Value of SEPA Hydropower

AMEA®

ALABAMA MUNICIPAL ELECTRIC AUTHORITY

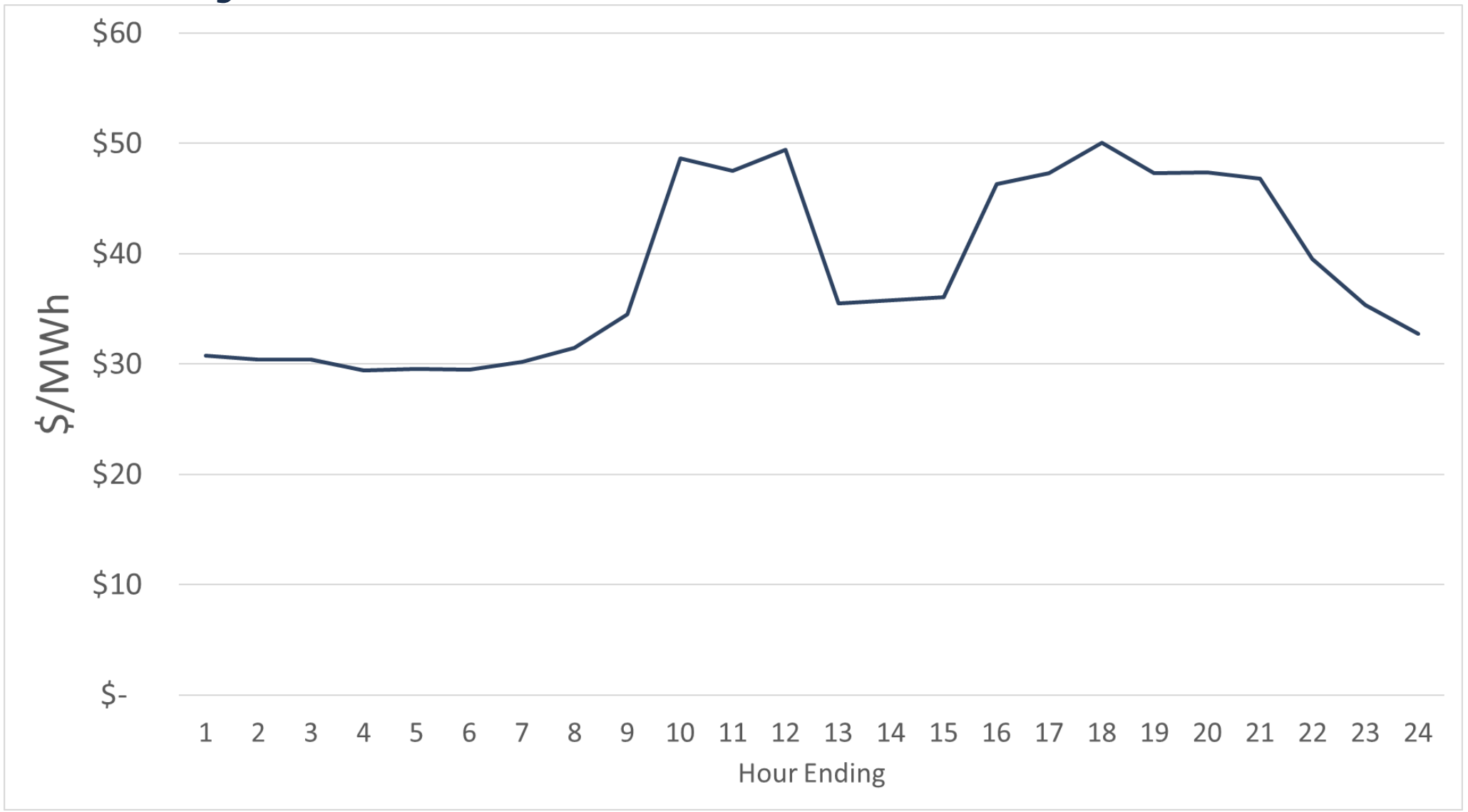
AMEA General Information

- Municipal Joint Action Agency
- Formed as a Public Corporation in August 1981
- Eleven Full Requirements Members
- 350,000 + Member Retail Customers
- AMEA Acts as Agent for our Member's SEPA

