

Counting the Capacity that Didn't Hatch: The Rate Mitigation Effect of DSM Programs

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Presented at the 2013 ACEEE National Conference on Energy Efficiency as a Resource
September 22-24, 2013 – Nashville, TN

Center for Energy and Environment

- ❖ Non-profit based in Minneapolis, MN
- ❖ Energy efficiency program and service provider
- ❖ Energy and Home Improvement Financing
- ❖ Building Science and Program Design Research
- ❖ Minnesota Energy Policy

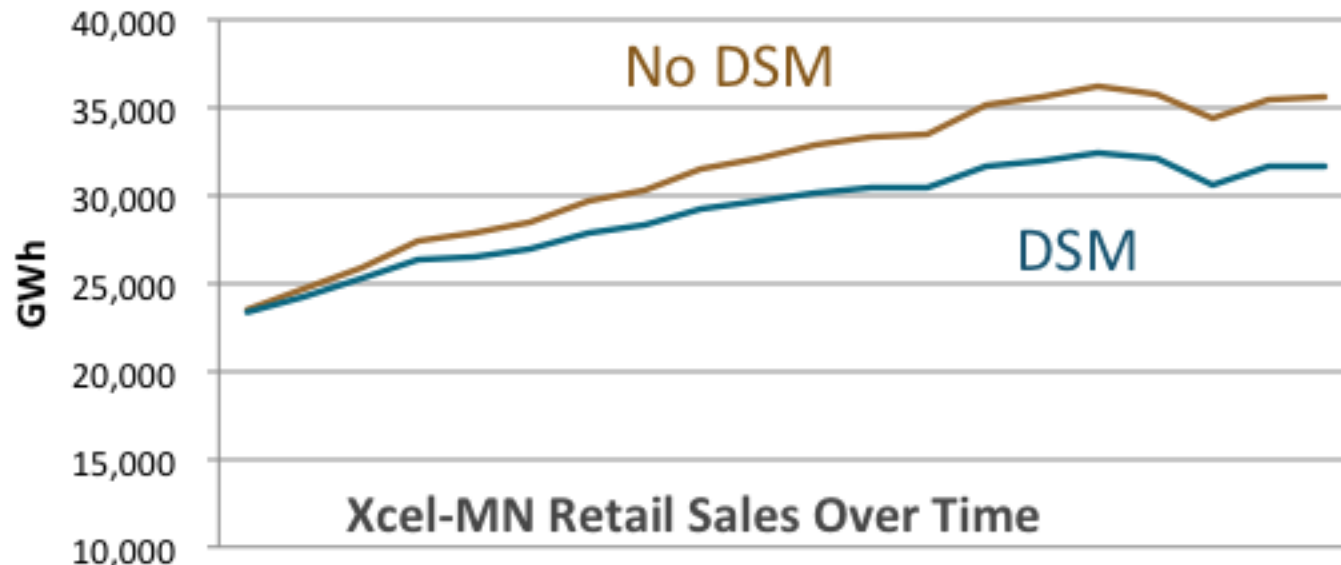


Energy Efficiency as a BIG Resource means...

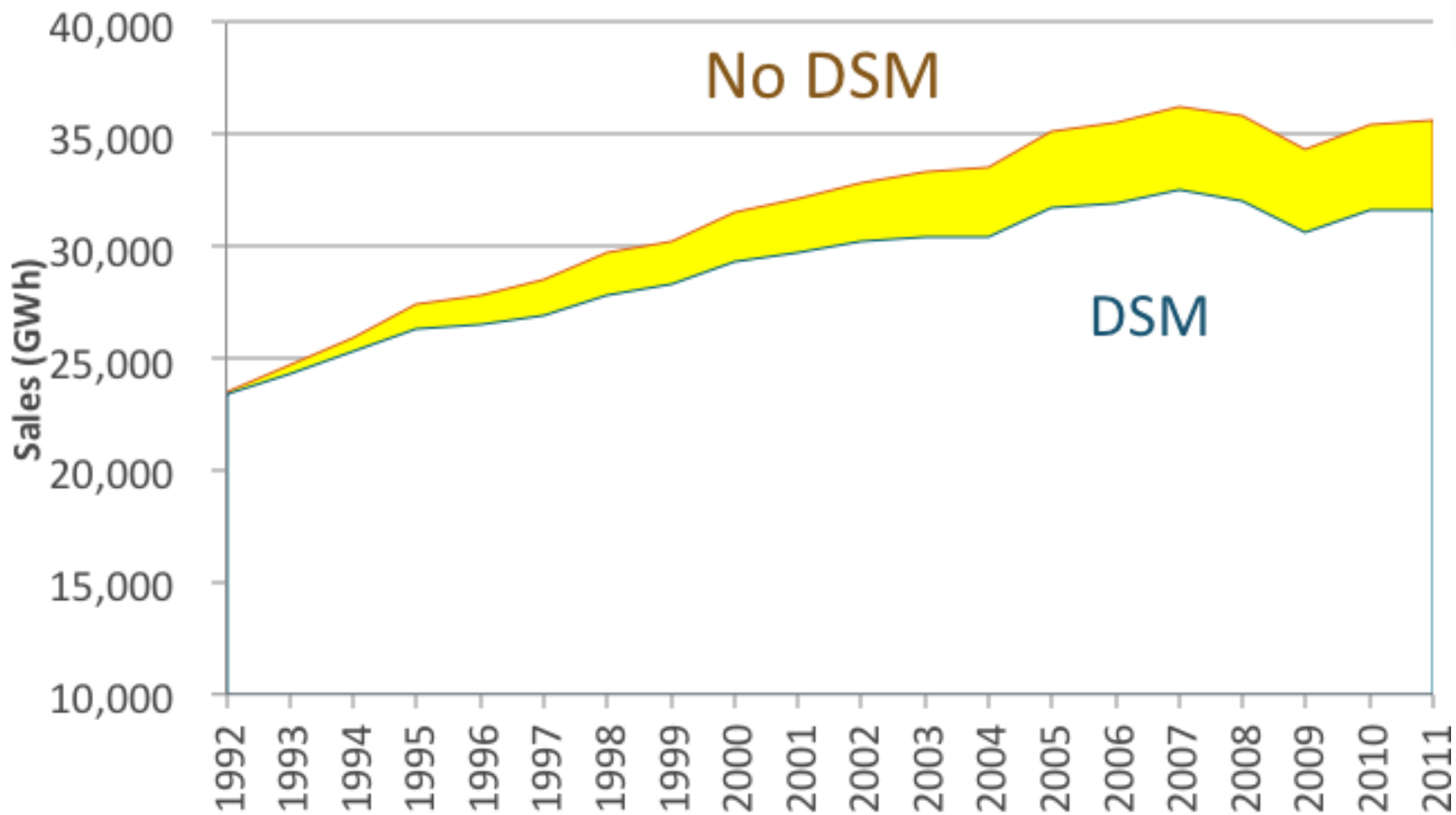
- ❖ A better understanding of the system wide revenue benefits of DSM programs

