



## Improving ROI by Leveraging ArcGIS Server for Data Analytics



**Subrahmanyam(Subbu) Pendyala**  
**Anil Jayavarapu**

June 29, 2016



## Agenda

- **About Pepco Holdings**
  
- **GIS at Pepco Holdings**
  
- **Analytics**
  - **Business Needs**
  - **Current Approach: Mixed Bag**
  - **New Approach: Leveraging “*ArcGIS for Server*” for Analytics**

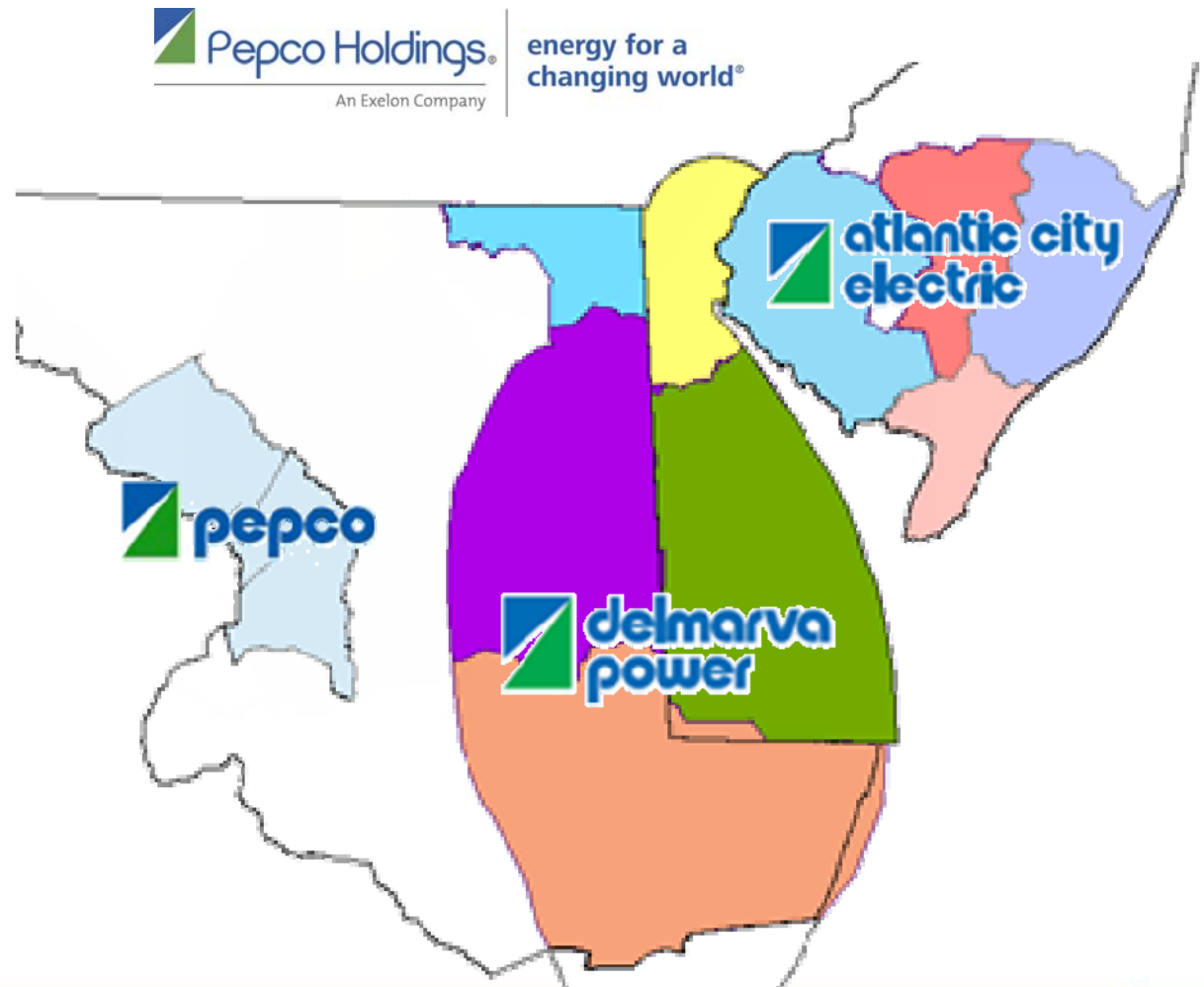
## About Pepco Holdings

- Provides electric service to approximately 2 million customers in

- Washington DC
- Maryland
- Delaware
- New Jersey

- Operating Companies

- Pepco
- Delmarva Power
- Atlantic City Electric



## GIS at Pepco Holdings

- **Departments and Business Processes Supported By GIS**
  - System Planning
  - Distribution Engineering
  - Transmission
  - Drafting
  - Construction
  - Maintenance
  - Outage Management
  - Reliability
  - Vegetation Management
  - Tax Accounting
  - Situational Awareness

Who is  
Using  
GIS ?

