation	If our assets are not local, price separation increases financial risk

Recommendations From the Study

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RECOMMENDATION	DETAILS
Confirm Steam Customer's Interest in New Contract	• Discuss mutual interest and seek agreement to continue CHP investigation
If CHP Pursued, Prioritize Certain Considerations	• Seek to optimize IRA tax incentives • Investigate flex fuel options (natural gas, fuel oil, hydrogen) • Size natural gas interconnection to provide flexibility for the future • Make efforts to reuse MISO interconnection rights from Units 7 & 8

Pursue Additional Renewable Resources	• Monitor market to determine optimal time to issue renewable RFP
	  ◦ Investigate combination of both solar and wind alternatives
	• Target annual output equivalent to 25% of native system energy
	  ◦ If CHP not pursued, consider target of 50% renewables
	• Preference for local projects, but entertain projects in MISO Zone 3
	• Monitor storage technology development
	• Optimize IRA tax incentives

Timeline Considerations

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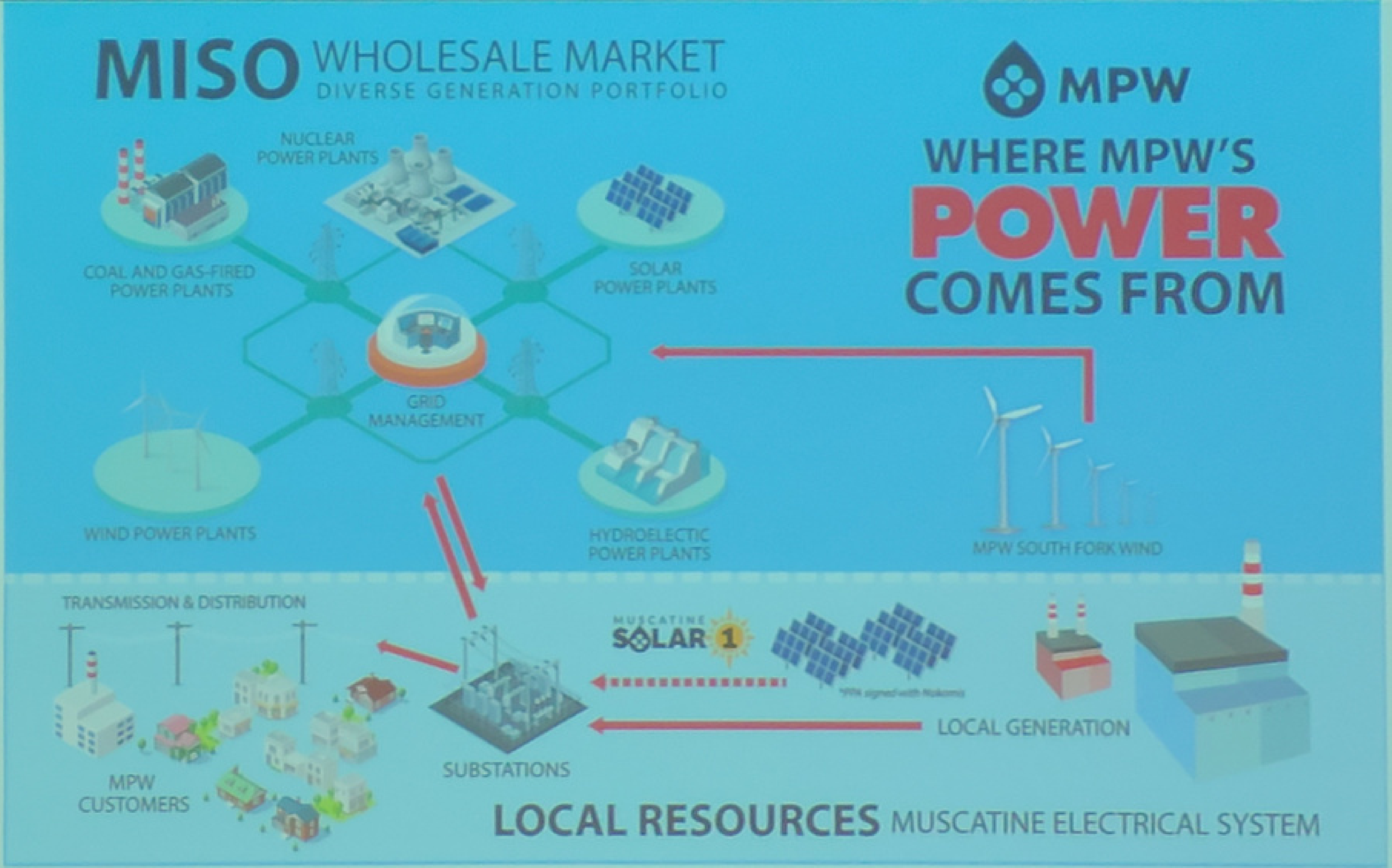
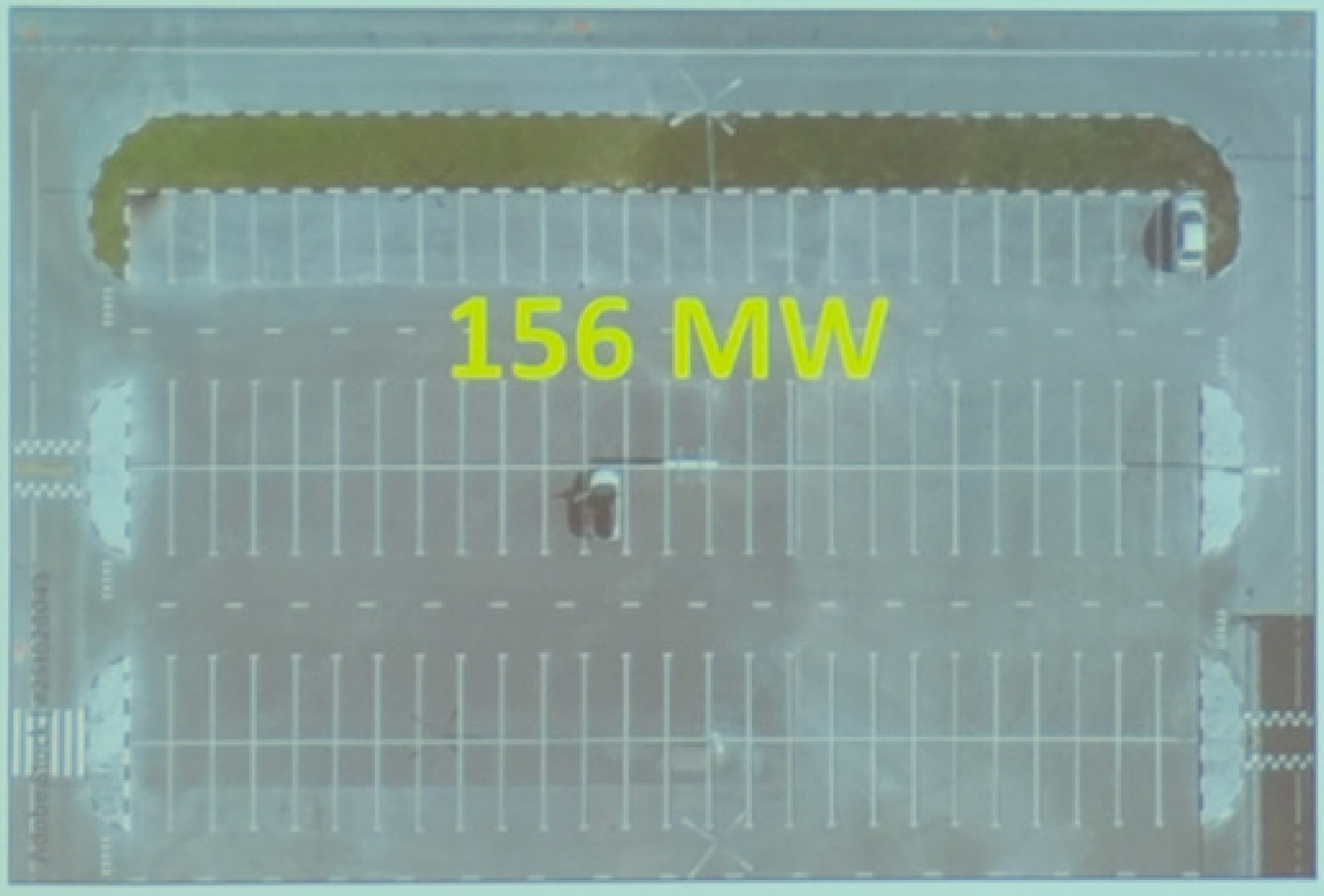
YEAR	ITEM	TIMING	DETAIL
2023	CHP	Q2	CHP must start design, permitting, and contracting activities to achieve IRA deadlines
2024	ELG	Mid-Year	Start expending some compliance dollars; ramping up over time
	CHP	End of Year	CHP must start physical work to receive IRA incentives (still a lot of unknowns)
2025	ELG	End of Year	Last chance to change compliance strategy for Unit 9
2028	ELG	End of Year	Unit 9 must be in full compliance
	CHP	End of Year	CHP must be in service to receive IRA incentives