Minnesota DSM Case Study

- ❖ Xcel Energy's 20-year program history
- ❖ Backward looking scenario analysis to compare capacity options
- ❖ Compare additional revenue requirements



The Resource Wedge



Itemized Utility Bill

Current Charges

Electric Charges Usage Period: 07/18/13 to 08/18/13

Invoice # 484773362

Residential Service 31 Days

Basic Service Chg

\$7.11

Affordability Chrg

\$0.50

Energy Charge Summer 490 kWh @ \$0.082060

\$40.21

Res Savers Switch AC

\$8.25 CR

Fuel Cost Charge 490 kWh @ \$0.030184

\$14.79

Resource Adjustment

\$1.60

Interim Rate Adj

\$5.39

Subtotal

\$61.35

City Fees @4.50%

\$2.77

Transit Improvement T

\$0.16

City Tax @0.50%

\$0.31

County Tax @0.15%

\$0.10

State Tax @6.875%

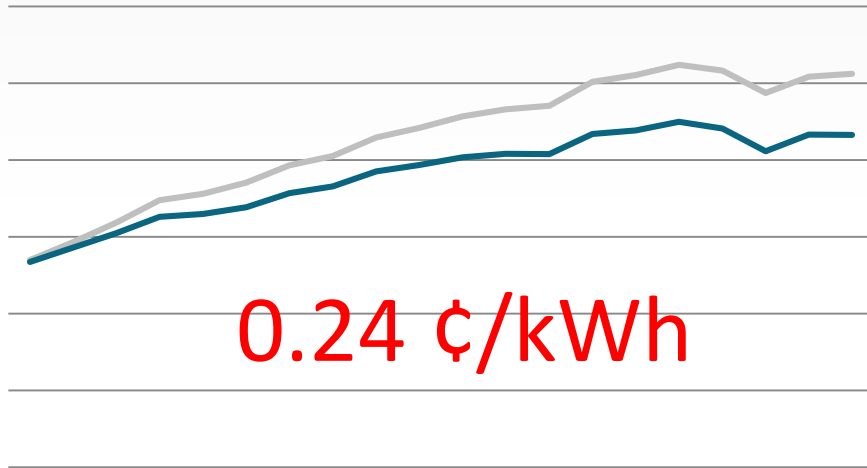
\$4.42

Total Amount

\$69.11

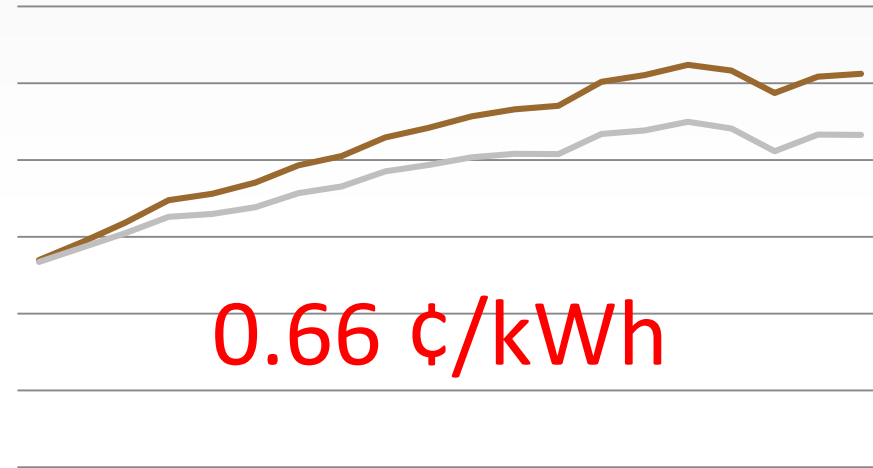
What if alternative power plant capacity was itemized?

DSM Scenario



- ❖ Lower Resource Costs
- ❖ Fewer Sales

Power Plant Scenario



- ❖ Higher Resource Costs
- ❖ More Sales

Additional Revenue Requirements =
 Σ Annual Additional Costs \div Total Sales

Cost Considerations

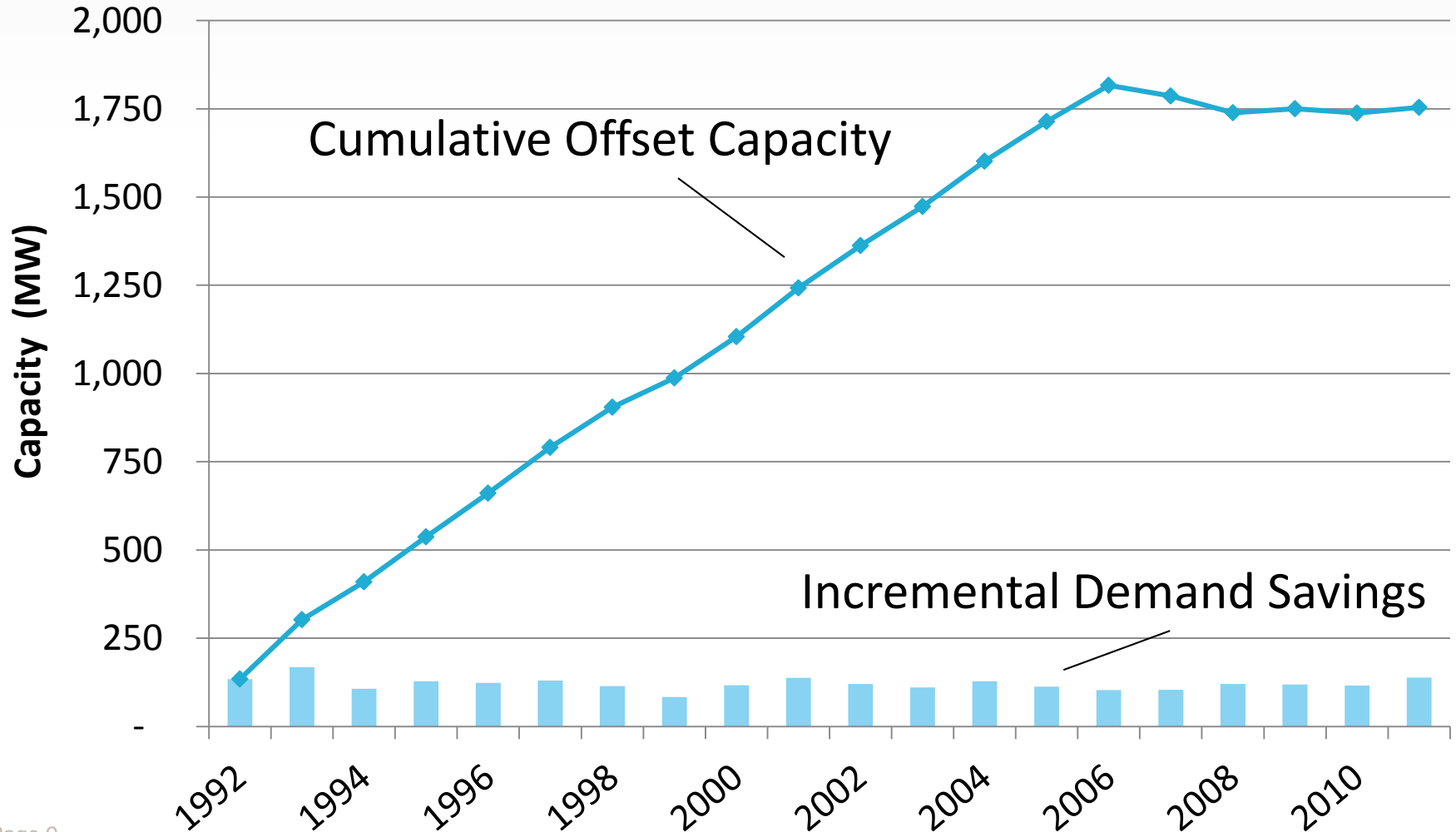
❖ DSM Scenario

- + Conservation and Load Management Program Costs
- + Indirect Impact
- + Lost Revenue & Incentives