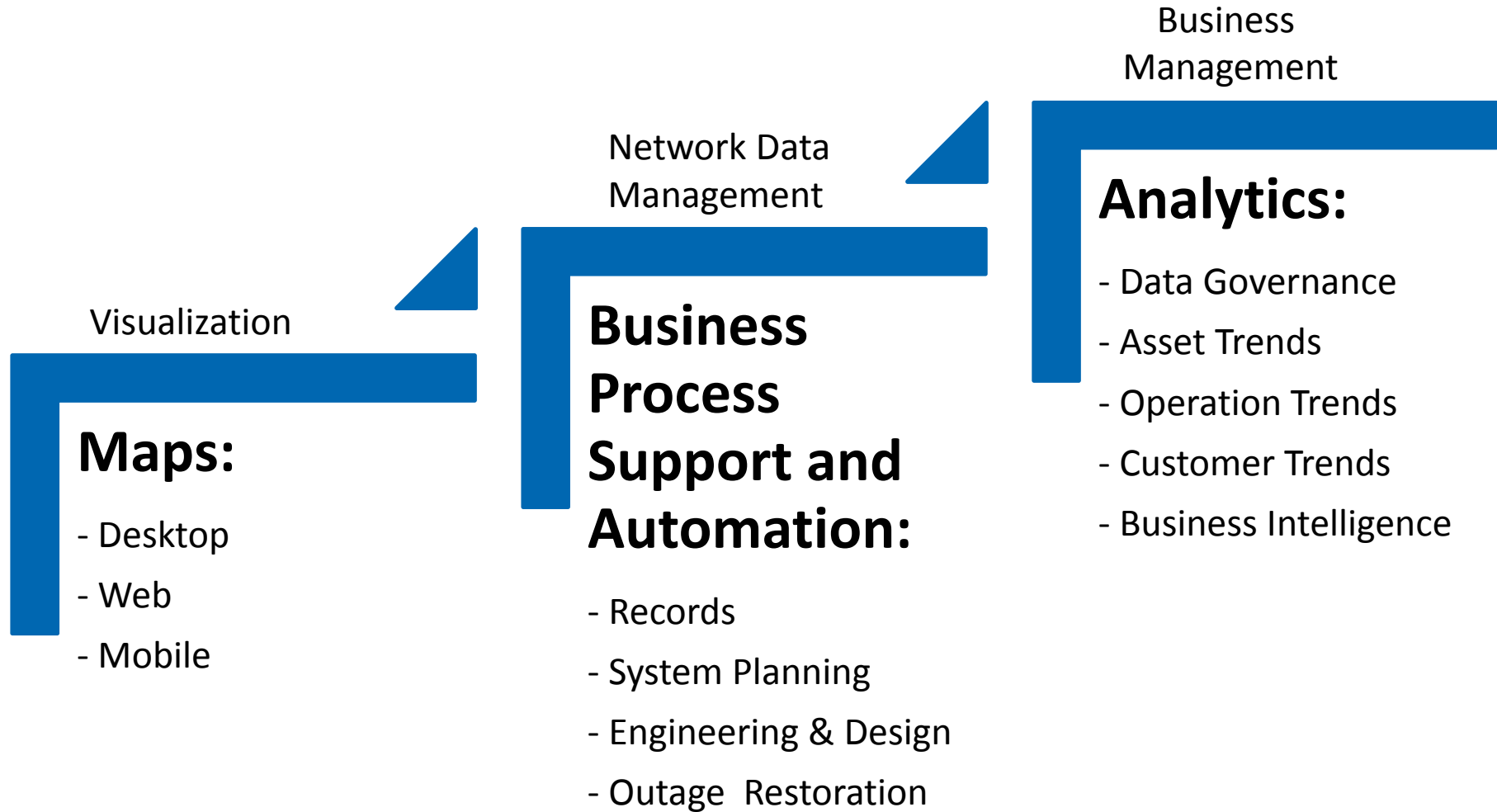
## GIS at Pepco Holdings

- Desktop GIS (ArcGIS) : 2251 (Editors + View Only)
- Web GIS (Portal for ArcGIS) : 933 Users
- Cloud GIS (ArcGIS Online) : 140 Users
- Mobile GIS (ArcGIS Explorer) : 120
- Mobile GIS (ArcGIS Collector) : 60

**40%**  
Of the Employees

How many  
are using  
GIS?

# GIS Value Proposition



## Analytics: Business Needs

- **Bi-Weekly**
  - Equipment with more than one FeederID
  - De-energized
  - Missing data
  - Invalid geometry checks
  - Un-Split line check for fuses, open points and switches
  - Conflicts in database
  
- **Monthly**
  - Inspections
  - Vegetation management
  
- **Quarterly**
  - Asset tax reporting
  - Transformers count by feeder and ward
  
- **Yearly**
  - Circuit mileage
  - Pole mileage
  
- **Ad-hoc**
  - Device Counts by Feeder, System, Grid

# GIS: Beyond Maps

## Analytics: Business Need Categories

### ■ Asset Reporting

- Inspection Trends
- Installation Trends
- Aging Trends
- Reliability Trends
- Customer Trends

- By Feeder
- By Asset Type
- By Region

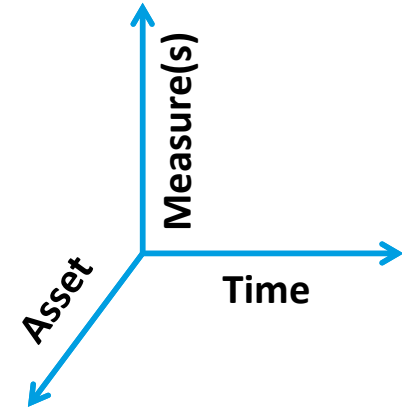
### ■ Data Diagnostics

- What is updated in the last week, month, quarter, year?
- Is the data quality getting better?
- What are the unposted changes?

### ■ Business Reporting

- Designs By Operating Company/District
- Tax Reporting

# GIS: Enabling Analytics



**Multi-Dimensional  
Spatial Trends**



## Analytics: Current Approach

- **ArcGIS Desktop**
  - Schneider Reporting Tool
  - Data Reviewer
- **ArcGIS Scripts**
  - VBA macros
- **Custom Web Applications**
  - Compass (.ASP)
- **ArcGIS Portal Widgets**
  - Design Dashboard (Java Stack)
  - Data Quality Dashboard (Java Stack)

*An Analyst or End User has to spend time each time*

Evolution:  
-Multiple Tools  
-Customizations  
-Disintegrated  
-Manual Trending

## Expectations: GIS/IT Strategy

- Continue to improve user satisfaction
- Implement generic tooling to address most (not all) requirements
- Provide automated trending
- Scalable and flexible
- Easy to deploy
- No programming
- No modeling
- Leverage existing software
- Leverage existing hardware

Mandate:  
Reduce  
Customizations

# New Approach: "Metrics Extension" to ArcGIS for Server



## Data Trends



Intelligence to Make Informed Decisions  
Business | Policy



- Executives
- Managers
- Supervisors
- Consultants
- Administrators
- Analysts
- Employees

