

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

Volume 1: North American Market



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SAMPLE

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Survey results this year indicate that encryption of data in substation communication networks mostly takes place between the substation and the external host or network. Twenty-nine percent of all respondents said all data is encrypted for such communications, and 40% said some data is encrypted. Thirty-two percent responded that they do not encrypt data in transit from the substation to the external host or network. ....	66
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### 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)

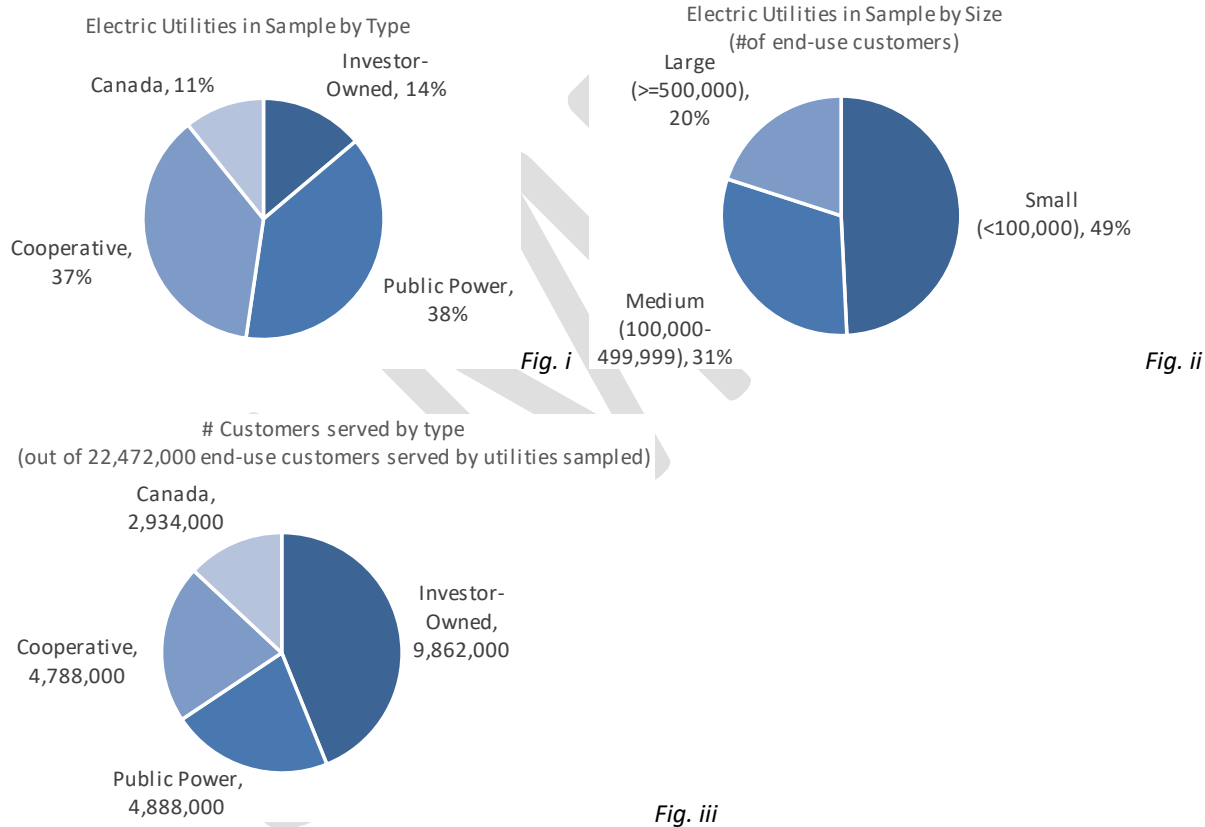


Table i. Comparison of Newton-Evans sample size by study years

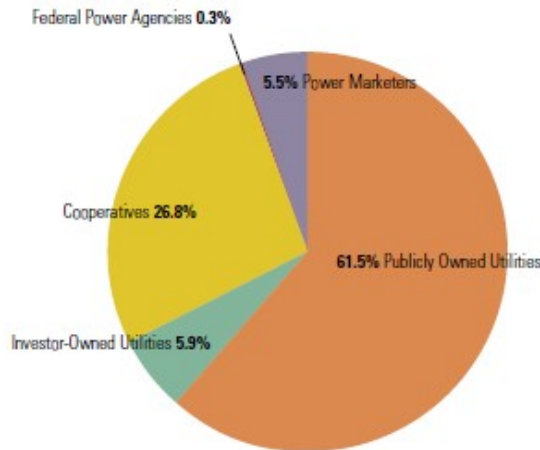
Utility Type	# of surveys			# of electricity customers represented		
	2011	2014	2017	2011	2014	2017
Investor-Owned	13	15	9	18,586,000	20,212,000	9,862,000
Public Power	21	28	25	2,893,675	8,241,000	4,888,000
Cooperative	16	25	24	1,367,461	2,210,000	4,788,000
Canada	8	9	7	4,612,510	1,931,000	2,934,000
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%
<b>TOTAL</b>	<b>3,262</b>	<b>100.0%</b>



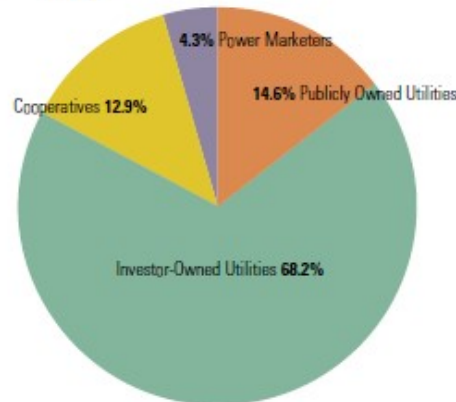
### Number of Customers

	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%
<b>TOTAL</b>	<b>137,309,933</b>	<b>7,198,820</b>	<b>144,508,753</b>	<b>100.0%</b>

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.