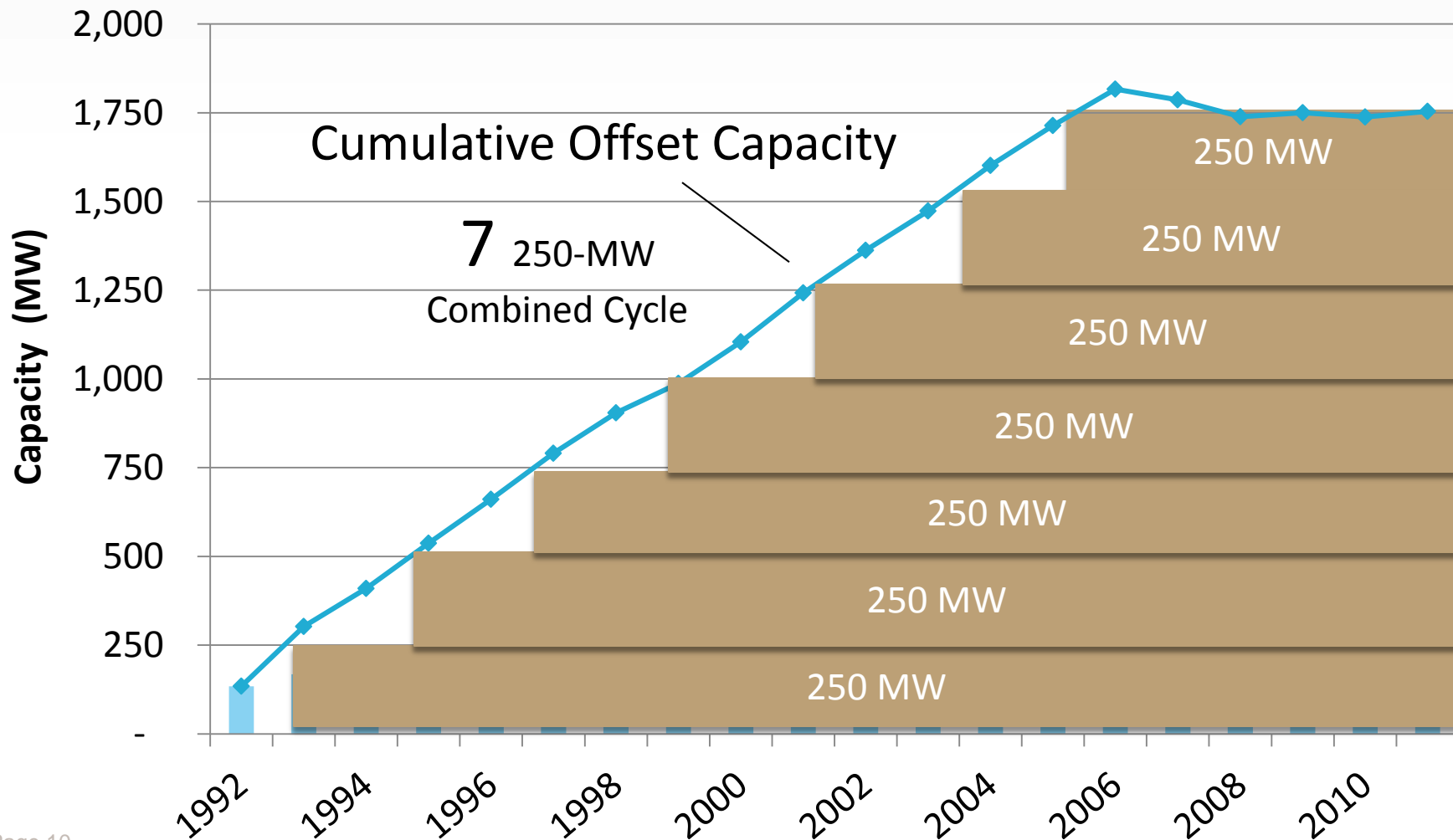
❖ Power Plant Scenario

- + Capital & Financing Costs
- + Shareholder Returns
- + Fuel Costs
- + O&M
- + T&D maintenance

