The World Market for Substation Automation and Integration Programs in Electric Utilities: 2017-2020

Volume 1: North American Market

Introduction

Findings in this study are based on a survey of 65 electric utilities that provide electricity to a combined total of 23 million end users in the U.S. and Canada. The survey sample consists of a mix of investor owned and public power utilities as well as utility cooperatives. Responding companies are categorized by size in terms of how many end use or downstream electricity users they serve: "small" is <100,000 customers, "medium" is 100,000 to 499,999, and "large" is ≥500,000 customers. According to the American Public Power Association's *2017-2018 Annual Directory & Statistical Report*, publicly owned utilities make up 59.5% of electric utility companies in the U.S. and serve 14.5% of the country, while investor-owned utilities make up 5.5% of U.S. electric companies and deliver electricity to 68.1% of the country. Additionally, electric cooperatives serve 12.9% of American end-users. (See fig. iv)

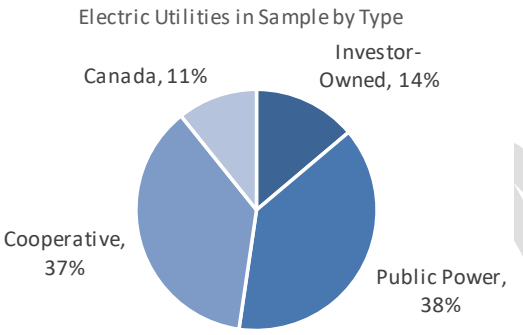


Fig. i

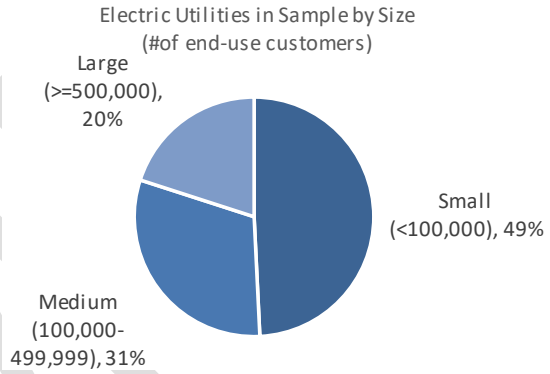


Fig. ii

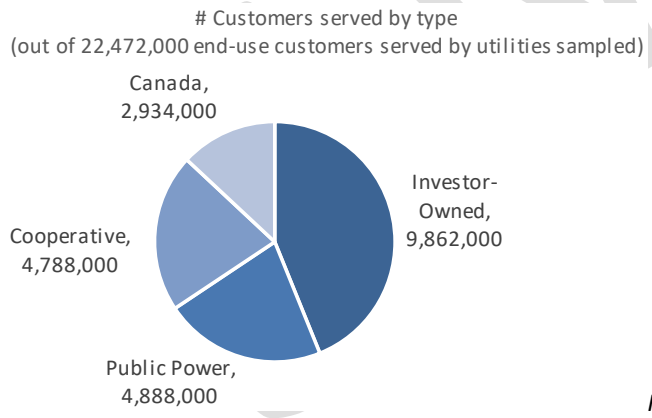


Fig. iii

Table i. Comparison of Newton-Evans sample size by study years

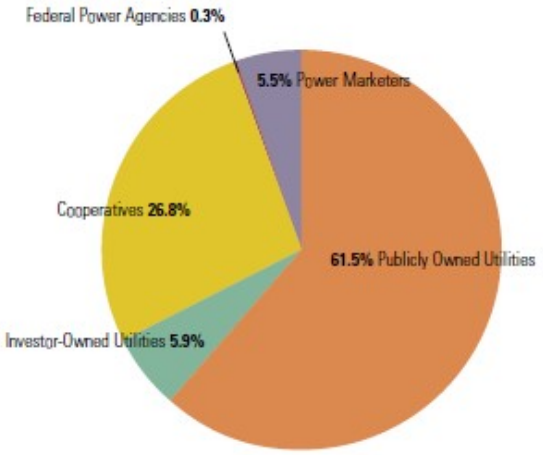
	# of surveys			# of electricity customers represented		
Utility Type	2011	2014	2017	2011	2014	2017
Investor-Owned	13	15	9	18,586,000	20,212,000	9,862,000
Public Power	21	28	25	2,893,675	8,241,000	4,888,000
Cooperative	16	25	24	1,367,461	2,210,000	4,788,000
Canada	8	9	7	4,612,510	1,931,000	2,934,000
Total	58	77	65	27,459,646	32,594,000	22,472,000

Responses to each survey question are cross-tabulated by type and size of utility.