1

Define

2

Schedule

3

Compute

4

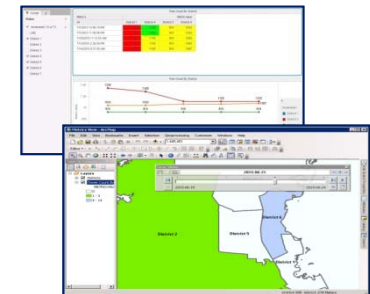
Share

**Metrics Administrator**

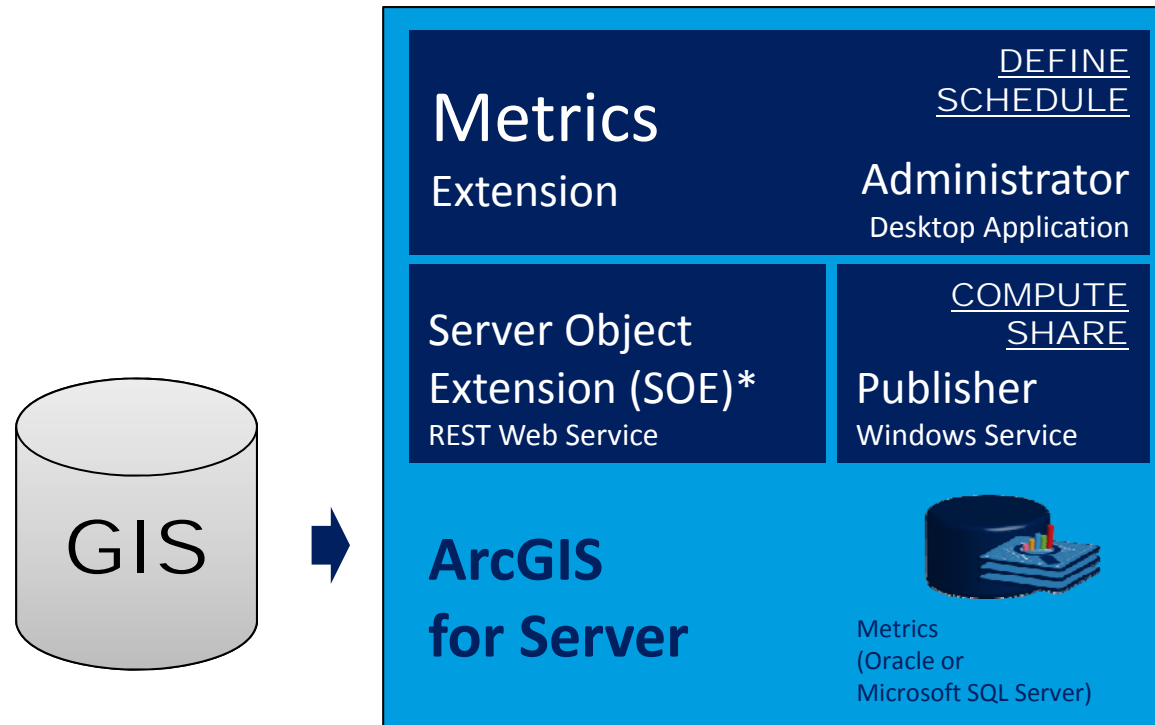
Metrics Publisher

ArcGIS for Server

**Metrics Database**



# New Approach: "Metrics Extension" to ArcGIS for Server



## OPTIONS

1



Email

2



Excel (Shared Folder)

3



Websites (html reports)

4



Portal for ArcGIS

5



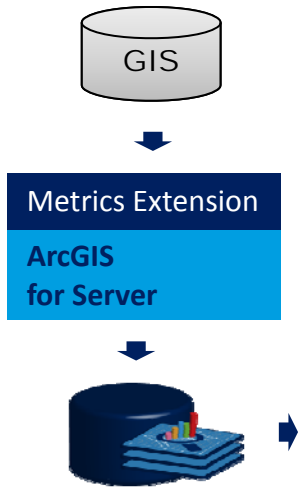
Business Intelligence Tools

\* Certified for ArcGIS Server 10.1, 10.2, and 10.3

## Automated Trending

Current	Min	Max	Avg	Recent		~7d		~30d		~90d		~1y		~2y	
				+/-	%	+/-	%	+/-	%	+/-	%	+/-	%	+/-	%

# Asset Counts by Feature Class and Subtype



## Tree View: Low footprint asset history

**Facts**

ID: 1 Name: Measures By Feature Class and Subtype\*

2015

- OCT
  - 10/1/2015 8:14:21 PM(572)
  - 10/10/2015 7:41:46 PM(572)
  - 10/17/2015 8:59:13 PM(572)
  - 10/24/2015 8:58:38 PM(572)

Buttons: Delete, Hide, Unhide, Close

**Fact details**

CATEGORY	Current
PHI.SpanAnno.Not Applicable.Not Applicable	0
PHI.WorkRequest.Not Applicable.Not Applicable	7487106221
PHI.DesignGraphics.Not Applicable.Not Applicable	0
PHI.Design.Not Applicable.Not Applicable	2039307672
PHI.WorkLocation.Not Applicable.Not Applicable	0
PHI.SectionalizerAnno.AnnotationClassID.Design	12
PHI.SectionalizerAnno.AnnotationClassID.Feeder	12
PHI.Sectionalizer.SUBTYPECD.Single Phase Hydraulic Sectionalizer	1
PHI.Sectionalizer.SUBTYPECD.Two Phase Hydraulic Sectionalizer	0
PHI.Sectionalizer.SUBTYPECD.Three Phase Hydraulic Sectionalizer	15
PHI.Sectionalizer.SUBTYPECD.Three Phase Electronic Sectionalizer	1
PHI.FieldNotesPolygon.Not Applicable.Not Applicable	39401493821
PHI.Busbar.SUBTYPECD.Network Bus	54853
PHI.Busbar.SUBTYPECD.Bus Bar	142521
PHI.Busbar.SUBTYPECD.Bus Bar Extension	11108
PHI.Busbar.SUBTYPECD.Station Bus Bar	93483
PHI.Busbar.SUBTYPECD.Internal Busbar	10
PHI.DesignGraphicsPolygon.SUBTYPECD.Traffic Control Area	0
PHI.DesignGraphicsPolygon.SUBTYPECD.Sediment Control Area	0
PHI.SurfaceStructure.SUBTYPECD.AMI Support Structure	0
PHI.SurfaceStructure.SUBTYPECD.Pad	131406
PHI.SurfaceStructure.SUBTYPECD.Pedestal	48700
PHI.SurfaceStructure.SUBTYPECD.Cabinet	3684
PHI.SurfaceStructure.SUBTYPECD.PartServ	11399
PHI.SurfaceStructure.SUBTYPECD.Loop Protector	1919

# Asset Counts by Feature Class and Subtype

## Pivot: Interactive Analytics Leveraging BI

Timeline



Metrics Extension  
ArcGIS  
for Server

Business  
Intelligence  
(Microstrategy)