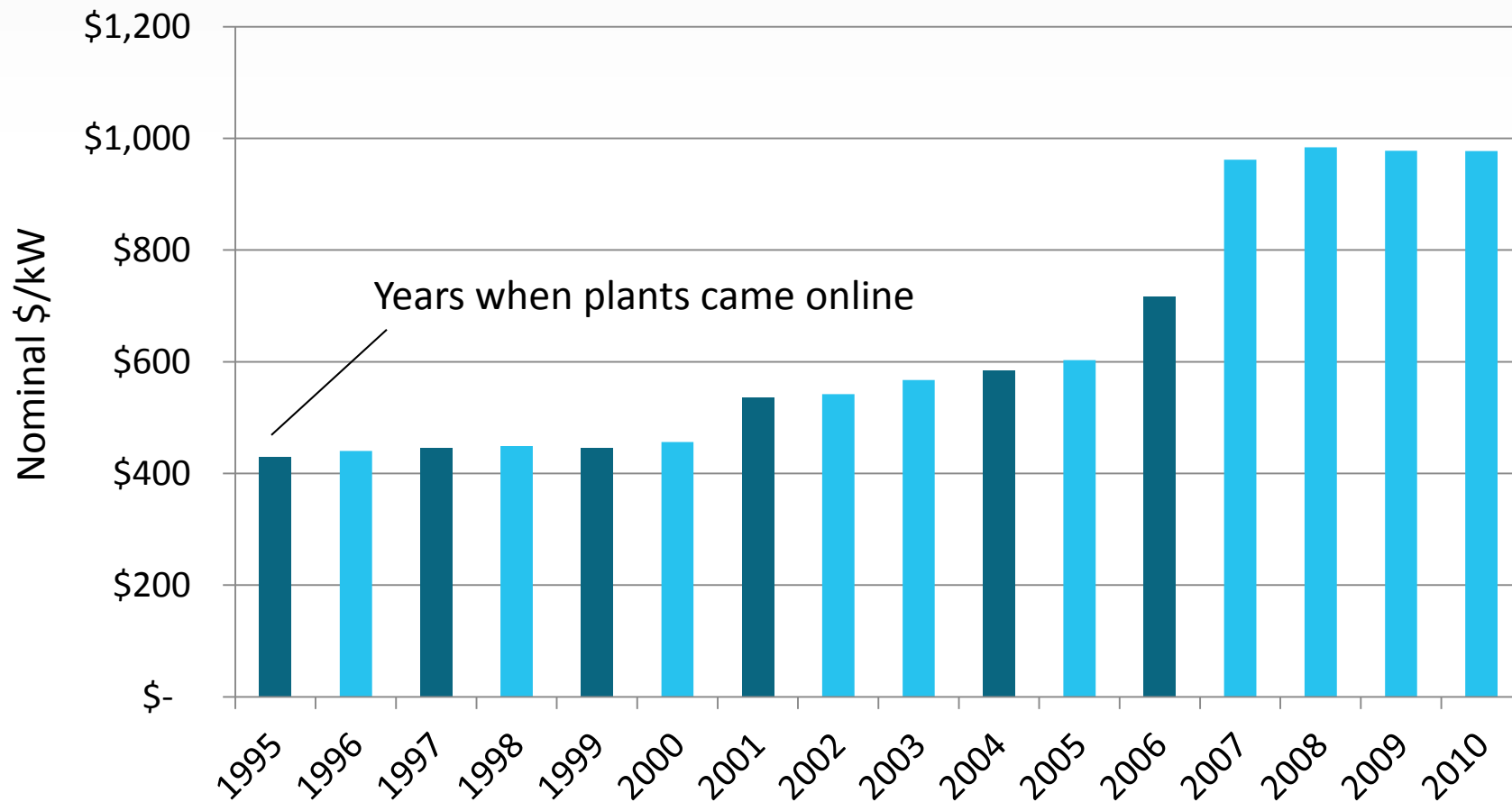
Power Plant Offsets from DSM



Power Plant Offsets from DSM



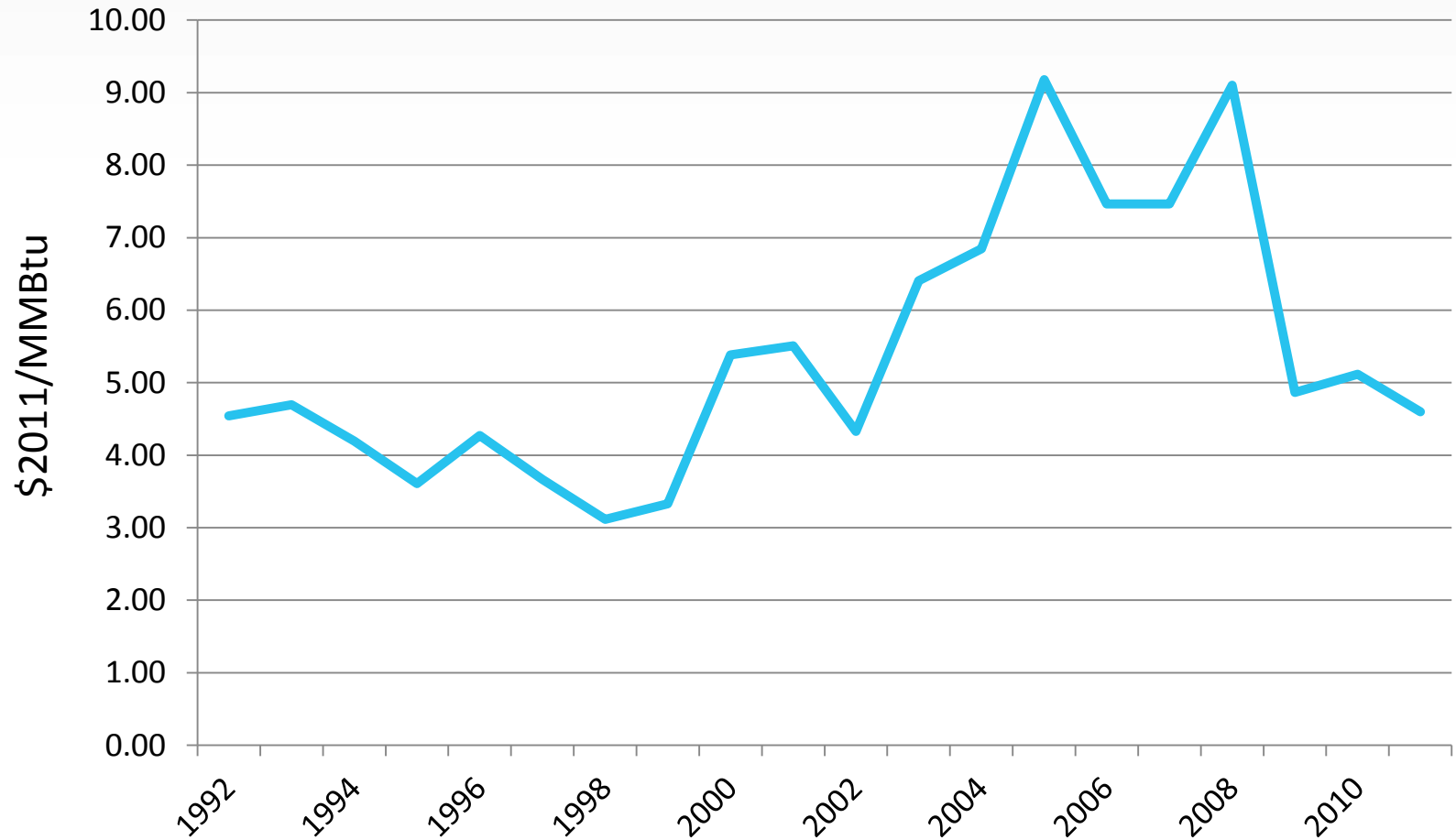
Combined Cycle Overnight Capital Costs



Capital Revenue Requirement Calculations

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Plant Construction Costs		50,000,000										
Project Rate Base Calculations												
Beginning Period Book Value			#####	#####	#####	#####	#####	#####	#####	#####	#####	#####
Book Depreciation			<u>(1,250,000)</u>	<u>(1,250,000)</u>	<u>(1,250,000)</u>	<u>(1,250,000)</u>	<u>(1,250,000)</u>	<u>(1,250,000)</u>	<u>(1,250,000)</u>	<u>(1,250,000)</u>	<u>(1,250,000)</u>	<u>(1,250,000)</u>
Ending Book Value			#####	#####	#####	#####	#####	#####	#####	#####	#####	#####
Beginning Period Accum Def Tax			-	509,375	1,935,625	3,168,313	4,227,813	5,130,425	5,890,413	6,583,163	7,275,913	7,970,700
Deferred Taxes			509,375	1,426,250	1,232,688	1,059,500	902,613	759,988	692,750	692,750	694,788	692,750
Ending Period Accum Def Tax			509,375	1,935,625	3,168,313	4,227,813	5,130,425	5,890,413	6,583,163	7,275,913	7,970,700	8,663,450
Project Rate Base (Book - Accum Def Tax)												
Beginning Period			#####	#####	#####	#####	#####	#####	#####	#####	#####	#####
Ending Period			#####	#####	#####	#####	#####	#####	#####	#####	#####	#####
Average			#####	#####	#####	#####	#####	#####	#####	#####	#####	#####
Tax Depreciation Calculations												
15 yr MACRS Schedule			5.00%	9.50%	8.55%	7.70%	6.93%	6.23%	5.90%	5.90%	5.91%	5.90%
Tax Depreciation			2,500,000	4,750,000	4,275,000	3,850,000	3,465,000	3,115,000	2,950,000	2,950,000	2,955,000	2,950,000
Current Income Tax Calculations												
