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September 20, 2019

VIA ELECTRONIC FILING

Kimberly A. Campbell, Chief Clerk North Carolina Utilities Commission 4325 Mail Service Center Raleigh, North Carolina 27699-4300

RE: Duke Energy Carolinas, LLC and Duke Energy Progress, LLC's Information on Integrated Volt-Var Control Docket No. E-100, Sub 157

Dear Ms. Campbell:

Pursuant to the Commission's July 22, 2019 Order Accepting Smart Grid Technology Plans and Requiring Additional Information, I enclose Duke Energy Carolinas, LLC and Duke Energy Progress, LLC's (collectively, "Duke Energy") detailed information on Integrated Volt-Var Control ("IVVC"), as provided in a data request response to the Public Staff, for filing in connection with the referenced matter. Duke Energy's relevant Data Request Response and Attachments 1 through 4 directly supporting the IVVC analysis are enclosed. The file identified as "Attachment 5" in the Data Request Response pertains to a different program and is not relevant.

Because Attachments 1 through 4 to the Data Request Response do not conform easily to standard format (e.g., 8.5 by 11 inches), I will provide the Excel spreadsheets to Commission counsel.

Thank you for your attention to this matter. If you have any questions, please let me know.

Sincerely.

Lawrence B. Somers

Enclosures

cc: Parties of Record

NC Public Staff
Docket No. E-100, Sub 157
NC Public Staff Data Request No. 1
2018 SGTP
Item No. 1-4

DUKE ENERGY CAROLINAS, LLC AND DUKE ENERGY PROGRESS, LLC

Request:

Please provide a summary of the cost-benefit analysis relied upon by each Company for each project identified in Section 3 ("Current or Scheduled"); Section 4 (Under Consideration), and Section 5 (Pilots or Initiatives) of each SGTP. The responses should explain the type/nature and value of the benefits identified, who will benefit (Company, customer, or both), and an estimate of when these benefits will be realized. If any cost-benefit analysis includes more than one project, to the extent possible, please provide a project-specific analysis. The responses should also include the net book value of any equipment taken out of service and either replaced or maintained in inventory for future use. The Public Staff may follow up with additional requests for specific analyses.

Response:

As discussed in detail in the pre-read materials provided at the November 8 North Carolina Grid Improvement Stakeholder Workshop, cost-benefit analyses are not needed, and are thus not performed, for all of the work that the Company performs, but the Company does ensure that all of its work is done in a cost-effective manner. As of the date of the filing of the 2018 SGTP, projects that are supported by a cost-benefit analysis were AMI (CBA's provided in prior filings), IVVC in DEC, and CVR in DEP. The details of the IVVC cost-benefit analysis are provided in the following attached files:

- SGTP PSDR 1-4 Attachment 1 DEC_IVVC_Improved VAR Management_Benefit.xlsx
- SGTP PSDR 1-4 Attachment 2 –DEP DSDR to CVR Capital and O&M Costs.xlsx
- SGTP PSDR 1-4 Attachment 3 DEC IVVC_DEP CVR_PVRR_Benefits.xlsm
- SGTP PSDR 1-4 Attachment 4 IVVC DEC Capital and O&M Costs.xlsx

After the October 1 SGTP filing, the Company completed the self-optimizing grid (SOG) cost benefit analysis. The summary analysis results were presented at the November 8 North Carolina Grid Improvement Plan Stakeholder Workshop. The details of the SOG cost-benefit analysis are provided in the following file:

•SGTP PS DR 1-4 Attachment 5 – Duke Energy_NorthCarolina_GIP_SOG_BCA

Additionally, and upon request of the participants at the aforementioned November 8 workshop, the Company has agreed to provide additional cost benefit analyses results for projects in the Company's developing Grid Improvement Plan for the Carolinas as they are completed, and that information will also be provided to Public Staff informally as well as a supplement to this response if requested.

Attachment 1

Improved VAR Management	(89,233)	-	(1,585)	(3,065)	(4,660)	(6,321)	(6,508)	(7,305)	(7,607)	(7,884)	(8,271)	(8,577)	(9,227)	(9,784)	(10,281)	(11,023)	(11,737)	(8,691)	(8,926)	(9,259)	(9,539)	(10,005)	(10,430)	(10,799)	(11,142)	(11,278)	(11,416)
Benefit phase-in		0.0%	25.0%	50.0%	75.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Load		2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
Peak Load (MW)		13,168	13,279	13,390	13,503	13,617	13,731	13,847	13,963	14,080	14,199	14,318	14,439	14,560	14,683	14,806	14,931	15,020	15,110	15,201	15,292	15,384	15,476	15,569	15,662	15,756	15,851
Load Growth (MW)			111	112	113	114	115	115	116	117	118	119	120	121	122	123	125	90	90	91	91	92	92	93	93	94	95
Load Growth (%)			0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
Plant Carrying Cost (\$/kW/Yr)																											
CC - F Class 2X2X1	Ç	58.43	\$ 56.56	\$ 54.21	\$ 54.49	\$ 54.98	\$ 56.13	\$ 62.47	\$ 64.51	\$ 66.31	\$ 68.99	\$ 70.94	\$ 75.68	79.58	\$ 82.92	88.17	\$ 93.09	\$ 96.05	\$ 98.05	\$ 101.11	\$ 103.55	\$ 107.96	\$ 111.87	\$ 115.13	\$ 118.09	\$ 118.82	\$ 119.55
VAR Factor % Capacitors OFF-LINE Unit Conversion Deployment Schedule	0.60 15% 1,000 4.0		- [Based on II [Conversior	mperical Do n of KW to N	nta] //W]		d on emperi mproved VA			_		for until afi	er the Comp	oletion of the	4-Year Deplo	yment)]											

13

Improved VAR Management = $\sqrt{(\text{Distribution Peak Load} * \text{Expected Annual Load Growth} * \text{VAR Factor} * \% \text{ of Capacitors Offline})^2 + ((\text{Distribution Peak Load} * \text{Expected Annual Load Growth})^2)}$

Benefits (\$000)

= Square Root ((Distribution Peak Load * Expected Annual Growth of Load * VAR Factor * % of Capacitors Offline) ^ 2 + (Distribution Peak Load * Expected Annual Growth of Load) ^ 2) * Carrying Cost of a Plant * 1000 for unit conversion * Deployment Schedule

2018 Duke Energy Carolinas Integrated Resource Plan page 16,17 load growth projection through year 2033.

RES 0.013000 0.260 0.00338 **GEN SVC** 0.007000 59% 0.590 0.00413 IND 0.006000 15% 0.150 0.0009

0.841%

^{*} Carrying Cost of a Plant * 1000 for unit conversion * Deployment Schedule

Attachment 2

	ESCALATION RATE: TOTAL PROJECT COST 5 YEARS (Nominal):																										
	TOTAL COST 26 Year Investment Period (Nominal):	\$ 9,242,437			PROJECT																						
(YRS) TRANSMISSION Cost	t Estimate Uncertainty Contingency:	5.00%	97,641	100,082	3 102,584	4 104,635	5 0	6	7	8	9	10 0	11 0	12 1	13 1 0	4 1 0	5 16 0 0	17 0	1	8 19 0 0	20	21	22 0	23 0	24 0	25 2	7 28 29 30 31
10 Transmission - Substation Relays			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0	0		0 0	0	0	0	0	0	0	
15 Sub Capacitor Bank Controls - Retail Station Cap	pacitor Equipment Replacement		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0	0		0 0	0	0	0	0	0	0	
15 Sub LTC Control Panel Replacement (Load Tap			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0	0		0 0	0	0	0	0	0	0	
10 Sub LTC Position for IVVC			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0	0		0 0	0	0	0	0	0	0	
15 Sub Voltage Regulator (VR), VR Control Panel &	Comms		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0	0		0 0	0	0	0	0	0	0	
15 Mobile Substations			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0	0		0 0	0	0	0	0	0	0	
Spartan Replacements			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0	0		0 0	0	0	0	0	0	0	
Add or change control settings for CVR operatio	on on substation devices		97,641	100.082	102.584	104.635	0	0	0	0	0	0	0	0	0	0	0 0	0		0 0	0	0	0	0	0	0	
	on substation devices.		37,041	100,002	102,304	104,033	0	0	0	0	0	0	0	0	0	0	0 0			0 0	0	0	0	0	0	0	/
Transmission: Contingency TELECOM Cost	t Estimate Uncertainty Contingency:	5.00%	0	0	0	0	<u> </u>	0		0	0	0	0 0)	0 0	0	0	0	<u> </u>	0	0					
	t Estimate Uncertainty Contingency:	5.00%	0	0	0	0	ا	0	ا	ا	ا	0	ام		0	ام	0					0	0	0	U	0	
7 Subst Comms: Cellular Connected Subs			0	0	U	0	U	U	U	U	U	U	U	U	U	U .	<u> </u>	0	'	0	0	0	0	U	U	U	
On-Going Capital: Cellular Connected Subs												_					-	1	1								4 + + + + + + + + + + + + + + + + + + +
20 Subst Comms: Fiber Connected Subs			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0	0) (0 0	0	0	0	0	0	0	4 + + + + + + + + + + + + + + + + + + +
20 Subst Comms: Leased T1/MPLS Connected Site			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0	0)	0 0	0	0	0	0	0	0	4
Subst Comms: Intra-sub Communications - SDM			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0	0		0 0	0	0	0	0	0	0	4
Subst Comms: Leased T1/MPLS Connected Sub	bs		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0	0		0 0	0	0	0	0	0	0	_
Subst Comms: Material Freight			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0	0		0 0	0	0	0	0	0	0	
7 Dist Line Communications Materials			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0	0		0 0	0	0	0	0	0	0	
On-Going Capital: Dist Line Communications Ma	aterials																										
Dist Network Connectivity - Firewall, Testing, Sup			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0	0		0 (0	0	0	0	0	0	
7 Dist Modem Procure, Config, Activate, Support			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0	0		0 0	0	0	0	0	0	0	
On-Going Capital: Dist Modem Procure, Config,																											
7 Dist Modem Configuration & Activation - USAT		_	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0	0		0 0	0	0	0	0	0	0	
On-Going Capital: Dist Modem Configuration & A						•					,								,								
Dist Material Freight	- Contraction - Contraction	_	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0 0	0	0	0	0	0	0	/
		_	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0	0		0 0	0	0	0	0	0	0	1 + + + + + + + + + + + + + + + + + + +
Dist Meals/Travel/Lodging		_	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0			0 0	0	0	0	0	0	0	
Telecom: Contingency	Fatimata Unacutainto Cautin manan	F 000/	1,008,246	1,033,451	1.059.287	1 085 770	0	0	0	0	0	0	0	0	0	0	0 0	0) \	0 0	0	0	0	0	0	0	
	Estimate Uncertainty Contingency:	5.00%	1,008,246	1,033,451	1,059,287	1,085,770	0	0	0	0	0	0	0	0	0	0	0 0	0		0 (0	0	0	0	0	0	
· · · · · · · · · · · · · · · · · · ·	sume servers/hardware covered under DMS upgrade)	_	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0)	0 0	0	0	0	0	0	0	4
IT: CVR operation mode Configuration for Substa		_	302,474	,	317,786	325,731	0	0	0	0	0	0	0	0	0	0	0 0	0)	0 0	0	0	0	0	0	0	4
10 IT: DMS Model Updates / Testing CVR operation	mode	_	604,948	620,071	635,573	651,462	0	0	0	0	0	0	0	0	0	0	0 0	0	0	0 0	0	0	0	0	0	0	4
10 IT: Infrastructure Labor			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0	0		0 0	0	0	0	0	0	0	4
15 IT: EMAX / Aspen / Asset Management Settings	Modifications		100,824	103,345	105,928	108,577	0	0	0	0	0	0	0	0	0	0	0 0	0		0 0	0	0	0	0	0	0	
IT: Contingency			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0 0	0	0	0	0	0	0	<u> </u>
	Estimate Uncertainty Contingency:	5.00%	878,167	896,136	913,895	932,894	0	0	0	0	0	0	0	0	0	0	0	0),	0 0	0	0	0	0	0	0	
15 Line Regulator Control Panels Replace / Upgrade			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0	0		0 0	0	0	0	0	0	0	
15 Line Capacitor Bank Controls Replace / Upgrade	e (Existing)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0	0		0 0	0	0	0	0	0	0	<u> </u>
Circuit Conditioning: Load Balancing			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0	0		0 0	0	0	0	0	0	0	<u> </u>
Circuit Conditioning: Reconductoring (wire size)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0 0	0	0	0	0	0	0	<u> </u>
Circuit Conditioning: Transformer/Service Issues			0	0	0	o	0	0	0	0	0	0	0	0	0	0	0 0	0		0 0	0	0	0	0	0	0	
Circuit Conditioning New Line Capacitor Bank &			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0	0		0 0	0	0	0	0	0	0	<u> </u>
30 Line Regulators Replace / Upgrade (Existing)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0			0 0	0	0	0	0	0	0	
10 Medium Voltage Sensors (3 phase Sensors)			0	<u> </u>	0		٥	0	ol o	0	٥	0	0	0	0	0	0 0			0 0		0	0	0	0	0	
GIS Field Verification			0	<u> </u>	0	0	- J	0				0	0	0	0	0	0 0			0 0		0	0		0	0	/
GIS Update from Verification			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0			0 0		0	0	0	0	0	
•			0	0	0	0	- 0	0	0	0	0	0	0	0	0	0	0	-		0 0		U	0	0	U	0	
Circuit Conditioning: Feeder Analysis			0	0	0	0	0	U	0	0	0	0	0	0	0	0	0	0	<u>'</u>	0	0	U	0	U	U	0	
Circuit Conditioning: Work Order Design			0	0	0	0	0	0	0	0	0	0	0	0	U	0	0	0	'	0	0	0	0	0	0	0	4 + + + + + + + + + + + + + + + + + + +
Circuit Conditioning: QA/QC			0	222 (22	0	0	0	0	0	0	0	0	0	0	U	0	<u> </u>	0)	U C	0	0	0	0	0	0	4 + + + + + + + + + + + + + + + + + + +
Add or change control settings for CVR operation	on on distribution line IVVC devices.		878,167	896,136	913,895	932,894	0	0	0	0	0	0	0	0	0	0	0 0	0)	0 0	0	0	0	0	0	0	4
Distribution: Contingency			0	0	0	0	0	0	0	0	0	0							<u> </u>								<u> </u>
STAFFING PLAN			247,594		259,519	265,054	0	0	0	0	0	0	0	0	0	0	0 0	0		0 0	0	0	0	0	0	0	
Project Management & Support			154,579	162,144	163,197	166,325	0	0	0	0	0	0	0	0	0	0	0 0	0		0 0	0	0	0	0	0	0	4
Project Controls Team			35,038	35,913	36,311	37,219	0	0	0	0	0	0	0	0	0	0	0 0	0		0 0	0	0	0	0	0	0	
BPM/Change Management			28,977	29,701	29,944	30,692	0	0	0	0	0	0	0	0	0	0	0 0	0		0 0	0	0	0	0	0	0	
Overhead Allocation (Grid Mod , IT) / AFUDC			29,000	29,724	30,067	30,818	0	0	0	0	0	0	0	0	0	0	0 0	0		0 0	0	0	0	0	0	0	<u> </u>
Grand Total: All Cash Flow Categories (NOMINA	AL)	\$9,242,437	2,231,648	2,287,151	2,335,285	2,388,353	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0 0 0 0