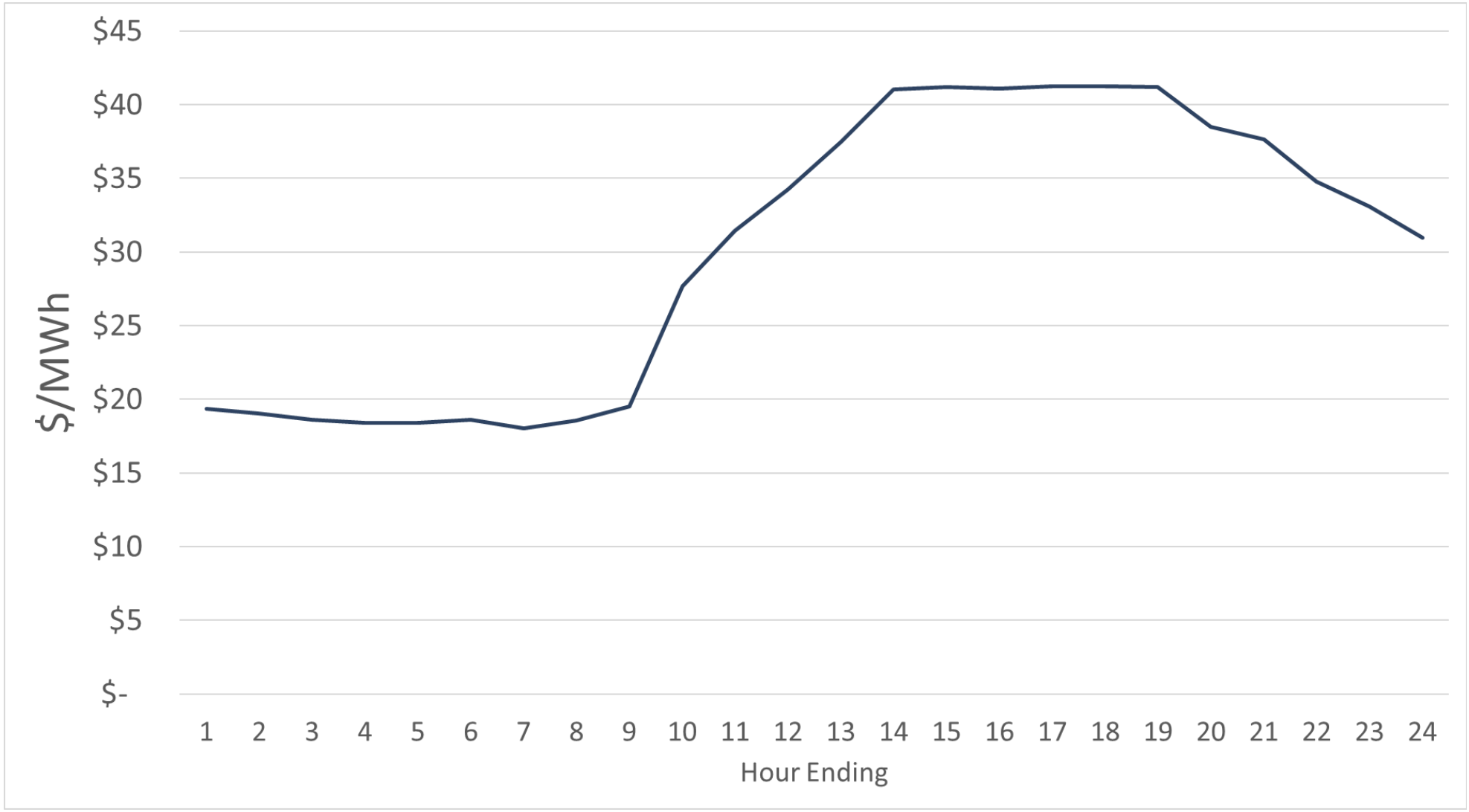
SEPA in the Wholesale Market

- AMEA's Member's pay SEPA monthly for Capacity and Energy
- AMEA's Member's SEPA Energy is scheduled by Southern Company Services for the benefit of the entire Southern System
- AMEA is credited hourly for our pro-rata share of the Southern Company SEPA schedule at the **hourly** market price
- We pass the credit through to our members