Return on Average Rate Base			4,118,738	4,055,654	3,861,148	3,678,815	3,507,373	3,345,798	3,193,192	3,044,814	2,896,436	2,747,930
Interest Expense			(1,360,386)	(1,367,568)	(1,312,208)	(1,259,577)	(1,209,388)	(1,161,411)	(1,115,445)	(1,070,427)	(1,025,410)	(980,363)
+ Book Depreciation			1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000
-Tax Depreciation			(2,500,000)	(4,750,000)	(4,275,000)	(3,850,000)	(3,465,000)	(3,115,000)	(2,950,000)	(2,950,000)	(2,955,000)	(2,950,000)
+ Deferred Taxes			<u>509,375</u>	<u>1,426,250</u>	<u>1,232,688</u>	<u>1,059,500</u>	<u>902,613</u>	<u>759,988</u>	<u>692,750</u>	<u>692,750</u>	<u>694,788</u>	<u>692,750</u>
Current Tax Basis			2,017,728	614,336	756,628	878,738	985,598	1,079,374	1,070,497	967,136	860,814	760,317
(Composite Tax Rate / (1-Composite Tax Rate)			69%	69%	69%	69%	69%	69%	69%	69%	69%	69%
Current Income Taxes			1,387,720	422,518	520,381	604,364	677,859	742,355	736,249	665,161	592,037	522,918
Revenue Requirement Calculations												
Book Depreciation (40yr Straight Line)			1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000
Deferred Taxes ([Tax Depr - Book Depr]*Tax Rate)			509,375	1,426,250	1,232,688	1,059,500	902,613	759,988	692,750	692,750	694,788	692,750
Current Income Taxes			1,387,720	422,518	520,381	604,364	677,859	742,355	736,249	665,161	592,037	522,918
Return On Average Rate Base			<u>4,118,738</u>	<u>4,055,654</u>	<u>3,861,148</u>	<u>3,678,815</u>	<u>3,507,373</u>	<u>3,345,798</u>	<u>3,193,192</u>	<u>3,044,814</u>	<u>2,896,436</u>	<u>2,747,930</u>
TOTAL REVENUE REQUIREMENTS			7,265,833	7,154,422	6,864,217	6,592,680	6,337,845	6,098,140	5,872,190	5,652,725	5,433,260	5,213,599