U.S. Electric Utility Industry Statistics

Number of Electricity Providers

		% of Total
Publicly Owned Utilities	2,006	61.5%
Investor-Owned Utilities	193	5.9%
Cooperatives	873	26.8%
Federal Power Agencies	9	0.3%
Power Marketers	181	5.5%
TOTAL	**3,262**	**100.0%**



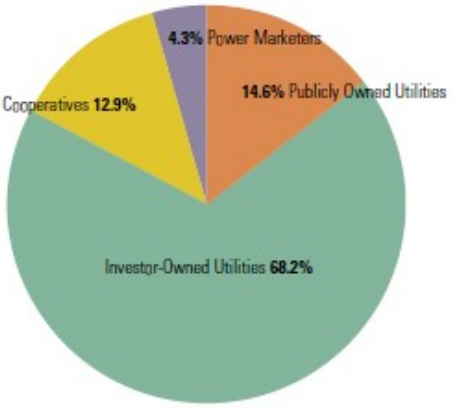
Number of Customers

	Full-Service Customers	Delivery-Only Customers	Total	% of Total
Publicly Owned Utilities	21,079,590	8,142	21,087,732	14.6%
Investor-Owned Utilities	91,433,104	7,177,366	98,610,470	68.2%
Cooperatives	18,585,274	13,310	18,598,584	12.9%
Federal Power Agencies	38,713	2	38,715	0.0%
Power Marketers	6,173,252	0	6,173,252	4.3%
TOTAL	**137,309,933**	**7,198,820**	**144,508,753**	**100.0%**

Delivery-only customers represent the number of customers in a utility's service territory that purchase energy from an alternative supplier.

Nearly all of power marketers' full-service customers are in Texas. Investor-owned utilities in the ERCOT region of Texas no longer report ultimate customers. Their customers are counted as full-service customers of retail electric providers (REPs), which are classified by the Energy Information Administration as power marketers. The REPs bill customers for full service and then pay the IOU for the delivery portion.

Source: Energy Information Administration Form EIA-861, 2011. Does not include U.S. territories.



American Public Power Association • *2013-14 Annual Directory & Statistical Report* www.PublicPower.org

Fig. iv

1. Please rank the difficulty from 1 to 5 for the following listed "potential obstacles" to implementing substation automation and integration for New Substations and Retrofitted Substations to be built through year-end 2020. Use: "1 = doesn't stand in our way" to "5 = formidable obstacle."

_____% of respondents said that when it comes to new substations, "lack of appropriate communications technology inside the fence" is not a concern. _____% of all respondents said it is not an obstacle for retrofitted substations either. However, ____% of respondents indicated "lack of appropriate communications technology from substation to substation" was at least somewhat of an obstacle for retrofitted substations.

_____% of respondents overall ranked "security concerns" as a 4 or 5 (somewhat/formidable obstacle) for new substations and _____% ranked it 4 or 5 for retrofitted substations.

When it comes to New Substations, more public power utilities see three things as obstacles that other types of utilities do not:

-
-
-

Additionally_____% of public power utilities cited "lack of funding" for retrofitting substations as an obstacle for them, which is higher than the overall sample summary (_____%). See Tables 1-1 and 1-3.

