BEFORE
THE PUBLIC UTILITIES COMMISSION OF OHIO

In the Matter of the Application of Ohio Power Company for Authority to Establish a Standard Service Offer Pursuant to Section 4928.143, Revised Code, in the Form of an Electric Security Plan	)))))	Case No. 16-1852-EL-SSO
In the Matter of the Application of Ohio Power Company for Approval of Certain Accounting Authority	)))	Case No. 16-1853-EL-AAM

OHIO POWER COMPANY'S APPLICATION
TO AMEND ITS ELECTRIC SECURITY PLAN

WORKPAPERS
For
Scott S. Osterholt

EPRI (Avista filing; Jan-16)
Capital Cost

	EVSE Equip	Install	Site Wiring	Utility Distr.	Total Cost	Year 1	Year 2
Res SFH Level 2						2,060	3,004
Workplace/Fleet/MF Level 2	700	350	1,700	750	3,500		
Public Level 2	2,500	500	3,000	2,000	8,000		
Public DC Fast Charging	35,000	55,000	10,000	25,000	125,000		
MF & Public Level 2	5,300	4,684					

	Year 1	Year 2	Year 3
Installs			
Res SFH Level 2	40	80	
Workplace/Fleet/MF Level 2	30	70	
Public Level 2	20	25	
Public DC Fast Charging	2	5	
Total	92	180	
Capital			
Res SFH Level 2	189,500	540,750	
Public	515,000	1,070,000	
Total	704,500	1,610,750	
O&M	271,135	329,833	179,458
Total	975,635	1,940,583	179,458
Approx. O&M Cost per Unit	5,214	2,170	1,181

PG&E News Item

	SDG&E	SCE	PGE Proposal	Counter-Prop to PGE
Installation Costs ($M)	45	22	654	87.4
Number of Installs	3500	1500	25000	2500
Average Cost	12,857	14,667	26,160	34,960

AEP Regulatory Filing

EVSE Equipment Cost Estimates

	Approx. Source Data	Year 1	Year 2	Year 3	Year 4	Total
Installations						
Level 2 Stations		30	50	85	85	250
DC Faster Chargers		5	6	7	7	25
Residential (Lvl 2)		250	250	250	250	1,000
Total		285	306	342	342	1,275
Cumulative Installations						
Level 2 Stations		30	80	165	250	
DC Faster Chargers		5	11	18	25	
Residential (Lvl 2)		250	500	750	1,000	
Total		285	591	933	1,275	
Install Cost per Station						
Level 2 Stations	4,992	12,000	12,000	12,000	12,000	
DC Faster Chargers	125,000	75,000	75,000	75,000	75,000	
Residential (Lvl 2)		1,000	1,000	1,000	1,000	
O&M Cost per Station						
Level 2 Stations	2,320	2,000	2,000	2,000	2,000	
DC Faster Chargers	3,480	3,000	3,000	3,000	3,000	
Residential (Lvl 2)		200	200	200	200	
Capital Cost						
Level 2 Stations		360,000	600,000	1,020,000	1,020,000	3,000,000
DC Faster Chargers		375,000	450,000	525,000	525,000	1,875,000
Residential (Lvl 2)		250,000	250,000	250,000	250,000	1,000,000
Program Administration Expenses		126,000	129,780	133,673	137,684	527,137
Total		1,111,000	1,429,780	1,928,673	1,932,684	6,402,137
O&M Cost		125,000	293,000	534,000	775,000	1,727,000
Total		1,236,000	1,722,780	2,462,673	2,707,684	8,129,137

EXPORT TO WORD TABLE

	Year 1	Year 2	Year 3	Year 4	Total
Installations					
Level 2 Stations	30	50	85	85	250
DC Faster Chargers	5	6	7	7	25
Residential (Lvl 2)	250	250	250	250	1,000
Total	285	306	342	342	1,275
Capital Cost	$1,111,000	$1,429,780	$1,928,673	$1,932,684	$6,402,137
O&M Cost	125,000	293,000	534,000	775,000	1,727,000
Total	$1,236,000	$1,722,780	$2,462,673	$2,707,684	$8,129,137

Microgrid System Cost

Unit Capital Costs	
Solar ($/kW-DC)	$2,500
Battery System ($/kWh-DC)	$700
Smart Inverter ($/kW-DC)	$660
System Size	
Solar Array (kW-DC)	500
Battery Capacity (kWh-DC)	3,000
(kW-DC)	500
Capital Costs ($)	
Solar Array	$1,250,000
Battery System (BESS)	$2,100,000
Smart Inverter - PV System	$330,000
Smart Inverter - BESS	$330,000
Distribution Connectivity and Control Equipment	
Distribution Switch	$170,000
PQ Meters (3)	$12,000
Communications Nodes (6)	$6,000
Distribution Synchrophasors (2)	$20,000
12.4 kV Transformer	$30,000
Secondary Transformer	$5,000
125 kVA transformer	$16,000
275 kVA transformer	$18,000
Total	$277,000
Installation & PM Costs	$650,000
Software Costs	$250,000
Total Capital Cost	$5,187,000

AEP Microgrid Program Costs	Year 1	Year 2	Year 3	Year 4	Total
Microgrids Deployed (#)	2.5	2.5	2.5	2.5	10.0
Total Capital Cost	$12,967,500	$12,967,500	$12,967,500	$12,967,500	$51,870,000
O&M Cost	$375,000	$750,000	$1,125,000	$1,500,000	$3,750,000
Total	$13,342,500	$13,717,500	$14,092,500	$14,467,500	$55,620,000