The substation, distribution, telecommunications, and IT infrastructure are already in place because DSDR already exists in DEP. As such, it is expected that few new devices will be installed. The current DEP DMS will transition to the enterprise DMS platform in the future. This evaluation assumes the future version of the DMS platform will have already been deployed.

ESCALATION RATE: TOTAL PROJECT O&M COST 5 YEARS (Nominal): \$ 82	<mark>2.5%</mark> ,128																													
TOTAL O&M COST 32 Year Investment Period (Nominal): \$82			PROJECT																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	28	29	30	31
RANSMISSION	976	1,001	1,026	1,046	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
ransmission - Substation Relays	0	0	0	0	0	0	0	0	0	0																				
ssume 1% of Capital Cost for Transmission O&M	976	1,001	1,026	1,046	0	0	0	0	0	0																				
n Going Substation Costs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
ELECOM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		•		
ubst Comms On Going O&M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
st Line Communications (Operations Support / Cellular)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
oject O&M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	_			
	10,082	10,335	10,593	10,858	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
ssume 1% of Capital Cost for IT O&M	10,082	10,335	10,593	10,858	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
ISTRIBUTION	8,782	8,961	9,139	9,329	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
ssume 1% of Capital Cost for Distribution O&M	8,782	8,961	9,139	9,329	0	0	0	0	0	0																				
n Going Distribution Costs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
aff Support	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		,		
rid Management: Transition GMgmt Deployment personnel to On-Going Support (Post-P <u>roject)</u>	0	0	o	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	o	0	0	0	0				
rand Total - All Cash Flow Categories \$83	2,128 19,841	20,297	20,758	21,233	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				

The substation, distribution, telecommunications, and IT infrastructure are already in place because DSDR already exists in DEP. As such, it is expected that few new devices will be installed. The current DEP DMS will transition to the enterprise DMS platform in the future. This evaluation assumes the future version of the DMS platform will have already been deployed.

Attachment 3

		_	
BENEFITS with CO2		DEC IVVC Only	DEC IVVC Only
\$K - PVRR Thru 2043	Base	Change:	Delta: Change - Base
System Costs (PROSYM)			
Variable Costs			
VOM	\$4,021,580	\$3,997,696	(\$23,884)
Fuel Cost	\$36,184,040	\$35,814,819	(\$369,220)
Reagent Cost	\$37,137	\$36,855	(\$282)
Start Cost	\$946,252	\$934,289	(\$11,963)
SO2 Cost	\$536	\$529	(\$7)
<u>NOx Cost</u> Subtotal	\$23,380 \$41,313,035	\$23,039 \$40,907,339	(\$341) (\$405.608)
	\$41,212,925	\$40,807,228	(\$405,698)
Fixed O&M	\$3,274,219	\$3,269,647	(\$4,572)
Fuel Demand Cost	\$8,477,838	\$8,477,838	\$0
CO2 Cost	\$6,885,131	\$6,770,123	(\$115,007)
Avoided Capacity of 217MW F-frame	\$0	-\$112,201	(\$112,201) (\$637,478)
Total System Costs Saving of Performing upgrade now	\$59,850,113	\$59,324,836	(\$637,478)
IVVC Capital			
Charged Capital	\$0	\$563,979	\$563,979
Improved VAR Management	<u>\$0</u> \$0	<u>-\$89,233</u>	<u>(\$89,233)</u>
	\$0	\$474,746	\$474,746
IVVC O&M			
O&M (non-levelized)	\$0	\$67,586	\$67,586
Empty	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>
	\$0	\$67,586	\$67,586
DEP CVR			
Capital (non-levelized)	\$0	\$0	\$0
O&M (non-levelized)		<u>\$0</u>	
	\$0 \$0	\$0	<u>\$0</u> \$0
Total Benefit for Outage Now	\$59,850,113	\$59,867,167	(\$95,147)

BENEFITS without CO2		DEC IVVC Only	DEC IVVC Only
\$K - PVRR Thru 2043	Base	Change:	Delta: Change - Base
System Costs (PROSYM)			
Variable Costs			
VOM	\$3,945,581	\$3,923,630	(\$21,951)
Fuel Cost	\$37,230,698	\$36,844,636	(\$386,062)
Reagent Cost	\$38,622	\$38,423	(\$200)
Start Cost	\$1,125,076	\$1,105,349	(\$19,727)
SO2 Cost	\$732	\$721	(\$11)
NOx Cost	<u>\$25,314</u>	<u>\$24,929</u>	<u>(\$385)</u>
Subtotal	\$42,366,023	\$41,937,688	(\$428,335)
Fixed O&M	\$3,106,008	\$3,099,999	(\$6,008)
Fuel Demand Cost	\$7,641,414	\$7,641,414	\$0
CO2 Cost	\$0	\$0	\$0
Avoided Capacity of 217MW F-frame	\$0	-\$112,201	(\$112,201)
Total System Costs Saving of Performing upgrade now	\$53,113,445	\$52,679,101	(\$546,545)