Hourly Wholesale Market Prices – Winter Day



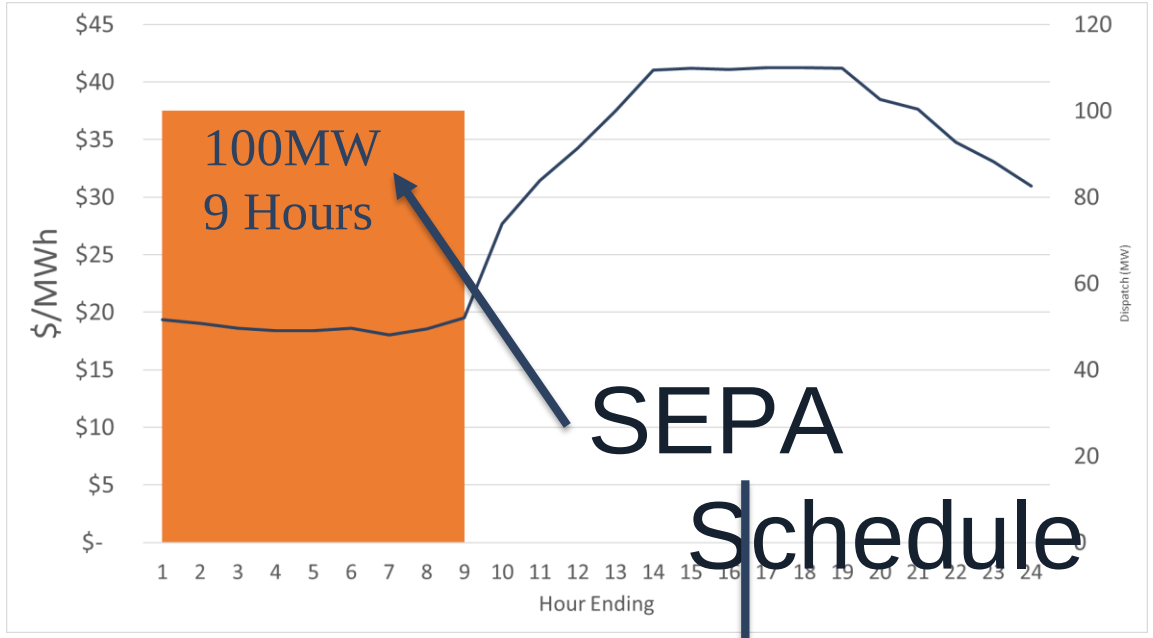
Hourly Wholesale Market Prices – Summer Day