**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:

- 
- 
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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.

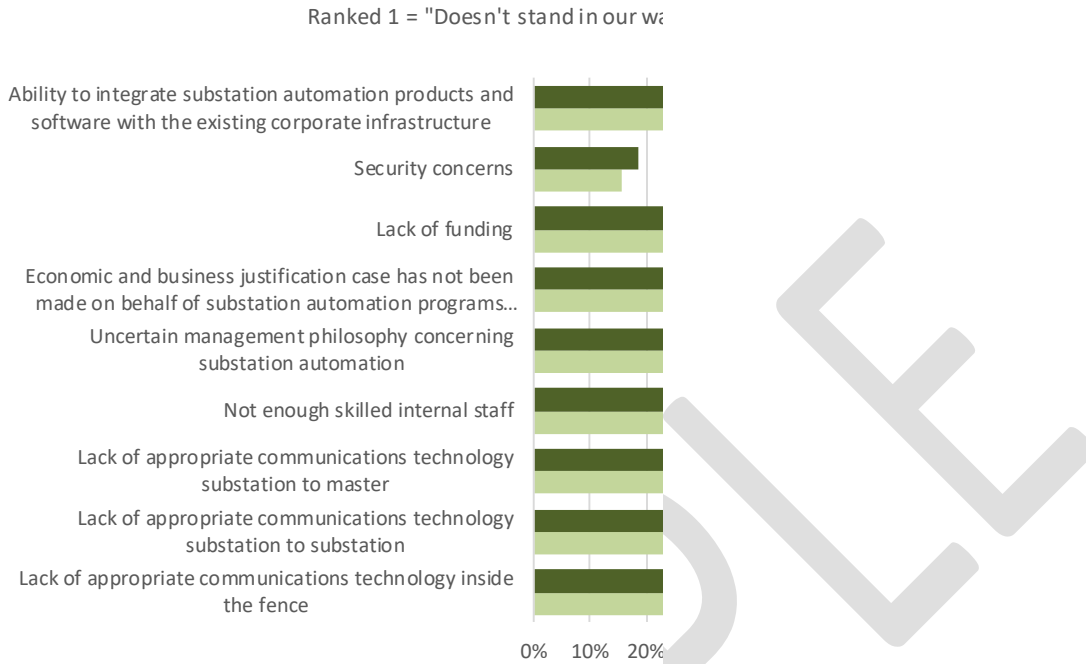


Fig. 1a

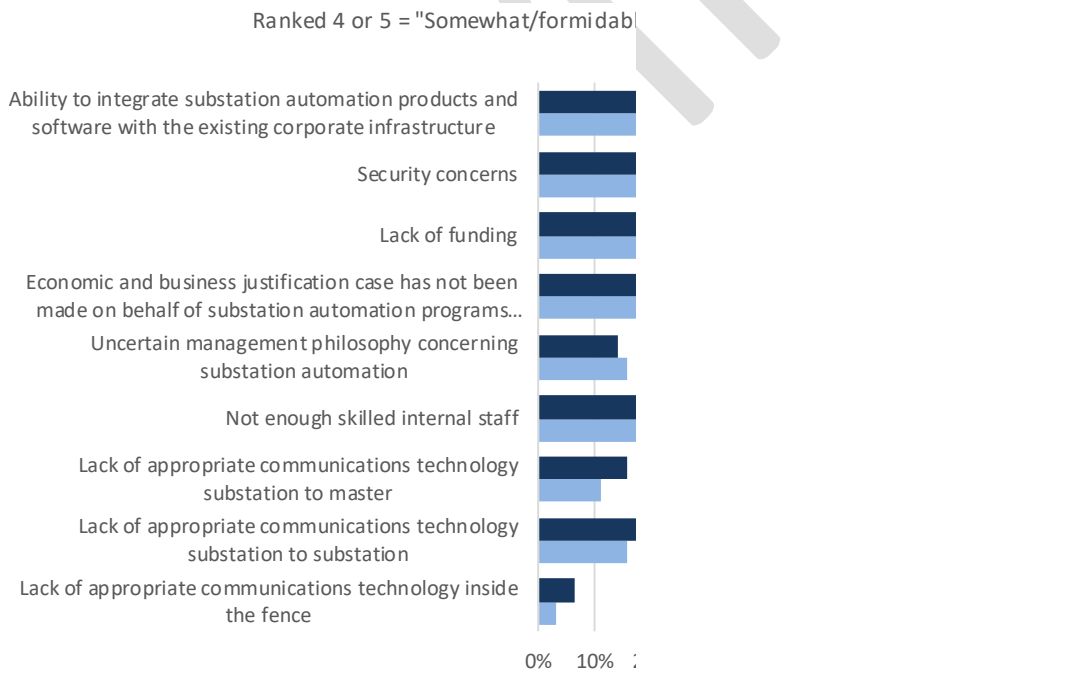


Fig. 1b



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]

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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	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	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	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	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	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>Total</u>
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	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>Total</u>
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 Cooperative, 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 Utilities 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