Variable

Assumptions

After-Tax Discount Rate 6.81%
Escalation Rate 2.50%
Discount Year 2018

Raca		Nominal	Real	Nominal \$k	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Base Base Base Base Base Base Base Base	System Production Cost, w/o CO2 Variable Costs VOM Fuel Cost Reagent Cost Start Cost SO2 Cost NOx Cost Fixed O&M Fuel Demand Cost CO2 Cost	\$126,825,829 \$98,478,557 \$8,778,159 \$87,097,874 \$72,420 \$2,481,158 \$804 \$48,141 \$7,768,829 \$20,578,445 \$22,689,488	\$52,964,982 \$41,212,925 \$4,021,580 \$36,184,040 \$37,137 \$946,252 \$536 \$23,380 \$3,274,219 \$8,477,838 \$6,885,131		\$3,243,582 \$2,868,427 \$309,045 \$2,509,315 \$3,020 \$44,869 \$103 \$2,076 \$183,065 \$192,090 \$0	\$3,129,078 \$2,655,218 \$325,288 \$2,280,622 \$2,624 \$44,792 \$83 \$1,809 \$193,079 \$280,781 \$0	\$3,203,182 \$2,427,721 \$326,972 \$2,054,205 \$3,117 \$41,686 \$60 \$1,681 \$196,898 \$578,564 \$0	\$3,078,733 \$2,310,891 \$254,699 \$2,013,694 \$3,189 \$37,521 \$49 \$1,738 \$193,136 \$574,707 \$0	\$3,075,623 \$2,324,688 \$248,313 \$2,029,949 \$3,178 \$41,512 \$41 \$1,694 \$176,829 \$574,106 \$0	\$3,062,031 \$2,308,444 \$250,283 \$2,005,699 \$2,936 \$47,811 \$39 \$1,675 \$189,798 \$563,788 \$0	\$3,111,548 \$2,354,609 \$270,646 \$2,028,087 \$3,145 \$51,035 \$37 \$1,658 \$193,326 \$563,612 \$0	\$3,146,197 \$2,383,008 \$262,369 \$2,063,907 \$3,158 \$51,889 \$38 \$1,647 \$199,766 \$563,423 \$186,086	\$3,261,115 \$2,485,225 \$273,251 \$2,149,187 \$3,152 \$57,785 \$41 \$1,810 \$207,989 \$567,901 \$307,183	\$3,319,935 \$2,466,708 \$290,575 \$2,117,108 \$2,949 \$54,339 \$34 \$1,703 \$222,699 \$630,528 \$405,051	\$3,480,203 \$2,522,587 \$297,591 \$2,168,805 \$2,955 \$51,508 \$32 \$1,695 \$243,099 \$714,518 \$509,839	\$3,677,151 \$2,698,004 \$283,924 \$2,343,005 \$2,906 \$66,433 \$23 \$1,713 \$264,628 \$714,518 \$593,889	\$4,112,697 \$3,116,064 \$298,466 \$2,743,420 \$2,951 \$69,425 \$29 \$1,774 \$282,393 \$714,240 \$729,821	\$4,421,930 \$3,399,751 \$300,749 \$3,019,222 \$2,896 \$74,927 \$33 \$1,924 \$300,634 \$721,545 \$849,544	\$4,996,042 \$3,854,370 \$322,619 \$3,450,779 \$2,629 \$76,394 \$37 \$1,911 \$326,725 \$814,947 \$969,839	\$5,300,344 \$4,217,152 \$335,773 \$3,783,898 \$2,640 \$92,724 \$47 \$2,070 \$305,831 \$777,361 \$1,130,291	\$5,483,486 \$4,375,406 \$341,746 \$3,906,888 \$2,606 \$121,968 \$33 \$2,165 \$320,998 \$787,082 \$1,226,411	\$5,743,193 \$4,496,736 \$352,409 \$4,006,201 \$2,540 \$133,675 \$15 \$1,898 \$342,487 \$903,970 \$1,250,376	\$5,968,565 \$4,586,770 \$375,476 \$4,071,694 \$2,523 \$135,164 \$5 \$1,906 \$368,228 \$1,013,567 \$1,349,816	\$6,316,977 \$4,924,384 \$387,442 \$4,383,264 \$2,547 \$149,115 \$7 \$2,009 \$379,024 \$1,013,567 \$1,498,773	\$6,711,745 \$5,292,992 \$400,594 \$4,725,983 \$2,598 \$161,695 \$8 \$2,113 \$394,457 \$1,024,297 \$1,633,686	\$7,113,557 \$5,551,313 \$407,077 \$4,954,882 \$2,476 \$185,103 \$2 \$1,773 \$419,923 \$1,142,322 \$1,727,316	\$7,533,123 \$5,953,506 \$423,387 \$5,332,321 \$2,551 \$193,354 \$4 \$1,888 \$437,296 \$1,142,321 \$1,913,087	\$7,730,637 \$6,113,899 \$442,935 \$5,485,522 \$2,557 \$180,964 \$3 \$1,917 \$451,309 \$1,165,430 \$2,030,898	\$8,102,266 \$6,202,432 \$489,784 \$5,565,452 \$2,240 \$143,109 \$1 \$1,847 \$480,206 \$1,419,630 \$2,095,775	\$8,502,889 \$6,588,251 \$506,744 \$5,904,762 \$2,337 \$172,361 \$1 \$2,045 \$495,007 \$1,419,630 \$2,281,809
Base Base Base Base Base	Capital Empty None None None	\$0 \$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0 \$0		\$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0 \$0
Base Base Base Base	O&M Empty None None	\$0 \$0 \$0	\$0 \$0 \$0		\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0
1 1 1 1 1 1 1 1 1	DEC IVVC SCENARIO System Production Cost, w/o CO2 Variable Costs VOM Fuel Cost Reagent Cost Start Cost SO2 Cost NOx Cost Fixed O&M Fuel Demand Cost CO2 Cost	\$125,639,887 \$97,308,417 \$8,713,462 \$86,035,732 \$71,638 \$2,439,478 \$789 \$47,318 \$7,753,024 \$20,578,445 \$22,318,187	\$52,554,713 \$40,807,228 \$3,997,696 \$35,814,819 \$36,855 \$934,289 \$529 \$23,039 \$3,269,647 \$8,477,838 \$6,770,123		\$3,243,582 \$2,868,427 \$309,045 \$2,509,315 \$3,020 \$44,869 \$103 \$2,076 \$183,065 \$192,090 \$0	\$3,129,078 \$2,655,218 \$325,288 \$2,280,622 \$2,624 \$44,792 \$83 \$1,809 \$193,079 \$280,781 \$0	\$3,203,182 \$2,427,721 \$326,972 \$2,054,205 \$3,117 \$41,686 \$60 \$1,681 \$196,898 \$578,564 \$0	\$3,072,265 \$2,304,423 \$254,265 \$2,007,581 \$3,189 \$37,609 \$49 \$1,730 \$193,136 \$574,707 \$0	\$3,063,365 \$2,312,430 \$247,613 \$2,018,852 \$3,171 \$41,079 \$41 \$1,675 \$176,829 \$574,106 \$0	\$3,047,447 \$2,293,860 \$249,342 \$1,991,229 \$2,933 \$48,669 \$38 \$1,648 \$189,798 \$563,788 \$0	\$3,086,608 \$2,329,670 \$269,285 \$2,005,512 \$3,120 \$50,091 \$37 \$1,625 \$193,326 \$563,612 \$0	\$3,117,596 \$2,354,407 \$260,702 \$2,037,446 \$3,119 \$51,486 \$37 \$1,617 \$199,766 \$563,423 \$183,100	\$3,222,818 \$2,446,928 \$270,499 \$2,114,511 \$3,135 \$56,990 \$39 \$1,754 \$207,989 \$567,901 \$300,969	\$3,285,920 \$2,432,693 \$288,240 \$2,085,814 \$2,928 \$54,012 \$33 \$1,665 \$222,699 \$630,528 \$397,541	\$3,446,208 \$2,488,592 \$294,806 \$2,138,465 \$2,917 \$50,713 \$31 \$1,660 \$243,099 \$714,518 \$500,579	\$3,642,787 \$2,663,640 \$281,105 \$2,311,744 \$2,878 \$66,218 \$22 \$1,673 \$264,628 \$714,518 \$583,460	\$4,069,866 \$3,073,335 \$295,867 \$2,704,114 \$2,928 \$68,665 \$27 \$1,734 \$282,291 \$714,240 \$716,012	\$4,373,676 \$3,352,534 \$297,912 \$2,976,294 \$2,867 \$73,549 \$31 \$1,881 \$299,597 \$721,545 \$833,608	\$4,945,393 \$3,804,786 \$319,395 \$3,405,625 \$2,589 \$75,265 \$37 \$1,877 \$325,660 \$814,947 \$954,113	\$5,247,654 \$4,165,551 \$331,289 \$3,737,125 \$2,571 \$92,496 \$45 \$2,025 \$304,742 \$777,361 \$1,110,601	\$5,421,571 \$4,314,605 \$337,854 \$3,851,383 \$2,646 \$120,573 \$31 \$2,117 \$319,882 \$787,082 \$1,200,953	\$5,690,365 \$4,445,052 \$349,837 \$3,958,973 \$2,428 \$131,933 \$14 \$1,866 \$341,343 \$903,970 \$1,233,231	\$5,909,966 \$4,529,346 \$372,064 \$4,019,674 \$2,486 \$133,255 \$5 \$1,863 \$367,052 \$1,013,567 \$1,329,852	\$6,255,979 \$4,864,589 \$384,159 \$4,329,632 \$2,498 \$146,318 \$7 \$1,976 \$377,822 \$1,013,567 \$1,476,389	\$6,631,309 \$5,213,786 \$397,100 \$4,655,549 \$2,537 \$156,518 \$8 \$2,075 \$393,225 \$1,024,297 \$1,606,598	\$7,015,485 \$5,454,503 \$403,516 \$4,867,389 \$2,421 \$179,435 \$2 \$1,740 \$418,661 \$1,142,322 \$1,697,415	\$7,454,529 \$5,876,209 \$419,946 \$5,261,914 \$2,490 \$190,002 \$4 \$1,852 \$435,998 \$1,142,321 \$1,885,141	\$7,635,938 \$6,020,527 \$439,389 \$5,402,716 \$2,526 \$174,021 \$3 \$1,872 \$449,982 \$1,165,430 \$1,996,938	\$8,018,290 \$6,119,816 \$486,126 \$5,489,764 \$2,207 \$139,906 \$1 \$1,812 \$478,846 \$1,419,630 \$2,063,933	\$8,409,010 \$6,495,768 \$501,844 \$5,820,283 \$2,293 \$169,329 \$1 \$2,017 \$493,613 \$1,419,630 \$2,247,754
1 1 1 1 1	Other Other O&M Empty Avoided Capacity of 217MW F-frame	\$159,022 \$159,022 \$0 \$260,532	\$63,277 \$67,586 \$0 \$112,201		\$392 \$392 \$0 \$0	\$2,816 \$2,816 \$0 \$2,352	\$3,260 \$3,260 \$0 \$4,763	\$3,800 \$3,800 \$0 \$7,236	\$4,286 \$4,286 \$0 \$9,770	\$4,962 \$4,962 \$0 \$9,894	\$5,265 \$5,265 \$0 \$10,020	\$5,570 \$5,570 \$0 \$10,147	\$5,875 \$5,875 \$0 \$10,276	\$6,184 \$6,184 \$0 \$10,406	\$6,447 \$6,447 \$0 \$10,538	\$6,658 \$6,658 \$0 \$10,672	\$6,745 \$6,745 \$0 \$10,808	\$6,835 \$6,835 \$0 \$10,945	\$6,928 \$6,928 \$0 \$11,084	\$7,022 \$7,022 \$0 \$11,225	\$7,119 \$7,119 \$0 \$11,367	\$7,219 \$7,219 \$0 \$11,512	\$7,321 \$7,321 \$0 \$11,658	\$7,425 \$7,425 \$0 \$11,806	\$7,532 \$7,532 \$0 \$11,956	\$7,642 \$7,642 \$0 \$12,108	\$7,754 \$7,754 \$0 \$12,262	\$7,869 \$7,869 \$0 \$12,417	\$7,988 \$7,988 \$0 \$12,575	\$8,109 \$8,109 \$0 \$12,735
1 1 1	Capital Costs Capital IVVC Charged Capital Empty	\$957,663 \$957,663 \$0	\$528,020 \$563,979 \$0		\$1,513 \$1,513 \$0	\$116,077 \$116,077 \$0	\$119,389 \$119,389 \$0	\$122,229 \$122,229 \$0	\$124,552 \$124,552 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$6,938 \$6,938 \$0	\$7,105 \$7,105 \$0	\$7,275 \$7,275 \$0	\$18,867 \$18,867 \$0	\$11,935 \$11,935 \$0	\$12,233 \$12,233 \$0	\$12,490 \$12,490 \$0	\$7,922 \$7,922 \$0	\$71,497 \$71,497 \$0	\$73,284 \$73,284 \$0	\$75,116 \$75,116 \$0	\$68,250 \$68,250 \$0	\$0 \$0 \$0	\$14,964 \$14,964 \$0	\$24,694 \$24,694 \$0	\$25,312 \$25,312 \$0	\$25,881 \$25,881 \$0	\$10,141 \$10,141 \$0