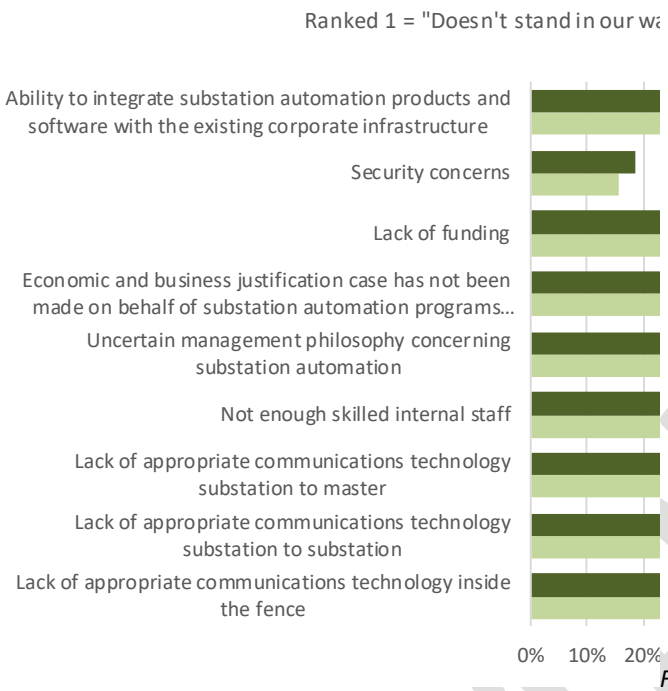

Ranked 1 = "Doesn't stand in our wa
Ability to integrate substation automation products and software with the existing corporate infrastructure
Security concerns
Lack of funding
Economic and business justification case has not been made on behalf of substation automation programs...
Uncertain management philosophy concerning substation automation
Not enough skilled internal staff
Lack of appropriate communications technology substation to master
Lack of appropriate communications technology substation to substation
Lack of appropriate communications technology inside the fence
0%
10%
20%

Fig. 1a

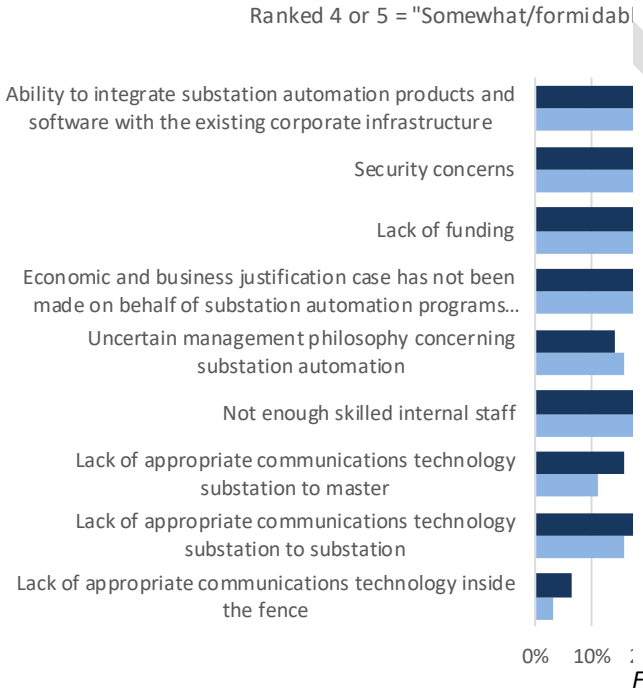

Ranked 4 or 5 = "Somewhat/formidab
Ability to integrate substation automation products and software with the existing corporate infrastructure
Security concerns
Lack of funding
Economic and business justification case has not been made on behalf of substation automation programs...
Uncertain management philosophy concerning substation automation
Not enough skilled internal staff
Lack of appropriate communications technology substation to master
Lack of appropriate communications technology substation to substation
Lack of appropriate communications technology inside the fence
0%
10%

Fig. 1b

2014 Study Findings

[Included in the full report]

2011 Study Findings

[Included in the full report]

2008 Study Findings

[Included in the full report]

[Included in the full report]

2005 Study Findings

[Included in the full report]

2002 Study Findings

[Included in the full report]

2000 Study Findings

[Included in the full report]

Table 1-1 "potential obstacles" to implementing substation automation and integration "1 = doesn't stand in our way" to "5 = formidable obstacle."
NEW SUBSTATIONS