		Visualization 1			
Featureclass	At	10/1/2015 8:14:21 PM	10/10/2015 7:41:46 PM	10/17/2015 8:59:13 PM	10/24/2015 8:58:38 PM
	Subtype	Metricvalue	Metricvalue	Metricvalue	Metricvalue
PHI.CapacitorBank	Fixed Bank	1019	1020	1015	1014
	Switched Bank	4134	4134	4134	4133
PHI.CircuitBreaker	Circuit Breaker	2572	2572	2568	2569
	Supply Breaker	601	601	601	601
	Tie Breaker	915	915	915	915
PHI.FuseBank	Internal Fuse	39	39	39	39
	Primary Current Limiting	7784	7793	7799	7801
	Primary Current Limiting-Expulsion	1883	1882	1883	1884
	Primary Expulsion	95526	95513	95505	95525
	Secondary Current Limiting	1	1	1	1
	Transclosure	740	742	742	742
PHI.OpenPoint	UG Fuse	14	14	14	14
	Bolted	30	30	30	30
	Load Break Elbow	277462	277534	277572	277597
	Load Break Elbow - Taphole	9834	9849	9855	9862
	Non-Load Break Elbow	6166	6166	6166	6166
	Primary Open Point	1922	1925	1927	1929
PHI.Pole	Secondary Open Point	54463	54469	54486	54478
	H-Frame	7287	7285	7127	7125
	Multi-pole	1707	1709	1672	1664
	Non-Wood Light Pole	46928	46991	47041	47058
	Non-Wood Power Pole	10125	10182	10338	10627
	Push Pole	3214	3214	3219	3217
PHI.ServicePoint	Wood Light Pole	74018	73976	73908	73901
	Wood Power Pole	798936	798735	798305	797917
	Service Point General	1610495	1610259	1610211	1610138
PHI.StreetLight	Dusk to Dawn	2614	2613	2613	2614
	High Pressure Sodium	285308	285427	285447	285467
	Incandescent	13535	13535	13530	13530
	Induction	44	44	44	44
	LED	2128	2128	2168	2169
	Mercury Vapor	61292	61260	61221	61231
	Metal Halide	5191	5191	5186	5186
	Unknown	57926	57926	57921	57921

Filters

Feature Class

Subtype

Asset Counts

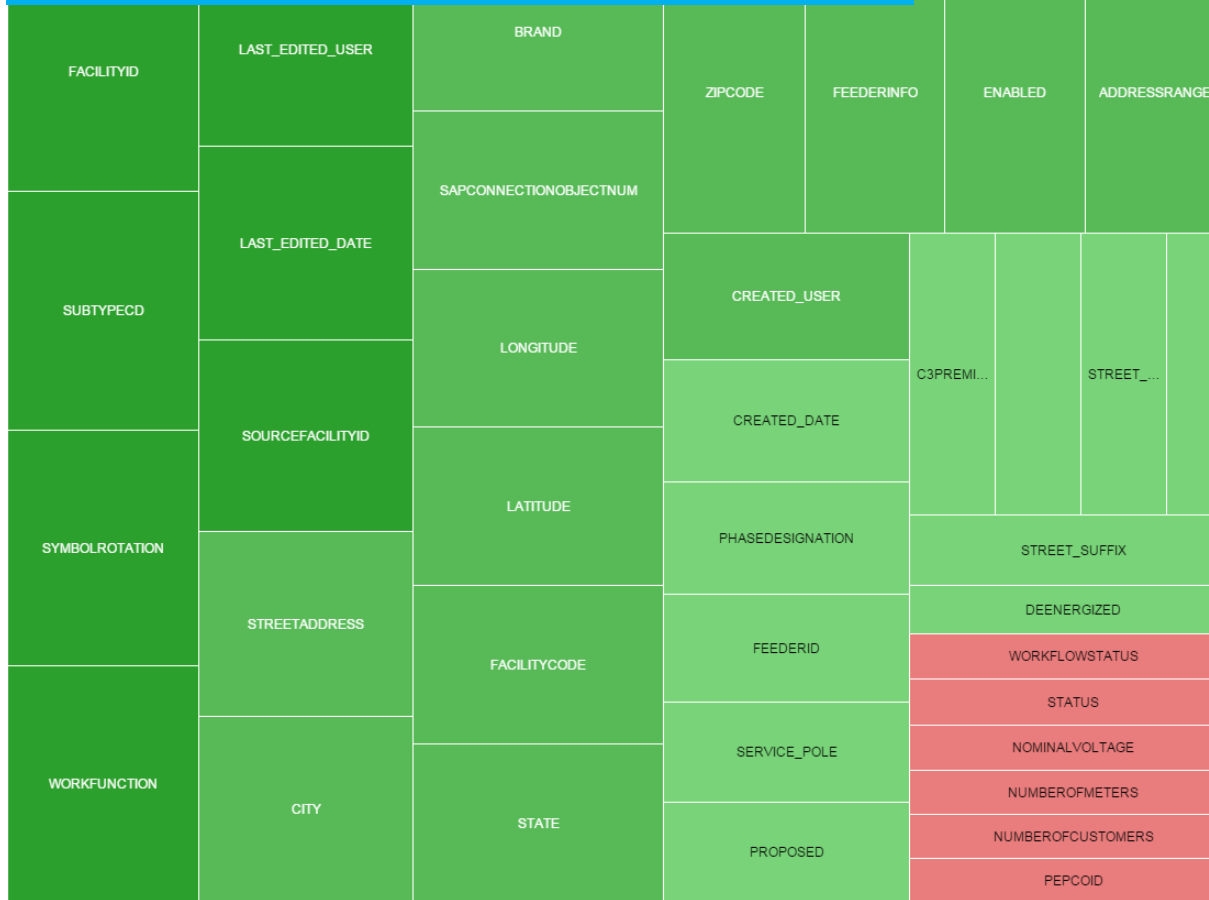
# Field Density



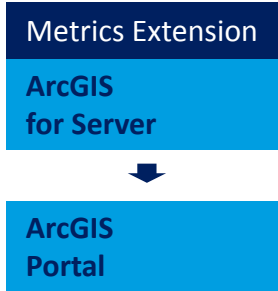
## Which assets(feature classes ) are well populated?

