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January 18, 2016 **BY RESS & OVERNIGHT COURIER**

Ms. Kirsten Walli
Board Secretary
Ontario Energy Board
P.O. Box 2319
2300 Yonge Street, Suite 2700
Toronto, Ontario
M4P 1E4

Dear Ms. Walli:

Re: Enersource Hydro Mississauga Inc. Application for Distribution Rates Effective January 1, 2016, Board File No. EB-2015-0065 Responses to Technical Conference Undertakings

On January 8, 2016, the Ontario Energy Board ("OEB") held a Technical Conference for Enersource Hydro Mississauga Inc.'s ("Enersource") 2016 Price Cap Incentive Rate Application. In the Technical Conference, Enersource agreed to provide responses to undertakings, JT1.1 through JT1.17.

Attached herewith, Enersource provides its complete responses to those undertakings, in the above captioned proceeding.

Please note, Metrolinx has advised us that the Hurontario LRT will now be comprised of a 20 km, 22 stop system along Hurontario Street from the Port Credit GO station in the south and the Brampton Gateway Terminal (at Steeles Ave. in Brampton) to the north. This amended scope reflects the decision taken by the City of Brampton Council of October 27, 2015 which did not approve the LRT segment north of Steeles to the downtown Brampton GO station.

Two hard copies of this letter and undertaking responses will be sent to the Board in addition to filing this via RESS.

If you have any questions, please do not hesitate to contact me at (905) 283-4098.

Sincerely,

(Original signed by)

Gia M. DeJulio
Director, Regulatory Affairs

2185 Derry Road West, Mississauga, Ontario L5N 7A6
tel 905.273.9050 **fax** 905.566.2737 enersource.com

cc. Norm Wolff, Executive Vice-President and Chief Financial Officer, Enersource
Jane Scott, Project Advisor, Ontario Energy Board
Richard Lanni, Counsel, Ontario Energy Board
Fred Cass, Aird & Berlis LLP
All Intervenors, On Record

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UNDERTAKING NO. JT1.1:

TO PROVIDE IN-SERVICE INFORMATION FOR JDE MAJOR VERSION UPGRADES.

Response:

After further review, no significant modules of the JDE upgrades will be complete in 2016. The ICM amount for this item has been removed from the submission.

UNDERTAKING NO. JT1.2:

TO PROVIDE A LIST OF THE PROJECTS THAT ARE IN THE ICM VERSUS THE PROJECTS THAT ARE IN THE TOTAL CAPITAL BUDGET.

Response:

Below is a list of ICM projects excerpted from the attached detailed live spreadsheet.

Business Unit	Description	2016 ICM
C0504 - Substation Upgrade	Mini Orlando MS	$ 4,995,385
C0504 - Substation Upgrade	Webb MS - Land	$ 500,000
C0504 - Substation Upgrade	Mini Britannia - Land	$ 500,000
C0504 - Substation Upgrade	Duke MS - Land	$ 500,000
C0504 - Substation Upgrade		**$ 6,495,385**
SYSTEM SERVICE		**$ 6,495,385**
C0505 - Subdivision Rebuild	Ellengale - Ibbetson Cres/ Shamir	$ 2,000,000
C0505 - Subdivision Rebuild	Rockwood - Fieldgate/ Maple Ridge	$ 1,500,000
C0505 - Subdivision Rebuild	Clarkson - Bromsgrove/ Cramer/Sherhill	$ 1,750,000
C0505 - Subdivision Rebuild		**$ 5,250,000**
C0561 - Overhead Rebuilds	Vermouth/Breckonridge	$ 360,000
C0561 - Overhead Rebuilds	Holburne - Section 1	$ 360,000
C0561 - Overhead Rebuilds	Meadow Wood/Country Club	$ 1,170,000
C0561 - Overhead Rebuilds		**$ 1,890,000**
C0562 - Subtransmission Renewal	Bloor - Cawthra to Tomken	$ 600,000
C0562 - Subtransmission Renewal	Lakeshore - Seneca to Cawthra	$ 690,000
C0562 - Subtransmission Renewal	Park - Hurontario to Kane	$ 960,000
C0562 - Subtransmission Renewal	Queen - Briarwood to Seneca	$ 600,000
C0562 - Subtransmission Renewal	Goreway - Derry to City Limits	$ 1,200,000
C0562 - Subtransmission Renewal	Stavebank MS - Feeder Egress	$ 150,000
C0562 - Subtransmission Renewal		**$ 4,200,000**
C0563 - U/G TX/Replace/Overhaul	Underground Transformer and Equipment Renewal	$ 4,125,000
C0563 - U/G TX/Replace/Overhaul		**$ 4,125,000**
C0564 - O/H TX/Replace/Overhaul	Overhead Transformer and Equipment Renewal	$ 3,000,000
C0564 - O/H TX/Replace/Overhaul		**$ 3,000,000**
SYSTEM RENEWAL		**$ 18,465,000**
C0597 - Grid Supply Point Metering	TCP/IP GSP Conversion & Reseal	$ 163,320
C0597 - Grid Supply Point Metering	Tomken Upgrade	$ 1,100,000
C0597 - Grid Supply Point Metering		**$ 1,263,320**
SYSTEM ACCESS		**$ 1,263,320**
C0581 - Engineering & Asset Systems	InService Upgrade	$ 125,000
C0581 - Engineering & Asset Systems	G/Technology Upgrade	$ 70,000
C0581 - Engineering & Asset Systems	SmartPlant Foundation Upgrade	$ 362,092
C0581 - Engineering & Asset Systems		**$ 557,092**
C0589 - Meter to Cash	Monthly billing	$ 725,000
C0589 - Meter to Cash	BizTalk Upgrade	$ 373,118
C0589 - Meter to Cash		**$ 1,098,118**
GENERAL PLANT		**$ 1,655,210**
NET CAPITAL EXPENDITURES (EXCLUDING HYDRO ONE TS PAYMENTS)		**$ 27,878,915**
Hydro One TS Payments		$ 40,478,700
INCREMENTAL CAPITAL MODULE REQUEST AMOUNT		**$ 68,357,615**