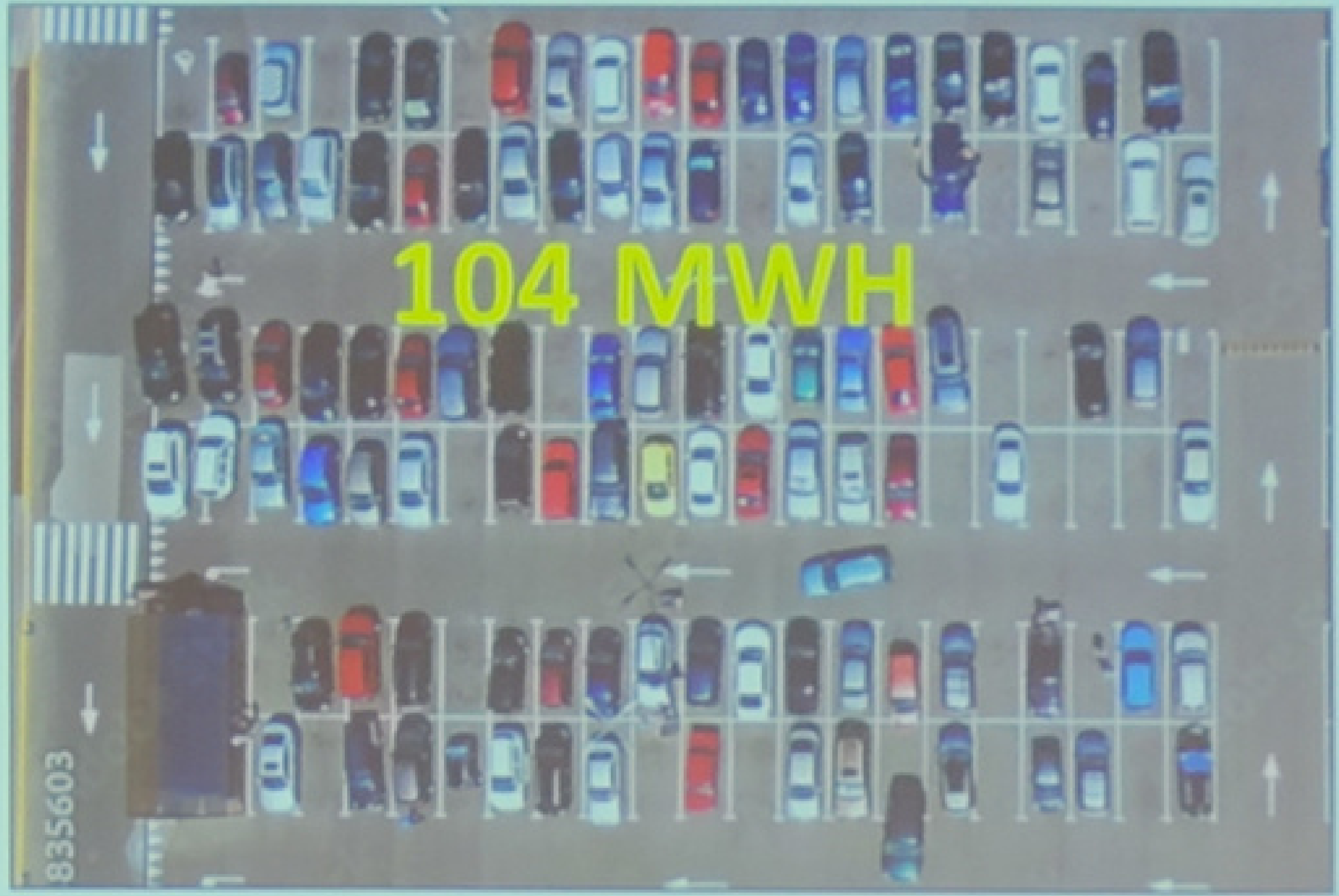


MISO WHOLESALE MARKET
DIVERSE GENERATION PORTFOLIO
MPW
WHERE MPW'S
POWER
COMES FROM
NUCLEAR POWER PLANTS
COAL AND GAS-FIRED POWER PLANTS
SOLAR POWER PLANTS
GRID MANAGEMENT
WIND POWER PLANTS
HYDROELECTIC POWER PLANTS
MPW SOUTH FORK WIND
TRANSMISSION & DISTRIBUTION
MUSCATINE SOLAR 1
LOCAL GENERATION
SUBSTATIONS
MPW CUSTOMERS
LOCAL RESOURCES MUSCATINE ELECTRICAL SYSTEM

Capacity vs Energy