PHI.AerialMarker	41.3
PHI.AMIDevice	47.56
PHI.AnchorGuy	54.18
PHI.Arrestor	0
PHI.Boundary	26.5
PHI.Bridge_Tunnel	32.36
PHI.Bridge_TunnelPoint	26.6
PHI.Buildings	16.35
PHI.Buildings_line	5.47
PHI.Busbar	51.52
PHI.CABLEFAILURE	33.51
PHI.CapacitorBank	59.33
PHI.CAPACITORCONTROL	41.42
PHI.CAPACITORCONTROLSETTING	29.25
PHI.CAPACITORINSPECTION	21.29
PHI.CAPACITORUNIT	44.6
PHI.CELLINFORMATION	46.82
PHI.CircuitBreaker	54.86
PHI.CIRCUITSOURCE	72.22
PHI.Cities	39.87
PHI.CityBoundary	33.05
PHI.CityBoundaryTax	0
PHI.CompanyProperty	16.44
PHI.ControlPoint	0
PHI.CountyBoundary	39.2
PHI.CurrentLimiterPolygon	36.41
PHI.CUSTOMERINFORMATION	55.85
PHI.DataQuality	83.33
PHI.Design	52.21
PHI.DesignGraphicsLine	29.61
PHI.DesignGraphicsPoint	0
PHI.DesignGraphicsPolygon	0

## Which fields are well populated on a asset?



# Null Values



Featured Maps and Apps

Data Governance

GIS Data Errors

Design States

## Data Governance

Quantity **Select**  
Generate Count/Feet  
Field Density

Editing **Select**  
Revision to Version Age and Depth  
Unposted Changes

Discrepancies **Select**  
Xfmr w/ 2nd Feeder ID  
OH Primary w/ 2nd Feeder ID  
UG Primary w/ 2nd Feeder ID  
Xfmr De-energized  
Fusebank De-energized  
OpenPoint De-energized  
RecloserBank De-energized  
SwitchBank De-energized  
OH Primary De-energized  
UG Primary De-energized

https://cp-wpd-ts50c.pepcoholdings.biz/metrics

**Data Governance: Quantitative and Qualitative Trends**

Quantity **Select** Editing **Select** **Null Values**

Generated By Metrics Extension to ArcGIS for Server - Analytics for GIS - © 2015

Select  
Xfmr Unit KVA  
Xfmr Lowside Voltage  
OH Primary Size  
**OH Primary Material**  
UG Primary InsulationType  
UG Primary Material

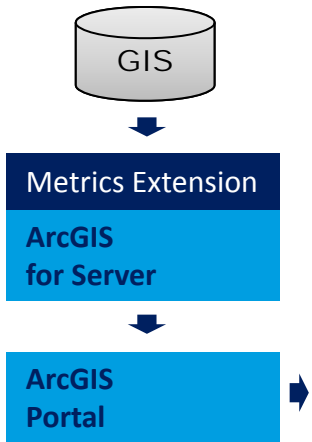
### OH Primary Conductor Null Material

Category	Current	Min	Max	Avg	Recent										
	21-Jun-16				25-Oct-15	+/-	%	+/-	%	+/-	%	+/-	%	+/-	%
AA.0	8326	8326	8326	8326	73	0.88									
AA.1	6	6	6	6	12	200									
AA.32	83	83	83	83	5	6.02									
AA.2	2	2	2	2	27	1350									
AAAC.0	96271	96271	96271	96271	-5435	-5.65									
AAAC.1	6047	6047	6047	6047	2015	33.32									
AAAC.-10	40	40	40	40	-40	-100									
AAAC.32	897	897	897	897	38	4.24									
AAAC.2	1917	1917	1917	1917	-230	-12									
AAAC.20	0	0	0	0	1										
AAC.0	346377	346377	346377	346377	-10266	-2.96									
AAC.1	16595	16595	16595	16595	4504	27.14									
AAC.32	1649	1649	1649	1649	83	5.03									
AAC.2	1740	1740	1740	1740	606	34.83									
AAC.20	0	0	0	0	1										
ACSR.0	425839	425839	425839	425839	-15058	-3.54									



# Versions By Age and Depth

## Monitoring Data Edit Volume and Latency



**Facts**

Facts

ID: 4 Name: \*  
Version Count By Depth and Age\*

2015  
2016  
JUN  
6/17/2016 11:28:31 AM(24)

Fact details

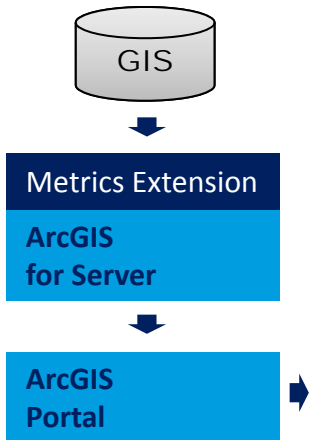
CATEGORY	Current	MIN	MAX	MEAN	RECENT
Not Applicable.Depth 1.Greater than 360 days	11345	11310	12357	11831.00	12130
Not Applicable.Depth 1.90 days to 180 days	3655	3476	3788	3688.00	3476
Not Applicable.Depth 1.30 days to 90 days	2870	2870	3346	3186.00	3083
Not Applicable.Depth 1.24 hours to 7 days	1022	189	1022	592.00	230
Not Applicable.Depth 1.180 days to 360 days	5689	5689	8968	8067.00	8192
Not Applicable.Depth 1.7 days to 30 days	1087	984	1742	1286.00	1742
Not Applicable.Depth 1.Less than 24 hours	75	5	75	37.00	
Not Applicable.Depth 2.Greater than 360 days	256	256	399	347.00	373
Not Applicable.Depth 2.90 days to 180 days	88	50	115	100.00	115
Not Applicable.Depth 2.30 days to 90 days	111	56	139	115.00	139
Not Applicable.Depth 2.24 hours to 7 days	13	9	27	17.00	14
Not Applicable.Depth 2.7 days to 30 days	55	55	100	73.00	60
Not Applicable.Depth 2.180 days to 360 days	109	61	156	129.00	141
Not Applicable.Depth 2.Less than 24 hours	6	2	6	4.00	
Not Applicable.Depth 3.Greater than 360 days	35	11	47	38.00	43
Not Applicable.Depth 3.90 days to 180 days	15	3	15	10.00	10

Version Count By Depth and Age

Metrics	Metricvalue						
At	180 days to 360 days	24 hours to 7 days	30 days to 90 days	7 days to 30 days	90 days to 180 days	Greater than 360 days	Less than 24 hours
9/26/2015 8:46:45 PM	9168	806	3491	1080	3915	12566	6
9/30/2015 7:51:57 PM	9014	725	3357	1089	3789	11937	74
10/3/2015 4:40:11 PM	9056	296	3477	1625	3832	11745	5
10/9/2015 8:55:40 PM	8110	199	3444	1673	3798	12354	56
10/17/2015 8:09:36 PM	8073	975	3241	1152	3899	12790	11
10/24/2015 10:14:54 PM	8369	250	3249	1808	3602	12563	
6/17/2016 11:28:32 AM	5815	1035	2993	1150	3761	11642	81