In reference to the attached detailed spreadsheet, the difference between column E, 2016 Budget (previously filed), and column F, 2016 ICM Capital, is the removal of 2016 projects that will not be in service in 2016, offset by projects that started in 2015 and are going into service in 2016.

Three ICM projects are for the purchase of three parcels of land on which to build municipal substations, and are included in the determination of the ICM rate rider. Should, for some reason, the OEB decide that these capital expenses are not to be captured in the ICM calculation, Enersource requests the OEB to permit Enersource to include these purchases in construction in progress ("CIP").

UNDERTAKING NO. JT1.2 (ADDITIONAL):

TO PROVIDE THE SYSTEM RELIABILITY MINUTES TOTAL FOR THOSE PROJECTS .

Response:

Please see column J of the live spreadsheet provided in the response to Undertaking No. JT1.2.

Enersource strongly advises against the use of the system reliability minutes estimates for anything other than comparability among capital projects. These reliability minutes, among other metrics for the same purpose, were assigned by project managers for the objective of distinguishing between the many competing priorities for Enersource's finite resources. These data represent relative indicators, and are estimates based on managers' skills and experience.

UNDERTAKING NO. JT1.2 (ADDITIONAL):

FOR EACH OF THE PROJECTS ON YOUR LIST OF ICM PROJECTS, TO IDENTIFY THE SIGNIFICANT INFLUENCE ON YOUR OPERATIONS OF DOING OR NOT DOING THAT PROJECT.

Response:

C0504 - Substation Upgrade
Two municipal substations, Webb MS and Duke MS, are required to meet the demand growth in Mississauga's Downtown Core. The land purchases for these two substations are included in the 2016 ICM project list. In addition, the ICM project list includes the cost of building Mini-Orlando MS that will meet the demand of a significant commercial/industrial development expected in the near future. Land purchase for Mini Britannia MS is also included. This substation will offload Erindale T1T2 TS that is expected to be overloaded by 40MW by 2023. Meeting system growth and increasing customer demand are regulatory requirements.

C0581 - Engineering & Asset Systems
These ICM projects include critical updates to the IOM, AM/FM and SmartPlant information systems. These upgrades will ensure that the latest fixes and code promotions are included in the releases and rolled into production. Without upgrades, vendor support expires, with Enersource at risk that its information systems will fail, possibly calamitously.

C0589 - Meter to Cash
This expense for monthly billing meets regulatory compliance, and includes hardware costs to increase processing power needed for the significant increase in billing volume.

Generally
Through continuously-improving inspection, testing and maintenance planning and project prioritization process, Enersource has developed a plan that paces spending while still meeting distribution system and general plant service requirements. Due to improvement in the quality of asset data, centralization of asset management practices, and better coordination of these activities, Enersource has a clearer understanding of the condition of its assets, and is able to better forecast planned renewal expenditures, both overhead and underground, for the near future. Through regular inspections and asset condition assessments, Enersource determined that aging assets, such as underground cables, wood poles, and motorized overhead switches have very poorly deteriorating health indexes, and they need to be replaced in order to manage the ongoing risks of reliability, public and employee safety, environmental considerations, etc. The detailed list of risk categories used to prioritize projects is provided in response to Interrogatory Supp-Staff-11.