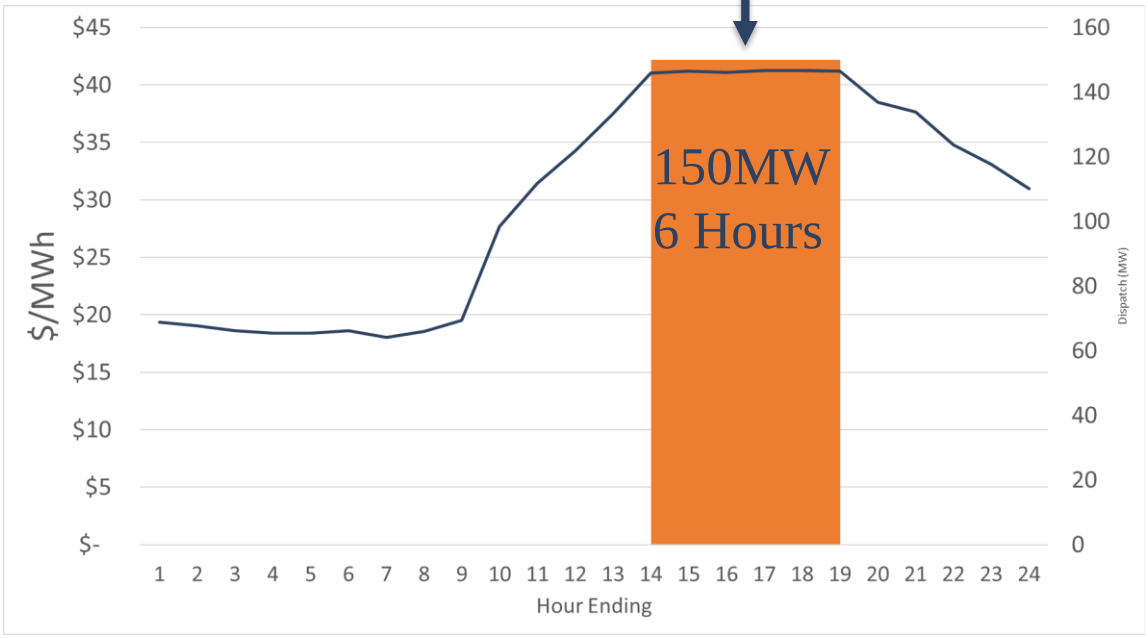


SEPA - Peak vs Off Peak

	Chart Above	Chart Below
Hours in Schedule	9	6
MW	100	150
SEPA Delivered MWh	900	900
SEPA Costs ($/MWh)	$12.00	$12.00
Market Price ($/MWh)	$20.00	$40.00
Savings per MWh	$8.00	$28.00
SEPA Savings vs Market	**$ 7,200**	**$ 25,200**

- The difference in AMEA's cost on this day would be **$18,000** depending on how SEPA was scheduled





SEPA Capacity

- Capacity more expensive than typical peaking capacity in southeast US
- Savings must be made on energy

Assumptions	
SEPA Energy Costs $/MWh	$ 15.00
Weekly Hours Scheduled	20
Total SEPA Capacity Factor	20%
Alternate Product Gas Price $/mmBTU	$3.00

	SEPA Costs	Alternative Energy Purchase	SEPA Savings (Costs) to Customer
Capacity Costs	$ 8,454,815	$ 5,167,980	($3,286,835)
Peaking (Schedule) Energy Costs	$ 2,687,350	$ 6,449,639	$3,762,289
Baseload (Must Run) Energy Costs	$ 1,839,801	$ 2,575,721	$735,920
Grand Total	**$ 12,981,966**	**$ 14,193,340**	**$1,211,375**

Amount Scheduled

Assumptions	
SEPA Energy Costs $/MWh	$ 15.00
Weekly Hours Scheduled	10
Total SEPA Capacity Factor	20%
Alternate Product Gas Price $/mmBTU	$3.00

- If Customers can only schedule 10 hours a week (instead of 20); value of SEPA decrease

	SEPA Costs	Alternative Energy Purchase	SEPA Savings (Costs) to Customer
Capacity Costs	$ 8,454,815	$ 5,167,980	($3,286,835)
Peaking (Schedule) Energy Costs	$ 1,343,675	$ 3,224,820	$1,881,145
Baseload (Must Run) Energy Costs	$ 3,183,476	$ 4,456,866	$1,273,390
Grand Total	**$ 12,981,966**	**$ 12,849,665**	**($132,300)**

Insufficient Water

- When there is insufficient water available, SEPA purchases "Replacement Energy" from market, which causes energy cost to go up
- Could eventually cause Customers to purchase additional capacity

Assumptions	
SEPA Energy Costs $/MWh	$ 20.00
Weekly Hours Scheduled	20
Total SEPA Capacity Factor	20%
Alternate Product Gas Price $/mmBTU	$3.00

	SEPA Costs	Alternative Energy Purchase	SEPA Savings (Costs) to Customer
Capacity Costs	$ 8,454,815	$ 5,167,980	($3,286,835)
Peaking (Schedule) Energy Costs	$ 3,583,133	$ 6,449,639	$2,866,506
Baseload (Must Run) Energy Costs	$ 2,453,068	$ 2,575,721	$122,653
Grand Total	**$ 14,491,016**	**$ 14,193,340**	**($297,676)**