	Delta (1-Base) System Production Cost, w/o CO2 Variable Costs VOM Fuel Cost Reagent Cost Start Cost SO2 Cost NOx Cost Fixed O&M Savings Fuel Demand Cost CO2 Cost	-\$1,185,942 -\$1,170,140 -\$64,698 -\$1,062,142 -\$781 -\$41,681 -\$15 -\$823 -\$15,805 \$0 -\$371,301	-\$410,269 -\$405,698 -\$23,884 -\$369,220 -\$282 -\$11,963 -\$7 -\$341 -\$4,572 \$0 -\$115,007		\$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	-\$6,468 -\$6,468 -\$434 -\$6,114 \$1 \$87 \$0 -\$8 \$0 \$0	-\$12,257 -\$12,257 -\$701 -\$11,097 -\$7 -\$433 -\$1 -\$19 \$0 \$0	-\$14,584 -\$14,585 -\$941 -\$14,470 -\$4 \$858 -\$1 -\$27 \$0 \$0	-\$24,940 -\$24,939 -\$1,360 -\$22,575 -\$25 -\$945 -\$1 -\$33 \$0 \$0 \$0	-\$28,600 -\$28,600 -\$1,667 -\$26,461 -\$39 -\$403 -\$1 -\$30 \$0 \$0	-\$38,297 -\$38,297 -\$2,751 -\$34,676 -\$16 -\$795 -\$2 -\$56 \$0 \$0 -\$6,213	-\$34,015 -\$34,015 -\$2,335 -\$31,294 -\$21 -\$326 -\$1 -\$38 \$0 \$0 -\$7,510	-\$33,995 -\$33,995 -\$2,785 -\$30,341 -\$38 -\$795 -\$1 -\$35 \$0 \$0 -\$9,259	-\$34,364 -\$34,364 -\$2,818 -\$31,262 -\$28 -\$215 -\$1 -\$40 \$0 \$0 -\$10,429	-\$42,832 -\$42,729 -\$2,600 -\$39,305 -\$22 -\$760 -\$1 -\$41 -\$103 \$0 -\$13,808	-\$48,254 -\$47,217 -\$2,837 -\$42,928 -\$30 -\$1,378 -\$1 -\$43 -\$1,036 \$0 -\$15,936	-\$50,649 -\$49,584 -\$3,224 -\$45,154 -\$40 -\$1,130 -\$1 -\$34 -\$1,065 \$0 -\$15,726	-\$52,690 -\$51,601 -\$4,484 -\$46,772 -\$70 -\$228 -\$2 -\$46 -\$1,089 \$0 -\$19,690	-\$61,916 -\$60,801 -\$3,892 -\$55,505 \$41 -\$1,395 -\$2 -\$48 -\$1,116 \$0 -\$25,458	-\$52,828 -\$51,684 -\$2,571 -\$47,227 -\$112 -\$1,742 \$0 -\$32 -\$1,144 \$0 -\$17,145	-\$58,600 -\$57,423 -\$3,413 -\$52,021 -\$37 -\$1,910 \$0 -\$43 -\$1,176 \$0 -\$19,964	-\$60,998 -\$59,796 -\$3,283 -\$53,632 -\$50 -\$2,797 \$0 -\$33 -\$1,202 \$0 -\$22,384	-\$80,436 -\$79,205 -\$3,494 -\$70,434 -\$60 -\$5,177 \$0 -\$39 -\$1,232 \$0 -\$27,089	-\$98,072 -\$96,810 -\$3,561 -\$87,493 -\$55 -\$5,668 \$0 -\$33 -\$1,263 \$0 -\$29,901	-\$78,595 -\$77,298 -\$3,441 -\$70,407 -\$61 -\$3,353 \$0 -\$36 -\$1,298 \$0 -\$27,945	-\$94,699 -\$93,372 -\$3,546 -\$82,806 -\$31 -\$6,943 \$0 -\$46 -\$1,327 \$0 -\$33,960	-\$83,976 -\$82,617 -\$3,658 -\$75,688 -\$33 -\$3,202 \$0 -\$36 -\$1,360 \$0 -\$31,842	-\$93,879 -\$92,483 -\$4,900 -\$84,479 -\$44 -\$3,032 \$0 -\$28 -\$1,394 \$0 -\$34,055
3 3 3 3 3 3 3 3 3 3 3 3	DEP DSDR to CVR Incremental Benefits Scenar System Production Cost, w/o CO2 Variable Costs VOM Fuel Cost Reagent Cost Start Cost SO2 Cost NOx Cost Fixed O&M Fuel Demand Cost CO2 Cost	\$126,250,254 \$97,902,978 \$8,750,403 \$86,565,581 \$72,253 \$2,466,227 \$798 \$47,718 \$7,768,829 \$20,578,445 \$22,505,560	\$52,755,643 \$41,003,585 \$4,010,824 \$35,991,500 \$37,073 \$940,453 \$533 \$23,202 \$3,274,219 \$8,477,838 \$6,828,120		\$3,243,582 \$2,868,427 \$309,045 \$2,509,315 \$3,020 \$44,869 \$103 \$2,076 \$183,065 \$192,090 \$0	\$3,129,078 \$2,655,218 \$325,288 \$2,280,622 \$2,624 \$44,792 \$83 \$1,809 \$193,079 \$280,781 \$0	\$3,203,182 \$2,427,721 \$326,972 \$2,054,205 \$3,117 \$41,686 \$60 \$1,681 \$196,898 \$578,564 \$0	\$3,075,456 \$2,307,613 \$254,393 \$2,010,715 \$3,186 \$37,540 \$49 \$1,732 \$193,136 \$574,707 \$0	\$3,066,870 \$2,315,935 \$247,528 \$2,021,999 \$3,178 \$41,506 \$41 \$1,682 \$176,829 \$574,106 \$0	\$3,052,207 \$2,298,619 \$249,502 \$1,996,394 \$2,939 \$48,088 \$38 \$1,658 \$189,798 \$563,788 \$0	\$3,093,367 \$2,336,429 \$269,534 \$2,011,369 \$3,143 \$50,709 \$37 \$1,637 \$193,326 \$563,612 \$0	\$3,128,184 \$2,364,995 \$261,575 \$2,047,353 \$3,148 \$51,259 \$37 \$1,622 \$199,766 \$563,423 \$184,189	\$3,243,075 \$2,467,185 \$272,367 \$2,132,991 \$3,151 \$56,848 \$40 \$1,788 \$207,989 \$567,901 \$304,272	\$3,303,177 \$2,449,950 \$289,566 \$2,102,007 \$2,946 \$53,711 \$34 \$1,687 \$222,699 \$630,528 \$401,342	\$3,464,334 \$2,506,717 \$296,636 \$2,154,502 \$2,945 \$50,923 \$32 \$1,680 \$243,099 \$714,518 \$505,603	\$3,656,760 \$2,677,614 \$282,713 \$2,324,652 \$2,900 \$65,631 \$22 \$1,695 \$264,628 \$714,518 \$587,718	\$4,092,164 \$3,095,530 \$297,459 \$2,724,542 \$2,933 \$68,809 \$28 \$1,759 \$282,393 \$714,240 \$723,840	\$4,397,123 \$3,374,945 \$299,082 \$2,996,416 \$2,879 \$74,637 \$32 \$1,900 \$300,634 \$721,545 \$840,965	\$4,966,421 \$3,824,749 \$321,031 \$3,424,099 \$2,634 \$75,059 \$37 \$1,889 \$326,725 \$814,947 \$961,068	\$5,271,186 \$4,187,994 \$334,600 \$3,756,965 \$2,602 \$91,724 \$47 \$2,057 \$305,831 \$777,361 \$1,121,573	\$5,454,839 \$4,346,758 \$340,501 \$3,880,818 \$2,598 \$120,669 \$32 \$2,141 \$320,998 \$787,082 \$1,216,035	\$5,710,788 \$4,464,332 \$351,445 \$3,977,178 \$2,518 \$131,294 \$15 \$1,882 \$342,487 \$903,970 \$1,240,664	\$5,939,332 \$4,557,537 \$374,378 \$4,044,760 \$2,516 \$133,990 \$5 \$1,887 \$368,228 \$1,013,567 \$1,339,115	\$6,284,830 \$4,892,237 \$385,991 \$4,353,689 \$2,547 \$148,010 \$7 \$1,992 \$379,024 \$1,013,567 \$1,487,080	\$6,678,811 \$5,260,056 \$399,083 \$4,695,670 \$2,593 \$160,607 \$8 \$2,096 \$394,457 \$1,024,297 \$1,621,242	\$7,068,120 \$5,505,874 \$405,865 \$4,912,391 \$2,482 \$183,381 \$2 \$1,754 \$419,923 \$1,142,322 \$1,713,140	\$7,508,291 \$5,928,673 \$421,578 \$5,308,621 \$2,534 \$194,068 \$4 \$1,868 \$437,296 \$1,142,321 \$1,900,124	\$7,690,285 \$6,073,547 \$441,374 \$5,448,268 \$2,566 \$179,442 \$3 \$1,894 \$451,309 \$1,165,430 \$2,014,698	\$8,065,800 \$6,165,964 \$488,110 \$5,530,012 \$2,229 \$143,783 \$1 \$1,830 \$480,206 \$1,419,630 \$2,079,967	\$8,462,992 \$6,548,357 \$504,789 \$5,866,027 \$2,325 \$173,192 \$1 \$2,023 \$495,007 \$1,419,630 \$2,262,926
3 3 3 3 3	Capital Empty None None None	\$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0 \$0		\$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0 \$0
3 3 3 3	O&M Empty None None	\$0 \$0 \$0	\$0 \$0 \$0		\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0	\$0 \$0 \$0
	Delta (3-Base) System Production Cost, w/o CO2 Variable Costs VOM Fuel Cost Reagent Cost Start Cost SO2 Cost NOx Cost Fixed O&M Savings Fuel Demand Cost CO2 Cost	-\$575,576 -\$575,578 -\$27,757 -\$532,294 -\$167 -\$14,932 -\$6 -\$423 \$0 \$0 \$0 -\$183,928	-\$209,339 -\$209,340 -\$10,756 -\$192,539 -\$64 -\$5,799 -\$3 -\$178 \$0 \$0 -\$57,011		\$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	\$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	-\$3,277 -\$3,277 -\$3,07 -\$2,980 -\$3 \$19 \$0 -\$7 \$0 \$0 \$0	-\$8,753 -\$8,753 -\$7,950 \$0 -\$6 \$0 -\$12 \$0 \$0 \$0	-\$9,824 -\$9,825 -\$781 -\$9,305 \$3 \$276 -\$1 -\$17 \$0 \$0	-\$18,181 -\$18,180 -\$1,111 -\$16,718 -\$2 -\$326 -\$1 -\$22 \$0 \$0	-\$18,013 -\$18,013 -\$794 -\$16,553 -\$10 -\$629 \$0 -\$26 \$0 \$0 -\$1,897	-\$18,040 -\$18,040 -\$884 -\$16,196 \$0 -\$937 -\$1 -\$22 \$0 \$0 -\$2,911	-\$16,758 -\$16,758 -\$1,009 -\$15,101 -\$3 -\$628 \$0 -\$16 \$0 \$0 -\$3,709	-\$15,870 -\$15,870 -\$955 -\$14,304 -\$10 -\$585 \$0 -\$15 \$0 \$0 -\$4,235	-\$20,391 -\$20,390 -\$1,211 -\$18,353 -\$6 -\$802 -\$1 -\$18 \$0 \$0 -\$6,171	-\$20,534 -\$20,534 -\$1,008 -\$18,878 -\$18 -\$615 \$0 -\$15 \$0 \$0 -\$5,981	-\$24,806 -\$24,806 -\$1,667 -\$22,807 -\$18 -\$289 -\$1 -\$25 \$0 \$0 -\$8,579	-\$29,621 -\$29,621 -\$1,588 -\$26,680 \$5 -\$1,335 \$0 -\$22 \$0 \$0 -\$8,771	-\$29,158 -\$29,159 -\$1,174 -\$26,932 -\$39 -\$1,001 \$0 -\$14 \$0 \$0 -\$8,719	-\$28,647 -\$28,648 -\$1,246 -\$26,070 -\$8 -\$1,299 -\$1 -\$24 \$0 \$0 -\$10,376	-\$32,404 -\$32,404 -\$964 -\$29,022 -\$22 -\$2,381 \$0 -\$16 \$0 \$0 -\$9,711	-\$29,233 -\$29,233 -\$1,098 -\$26,934 -\$7 -\$1,174 \$0 -\$19 \$0 \$0	-\$32,147 -\$32,147 -\$1,451 -\$29,575 \$0 -\$1,105 \$0 -\$16 \$0 \$0 -\$11,693	-\$32,934 -\$32,935 -\$1,511 -\$30,313 -\$4 -\$1,089 \$0 -\$18 \$0 \$0 -\$12,444	-\$45,437 -\$45,439 -\$1,212 -\$42,492 \$6 -\$1,722 \$0 -\$19 \$0 \$0 -\$14,176	-\$24,832 -\$24,833 -\$1,810 -\$23,700 -\$17 \$714 \$0 -\$20 \$0 \$0 -\$12,963	-\$40,353 -\$40,352 -\$1,562 -\$37,254 \$10 -\$1,523 \$0 -\$23 \$0 \$0 -\$16,199	-\$36,467 -\$36,468 -\$1,674 -\$35,440 -\$11 \$674 \$0 -\$17 \$0 \$0 -\$15,807	-\$39,897 -\$39,894 -\$1,955 -\$38,735 -\$13 \$831 \$0 -\$21 \$0 \$0 -\$18,883