Capacity – Need enough total parking spaces to cover busiest day, plus some extra



Energy – The number of cars actually using the parking lot over the course of an hour

Capacity and Energy

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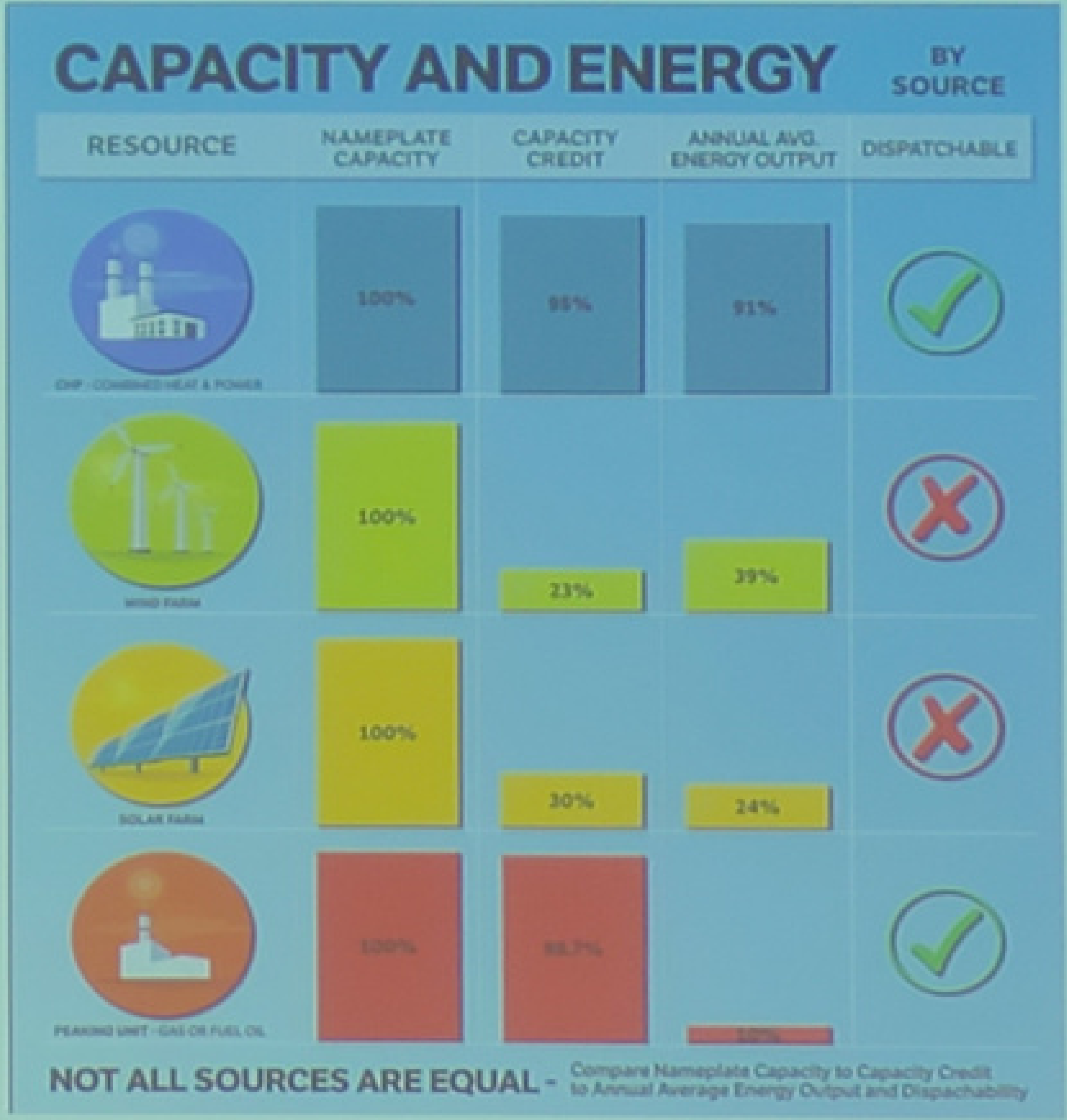
- Nameplate and capacity accreditation vary by resource
- Nameplate and actual energy output also vary by resource
- Intermittent resources require more reliance on the market, additional resources or storage