Competing priorities - Control Over Water/Energy

- Because capacity is more expensive SEPA must save money in energy market to be economical (Shows actual energy savings in market)

ACTUAL DISPATCH

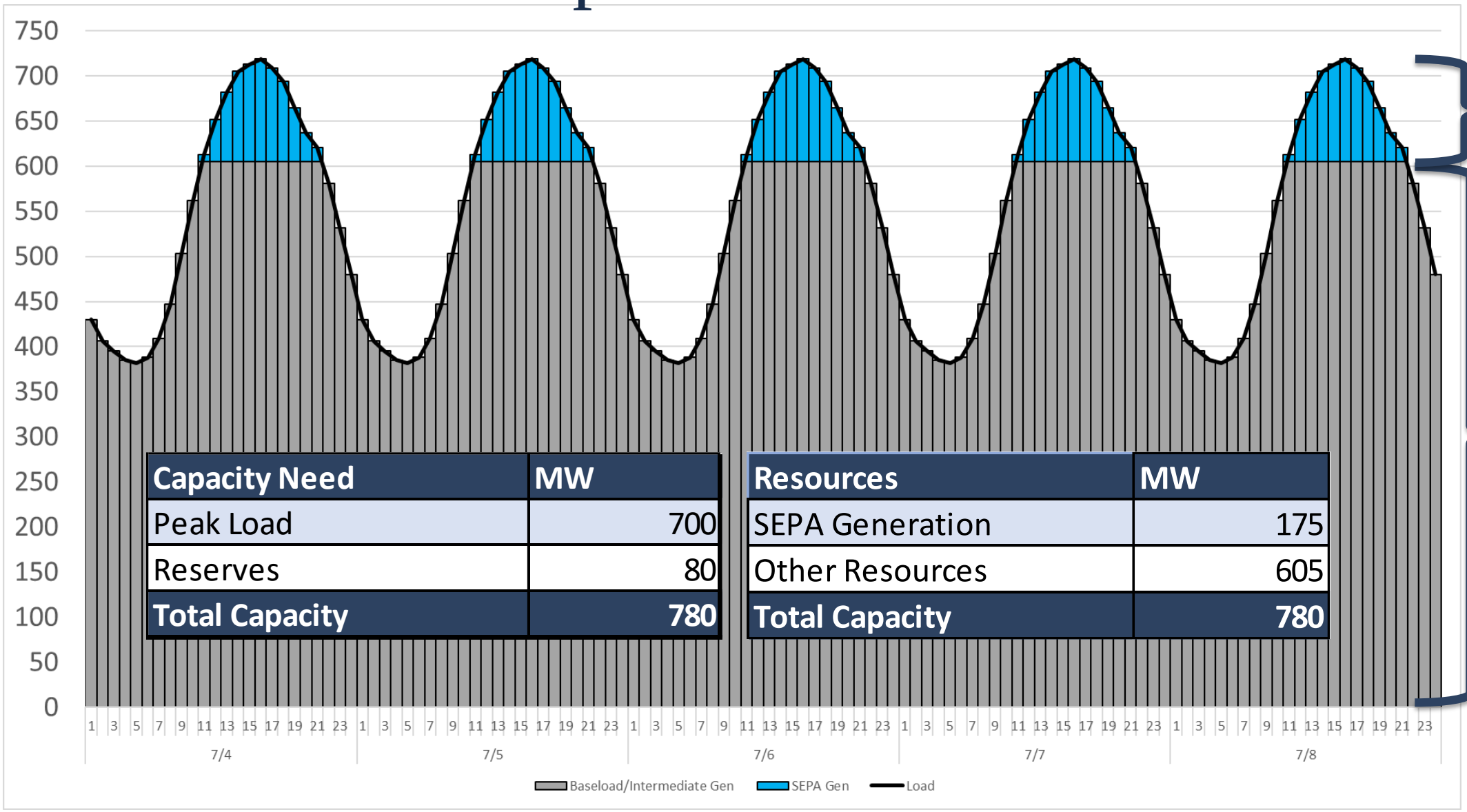
Fiscal Year	AMEA SEPA Capacity (MW)	Additional SEPA Capacity Cost (vs Alternative)	Actual SEPA Energy Savings (vs market)	Net SEPA Benefit (Costs)
2016	151	$3,286,835	$3,133,158	($153,677)
2017	151	$3,286,835	$2,471,761	($815,074)
2018	151	$3,286,835	$4,589,573	$1,302,737
2019	151	$3,286,835	$6,087,143	$2,800,308
2020	166	$3,286,835	$2,837,716	($449,119)