Variable

Assumptions

After-Tax Discount Rate 6.81%
Escalation Rate 2.50%
Discount Year 2018

Nominal Nominal \$k 12 Real 11 13 stem Production Cost, w/o CO2 Base \$127,452,892 \$53,113,444 \$3,073,582 \$3,109,328 \$3,263,476 \$3,322,005 \$3,470,858 \$3,681,766 \$4,124,921 \$4,442,289 \$5,268,278 \$5,455,529 \$5,767,554 \$6,760,242 \$7,657,267 \$8,126,082 \$8,584,564 \$3,203,677 \$3,154,426 \$4,946,917 \$102,275,349 \$42,366,023 \$3,557,817 \$4,056,192 Variable Costs \$2,619,787 \$2,813,655 \$3,247,715 \$4,437,403 VOM \$8,524,994 \$3,945,581 \$297,728 \$302,527 \$320,529 \$331,313 Base \$244,090 \$286,818 \$274,840 \$459,202 \$472,699 \$90,533,623 \$37,230,698 \$2,128,436 \$3,634,281 Base Fuel Cost \$2,509,315 \$2,067,129 \$2,271,613 \$2,457,286 \$2,869,688 \$3,166,183 \$3,983,564 \$4,109,420 \$4,989,632 \$5,335,813 \$5,801,388 \$6,185,033 \$77,050 Base Reagent Cost \$38,622 \$3,020 \$3,117 \$3,143 \$3,131 \$2,935 \$3,134 \$3,158 \$3,143 \$3,036 \$2,928 \$2,762 \$2,721 \$2,747 \$2,738 \$2,781 \$3,083,619 \$1,125,076 \$44,792 \$56,259 \$76,395 \$74,961 \$83,524 \$95,604 \$116,675 \$254,301 \$206,927 \$243,538 Start Cost Base SO2 Cost \$1,385 \$732 \$103 \$59 \$35 \$37 \$40 \$40 \$58 \$78 \$116 \$118 \$101 \$71 \$12 \$12 \$13 \$13 \$13 \$54,679 \$1,681 \$1,674 \$1,566 \$1,578 \$1,897 \$1,960 \$2,121 \$2,362 \$2,626 \$2,754 \$2,882 \$2,254 \$2,232 \$2,213 \$2,467 NOx Cost \$25,314 \$2,076 \$1,809 \$1,547 \$1,570 \$1,749 \$1,696 \$2,354 \$2,349 \$2,481 \$2,586 \$2,194 Base Base Fixed O&M \$7,224,005 \$3,106,008 \$194,007 \$234,683 \$251,722 \$261,095 \$270,082 \$282,224 \$274,194 \$425,330 \$459,390 \$183,065 \$193,079 \$196,966 \$178,466 \$191,476 \$195,050 \$201,453 \$208,830 \$222,265 \$259,959 \$296,356 \$318,695 \$333,187 \$352,459 \$383,156 \$409,715 \$447,099 Base \$17,953,542 \$7,641,414 **Fuel Demand Cost** \$280,781 \$578,564 \$574,707 \$574,106 \$563,788 \$563,612 \$563,423 \$622,350 \$616,389 \$616,110 \$614,390 \$608,501 \$570,916 \$580,636 \$807,122 \$817,851 \$946,874 \$1,067,849 \$1,079,403 \$1,206,503 \$1,218,642 \$192,090 \$567,901 \$616,389 \$697,524 Base CO2 Cost \$0 \$0 \$0 Base Capital Base **Empty** Base Base None \$0 \$0 \$0 \$0 Base None Base Base **Empty** \$0 Base \$0 None Base None DEC IVVC SCENARIO System Production Cost, w/o CO2 \$126,217,123 \$52,679,100 \$3,431,277 \$3,642,143 Variable Costs \$101,058,330 \$41,937,688 \$2,428,147 \$2,300,906 \$2,308,143 \$2,297,836 \$2,324,707 \$2,356,097 \$2,450,097 \$2,443,057 \$2,581,170 \$2,775,019 \$3,200,965 \$3,508,807 \$3,998,144 \$4,374,595 \$4,547,219 \$4,709,636 \$4,825,480 \$5,143,744 \$5,506,655 \$5,891,688 \$6,100,291 \$6,389,035 \$6,820,964 \$8,465,937 \$3,923,630 \$284,553 \$299,407 \$317,536 \$328,664 Fuel Cost \$89,438,295 \$36,844,636 \$2,509,315 \$2,097,073 \$2,423,743 \$2,827,813 \$3,122,377 \$3,582,611 \$3,925,939 \$4,578,767 \$5,727,137 \$2,236,918 \$4,061,535 \$4,209,715 \$4,914,609 \$6,110,624 Reagent Cost \$76,439 \$38,423 \$3,020 \$3,134 \$3,125 \$2,908 \$3,138 \$3,118 \$3,160 \$3,124 \$3,054 \$2,948 \$3,011 \$2,879 \$2,712 \$2,729 \$2,723 \$2,676 \$2,735 \$3,022,592 \$56,110 \$55,335 \$72,834 \$178,702 Start Cost \$1,105,349 \$44,869 \$56,175 \$57,048 \$52,794 \$54,674 \$73,428 \$81,503 \$92,263 \$114,224 \$150,728 \$161,112 \$197,079 \$213,535 \$249,896 \$228,185 \$218,212 \$201,143 \$236,591 SO2 Cost \$1,361 \$721 \$35 \$39 \$39 \$56 \$76 \$113 \$70 \$59 \$12 \$12 \$13 NOx Cost \$53,706 \$24,929 \$1,552 \$1,544 \$1,710 \$1,846 \$1,911 \$2,061 \$2,321 \$2,567 \$2,705 \$2,837 \$2,306 \$2,305 \$2,524 \$2,205 \$2,198 \$2,167 \$2,419 \$2,076 \$1,809 \$1,681 \$1,535 \$1,516 \$1,656 \$2,440 \$2,146 Fixed O&M \$7,205,255 \$3,099,999 \$193,079 \$196,966 \$194,007 \$178,466 \$191,476 \$195,050 \$201,453 \$208,830 \$222,181 \$233,718 \$250,735 \$260,084 \$269,046 \$281,158 \$258,871 \$273,078 \$295,212 \$317,519 \$331,985 \$351,227 \$381,893 \$408,417 \$424,003 \$445,739 \$457,996 \$183,065 \$17,953,542 \$7,641,414 **Fuel Demand Cost** \$192,090 \$280,781 \$578,564 \$574,707 \$574,106 \$563,788 \$563,612 \$563,423 \$567,901 \$622,350 \$616,389 \$616,389 \$616,110 \$614,390 \$608,501 \$570,916 \$580,636 \$697,524 \$807,122 \$807,122 \$817,851 \$946,874 \$1,067,849 \$1,079,403 \$1,206,503 \$1,218,642 CO2 Cost \$0 \$0 Capital **Empty** None None **Empty** \$0 \$0 Delta (1-Base) System Production Cost, w/o CO2 -\$1,235,769 -\$434,344 -\$34,417 -\$39,623 -\$50,047 -\$90,050 -\$84.807 -\$86,961 -\$1,217,019 -\$6,946 -\$12,868 -\$16,498 -\$25,958 -\$33,453 -\$36,647 -\$34,332 -\$38,617 -\$38,636 -\$46,750 -\$49,010 -\$58,048 -\$62,809 -\$53,479 -\$64,038 -\$65,622 -\$71,544 -\$83,278 -\$81,339 -\$79,412 -\$88,722 -\$83,446 -\$85,568 Variable Costs -\$428,335 -\$59,057 -\$103 -\$859 -\$739 -\$1,569 -\$2,385 -\$2,404 -\$2,421 -\$2,060 -\$2,688 -\$3,121 -\$2,994 -\$2,650 -\$3,155 -\$2,759 -\$3,402 -\$3,360 -\$4,593 -\$3,304 VOM -\$21,951 -\$2,266 -\$2,461 -\$3,196 -\$2,450 -\$4,118 -\$15,719 -\$23,706 -\$30,092 -\$33,558 -\$33,543 -\$41,875 -\$43,806 -\$51,670 -\$57,625 -\$47,885 -\$73,088 -\$80,362 -\$74,252 Fuel Cost -\$1,095,328 -\$11,401 -\$31,362 -\$34,695 -\$58,267 -\$58,003 -\$75,023 -\$74,412 -\$74,409 -\$386,062 -\$64,319 -\$610 -\$17 -\$95 -\$62 -\$46 Reagent Cost -\$200 -\$23 -\$19 \$2 -\$19 \$18 -\$31 -\$29 -\$49 -\$52 \$8 -\$24 -\$63 -\$2,127 -\$61,027 -\$15 -\$637 -\$898 -\$637 -\$2,967 -\$2,021 -\$2,362 -\$2,913 -\$2,852 -\$3,638 Start Cost -\$19,727 \$0 -\$578 -\$593 -\$480 -\$1,585 -\$3,340 -\$2,451 -\$5,061 -\$3,731 -\$5,005 -\$4,405 -\$5,784 -\$6,946 SO2 Cost -\$24 -\$11 -\$2 -\$2 \$0 -\$973 -\$14 -\$35 -\$51 -\$48 -\$60 -\$42 -\$60 -\$49 -\$46 -\$49 -\$44 -\$49 -\$49 -\$34 -\$48 NOx Cost -\$385 -\$54 -\$40 -\$40 -\$62 Fixed O&M Savings -\$18,750 -\$6,008 -\$965 -\$987 -\$1,011 -\$1,036 -\$1,065 -\$1,089 -\$1,116 -\$1,144 -\$1,176 -\$1,202 -\$1,232 -\$1,263 -\$1,298 -\$1,327 -\$1,360 -\$1,394 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 **Fuel Demand Cost** \$0 \$0 CO2 Cost \$0 \$0 DEP DSDR to CVR Incremental Benefits Scenario \$126,816,037 \$52,887,279 System Production Cost, w/o CO2 \$3,243,582 \$3.129.078 \$3,203,677 \$3,071,224 \$3,066,363 \$3,091,133 \$3,136,402 \$3,248,129 \$3,303,041 \$3,451,169 \$3,661,623 \$4,101,929 \$4,417,581 \$4,918,400 \$5,235,819 \$5,423,802 \$5,737,179 \$5,981,947 \$6,319,705 \$6,721,241 \$7,262,278 \$7,615,220 \$7,801,388 \$8,079,583 \$8,535,463 \$4,027,676 \$2,428,147 \$2,302,510 \$2,313,791 \$2,303,820 \$2,332,471 \$2,471,397 \$2,458,426 \$2,600,097 \$2,793,513 \$3,224,723 \$3,533,109 \$4,404,944 \$5,550,931 \$5,932,246 \$6,137,656 \$6,296,656 \$6,425,983 \$101,638,495 \$42,139,858 \$2,655,218 \$4,568,971 \$6,857,431 Variable Costs VOM \$8,497,911 \$3,934,800 \$309.045 \$326,785 \$252,357 \$243.968 \$246,441 \$271.623 \$285,386 \$273,523 \$301,203 \$329,957 \$330,924 \$375.199 \$424,663 \$457.614 \$471,137 \$89,958,139 \$37,026,366 \$2,509,315 \$2,054,661 \$2,005,406 \$2,253,971 \$2,439,396 \$3,609,064 \$4,610,421 \$5,647,972 \$5,760,027 Fuel Cost \$2,280,622 \$2,014,779 \$1,997,199 \$2,004,649 \$2,111,772 \$2,849,010 \$3,144,206 \$3,954,433 \$4,080,874 \$4,314,460 \$4,954,643 \$5,298,064 \$5,495,414 \$6,140,559 \$76,965 \$3,140 \$3,138 \$3,138 \$3,036 \$2,917 \$2,744 \$2,734 Reagent Cost \$38,599 \$3,020 \$2,624 \$3,117 \$3,194 \$3,189 \$3,141 \$3,128 \$2,931 \$3,163 \$2,980 \$2,759 \$2,708 \$2,708 \$2,773 \$2,774 \$3,049,890 \$39,840 \$50,275 \$74,062 \$219,027 \$44,869 \$44,792 \$41,844 \$55,630 \$56,305 \$56,049 \$57,800 \$52,413 \$55,660 \$75,484 \$82,142 \$93,780 \$114,728 \$163,500 \$181,236 \$198,662 \$252,048 \$228,883 \$203,405 \$240,510 Start Cost \$1,114,226 \$151,185 \$215,760 SO2 Cost \$1,375 \$727 \$103 \$59 \$47 \$37 \$39 \$57 \$78 \$71 \$12 \$12 \$13 \$13 \$13 \$54,214 \$2,097 \$2,857 \$2,227 \$2,171 \$2,207 \$2,437 NOx Cost \$25,140 \$2,076 \$1,809 \$1,681 \$1,544 \$1,571 \$1,563 \$1,549 \$1,741 \$1,679 \$1,873 \$1,933 \$2,342 \$2,598 \$2,727 \$2,333 \$2,326 \$2,457 \$2,560 \$2,190 \$7,224,005 \$270,082 \$282,224 Fixed O&M \$3,106,008 \$183,065 \$193,079 \$196,966 \$194,007 \$178,466 \$191,476 \$195,050 \$201,453 \$208,830 \$222,265 \$234,683 \$251,722 \$261,095 \$259,959 \$274,194 \$296,356 \$318,695 \$333,187 \$352,459 \$383,156 \$409,715 \$425,330 \$447,099 \$459,390 **Fuel Demand Cost** \$17,953,542 \$7,641,414 \$192,090 \$280,781 \$578,564 \$574,707 \$574,106 \$563,788 \$563,612 \$563,423 \$567,901 \$622,350 \$616,389 \$616,389 \$616,110 \$614,390 \$608,501 \$570,916 \$580,636 \$697,524 \$807,122 \$807,122 \$817,851 \$946,874 \$1,067,849 \$1,079,403 \$1,206,503 \$1,218,642 CO2 Cost **Empty** \$0 None None \$0 **Empty** \$0 \$0 None None Delta (3-Base) -\$226,165 -\$10,514 -\$44,350 System Production Cost, w/o CO2 -\$636,855 -\$18,024 -\$19,690 -\$20,143 -\$22,992 -\$24,708 -\$32,460 -\$30,375 -\$39,002 -\$40,781 -\$42,048 -\$46,499 -\$49,101 -\$636,855 -\$226,165 -\$5,342 -\$7,220 -\$10,514 -\$18,194 -\$18,024 -\$15,347 -\$18,963 -\$19,690 -\$20,142 -\$22,992 -\$24,709 -\$28,516 -\$32,460 -\$31,727 -\$30,374 -\$34,970 -\$35,892 -\$39,002 -\$40,782 -\$42,048 -\$44,349 -\$46,498 -\$49,101 Variable Costs -\$27,082 -\$235 -\$122 -\$670 -\$1,181 -\$1,401 -\$966 -\$1,317 -\$1,395 -\$1,446 -\$1,241 -\$1,278 -\$1,257 -\$1,053 -\$752 -\$1,309 -\$1,585 -\$1,588 VOM -\$10,781 -\$1,418 -\$1,432 -\$1,324 -\$1,356 -\$1,195 -\$1,562 **Fuel Cost** -\$575,484 -\$4,621 -\$6,997 -\$9,290 -\$16,551 -\$16,416 -\$14,484 -\$20,678 -\$21,976 -\$25,217 -\$29,130 -\$28,546 -\$28,539 -\$31,142 -\$32,665 -\$37,749 -\$38,554 -\$39,907 -\$41,361 -\$44,474 -\$204,332 -\$16,664 -\$17,643 -\$17,890 -\$34,989 -\$85 -\$23 \$2 -\$4 -\$2 \$10 \$3 \$5 -\$5 \$1 -\$8 -\$10 -\$21 -\$12 -\$3 -\$8 -\$11 -\$4 -\$8 Reagent Cost Start Cost -\$33,729 -\$10,850 -\$478 -\$442 -\$184 -\$860 -\$600 -\$910 -\$899 -\$1,382 -\$1,824 -\$1,947 -\$1,905 -\$525 -\$2,527 -\$2,147 -\$2,252 -\$2,154 -\$2,822 -\$3,522 -\$3,027 SO2 Cost -\$10 -\$5 \$0 -\$465 -\$27 -\$22 -\$24 -\$23 -\$30 NOx Cost -\$174 \$0 -\$21 -\$17 -\$24 -\$24 -\$20 -\$27 -\$26 -\$23 -\$24 -\$26 -\$26 -\$24 Fixed O&M Savings \$0 \$0 \$0 \$0 Fuel Demand Cost \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 CO2 Cost