MPW Generation Resource Planning Approach

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Today's Update

Identify Planning Objectives

Planning objectives center around Reliability, Affordability, Sustainability and Flexibility

Develop Sensitivities/ Scenarios

Identify key sensitivities and apply to each portfolio

Develop Resource Portfolios

Develop portfolios that represent available generating assets and levels of sustainability

Portfolio Modeling & Analysis

Leidos Engineering evaluated performance of each resource portfolio against four market sensitivities

Study Results Review

<u>February 2023</u>
Review and discuss 2022 Power Supply Study (PSS) results Board of Trustees

Review Staff Recommendations

<u>March 2023</u>
Board of Directors approval to move forward with selected PSS recommendations

2022 Study Overview

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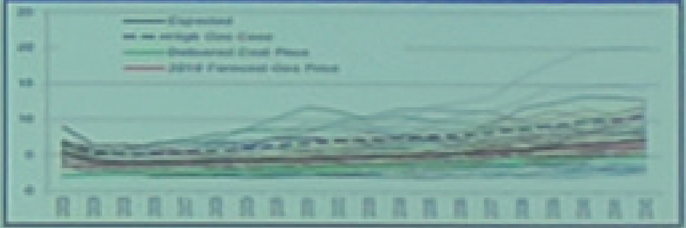
- Engaged consultant (Leidos) with broad expertise in comprehensive generation resource planning
- Leidos utilized their proprietary stochastic-econometric regional forecast (SERF) model to analyze financial performance of the scenarios
- Leidos and MPW jointly developed and reviewed scenarios and strategies to quantify the projected impacts to MPW's future, including re-analysis of 2019 scenarios

Power Supply Study Process

- Leidos SERF methodology
- Market
  - Regional transmission system changes, renewable mandates, planned and economic generation additions/retirements
  - 50 draws of stochastic price forecasts (system load, fuel, market)
  - 20-year planning study period (2023-2042)
  - Results provide stochastic projections of fuel prices, utility and regional loads, emissions and hourly power prices
- Assets
  - The resulting cost projections were used to compare and contrast potential financial implications of various power supply decisions
  - 19 discrete power supply scenarios; 4 market cases
  - 15 generating asset
  - Nearly 4,000 potential combinations
- Results
  - The model shows financial performance only
  - The CO_2 Case is a separate fundamental forecast from the Base Case

Leidos SERF Model



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Generating Assets

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Leidos Resource Optimization Program