# Features With More Than One Feeder ID

Governing Data Discrepancies Causing Downstream Impact on Other Systems

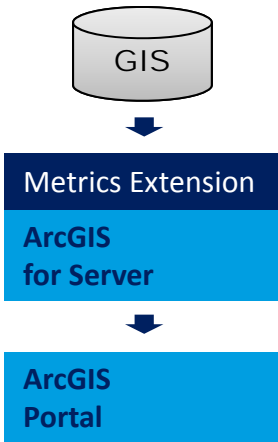


UGPrimary With More than one FeederID

Category	Current				Recent		~7d	~30d	~90d	~1y	~2y
	Min	Max	Avg	14-Jun-16	25-Oct-15						
DC NEW.None	1	1	182	121	120	12000					
DC NEW.Install	0	0	1	1	1						
DC NEW.Replace	1	1	2	2	1	100					
DC NEW.Remove	0	0	1	1	1						
MG NEW.None	1	1	23	19	20	2000					
MG NEW.Install	3	0	3	2	3	100					

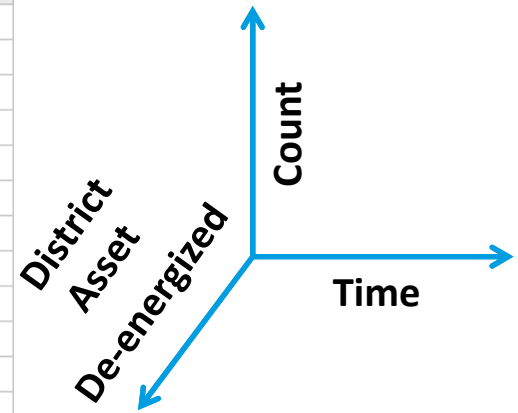
Category	Operating District	Metrics		Metricvalue			
		Featureclass		Install	None	Replace	Total
CAPE MAY		PHI.TransformerBank			5		5
		PHI.OHPrimary			8		8
DC		PHI.TransformerBank			67	18	85
		PHI.UGPrimary	5	727	11		743
MG		PHI.OHPrimary			296	16	312
		PHI.TransformerBank			80		80
		PHI.UGPrimary	9	112	3		124
PG		PHI.OHPrimary			444	24	468
		PHI.TransformerBank			100	20	120
		PHI.UGPrimary			47		47
PLEASANTVILLE		PHI.OHPrimary	6				6
		PHI.TransformerBank			1		1
		PHI.UGPrimary			20		20
SALISBURY		PHI.TransformerBank			1		1

# De-energized Features



Operating District	Featureclass	Fieldvalue (2)	WORKFUNCTION	Metricvalue
CAPE MAY	PHI.FuseBank	De-energized	None	1
	PHI.OpenPoint	De-energized	None	105
	PHI.TransformerBank	De-energized	None	3
CENTREVILLE	PHI.OHPrimary	De-energized	None	1
	PHI.OpenPoint	De-energized	None	23
CHRISTIANA	PHI.OpenPoint	De-energized	None	25
	PHI.UGPrimary	De-energized	None	6
DC	PHI.OpenPoint	De-energized	None	21
	PHI.TransformerBank	De-energized	None	4
GLASSBORO	PHI.OpenPoint	De-energized	None	1
MG	PHI.OpenPoint	De-energized	None	36
MILLSBORO	PHI.OpenPoint	De-energized	None	52
	PHI.UGPrimary	De-energized	None	1
NORTH EAST	PHI.FuseBank	De-energized	None	8
	PHI.OpenPoint	De-energized	None	8
	PHI.TransformerBank	De-energized	None	4
	PHI.UGPrimary	De-energized	None	4
PG	PHI.OpenPoint	De-energized	None	43
PLEASANTVILLE	PHI.OpenPoint	De-energized	None	11
SALISBURY	PHI.FuseBank	De-energized	Replace	16
	PHI.OpenPoint	De-energized	None	25
WINSLOW	PHI.OpenPoint	De-energized	None	28

**Data Integrity:  
Minimizing Impact  
On Downstream  
Systems**



**Multi-Dimensional  
Spatial Trends**

# Poles By Service District and Year Installed



Metrics	1923	1925	1929	1930	1934
CAPE MAY	0	2	0	740	10
CENTREVILLE	0	1	0	15	3
CHRISTIANA	12	104	0	124	123
DC	0	0	0	34	47
DC NEW	0	0	0	34	47
GLASSBORO	0	11	8	2680	165
MG	0	2	0	36	63