1 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	tal cost	N_S_ cost Dump 0 0 0 0 0 0 0 0 1,004 17 0 0 0 14 217 0 944 1,777	0 revenue	Dump Energy 4 28 38 37 6 12 5 2 2 5 5 0 0 0 2 0 6 13 0 0 1		Fuel Demand CO2 Cost 192,090 280,781 578,564 574,707 574,106 563,788 563,612 563,423 567,901 630,528 714,518 714,518 714,240 721,545 814,947 777,361 787,082 903,970 1,013,567 1,013,567 1,024,297	Thousands of Dollars Total cost E_N_S_ cost Dump revenue Dump Energy VOM Fuel Cost Reagent Cost Start Cost SO2 Cost NOx Cost Total FOM Fuel Demand CO2 Cost	YEAR 1 3,243,582 0 0 4 309,045 2,509,315 3,020 44,869 103 2,076 183,065 192,090 0 3,243,582	0 0 28 325,288 2,280,622 2,624 44,792 83 1,809 193,079 280,781 0	3 3,203,182 3, 0 0 38 326,972 2,054,205 2, 3,117 41,686 60 1,681 196,898 578,564 5 0 3,203,182 3,	4 ,078,733 3,0 0 0 37 254,699 2 ,013,694 2,0 3,189 37,521 49 1,738 193,136 1 74,707 574 0 ,078,733 3,0	5 075,623 0 0 0 6 248,313 250,949 2,009 3,178 41,512 41 1,694 176,829 189 14,106 563,0 0 075,623 3,063	2,031 3,111 0 0 12 0,283 270 5,699 2,028 2,936 3 7,811 51 39 1,675 1 9,798 193 ,788 563,6 0	8 0,548 3,332,283 0 0 0 0 5 2 0,646 262,369 0,087 2,063,907 0,145 3,158 37 38 37 38 0,658 1,647 0,326 199,766 0,326 199,766 0,12 563,423 0 186,086 0,548 3,332,282	9 3 3,569,301 1,004 0 0 2 2 2 2 3 273,251 7 2,149,187 3 3,152 57,785 3 41 7 1,810 207,989 567,901 307,183 2 3,569,301	10 3,725,003 3,725,003 3 17 0 5 290,575 2,117,108 2,949 54,339 34 1,703 222,699 630,528 7 405,051 3,725,003 3	11 ,990,042 4,2 0 0 5 297,591 2 ,168,805 2,3 2,955 51,508 32 1,695 243,099 2 714,518 71 509,839 5	12 13 71,040 4,842 0 0 0 0 83,924 298 43,005 2,743 2,906 2 66,433 69 23 1,713 1 64,628 282 4,518 714,2 93,889 729 71,039 4,842	14 2,518 5,271,4 0 0 0 0 3,466 300,7 3,420 3,019,2 2,951 2,8 0,425 74,9 29 29 29 2,774 1,9 2,393 300,6 721,545 2,821 849,5 2,518 5,271,4	15 74 5,965,882 0 1 0 0 2 0 49 322,619 22 3,450,779 96 2,629 27 76,394 33 37 24 1,911 34 326,725 5 814,947 44 969,839 74 5,965,882	16 2 6,430,636 1 0 0 0 0 6 335,773 3,783,898 2,640 92,724 7 47 2,070 305,831 777,361 1,130,291 2 6,430,636	17 6,709,912 14 0 13 341,746 3,906,888 2,606 121,968 33 2,165 320,998 787,082 1,226,411 6,709,912	18 6,993,786 217 0 0 352,409 4,006,201 2,540 133,675 15 1,898 342,487 903,970 1,250,376 6,993,786	19 7,318,382 0 0 0 0 375,476 4,071,694 2,523 135,164 5 1,906 368,228 1,013,567 1,349,816 7,318,381	20 7,816,694 944 0 1 387,442 4,383,264 2,547 149,115 7 2,009 379,024 1,013,567 1,498,773 7,816,693	21 8,347,209 1,777 0 0 400,594 4,725,983 2,598 161,695 8 2,113 394,457 1,024,297 1,633,686 8,347,209	22 8,840,873 0 0 0 407,077 4,954,882 2,476 185,103 2 1,773 419,923 1,142,322 1,727,316 8,840,874	23 9,446,328 118 0 12 423,387 5,332,321 2,551 193,354 4 1,888 437,296 1,142,321 1,913,087 2 9,446,328	24 9,761,535 10 0 0 0 442,935 5,485,522 5 2,557 180,964 3 1,917 451,309 165,430 1, 2,030,898 2	2,240 143,109 1 1,847 480,206 ,419,630 1, 2,095,775 2	26 10,784,698 0 0 0 506,744 5,904,762 2,337 172,361 1 2,045 495,007 1,419,630 2,281,809 10,784,697
22 23 24 25 26	22 23 24 25 1 26 1 Total 14 Year Total 1 2 3 4	8,840,873 9,446,328 9,761,535 10,198,041 10,784,698 49,519,409 tal cost E_N 3,243,582 3,129,078 3,203,182 3,072,265	0 118 0 0 0 4,092 N_S_ cost Dump 0 0 0	0 0 0 0 0 0 revenue	0 12 0 0 0 178 Dump Energy 4 28 38 38 39	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1,142,322 1,142,321 1,165,430 1,419,630 1,419,630 20,578,445 0 Tuel Demand CO2 Cost 192,090 280,781 578,564 574,707	Total cost E_N_S_ cost Dump revenue Dump Energy	YEAR 1 3,243,582 0 0 4	2 3,129,078 0 0 28	3 3,203,182 3, 0 0 38	<u>4</u> ,072,265 3,0 0 0 39	5 <u>6</u> 063,365 3,04 0 0 7	2 Z 7,447 3,086 0 0	8,608 3,300,696 0 0 0 0	9 5 3,524,783 0 995 0 0	10 3,683,478 3 17 0 13	11 ,946,788 4,2 0 0 6	12 13 26,247 4,785 0 0 0	5,878 5,207,2 0 0 0	15 84 5,899,506 0 0 1 3	16 5 6,358,256 0 0 0 0 8 6	17 6,622,539 16 0 11	18 6,923,692 96 0 3	1 <u>9</u> 7,239,818 0 0 3	20 7,733,210 841 0	21 8,239,687 1,780 0	22 8,712,900 0 0 1	23 9,339,788 118 0 11	24 9,632,876 10 0 0	25 0,082,223 1 0 0	2 <u>6</u> .0,656,764 0 0
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26	5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 1	3,063,365 3,047,447 3,086,608 3,300,696 3,524,783 3,683,478 3,946,788 4,226,247 4,785,878 5,207,284 5,899,506 6,358,256 6,622,539 6,923,692 7,239,818 7,733,210 8,239,687 8,712,900 9,339,788 9,632,876 10,082,223 10,656,764	0 0 0 0 995 17 0 0 0 0 0 0 0 16 96 0 841 1,780 0 118 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	7 14 5 5 8 13 6 3 0 1 3 6 11 3 3 0 0 1 11 0 0 0 0 210		574,106 563,788 563,612 563,423 567,901 630,528 714,518 714,518 714,240 721,545 814,947 777,361 787,082 903,970 1,013,567 1,013,567 1,024,297 1,142,322 1,142,321 1,165,430 1,419,630 1,419,630 20,578,445 0	VOM Fuel Cost Reagent Cost Start Cost SO2 Cost NOx Cost Total FOM Fuel Demand CO2 Cost	0	2,624 44,792 83 1,809 193,079 280,781 0	326,972 2,054,205 2, 3,117 41,686 60 1,681 196,898 578,564 5 0 3,203,182 3,	254,265 2,007,581 2,0 3,189 37,609 49 1,730 193,136 174,707 574 0 ,072,266 3,0	247,613 249 247,613 249 247,613 1,999 3,171 1 41,079 41 1,675 1 176,829 189 14,106 563, 0 063,366 3,04	9,342 269 1,229 2,005 2,933 3 8,669 50 38 1,648 1 9,798 193 ,788 563,6 0 7,446 3,086	2,285 260,702 2,512 2,037,446 3,120 3,119 3,091 51,486 37 37 3,625 1,617 3,326 199,766 512 563,423 0 183,100 5,608 3,300,696	2 270,499 2,114,511 3,135 5 56,990 7 39 7 1,754 207,989 567,901 300,969 3,524,783	288,240 2,085,814 2,928 54,012 33 1,665 222,699 630,528 397,541 3,683,478 3	294,806 2,3 2,917 50,713 31 1,660 243,099 2 714,518 71 500,579 5	81,105 295 11,744 2,704 2,878 2 66,218 68 22 1,673 1 64,628 282 4,518 714,2 83,460 716 26,246 4,785	i,867 297,9 i,114 2,976,2 i,928 2,8 i,665 73,5 27 i,734 1,8 i,291 299,5 i,012 833,6 i,878 5,207,2	12 319,395 94 3,405,625 67 2,589 49 75,265 31 37 81 1,877 97 325,660 5 814,947 08 954,113 84 5,899,506	331,289 3,737,125 2,571 92,496 7 45 7 2,025 304,742 777,361 1,110,601 6,358,256	337,854 3,851,383 2,646 120,573 31 2,117 319,882 787,082 1,200,953 6,622,538	349,837 3,958,973 2,428 131,933 14 1,866 341,343 903,970 1,233,231 6,923,691	372,064 4,019,674 2,486 133,255 5 1,863 367,052 1,013,567 1,329,852	384,159 4,329,632 2,498 146,318 7 1,976 377,822 1,013,567 1,476,389	397,100 4,655,549 2,537 156,518 8 2,075 393,225 1,024,297 1,606,598	403,516 4,867,389 2,421 179,435 2 1,740 418,661 1,142,322 1 1,697,415	419,946 5,261,914 2,490 190,002 4 1,852 435,998 1,142,321 1,1,885,141 1	439,389 5,402,716 2,526 174,021 3 1,872 449,982 165,430 1,1,996,938	486,126 5,489,764 2,207 139,906 1 1,812 478,846 ,419,630 1,2,063,933	501,844 5,820,283 2,293 169,329 1 2,017 493,613 1,419,630 2,247,754
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25	tal cost 3,243,582 3,129,078 3,203,182 3,075,456 3,066,870 3,052,207 3,093,367 3,312,373 3,548,244 3,704,519 3,969,937 4,244,478 4,816,004 5,238,089 5,927,489 6,392,759 6,670,874 6,951,590 7,278,447 7,772,704 8,301,681 8,781,260 9,408,521 9,704,990 10,145,767 10,725,918	N_S_ cost Dump 0 0 0 0 0 0 0 0 0 0 897 0 0 0 0 0 0 0 137 0 795 1,627 0 106 7 0 0 0	orevenue 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Dump Energy 4 28 38 37 6 11 4 2 3 4 5 0 0 0 0 0 3 7 12 1 0 0 0 0 14 0 0 0 0		Fuel Demand CO2 Cost 192,090 280,781 578,564 574,707 574,106 563,788 563,612 563,423 567,901 630,528 714,518 714,518 714,240 721,545 814,947 777,361 787,082 903,970 1,013,567 1,013,567 1,013,567 1,024,297 1,142,322 1,142,321 1,165,430 1,419,630 1,419,630	Total cost E_N_S_ cost Dump revenue Dump Energy VOM Fuel Cost Reagent Cost Start Cost SO2 Cost NOx Cost Total FOM Fuel Demand CO2 Cost	2,509,315 3,020 44,869 103 2,076 183,065 192,090	0 0 28 325,288 2,280,622 2,624 44,792 83 1,809 193,079 280,781 0	2,054,205 2, 3,117 41,686 60 1,681 196,898 578,564 5	,010,715 2,0 3,186 37,540 49 1,732 193,136 1 74,707 574	021,999 1,990 3,178 4 41,506 49 41 1,682 176,829 189 44,106 563,	6,394 2,011 2,939 3 8,088 50 38 1,658 1 9,798 193 ,788 563,6	8 0,367 3,312,373 0 0 4 2 0,534 261,575 0,369 2,047,353 0,709 51,259 37 37 1,637 1,622 1,326 199,766 12 563,423 0 184,189 1,367 3,312,372	3 2,132,991 3 3,151 5 56,848 7 40 2 1,788 5 207,989 567,901 3 304,272	2,102,007 2 2,946 53,711 34 1,687 222,699 630,528 7 401,342	2,945 50,923 32 1,680 243,099 214,518 71 505,603 5	24,652 2,724 2,900 2 65,631 68 22 1,695 1 64,628 282 4,518 714,2	2,996,4 2,933 2,8 3,809 74,6 28 2,759 1,9 2,393 300,6 240 721,545 3,840 840,9	16 3,424,099 79 2,634 37 75,059 32 37 00 1,889 34 326,725 5 814,947 65 961,068	3,756,965 2,602 91,724 7 47 2,057 305,831 777,361 3 1,121,573	3,880,818 2,598 120,669 32 2,141 320,998 787,082 1,216,035	3,977,178 2,518 131,294 15 1,882 342,487 903,970 1,240,664	19 7,278,447 0 0 0 374,378 4,044,760 2,516 133,990 5 1,887 368,228 1,013,567 1,339,115	4,353,689 2,547 148,010 7 1,992 379,024 1,013,567	4,695,670 2,593 160,607 8 2,096 394,457	4,912,391 2,482 183,381 2 1,754 419,923 1,142,322	23 9,408,521 106 0 14 421,578 5,308,621 2,534 194,068 4 1,868 437,296 1,142,321 1,900,124	5,448,268 5 2,566 179,442 3 1,894 451,309 1,165,430	0 0 0 488,110 5,530,012 2,229 143,783 1 1,830 480,206 1,419,630	5,866,027 2,325 173,192 1 2,023 495,007 1,419,630