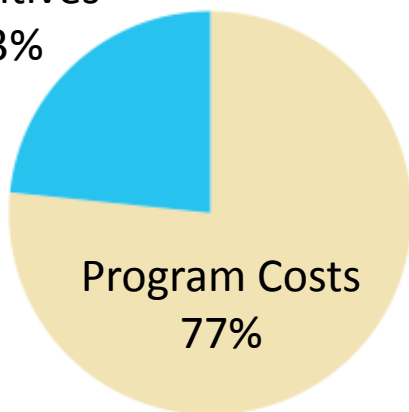
Historical Natural Gas Fuel Costs



Results

DSM Programs

Incentives
23%



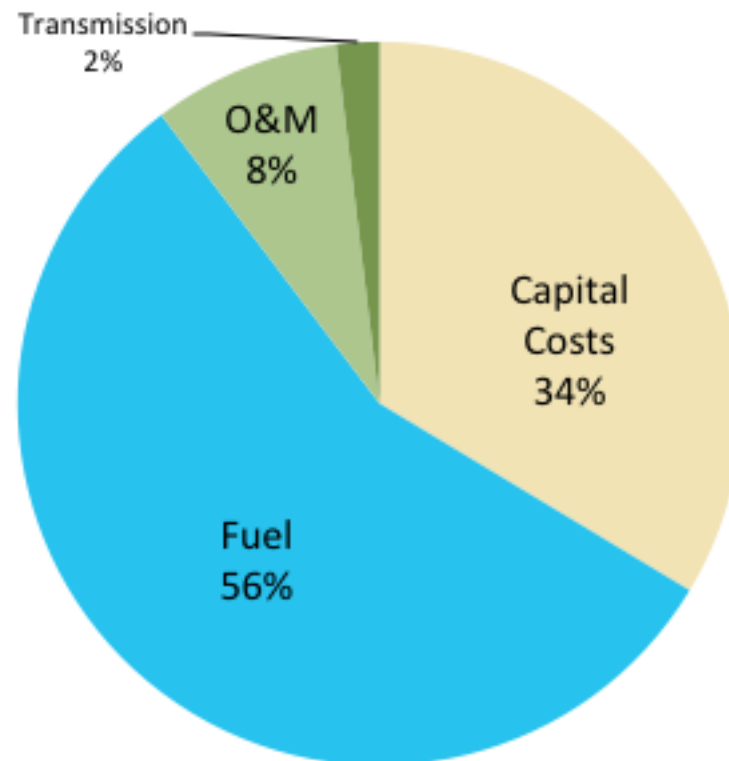
\$1.14 Billion

580,855 GWh

0.24 ¢/kWh

Natural Gas Power Plants

Transmission
2%



Total Cost

\$4.16 Billion

Total Sales

629,212 GWh

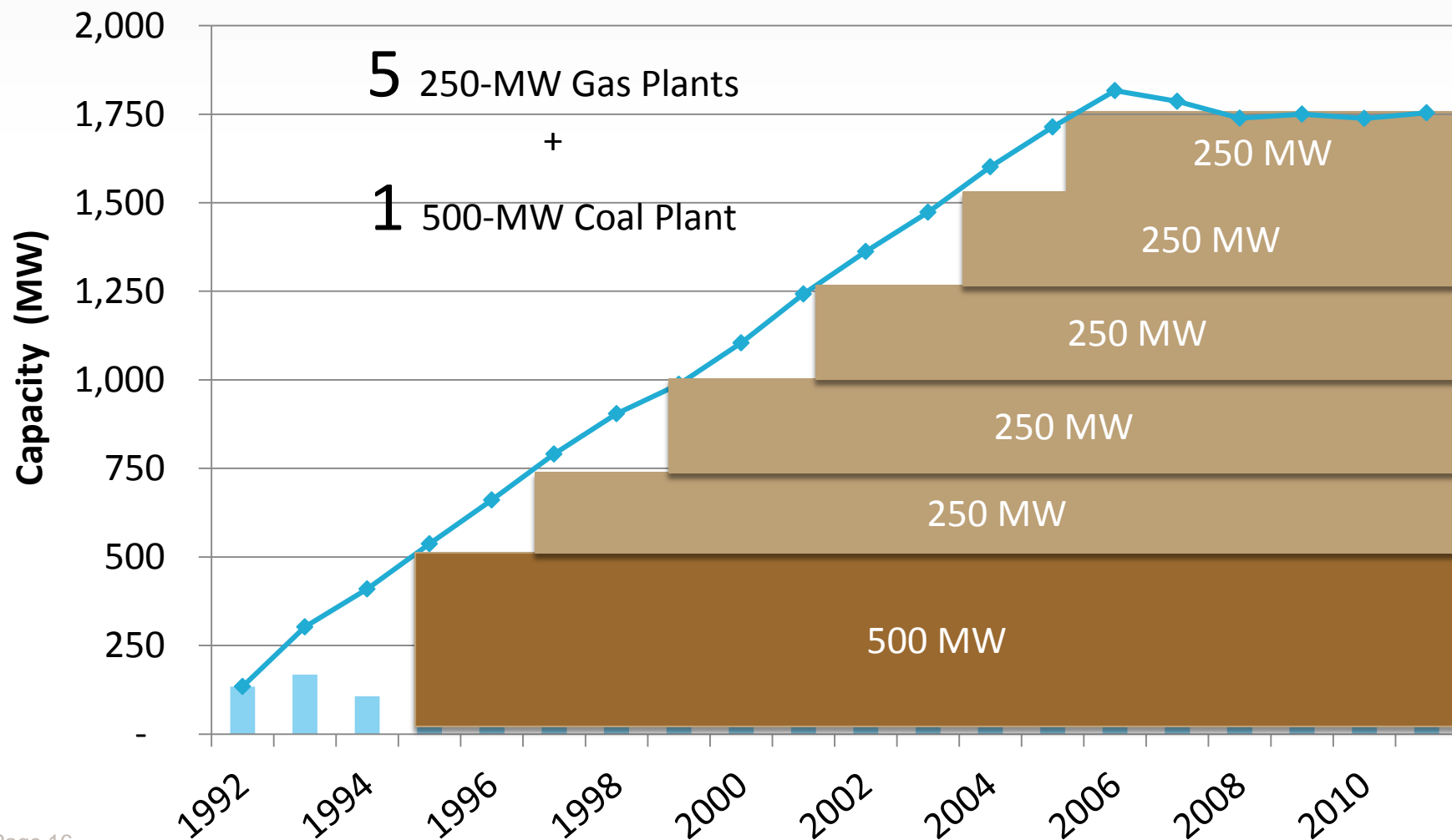
Add Revenue

0.66 ¢/kWh

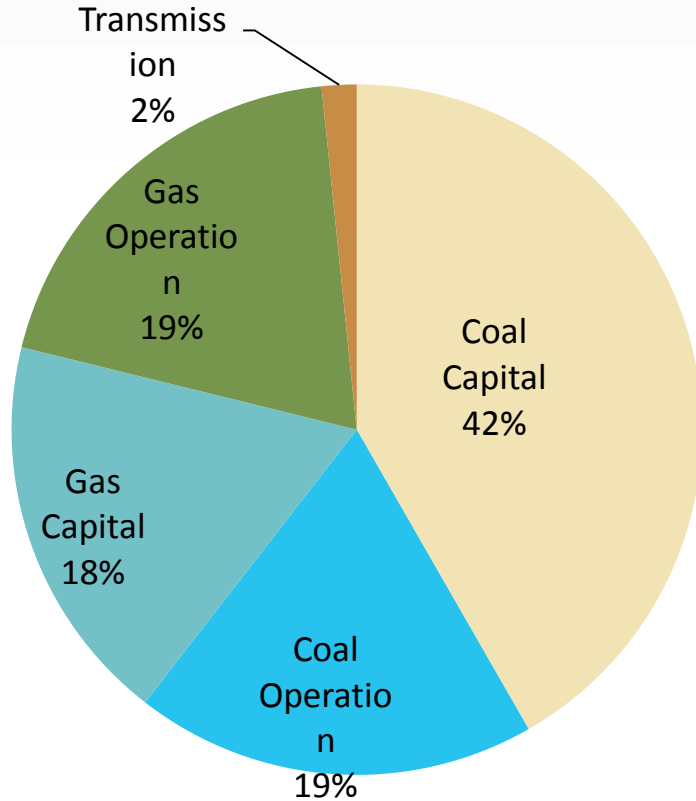
Scenario: Coal Plant Displacement



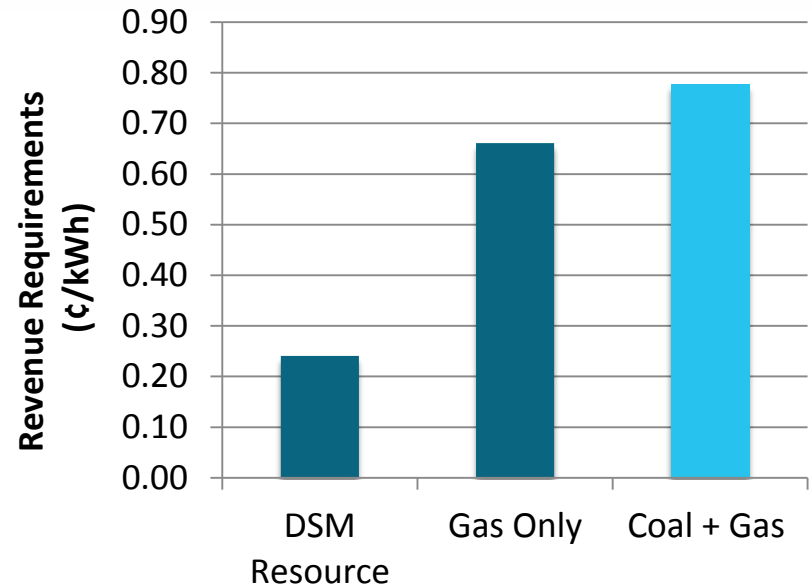
Power Plant Offsets from DSM



Scenario: Coal Plant Displacement



\$4.89 billion