1923

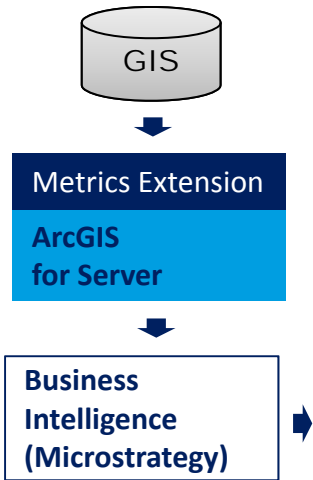
60+ Years Old

2016

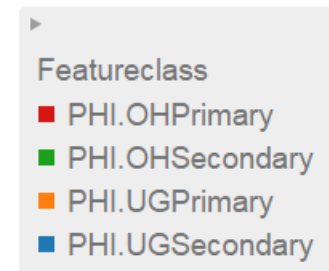
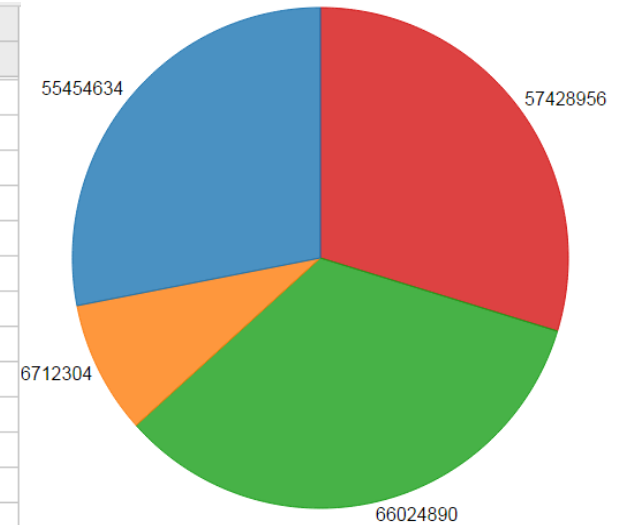
Metrics	1923	1925	1929	1930	1934	1935	1939	1940	1941	1942	1944	1947	1950	1951	1953	1954	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967			
CAPE MAY	0	2	0	740	10	7	23	12	1	22	15	17	16	2	54	36	10	3	6	11	4	2	5	20	1	21	4			
CENTREVILLE	0	1	0	15	3	20	33	0	0	71	43	359	236	0	0	374	0	266	225	203	227	250	261	397	294	441	0			
CHRISTIANA	12	104	0	124	123	136	382	0	3	294	178	389	309	9	0	468	0	1050	849	889	976	953	903	715	964	1000	0			
DC	0	0	0	34	47	518	30	0	0	6	0	280	332	0	0	59	0	537	2665	1182	116	431	1780	376	3895	48	0			
DC NEW	0	0	0	34	47	518	30	0	0	6	0	280	332	0	0	59	0	537	2665	1182	116	431	1780	376	3895	481	0			
GLASSBORO	0	11	8	2680	165	128	248	1	3	66	56	129	143	4	24	45	9	19	69	160	20	45	14	40	8	50	7			
MG	0	2	0	36	63	254	30	0	0	29	6	265	1255	0	0	388	0	1003	730	1467	652	938	787	971	2008	1040	0			
MG NEW	0	2	0	36	63	254	30	0	0	29	6	265	1255	0	0	388	0	951	750	1467	652	938	787	971	2007	1040	0			
MILLSBORO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
NORTH EAS	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	
PG	17	31	15	101	12	13	8	4	2	4	4	1	71	5	67	7	4	2	1	311	0	0	1	7	59	9	76	3	0	
PG NEW	22	347	282	307	249	440	244	234	130	67	56	0	10	1	1	2	48	6	8	147	8	9	2	21	172	92	344	6	0	
PLEASANTV	45	372	214	296	230	299	185	162	72	90	98	7	22	203	53	36	452	78	157	9	237	39	31	38	213	309	122	52	0	
SALISBURY	212	409	0	260	158	132	212	36	0	18	0	0	6	1	0	0	0	0	0	0	0	0	8	80	160	38	14	5	0	
WINSLOW	212	409	0	260	158	132	212	36	0	18	0	0	6	1	0	0	0	0	0	0	0	0	8	80	160	38	14	5	0	
	10	292	196	252	193	158	129	14	36	15	5	3	66	41	10	12	34	128	2	205	9	17	42	55	303	236	471	206	574	
	692	363	0	154	236	247	290	203	0	94	0	0	39	0	0	0	0	0	0	1	3	1	17	48	62	69	140	14	0	
	887	363	0	154	235	238	290	203	0	94	0	0	39	0	0	0	0	0	0	1	3	1	17	48	62	69	140	14	0	
	96	183	98	516	110	243	161	272	92	88	7	1	3	28	8	3	730	402	20	10	29	21	99	304	231	46	223	11	228	
	1	4	77	7	6	3	676	22	17	9	2	0	0	12	9	18	25	3	0	40	78	3	5	16	40	94	99	1	0	
	789	498	0	357	419	271	216	140	0	159	0	0	74	30	0	0	0	0	0	0	0	1	5	54	57	95	51	123	27	0
	789	497	0	357	402	266	216	106	0	159	0	0	74	30	0	0	0	0	0	0	0	1	5	54	57	95	51	106	27	0
	1	74	54	79	26	94	9	17	13	15	9	10	47	26	47	251	970	6	50	51	0	1	6	45	58	60	252	21	0	
	57	247	240	148	129	126	138	101	48	37	33	0	5	1	1	3	6	0	109	7	8	8	78	29	81	264	210	52	0	
	1	151	39	26	31	57	15	16	20	11	16	1	26	39	5	6	2	9	1	14	1	7	9	3	2	28	18	39	0	

# Circuit Mileage

Which Circuits changed the most and by how much?  
(For Tax Reporting and System Planning)



FeederID	Metrics	Metricvalue			
	Featureclass	Single Phase	Three Phase	Two Phase	Total
DE0169	PHI.OHSecondary	34278	0	0	34278
DE0175	PHI.UGSecondary	235679	258	93	236030
DE0181	PHI.OHSecondary	101138	1913	0	103051
DE0190	PHI.OHPrimary	78358	116402	15330	420180
	PHI.OHSecondary	78358	116402	15330	420180
DE0193	PHI.UGPrimary	61681	8102	180	69963
DE0201	PHI.OHPrimary	0	1888	0	1888
DE0202	PHI.OHPrimary	17989	23444	3793	45226
DE0203	PHI.OHPrimary	14626	47754	4854	134468
	PHI.OHSecondary	14626	47754	4854	134468
DE0209	PHI.OHSecondary	131791	1402	1219	134412
DE0216	PHI.OHPrimary	26638	61028	6972	189276
	PHI.UGSecondary	26638	61028	6972	189276
DE0217	PHI.OHSecondary	80063	2467	262	82792
DE0219	PHI.OHPrimary	1036	12965	427	14428
DE0223	PHI.UGSecondary	21862	1193	43	23098
DE0232	PHI.OHPrimary	107988	113244	57240	835416
	PHI.UGPrimary	107988	113244	57240	835416
	PHI.UGSecondary	107988	113244	57240	835416
DE0238	PHI.OHPrimary	44252	21734	1690	135352
	PHI.OHSecondary	44252	21734	1690	135352
DE0241	PHI.OHPrimary	16391	26916	9634	52941
DE0243	PHI.OHSecondary	107936	2232	0	220336
	PHI.UGSecondary	107936	2232	0	220336
DE0244	PHI.UGSecondary	190002	1895	381	192278



# Transformers Count By Phase and KVA

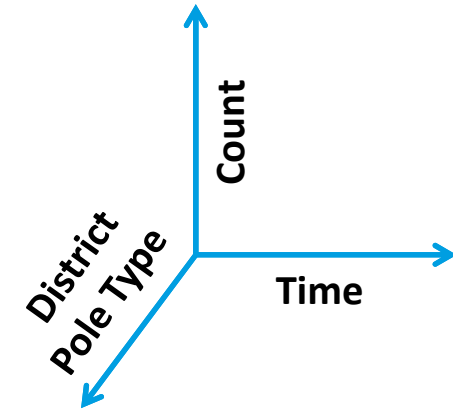
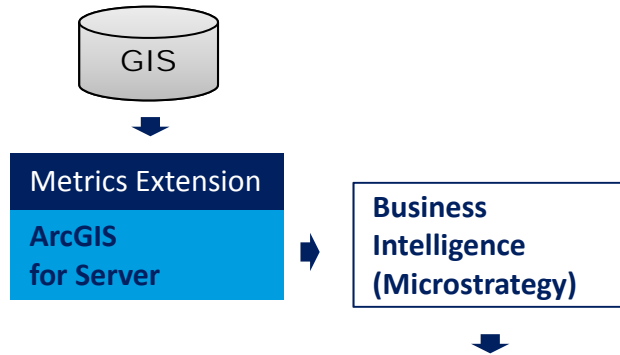
## Understanding Regional Trends