American Electric Power

Phase 2 Development

Assistance with Grid Modernization Testimony

Summary of Smart Street and Area Lighting Pilot Investment

Line	Description	Unit Cost	Units	Total Cost	Over Years	Year 1	Year 2	Year 3	Year 4	Year 5	Notes
	Fixed Costs										
1	Photocell	$ 50.00	202,000	$ 10,100,000	4	$ 2,525,000	$ 2,525,000	$ 2,525,000	$ 2,525,000		Silver Spring: OL_SL_Summary w_Analysis: Cell E21
2	Communications Endpoint	$ 40.00	202,000	$ 8,080,000	4	$ 2,020,000	$ 2,020,000	$ 2,020,000	$ 2,020,000		Silver Spring: OL_SL_Summary w_Analysis: Cell F21
4	Smart Lighting Installation	$ 30.00	202,000	$ 6,060,000	4	$ 1,515,000	$ 1,515,000	$ 1,515,000	$ 1,515,000		Silver Spring: OL_SL_Summary w_Analysis: Cell J21
3	100W HPS to LED Conversion	$ 140.00	1,000	$ 140,000	2	$ 70,000	$ 70,000	$ -	$ -		Silver Spring: OL_SL_Summary w_Analysis: Cell G21
X	LED Installation	$ 137.99	1,000	$ 137,990	2	$ 68,995	$ 68,995	$ -	$ -		Silver Spring: OL_SL_Summary w_Analysis: Cell J21
X	Engineering & Project Management	$ 320,000	4	$ 1,280,000	4	$ 320,000	$ 320,000	$ 320,000	$ 320,000		Engineer & PM, salary plus benefits
X	Software Licenses	$ 8	202,000	$ 1,616,000	1	$ 1,616,000	$ -	$ -	$ -		
5	System Integration	$ 500,000	1	$ 500,000	2	$ 250,000	$ 250,000	$ -	$ -		Estimated costs provided by Silver Spring
6	Subotal Fixed Costs			$ 27,913,990		$ 8,384,995	$ 6,768,995	$ 6,380,000	$ 6,380,000		
7	Contingency	7.0%		$ 1,953,979	4	$ 488,495	$ 488,495	$ 488,495	$ 488,495		Contingency
8	Total Fixed Costs			$ 29,867,969		$ 8,873,490	$ 7,257,490	$ 6,868,495	$ 6,868,495	$ -	
	Operating Costs	0									
9	Personnel	$ 150,000	5	$ 750,000	5	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000	Engineer, salary plus benefits
10	Network Software Licenses	$ 8.00	202,000	$ 1,616,000	1	$ 404,000	$ 808,000	$ 1,212,000	$ 1,616,000	$ 1,616,000	Costs provided by Silver Spring (Five year term)
10	Network Software SaaS Fee	$ 1.60	202,000	$ 323,200	1	$ 80,800	$ 161,600	$ 242,400	$ 323,200	$ 323,200	Costs provided by Silver Spring (Five year term)
11	Contingency	7.0%		$ 113,120	5	$ 22,624	$ 22,624	$ 22,624	$ 22,624	$ 22,624	Contingency
12	Total Operating Costs			$ 2,802,320		$ 657,424	$ 1,142,224	$ 1,627,024	$ 2,111,824	$ 2,111,824	
13	**Total Costs**			$ 32,670,289		$ 9,530,914	$ 8,399,714	$ 8,495,519	$ 8,980,319	$ 2,111,824	

American Electric Power

Phase 2 Development

Assistance with Grid Modernization Testimony

Summary of Smart Street and Area Lighting Pilot Investment

Total Pilot Cost 58,114,978

Line	Description	Smart Lighting Pilot Costs					Total
		Year 1	Year 2	Year 3	Year 4	Year 5	
1	Capital Costs	8,873,490	7,257,490	6,868,495	6,868,495	-	29,867,969
2	Operating Costs	657,424	1,142,224	1,627,024	2,111,824	2,111,824	7,650,320
3	Total Costs	9,530,914	8,399,714	8,495,519	8,980,319	2,111,824	37,518,289

Line	Description	Smart Lighting Pilot Costs					Total	
		Year 1	Year 2	Year 3	Year 4	Year 5		
1	Field Costs	6,818,495	6,818,495	6,563,495	6,563,495	15,000	26,778,979	Assuming system integration is 50/50 Field/Back-office and Engineer is 50/50 Fi
2	Back Office Costs	626,624	1,030,624	1,369,624	1,773,624	1,773,624	6,574,120	Assuming system integration is 50/50 Field/Back-office and Engineer is 50/50 Fi
3	Total Costs	7,445,119	7,849,119	7,933,119	8,337,119	1,788,624	33,353,099	

ield Back-office for first 2 years then 10% field
ield Back-office for first 2 years then 90% back office

	Year 1	Year 2	Year 3	Year 4	TOTAL
Installations					
Smart Lighting	50,500	50,500	50,500	50,500	202,000
LED	500	500	-	-	1,000
TOTAL	51,000	51,000	50,500	50,500	203,000
Capital Cost	$ 8,873,490	$ 7,257,490	$ 6,868,495	$ 6,868,495	$ 29,867,969
O&M Cost	$ 657,424	$ 1,142,224	$ 1,627,024	$ 2,111,824	$ 5,538,496
Total Cost	$ 9,530,914	$ 8,399,714	$ 8,495,519	$ 8,980,319	$ 35,406,465

Summary: Text - Workpapers of Scott Osterholt of Ohio Power Company electronically filed by Mr. Steven T Nourse on behalf of Ohio Power Company