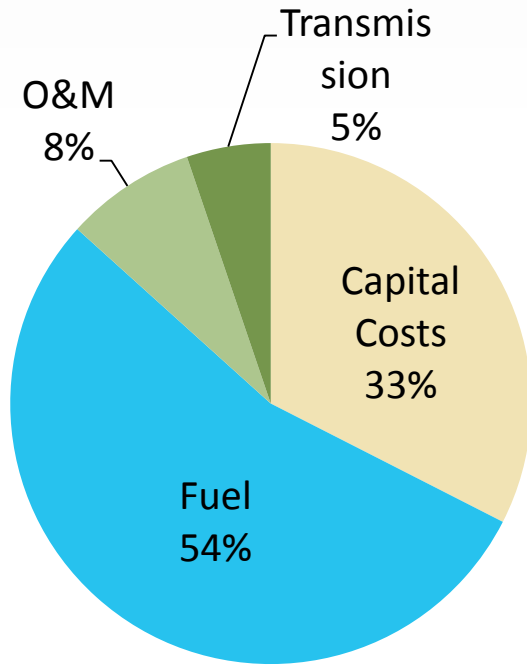


0.78 ¢/kWh

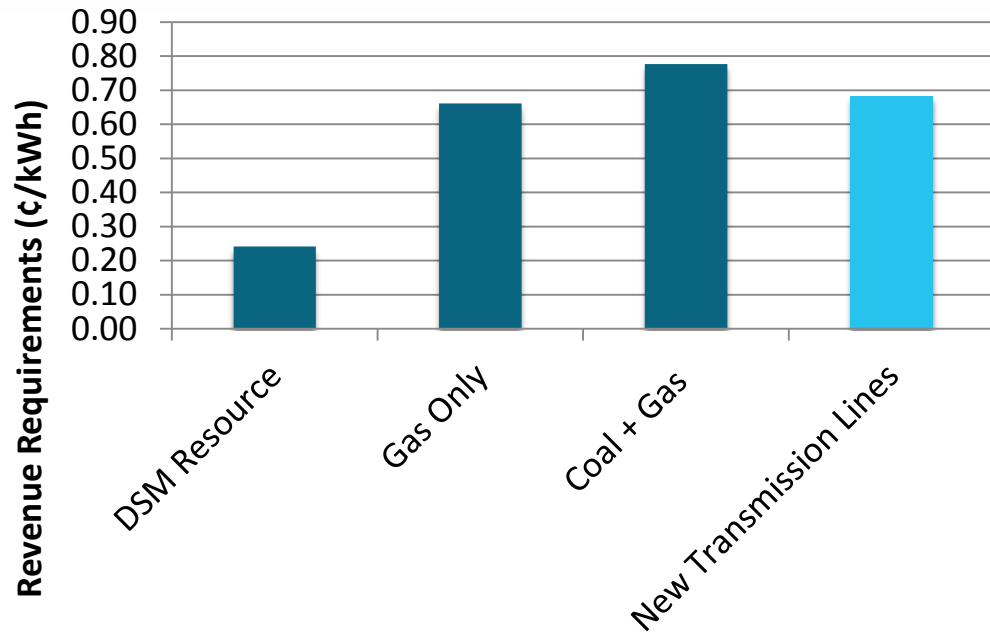
Scenario: Avoided Transmission Lines



Scenario: Avoided Transmission Lines



\$4.30 billion

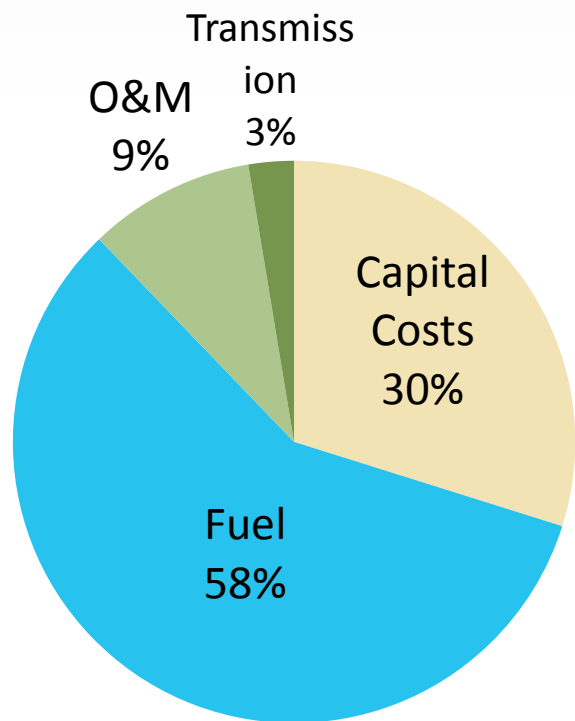


0.68 ¢/kWh

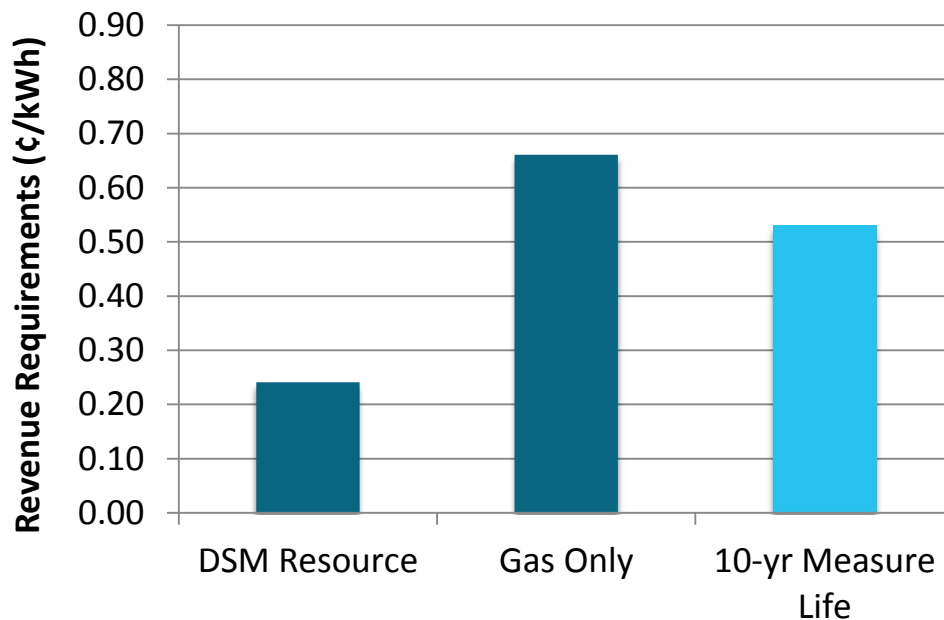
Scenario: Average Measure Life



10-Year Measure Life

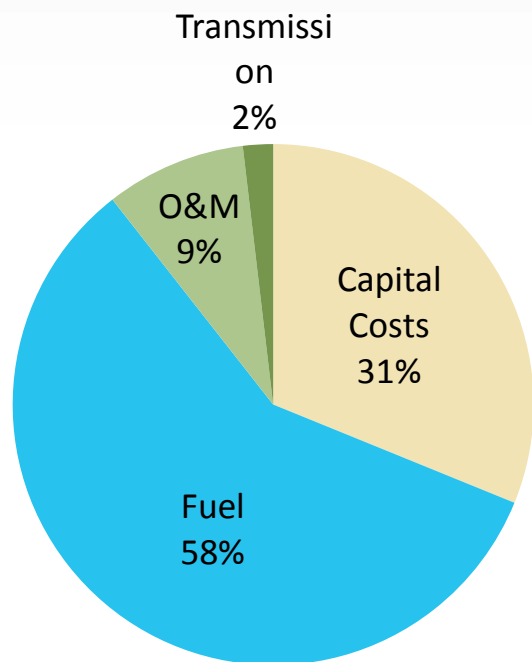


\$3.26 billion

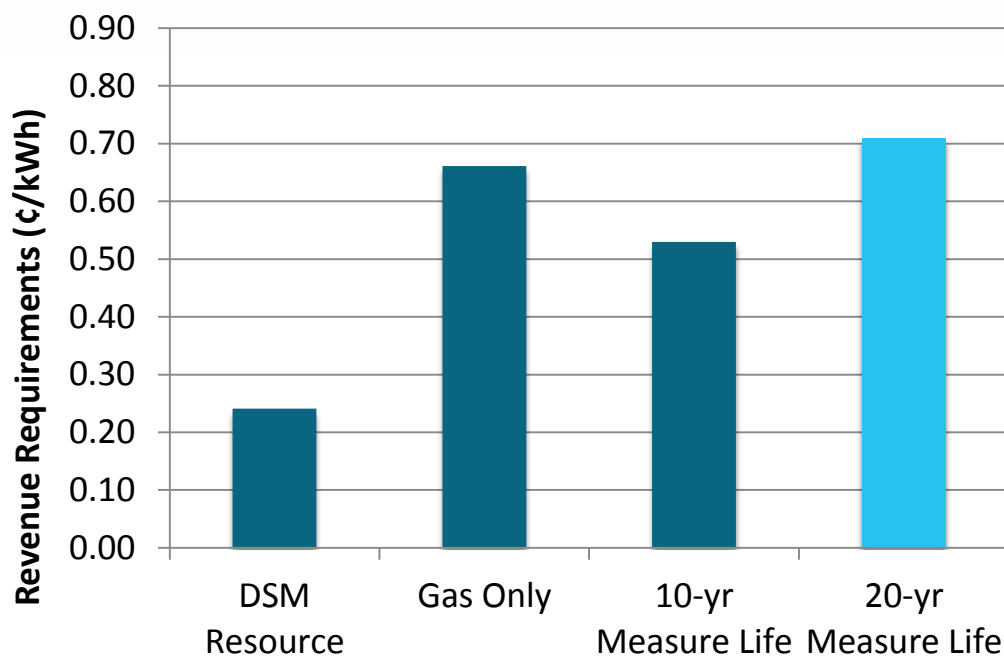


0.53 ¢/kWh

20-Year Measure Life

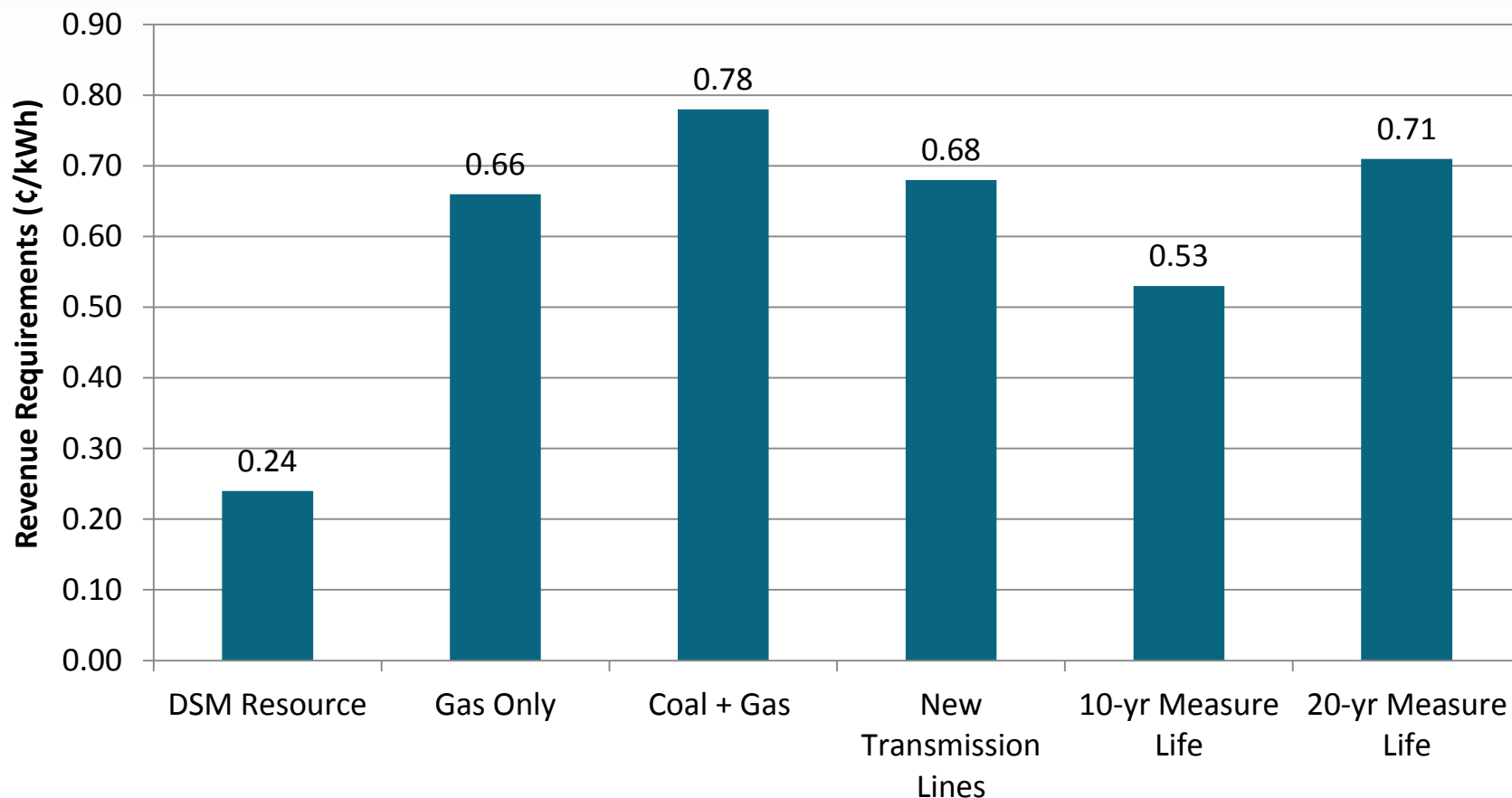


\$4.50 billion



0.71 ¢/kWh

Summary of Scenario Results



Summary

- ❖ DSM programs allow customers to save on the energy they do use, as well as the energy they don't
- ❖ System wide avoided revenue requirements are 3-4 times higher than DSM program costs
- ❖ Includes total DSM costs, but only power plant costs recovered during the 20-yr time frame
- ❖ One specific example, but relevant for other DSM programs, especially those just beginning.



Thank you!

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 Innovation Exchange

White paper forthcoming:

www.mncee.org/Innovation-Exchange/Resource-Center