- OPTIMAL DISPATCH shows historical look on what the Customer would save if they could schedule all SEPA energy (i.e. no “Must Run”)

OPTIMAL DISPATCH

Fiscal Year	AMEA SEPA Capacity (MW)	Additional SEPA Capacity Cost (vs Alternative)	OPTIMAL SEPA Energy Savings (vs market)	Net SEPA Benefit (Costs)
2016	151	$3,286,835	$ 4,376,193	$1,089,357
2017	151	$3,286,835	$3,552,654	$265,818
2018	151	$3,286,835	$7,222,125	$3,935,290
2019	151	$3,286,835	$7,622,137	$4,335,302
2020	166	$3,286,835	$3,942,355	$655,519

Ideal SEPA Dispatch for Summer Peak Load



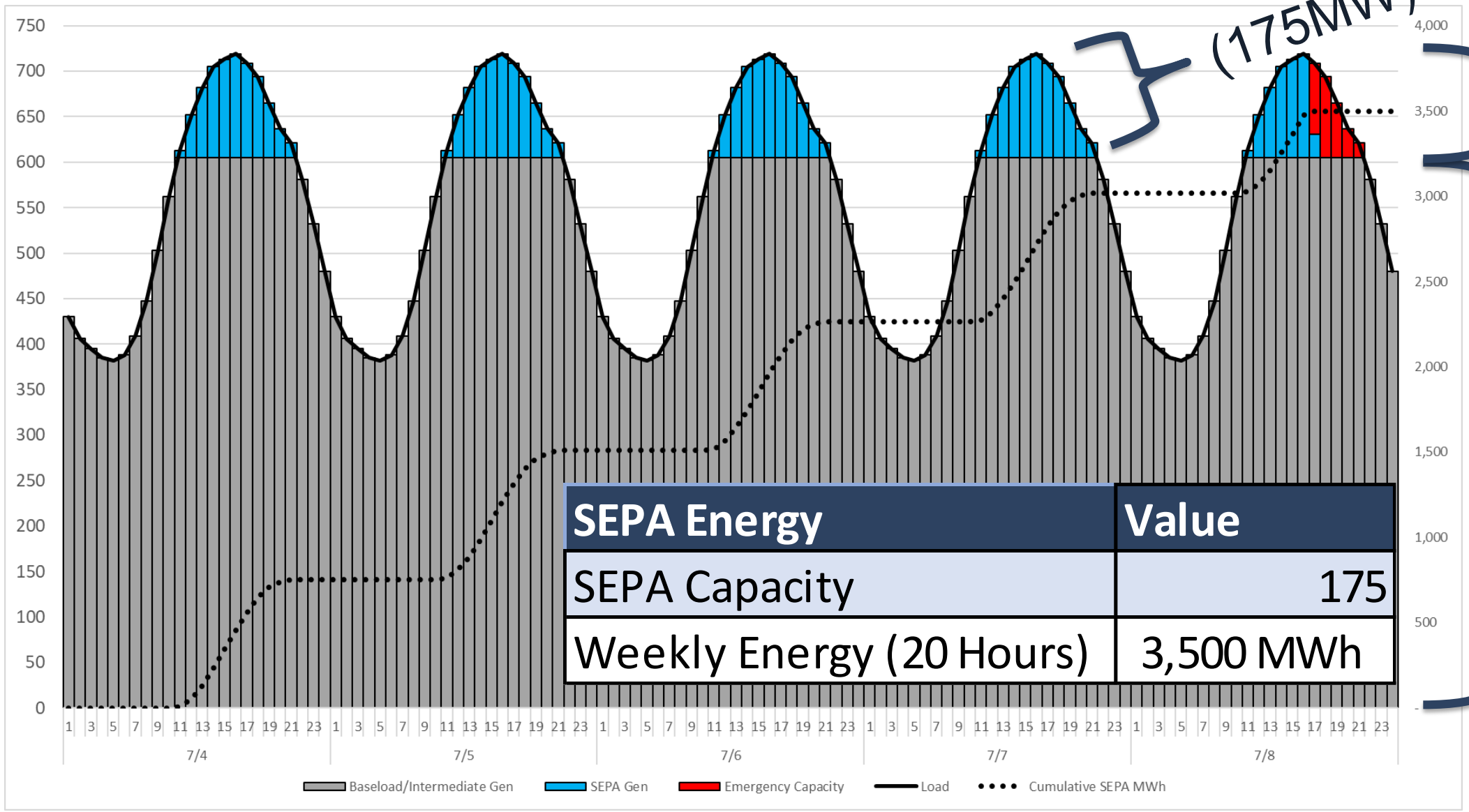
Capacity Need	MW
Peak Load	700
Reserves	80
Total Capacity	**780**