Areaname1	Metrics	Metricvalue																
		Fieldvalue (2)(Group) 1	10	15	20	25	2500	3	30	37	37.5	3750	4998	50	500	5000	6000	75
CAPE MAY	Three Phase	0	0	0	9	6	0	6	3	2	0	0	7	74	0	0	0	277
	Two Phase	0	1	5	14	0	0	38	0	2	0	0	48	0	0	0	0	88
	Single Phase	445	2961	14	7851	0	11	44	1905	1001	0	0	4241	0	0	0	0	1287
CENTREVILLE	Three Phase	0	0	0	4	3	0	0	0	0	0	0	3	89	1	0	0	138
	Two Phase	0	0	0	3	0	0	11	0	0	0	0	86	0	0	0	0	78
	Single Phase	343	1697	3	9227	0	107	10	0	69	0	0	5010	2	0	0	0	285
CHRISTIANA	Three Phase	0	9	0	21	67	0	8	3	1	13	0	31	385	10	3	0	433
	Two Phase	4	7	11	40	0	3	28	0	2	0	0	103	0	0	0	0	273
	Single Phase	721	2605	10	9437	0	50	26	3	1139	0	0	12411	4	0	0	0	3451
DC	Three Phase	0	1	0	2	18	1	8	0	0	1	0	11	325	15	1	0	611
	Two Phase	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0
	Single Phase	9	65	0	1033	0	124	13	0	274	0	0	4434	0	0	0	0	754
GLASSBORO	Three Phase	0	4	0	10	35	0	8	2	3	0	0	14	186	1	0	0	626
	Two Phase	2	2	23	30	0	0	263	0	0	0	0	246	0	0	0	0	167
	Single Phase	1856	13375	38	20625	0	63	203	152	6945	0	0	4472	10	0	0	0	1022
MG	Three Phase	0	0	0	4	90	0	13	0	0	0	0	21	984	0	0	0	838
	Two Phase	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Single Phase	312	281	1	6089	0	492	0	1	142	0	0	18319	1	0	0	0	6838
MILLSBORO	Three Phase	1	0	0	2	2	0	3	0	0	0	0	10	103	0	0	0	230
	Two Phase	0	1	4	7	0	0	7	0	0	0	0	184	0	0	0	0	131
	Single Phase	580	935	6	12778	0	10	10	23	53	0	0	5882	5	0	0	0	480
NORTH EAST	Three Phase	2	5	0	5	17	0	24	0	4	3	0	13	65	2	0	0	172
	Two Phase	0	0	1	0	0	0	1	0	0	0	0	28	0	0	0	0	22
	Single Phase	885	655	33	5585	0	14	27	1	322	0	0	2983	31	0	0	0	868
PG	Three Phase	0	1	0	5	42	2	28	0	0	0	1	16	682	1	0	0	1179
	Two Phase	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Single Phase	388	171	2	4414	0	343	1	0	107	0	0	13052	0	0	0	0	2906
PLEASANTVILLE	Three Phase	0	1	0	5	19	0	3	1	1	3	0	5	166	0	0	0	368
	Two Phase	0	3	6	15	0	0	104	0	2	0	0	124	0	0	0	0	163
	Single Phase	523	4322	11	11839	0	9	92	4061	2468	0	0	5527	1	0	0	0	1738
SALISBURY	Three Phase	0	3	0	2	0	0	2	0	0	0	0	21	256	0	0	0	391
	Two Phase	1	0	8	13	0	0	12	0	0	0	0	126	0	0	0	0	178
	Single Phase	731	1557	12	12923	0	255	19	16	65	0	0	5273	3	0	0	0	327
WINSLOW	Three Phase	0	0	0	4	4	0	8	1	0	0	0	4	87	0	0	0	337
	Two Phase	4	3	25	28	0	0	127	0	0	0	0	93	0	0	0	0	84
	Single Phase	960	5668	58	8680	0	3	230	432	4153	0	0	3054	0	0	0	0	920

# Poles by Type and Service District

## Multi-Dimensional Spatial Trends



## Understanding Regional Trends

Featureclass	Metrics	Metricvalue											
	SUBTYPECD	CAPE MAY	CENTREVILLE	CHRISTIANA	DC	GLASSBORO	MG	MILLSBORO	NORTH EAST	PG	PLEASANTVILLE	SALISBURY	WINSLOW
PHL.Pole	Aluminum Light Pole	1218	606	11807	20	1992	1618	5491	990	2579	3364	2998	2044
	Fiberglass Light Pole	1565	1972	22870	0	7424	347	9655	1096	360	7466	2173	3896
	H-Frame	651	6393	3718	0	1031	583	16039	21	30	219	14336	273
	Multi-pole	14	1255	2360	0	466	0	4020	7	0	93	2233	0
	Non-Wood Light Pole	6930	6479	87743	49	23719	5675	37244	5207	7645	27052	12987	15986
	Non-Wood Power Pole	4431	5595	15931	411	6081	1963	15786	954	5281	10217	3536	1130
	Push Pole	1974	7	633	7	8435	104	0	146	114	5061	0	5750
	Wood Light Pole	36923	13154	86879	51	109058	53367	22549	5272	2411	92779	19709	61975
	Wood Power Pole	335806	288406	505113	369494	961159	525103	260254	277628	511589	576235	333093	443424
Total	389512	323867	737054	370032	1119365	588760	371038	291321	530009	722486	391065	534478	

# Getting More Value Out of “ArcGIS Server”

## BEFORE                      NOW/FUTURE

During the day



8 to 10 Hours  
a Day

In the Night



Day  
Night  
Weekends



## Return on Investment (ROI): Metrics Extension to ArcGIS for Server

- **Implement automated process to define and share analytics**
  - Asset reporting
  - Data diagnostics
  - Business reporting
  
- **Faster response time to end user requests**
  
- **Exceed end user expectations by delivering trends periodically**
  
- **Reduce customizations**
  
- **Transition from a reactive to proactive posture**

## Questions?

### **Subrahmanyam(Subbu) Pendyala**

Sr. Analyst IT

Pepco Holdings, Inc.

[spendyala@pepco.com](mailto:spendyala@pepco.com)

### **Anil Jayavarapu**

Director, Software Solutions

Avineon, Inc.

[ajayavarapu@avineon.com](mailto:ajayavarapu@avineon.com)