Much of Enersource's distribution system was installed 20-40 years ago. Delaying capital investments needed now to replace aging assets at the end of their useful lives, would compound the risk that Enersource may not have the resources to address these in the future. Also, due to limitations with respect to available crews to do the work, it would have to be done at a premium. Delaying these necessary investments will result in large rate step-increases rather than the preferred pacing approach for the benefit of ratepayers.

UNDERTAKING NO. JT1.2 (ADDITIONAL):

FOR THOSE CHAPTER 5 CATEGORIES THAT HAVE BEEN IDENTIFIED AS HAVING ICM PROJECTS IN 2016, WHAT WAS IN THE 2013 COST OF SERVICE APPROVED RATES AND WHAT IS IN THE 2016.

Response:

Please see column I of the live spreadsheet provided in the response to Undertaking JT1.2.

UNDERTAKING NO. JT1.3:

TO PROVIDE THE APPLICATION REFERENCE TO THE SUB-TRANSMISSION EXPANSION AND RENEWAL.

Response:

Historically, Enersource has tracked subtransmission renewal and expansion projects under the 'Subtransmission Expansion' business unit. Starting in 2016, Enersource has separated subtransmission renewal and subtransmission expansion into two separate business units, to reflect the growing need to specifically track investments needed to renew the aging subtransmission system.

This change is reflected in the business cases submitted under the Supplementary ICM Evidence dated October 2, 2015, namely 'C0562 – Subtransmission Renewal' and 'C0507 – Subtransmission Expansion'.

UNDERTAKING NO. JT1.4:

TO PROVIDE THE NUMBER OF CONNECTIONS THE 1143 IS BASED ON.

Response:

The number of connections related to the 2016 industrial/commercial forecast from Enersource's 2012 Asset Management Plan ("AMP") of $1,143 is 200.

The industrial/commercial capital budget is required to connect new customers and provide service upgrades for existing customers.

It is important to note that Table 1 is an extract from what School Energy Coalition ("SEC") provided prior to the technical conference which compares Enersource's 2012 Asset Management Plan ("AMP") forecast for 2016, as included in Enersource's 2013 COS, to the 2016 rate application. The data in Table 1 are not comparable as the figures under the 2012 AMP column are net of customer contributions while the 2014 actuals and the 2016 rate application figures are gross figures.

Table 1 has been revised (see Table 2) to reflect all figures net of customer contributions in order to perform an appropriate comparison.

Table 1 – AMP Application Comparison (Original) (All dollar amounts in $000's)

Category	2014 Actual	2016 Forecast		
		2012 Asset Management Plan	2016 Rate Application	Difference
Road Projects	$580	$732	$3,000	$2,268
Light Rail Transit	$0	$0	$400	$400
New Subdivisions	$1,205	$1,354	$800	-$554
Industrial and Commercial Services	$4,774	$1,143	$2,600	$1,457
Residential Service Upgrades	$0	$0	$125	$125
Smart Metering Large Commercial	$414	$0	$1,506	$1,506
Wholesale Metering	$52	$0	$1,263	$1,263
Metering Equipment	$1,411	$859	$1,172	$313
Smart Metering	$0	$0	$0	$0
Smart Metering in New Condos	$719	$887	$1,387	$500
Green Energy - FIT/MicroFIT	$319	$293	$155	-$138
Subtotal - System Access	$9,474	$5,268	$12,408	$7,140

Table 2 – AMP Application Comparison (Revised) (All dollar amounts in $000's)

Category	2014 Actual (Net of Contributions)	2016 Forecast		
		2012 Asset Management Plan	2016 Rate Application (Net of Contributions)	Difference
Road Projects	$205	$732	$2,400	$1,668
Light Rail Transit	$0	$0	$400	$400
New Subdivisions	$722	$1,354	$300	-$1,054
Industrial and Commercial Services	$2,017	$1,143	$1,600	$457
Residential Service Upgrades	$0	$0	$94	$94
Smart Metering Large Commercial	$414	$0	$1,506	$1,506
Wholesale Metering	$52	$0	$1,263	$1,263
Metering Equipment	$1,411	$859	$1,172	$313
Smart Metering	$0	$0	$0	$0
Smart Metering in New Condos	$719	$887	$1,387	$500
Green Energy - FIT/MicroFIT	$87	$293	$155	-$138
Subtotal - System Access	$5,626	$5,268	$10,277	$5,009

UNDERTAKING NO. JT1.5:

TO PROVIDE THE ESTIMATE OF ADDITIONAL REVENUES.