Resources	MW
SEPA Generation	175
Other Resources	605
Total Capacity	**780**

SEPA (175MW)

Other Resource (605 MW)

Insufficient Water



SEPA Energy	Value
SEPA Capacity	175
Weekly Energy (20 Hours)	3,500 MWh

Advantages of SEPA

- If natural gas and/or power prices go up it will benefit SEPA's economics
- Renewable standards and carbon regulation could add benefits for hydropower
- Flexibility of hydropower will become increasingly more important in the future with more renewables (on site fuel, ancillary services)

Takeaways

- AMEA and its members benefit greatly from SEPA hydropower in the current market
- The more water available to the Customers to schedule, the greater the benefit
- Replacement energy hurts Customers through higher cost energy purchases and could potentially cause Customers to purchase additional capacity making the cost of SEPA power uneconomical

QUESTIONS?

BACKUP SLIDES

SEPA Cost Analysis Assumptions

- Peaking capacity price of $2.50kw/mo
- $3.00/mmBTU Natural Gas Price
- “Must Run” SEPA Energy would be purchased from 7,000 mmbtu/kWh Heat Rate Combined Cycle
- “Scheduled” SEPA Energy would be purchased from 12,000 mmbtu/kWh Heat Rate Gas Peaker

SEPA

SEPA Capacity	MW	172
SEPA Actual CF	%	20%
SEPA Scheduled Energy + Capacity		
Capacity Costs	$/kw - Mo	$4.09
Energy Costs	$/MWh	$ 15.00
Annual CF	%	12%
Annual Capacity Costs	$	$ 8,454,815
Annual Energy Costs	$	$ 2,687,350
SEPA Must Run Energy		
Energy Costs	$/MWh	$ 15.00
Annual CF	%	8%
Annual Energy Costs	$	$ 1,839,801
Total Annual Costs		**$ 12,981,966**

Alternative

Gas Peaking Energy + Capacity		
Gas Price	$/mmBTU	$3.00
Heat Rate	btu/KWh	12,000
Peaking Capacity Costs	$/kw - Mo	$ 2.50
Energy Costs	$/MWh	$ 36.00
Annual CF	%	12%
Annual Capacity Costs	$	$ 5,167,980
Annual Energy Costs	$	$ 6,449,639
Combine Cycle (Baseload) Energy		
Gas Price	$/mmBTU	$3.00
Heatrate	btu/KWh	7,000
Energy Costs	$/MWh	$ 21.00
Annual CF	%	8%
Annual Energy Costs	$	$ 2,575,721
Total Annual Costs		**$ 14,193,340**

SEPA is $1.21M Cheaper Annually

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SEPA is $0.13M More Expensive Annually

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SEPA is $0.30M More Expensive Annually