Total 148,759,383 3,569 0 180 0 0 0 0 0 0 0 20,578,445 0

		YEAR
Year Total cost E_N_S_cost Dump revenue Dump Energy VOM Cost Fuel Cost Reagent Cost Start Cost SO2 Cost NOx Cost Total FOM Fuel Demand CO2 Cost	Thousands of Dollar Total cost E_N_S_ cost Dump revenue Dump Energy	TR 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 3,243,582 3,129,078 3,203,677 3,076,565 3,073,582 3,069,598 3,109,328 3,154,426 3,263,476 3,322,022 3,470,858 3,681,766 4,124,921 4,442,289 4,946,917 5,268,292 5,455,529 5,767,576 6,016,936 6,355,597 6,760,557 7,303,058 7,657,267 7,845,777 8,126,551 8,584,578 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
5 6 3,069,598 0 0 13 563,788 7 7 3,109,328 0 0 4 563,612 8 8 3,154,426 0 0 1 563,423 9 9,263,476 0 0 3 567,901 0 10 3,322,022 17 0 4 1 11 3,470,858 0 0 6 2 12 3,681,766 0 0 2 3 13 4,124,921 0 0 0 4 14 4,442,289 0 0 2 5 15 4,946,917 0 0 5 6 16 5,268,292 14 0 5 7 17 5,455,529 0 0 18	VOM Fuel Cost Reagent Cost Start Cost SO2 Cost NOx Cost Total FOM Fuel Demand CO2 Cost	309,045 325,288 326,785 252,593 244,090 247,111 267,961 261,439 272,589 291,012 286,818 274,840 297,728 302,527 320,529 331,313 332,164 336,313 356,540 366,087 376,963 377,902 409,776 426,248 459,202 472,699 425,243 31,310 2935 31,517 31,94 31,89 2,942 31,433 31,43 31,31 2,935 31,57 31,34 31,58 31,43 31,43 31,58 31,43 31,44 31,44 31,44 31,44 31,44 31,44 31,44 31,44 31,44 31,44 31,44 31,44 31,44 31,4
8 18 5,767,576 22 0 0 0 0 807,524 9 19 6,016,936 19 0 0 4 807,122 0 20 6,355,597 0 0 0 1 1 807,122 1 21 6,760,557 315 0 3 817,851 2 22 7,303,058 0 0 0 3 946,874 3 946,874 3 23 7,657,267 0 0 0 9 1,079,403 5 25 8,126,551 469 0 0 0 0 1,218,642 1 100,000 1 1,218,642 1 100,000 1 1,218,642 1 100,000 1 1,218,642 1 100,000 1 1,218,642 1 100,000 1 1,218,642 1 100,000 1 1,218,542 0 1 1,000,000 1 1,000,000 1 1,000,000 1 1,000,000		
P Note Not	Total cost E_N_S_ cost Dump revenue Dump Energy VOM Fuel Cost Reagent Cost Start Cost SO2 Cost NOx Cost Total FOM Fuel Demand CO2 Cost	\$\frac{1}{3}\$\frac{2}{3}\$\frac{2}{3}\$\frac{1}{4}\$\frac{1}{5}\$\frac{6}{5}\$\frac{7}{3}\$\frac{8}{3}\$\frac{9}{2}\$\frac{1}{12}\$\frac{13}{3}\$\frac{11}{24}\$\frac{13}{4}\$\frac{15}{3}\$\frac{16}{16}\$\frac{17}{12}\$\frac{18}{3}\$\frac{19}{4}\$\frac{19}{3}\$\frac{12}{3}\$\frac{12}{3}\$\frac{14}{3}\$\frac{11}{3}\$\frac{11}{3}\$\frac{14}{3}\$\frac{11}{3}\$\frac{14}{3}\$\frac{11}{3}\$\frac{14}{3}\$\frac{14}{3}\$\frac{14}{3}\$\frac{14}{3}\$\frac{14}{3}\$\frac{14}{3}\$\frac{14}{3}\$\frac{14}{3}\$\frac{14}{3}\$\frac{14}{3}\$\frac{14}{3}\$\frac{14}{3}\$\frac{11}{3}\$\frac{14}{
3 23 7,576,557 0 0 9 9 1,007,849 1,079,403 4 6 2 1,079,403 1,206,503 6 26 8,479,617 14 0 0 0 0 0 0 0 0 0 0 17,953,542 0 1,206,503 6 26 8,479,617 14 0 0 0 0 0 0 0 0 0 0 17,953,542 0 1,206,503 6 26 8,479,617 14 0 0 0 0 0 0 0 0 0 0 17,953,542 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Total cost E_N_S_ cost Dump revenue Dump Energy VOM Fuel Cost Reagent Cost Start Cost SO2 Cost NOx Cost Total FOM Fuel Demand CO2 Cost	1 2 3 4 5 6 7 8 9 10 11 12 12 12 13 14 15 15 15 15 15 15 15 15 15 15 15 15 15

Total 126,816,779 741 0 197 0 0 0 0 0 0 0 17,953,542 0

6.81% 2.50%

Attachment 4

	TOTAL PROJECT COST 5 YEARS (Nominal): \$ 368,685,009 Total # SUBSTATIONS: 369																													
	Total # CIRCUITS: 1,807 TOTAL COST 26 Year Investment Period (Nominal): \$731,469,344		PF	ROJECT			1	,	1	1	1	ı	1		1	,		ı	ı	ı	ļ	ı	1	ı	1	-			•	
ING LIFE (YR	S) TRANSMISSION Cost Estimate Uncertainty Contingency: 5.00%				,,,	5 25,262,239	6 0	7 0 __	8 0	9 0	10 0	11 5,268,63				16 0	25,466,222	18 26,102,878	19 26,755,450	20 27,424,336				7,085,725	7,262,868	26	27	28	29 30	30 31
	10 Transmission - Substation Relays		· ·	2,948,041	3,021,742	3,097,285 2,509,814	0	0	0	0	0	0 3,681,69	9 3,773,742	3,868,085	3,964,787	0	0 3,375,421	0 3,459,807	0 3.546.302	0 3.634.959	0	4,712,886	4,830,708	4,951,476	5,075,263	0				
	15 Sub Capacitor Bank Controls - Retail Station Capacitor Equipment Replacement 15 Sub LTC Control Panel Replacement (Load Tap Changer)	0	2,330,612 654,109	2,388,877 670,462	2,448,599 687,223	2,509,814 704,404	0	0	0	0	0	0					3,375,421 947,345	3,459,807 971,029	3,546,302 995,304	3,634,959 1,020,187	0	0	0	0	0	0				
	10 Sub LTC Position for IVVC	0	,, -	1,270,703	1,302,470	1,335,032	0	0	0	0	0	0 1,586,93	3 1,626,607	1,667,272	1,708,954	0	0	0	0	0	0	2,031,409	2,082,194	2,134,249	2,187,605	0				
	15 Sub Voltage Regulator (VR), VR Control Panel & Comms 15 Mobile Substations	0		14,466,443 497,356	14,828,104 509.790	15,198,806	0	0	0	0	0	0					20,440,705 702,751	20,951,723 720,320	21,475,516 738.328	22,012,404 756.786	0	0	0	0	0	0				
	Spartan Replacements	0	683,920	701,018	718,544	736,508	0	0	0	0	0	0					702,731	720,320	738,328	750,760	0		0	0						
	Meals/Travel/Lodging - Internal Labor Expenses	0	58,619	60,085	61,587	63,127	0	0	0	0	0	0																		
	Transmission: Contingency TELECOM Cost Estimate Uncertainty Contingency: 5.00%	0	, ,		1,094,729 8,533,410	1,094,729	0	0	0	0 206,844 2	0 06.844 206	0 ,844 5,427,94	2 0			5,991,432	6,141,218	6,294,748	6,452,117		0		7,121,930	7,299,978	7,482,478	7.669.540				
	7 Subst Comms: Cellular Connected Subs		the state of the s		2,240,298	8,737,280 2,296,305	ol	ol	0	0	06,844 206	0	0 0		o	0,991,432	0,141,218	0,294,748	0,452,117	ol	0	ol	0	0	0	7,669,540				T
	On-Going Capital: Cellular Connected Subs								2,5	534,691 2,5	98,059 2,663	,010 2,729,58	5			3,012,952	3,088,275	3,165,482	3,244,619				3,581,453	3,670,989	3,762,764	3,856,833				
	20 Subst Comms: Fiber Connected Subs 20 Subst Comms: Leased T1/MPLS Connected Sites	0	1,179,086 471,153	1,208,564 482,931	1,238,778 495.005	1,269,747	0	0	0	0	0	0																		
	Subst Comms: Intra-sub Communications - SDM to Regulator, Cap Bank, LTC Controls	0	1,807,511	1,852,699	1,899,016	1,946,492	0	0	0	0	0	0																		
	Subst Comms: Leased T1/MPLS Connected Subs	0	9,481	9,718	9,961	10,210	0	0	0	0	0	0																		
	Subst Comms: Material Freight 7 Dist Line Communications Materials	0	1,025 1,880,370	1,051	1,077 1,975,564	1,104 2.024.953	0	0	0	0	0	0				0					0			2						
	On-Going Capital: Dist Line Communications Materials	U	1,000,370	1,927,379	1,9/0,004	2,024,903	<u> </u>	<u> </u>	2.2	235,169 2,2	91,048 2,348	,325 2,407,03	3	9	0	2,656,914	2,723,337	2,791,420	2,861,206	U	<u> </u>	U	3,158,236	3,237,192	3,318,121	3,401,074				+
	Dist Network Connectivity - Firewall, Testing, Support	0	28,508	29,221	29,951	30,700	0	0	0	0	0	0				,/	, -,	, - ,	, , ==											
	7 Dist Modem Procure, Config, Activate, Support On-Going Capital: Dist Modem Procure, Config, Activate, Support	0	87,956	90,155	92,409	94,719	0	0	0	0 104.552 1	0 07 166 109	0 .845 112.59	0 0	0	0	124 280	0 127,387	130.571	133 835	0	0	0	0 147 729	0 151,423	0 155 208	159.088				
	7 Dist Modem Configuration & Activation - USAT	0	139,626	143,116	146,694	150,361	0	0	0	0	0 109	0 112,59	0 0	0	0	124,280	121,381	130,571	133,835	0	0	0	0	131,423	155,208	159,088				+
	On-Going Capital: Dist Modem Configuration & Activation - USAT			-, -			-		1	165,971 1	70,120 174	,373 178,73	2		-	197,287	202,219	207,275	212,457				234,512	240,375	246,385	252,544				
	Dist Material Freight	0	1,025	1,051	1,077	1,104	0	0	0	0	0	0					-													
	Dist Meals/Travel/Lodging Telecom: Contingency	0	23,752 378.626	24,346 378.626	24,955 378.626	25,578 378.626	0	0	0 2	206,844 2	06,844 206	.844																		
	IT Cost Estimate Uncertainty Contingency: 5.00%	0	2,566,346	2,451,312	2,509,811	2,385,049	0	0	0	0	0	0 516,80	1 492,996	505,321	479,371	0	396,553	406,467	416,629	427,044	0	661,549	631,077	646,854	613,635	0				
	10 IT Materials & Mat Burdens/Contract Labor IT: Circuit Exits SCADA/DMS Labor	0	39,862 175.994	40,859 166.518	41,880 170.681	42,927 160 369	0	0	0	0	0	0 51,02	7 52,303	53,610	54,951	0	0	0	0	0	0	65,319	66,952	68,626	70,341	0				
	IT: Circuit Exits SCADA/DMS Labor IT: Subs Cap Banks	0	40,419	38,243	39,199	36,831	0	0	0	0	0	0																		
	IT: Substation Transformer LTC	0	40,176	38,012	38,963	36,609	0	0	0	0	0	0																		
	IT: Substation LTC Controls for IVVC	0	40,176 215 927	38,012 204.300	38,963 209,407	36,609	0	0	0	0	0	0																		
	IT: Substation Voltage Regulators IT: Line Regulators	0	436,498	412,994	423,319	397,743	0	0	0	0	0	0																		
	IT: Circuit Conditioning for IVVC (Power Flow Verification)	0	207,031	195,883	200,780	188,650	0	0	0	0	0	0																		
	IT: Line capacitors	0	535,580 77.651	506,741	519,410 75,306	488,029 70,757	0	0	0	0	0	0																		
	IT: Line Voltage Sensors (end point) 10 IT: IVVC SCADA Calcs/config	0	207,031	73,470 195,883	200,780	188,650	0	0	0	0	0	0 265,01	7 250,747	257,015	241,487	0	0	0	0	0	0	339,244	320,977	329,002	309,124					
	10 IT: DMS Model Updates (EGIS and SSE)	0	155,273	146,912	150,585	141,487	0	0	0	0	0	0 198,76	3 188,060		181,116	0	0	0	0	0	0	254,433	240,733	246,751	231,843	0				
	10 IT: Infrastructure Labor 15 IT: EMAX & Aspen Modifications	0	1,558 273 806	1,474 280.651	1,511 287.668	1,419	0	0	0	0	0	0 1,99	4 1,887	1,934	1,817	0	0 396.553	406.467	0 416.629	0 427 044	0	2,552	2,415	2,475	2,326	0				
	IT: Contingency	0	119,365	111,360	111,360	103,355	0	0	0	0	0	0					396,553	400,467	410,629	427,044	0		0	0						
	DISTRIBUTION Cost Estimate Uncertainty Contingency: 5.00%	812,184			,,	51,264,107	0	0	0	0	0	0 3,346,99	6 3,430,671	3,516,437	3,604,348	0	22,459,493	23,020,981	23,596,505	24,186,418	0	4,284,437	4,391,548	4,501,337	4,613,870	0				
	15 Line Regulator Control Panels Replace / Upgrade (Existing) 15 Line Capacitor Bank Controls Replace / Upgrade (Existing)	0	6,077,280 9.430.227		6,384,942 9,907.632	6,544,565 10,155,323	0	0	0	0	0	0					8,801,713 13,657,781	9,021,756 13,999,225	9,247,300 14,349,206	9,478,482 14.707.936	0	0	0	0	0	0				
	Circuit Conditioning: Load Balancing	0	886,358	908,517	931,230	954,511	0	0	0	0	0	0					13,037,781	13,999,225	14,349,206	14,707,936	0	<u> </u>	0	<u> </u>						
	Circuit Conditioning: Reconductoring (wire size)	0	0	0	0	0	0	0	0	0	0	0																		
	Circuit Conditioning: Transformer/Service Issues Circuit Conditioning New Line Capacitor Bank & Controls	0	-,=,	1,282,112 1,131,758	1,314,164 1,160,052	1,347,018	0	0	0	0	0	0																		
	30 Line Regulators Replace / Upgrade (Existing)	0	.,,	.,,	19,894,819	20,392,190	0	0	0	0	0	0																		
	10 Medium Voltage Sensors (3 phase Sensors)	0	2,614,668	2,680,034	2,747,035	2,815,711	0	0	0	0	0	0 3,346,99	6 3,430,671	3,516,437	3,604,348	0	0	0	0	0	0	4,284,437	4,391,548	4,501,337	4,613,870	0				
	GIS Field Verification GIS Update from Verification	305,348	1,502,310	1,539,867	1,578,364	1,550,414	0	0	0	0	0	0																		
	Circuit Conditioning: Feeder Analysis	86,331 306,074	424,747 1,505,885	435,366 1,543,532	446,250 1,582,120	1,554,103	0	0	0	0	0	0																		
	Circuit Conditioning: Work Order Design	114,432	640,363	656,373	672,782	664,339	0	0	0	0	0	0																		
	Circuit Conditioning: QA/QC Meals/Travel/Lodging/Fleet	0	1,192,228 142,190	1,222,034 145,745	1,252,585	1,283,899	0	0	0	0	0	0																		
	Distribution: Contingency	0	,	1 10,1 10	2,229,631	2,221,509	0	0	0	0	0	0																		
	STAFFING PLAN	331,804	6,288,200	7,025,964	7,187,682	7,279,679	0	0	0	0	0	0	0 0	0	0	0	0	0	0	0	0	0	0	0	0	0				
	Transmission Project Management Telecom Project Management	109,779	523,724 351,983	538,676 360.783	550,237 369,802	562,039 370,048	0	0	0	0	0	0																		
	IT Support	44,146	622,501	588,585	601,215	614,109	0	0	0	0	0	0																	_	1
	Distribution Project Management	59,171	598,841	720,612	736,058	751,825	0	0	0	0	0	0																		
	Corporate Office Support Project Controls Team	54,050 64.657			1,119,963	1,117,700 1,492,208	0	0	0	0	0	0	+																	
	BPM/Change Management (Onsite)	0			1,491,025 1,225,991	1,252,267	0	0	0	0	0	0																		
	Grid Mod Overhead Allocation	0	602,553	617,616	633,057	648,883	0	0	0	0	0	0																		
	IT Overhead Allocation AFUDC	0 n	48,204 409.690	49,409 409.690	50,644 409.690	51,910 409.690	0	0	0	0	0	0	+							-									+	+
	Grand Total: All Cash Flow Categories (NOMINAL) \$731,469,344	1,143,989	100,000	100,000	,	94,928,354	0	0	0 5,2	247,227 5,3	73,237 5,502	, <mark>397 14,560,37</mark>	9,324,015	9,557,115	9,757,460	5,991,432	54,463,487	55,825,074	57,220,701	52,037,798	0	11,690,281	19,057,458	19,533,894	19,972,851	7,669,540	0	0	0	0