Summary	1	2	3	4	5	Total
Lack of appropriate communications technology inside the fence						64
						100%
Lack of appropriate communications technology substation to substation						64
						100%
Lack of appropriate communications technology substation to master						64
						100%
Not enough skilled internal staff						64
						100%
Uncertain management philosophy concerning S.A.						64
						100%
Economic justification has not been made on behalf of S.A. programs here						64
						100%
Lack of funding						64
						100%
Security concerns						64
						100%
Ability to integrate S.A. products & software with corp. infrastructure						64
						100%
Other						64
						100%

Table 1-1 Cont'd.
RETROFITTED SUBSTATIONS

Summary	1	2	3	4	5	Total
Lack of appropriate communications technology inside the fence						64
						100%
Lack of appropriate communications technology substation to substation						64
						100%
Lack of appropriate communications technology substation to master						64
						100%
Not enough skilled internal staff						64
						100%
Uncertain management philosophy concerning S.A.						64
						100%
Economic justification has not been made on behalf of S.A. programs here						64
						100%
Lack of funding						64
						100%
Security concerns						64
						100%
Ability to integrate S.A. products & software with corp. infrastructure						64
						100%
Other						64
						100%

Table 1-2 "potential obstacles" to implementing substation automation and integration "1 = doesn't stand in our way" to "5 = formidable obstacle."
NEW SUBSTATIONS

Investor-Owned	1	2	3	4	5	Total
Lack of appropriate communications technology inside the fence						
Lack of appropriate communications technology substation to substation						
Lack of appropriate communications technology substation to master						
Not enough skilled internal staff						
Uncertain management philosophy concerning S.A.						
Economic justification has not been made on behalf of S.A. programs here						
Lack of funding						
Security concerns						
Ability to integrate S.A. products & software with corp. infrastructure						
Other						

Table 1-2 Cont'd.
RETROFITTED SUBSTATIONS

Investor-Owned	1	2	3	4	5	Total
Lack of appropriate communications technology inside the fence						
Lack of appropriate communications technology substation to substation						
Lack of appropriate communications technology substation to master						
Not enough skilled internal staff						
Uncertain management philosophy concerning S.A.						
Economic justification has not been made on behalf of S.A. programs here						
Lack of funding						
Security concerns						
Ability to integrate S.A. products & software with corp. infrastructure						
Other						

Newton-Evans thanks the following companies for participating in this survey:

Canada
AltaLink Management Ltd.
City of Medicine Hat
ENMAX Power Corporation
EPCOR Distribution & Transmission Inc.
FortisBC
Hydro-Sherbrooke
London Hydro

U.S. Cooperatives
Cass County Electric Coop
Choptank Electric Cooperative
Citizens Electric Corporation
East Kentucky Power Cooperative
Greystone Power Corp
I-M CEA
Jackson EMC
Jefferson Energy Cooperative
Mecklenburg Electric
Mid-Carolina Electric Coooperative, Inc
Midwest Energy Inc
MTEMC
NOVEC
Ozarks Electric Cooperative
Pickwick Electric Cooperative
Prairie Power, Inc.
Rutherford EMC
Salt River Project
Santee Cooper
Seminole Electric Cooperative
SMECO
SMEPA
Snapping Shoals EMC
South Ky RECC

U.S. Investor Owned Utilities
American Transmission Company
Avista Utilities
Duke Energy Florida
Duke Energy Progress
Empire District - Liberty Utilies Central
FirstEnergy
Indianapolis Power & Light Company
Otter Tail Power Company
PSE&G

U.S. Public Power Utilities
AMP Inc.
Austin Energy
City of Alcoa
City of Ames - Electric Services
City of Independence, Power & Light
City of Riverside Public Utilities
Clark Public Utilities
Cleveland Utilities
Clinton Utilities Board
Cowlitz PUD
Fort Collins Utilities
Hagerstown Light Department
Holyoke Gas & Electric Dept
Huntsville Utilities
Lafayette Utilities System
Lansing BWL
Nashville Electric Service
New York Power Authority
Omaha Public Power District
Rochester Public Utilities
Salem Electric Dept.
Silicon Valley Power / City of Santa Clara
SMUD
Snohomish County PUD
Tacoma Power