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	ESCALATION RATE:	2.5%																															
	TOTAL PROJECT O&M COST 5 YEARS (Nominal): \$	11,041,378																															
	Total # SUBSTATIONS:	369																															
	Total # CIRCUITS:	1807			PROJECT																												
D: / O 9 M	TOTAL O&M COST 32 Year Investment Period (Nominal):	\$159,021,852	4	•	•		_	•	-		•	40	امم	40	40	4.4	45	40	47	40	40	20	04	20	22	24	05	00	27	20	20	20	24 20
Proj / O&M Proiect	TRANSMISSION		1	212,142	217,445	222,881	228,453	0	,	8	9	10	11	1,020,530	1,046,043	1,072,195	1,098,999	1,126,474	1,154,636	1,183,502	1,213,090	1,243,417	1,274,502	1,306,365	1,339,024	1,372,500	1,406,812	1,441,982	21	28	29	30	31 32
Project	Transmission - Substation Relays		ام	28,761	29,480	30,217	30,973	0	0	0	0	0	0	1,020,530	1,040,043	1,072,195	1,096,999	1,120,474	1,154,636	1,163,502	1,213,090	1,243,417	1,274,502	1,300,305	1,339,024	1,372,500	1,400,612	1,441,962					
	Sub Capacitor Bank Controls - Retail Station Capacitor Equipment Replacement		0	23.306	23,889	24.486	25.098	0	0	0	0	0	0																				
	Sub LTC Control Panel Replacement (Load Tap Changer)		0	6.541	6,705	6.872	7.044	0	0	0	0	0	0																				
	Sub LTC Position for IVVC		0	12,397	12.707	13.025	13,350	0	0	0	0	0	0																				
	Sub Voltage Regulator (VR), VR Control Panel & Comms		0	141,136	144,664	148,281	151,988	0	0	0	0	0	0																				
On-Going	On Going Substation Costs			,	·			880,000	902,000	924,550	947,664	971,355	995,639	1,020,530	1,046,043	1,072,195	1,098,999	1,126,474	1,154,636	1,183,502	1,213,090	1,243,417	1,274,502	1,306,365	1,339,024	1,372,500	1,406,812	1,441,982					
Project	TELECOM		0	75,679	77,571	79,510	81,498	0	0	0	0	0	0	1,343,733	1,343,733	1,343,733	1,343,733		1,343,733	•	1,343,733	•	1,343,733	The state of the s	1,343,733	1,343,733	1,343,733	1,343,733					
On-Going	Subst Comms On Going O&M		0	14,750	21,500	41,000	90,500	138,000	138,000	138,000	138,000	138,000	138,000	138,000	138,000	138,000	138,000	138,000	138,000	138,000	138,000	138,000	138,000	138,000	138,000	138,000	138,000	138,000					
On-Going	Dist Line Communications (Operations Support / Cellular)		0	137,936	392,562	646,981	901,686	1,018,422	1,066,044	1,112,607	1,158,111	1,205,733	1,205,733	1,205,733	1,205,733	1,205,733	1,205,733	1,205,733	1,205,733	1,205,733	1,205,733	1,205,733	1,205,733	1,205,733	1,205,733	1,205,733	1,205,733	1,205,733					
	Project O&M		0	75,679	77,571	79,510	81,498	0	0	0	0	0	0			•		•				,							,				
On-Going	π		0	78,250	195,625	395,625	595,625	775,625	955,000	1,135,625	1,315,600	1,495,625	1,675,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000					
On-Going	IT: Software Application / Labor Costs / SCADA / PI		0	78,250	195,625	395,625	595,625	775,625	955,000	1,135,625	1,315,600	1,495,625	1,675,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000					
Project	DISTRIBUTION		391,678	2,297,640	2,355,081	2,413,958	2,387,839	0	0	0	0	0	0	2,203,417	2,258,503	2,314,966	2,372,840	2,432,161	2,492,965	2,555,289	2,619,171	2,684,650	2,751,767	2,820,561	2,891,075	2,963,352	3,037,435	3,113,371		<u>, </u>			
	Line Regulator Control Panels		0	60,773	62,292	63,849	65,446	0	0	0	0	0	0																				
	Line Capacitor Bank Controls		0	94,302	96,660	99,076	101,553	0	0	0	0	0	0																				
	Line Regulators		0	189,362	194,096	198,948	203,922	0	0	0	0	0	0																				
	Medium Voltage Sensors (3 phase Sensors)	_	0	26,147	26,800	27,470	28,157	0	0	0	0	0	0																				
	GIS Field Verification	_	305,348	1,502,310	1,539,867	1,578,364	1,550,414	0	0	0	0	0	0																				
	GIS Update from Verification		86,331	424,747	435,366	446,250	438,348	0	0	0	0	0	0																				
On-Going								1,900,000	1,947,500	1,996,188	2,046,092	2,097,244			2,258,503	2,314,966	2,372,840	·	2,492,965		2,619,171	2,684,650	2,751,767	2,820,561	2,891,075	2,963,352		3,113,371					
On-Going	Staff Support		0	0	0	0	0	250,000	256,250	262,656	269,223	275,953		289,923	297,171	304,601	312,216	320,021	328,022	336,222	344,628	353,243	362,075	371,126	380,405	389,915	399,663	409,654					
	Grid Management: Transition GMgmt Deployment personnel to On-Going Support (Post-Project)	#450 004 050	204 672	2.816.397	2 250 704	3,799,956	4 005 000	250,000 4,962,047	256,250	262,656 5,569,625	269,223	275,953 6,183,911	282,852	289,923 6 657 604	297,171 6.745,450	304,601 6 835 493	312,216 6 927 787	320,021	328,022	7.218.746	7,320,621	353,243 7 425 043	362,075	371,126	380,405 7,754,236	389,915 7,869,499	399,663	409,654					
	Grand Total - All Cash Flow Categories	\$159,021,852	391,678	2,816,397	3,259,784	3,799,956	4,285,602	4,962,047	5,264,794	5,569,625	5,874,690	6,183,911	6,446,900	6,657,604	6,745,450	6,835,493	6,927,787	7,022,389	7,119,355	7,218,746	7,320,621	7,425,043	7,532,076	7,641,785	7,754,236	7,869,499	7,987,643	8,108,740					

CERTIFICATE OF SERVICE

I certify that a copy of Duke Energy Progress, LLC and Duke Energy Carolinas, LLC's Information on Integrated Volt-Var Control, in Docket No. E-100, Sub 157, has been served by electronic mail, hand delivery or by depositing a copy in the United States mail, postage prepaid to the following parties of record:

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This is the 20th day of September, 2019.

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Deputy General Counsel

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