Response:

Total capital expenditures under the category System Access are forecasted to be $12,408 (all dollar amounts in $000's) gross of customer contributions and $10,277 net of customer contributions. Within the System Access category, projects relating to new subdivisions, industrial/commercial services, and smart metering in new condominiums will generate additional customers. The additional distribution revenues generated from new customer connections based on the proposed 2016 rates is expected to be $269 in 2016. Enersource relied on the forecasted customer connections and the expected in-service dates to calculate the additional revenues shown in Table 1 below.

Table 1 – Additional revenues from new customer connections (All dollar amounts in $000's)

SYSTEM ACCESS PROJECTS	BUSINESS UNIT	2016 BUDGET*	Additional Revenues
Road Projects	C0531	$ 2,400	$ -
LRT	C0532	$ 400	$ -
New Subdivisions	C0541	$ 300	$ 27
Industrial/Commercial Services	C0542	$ 1,600	$ 25
Residential Service Upgrades	C0544	$ 94	$ -
Smart Meters - Large Users	C0594	$ 1,506	$ -
Wholesale Meter Upgrades	C0597	$ 1,263	$ -
Metering Equipment	C0598	$ 1,172	$ -
Smart Metering in New Condos	C0899	$ 1,387	$ 217
FIT/MicroFIT Projects	C0900	$ 155	$ -
TOTAL SYSTEM ACCESS		**$ 10,277**	**$ 269**

*Total capital expenditures, net of customer contributions

Although System Access projects will deliver additional revenues related to new customer connections, it is important to note that Enersource has experienced a significant negative impact on distribution revenue as a result of customer reclassifications. Section 2.5.1 of the Distribution System Code requires distributors to review non-residential customers' rate classifications and perform customer reclassifications if warranted. The accumulation of customer reclassifications from 2013 to 2015 has resulted in a reduction of over $1,900 in distribution revenue; see Table 2 below. As a result of this impact on distribution revenue, any additional revenues related to customer growth should not be excluded from the requested ICM revenue requirement.

Table 2: Reduction in Distribution Revenue from Customer Reclassifications (All dollar amounts NOT in $000's)

Reclass year	2013	2014	2015	Total Impact
2013	(223,832)	(447,664)	(447,664)	(1,119,160)
2014	-	(120,483)	(636,151)	(756,634)
2015	-	-	(29,561)	(29,561)
Total Impact	**(223,832)**	**(568,147)**	**(1,113,376)**	**(1,905,355)**

UNDERTAKING NO. JT1.6:

TO PROVIDE THE NAME OF THE VENDOR -- FOR EACH CASE IN WHICH THE VENDOR HAS TOLD YOU THAT IN 2016 THEY WILL CEASE TO SUPPORT THE PRODUCT, THE NAME OF THE VENDOR, THE DATE THAT THEY TOLD YOU THEY WERE GOING TO CEASE TO SUPPORT IT, AND THE AMOUNT THAT IS INCLUDED IN YOUR BUDGET THIS YEAR FOR THAT UPGRADE.

Response:

Below is Enersource's Major IT Application Upgrade RoadMap.

Enersource Major IT Application Upgrade RoadMap

Engineering Systems

Vendor	Application	2016 Budget	Enersource Upgrade Schedule from Roadmap 2016	Current Version	Support
Intergraph	SmartPlant Foundation	$320,000	Q2	2009 R3, SP3	2014
Intergraph	G/Technology	$70,000	Q4	10.2.02	Q3 2016
Intergraph	InService	$125,000	Q2	9.2 MR4	Q1 2017
	Total	**$515,000**			

Note: SmartPlan Foundation is at risk without support, albeit lower risk to Enersource than other critical applications, including CC&B.

JDE / Enterprise Systems

Vendor	Application	2016 Budget	Enersource Upgrade Schedule from Roadmap 2016	Current Version	Support
Oracle	J.D. Edwards	$600,000	Q2	9	Q3 2016
	Total	**$600,000**			

Meter to Cash Systems

Vendor	Application	2016 Budget	Enersource Upgrade Schedule from Roadmap 2016	Current Version	Support
Oracle	CC&B	$950,000	Q1	2.2	Q1 2016
	Total	**$950,000**			

UNDERTAKING NO. JT1.7:

TO PROVIDE DETAILS OF $750,000 AMOUNT FOR A SYSTEM UPGRADE FOR MONTHLY BILLING.

Response:

The amount required for monthly billing is $725 (all dollar amounts in $000's). The details related to this request can be found in the business case provided in the supplementary evidence filed October 2, 2015.

The proposed capital budget amount of $725 is comprised of:

- $550 required for the purchase of additional system infrastructure (hardware and the associated license costs) to increase the system processing power as a result of the increase in billing volume and;
- $175 required for system reconfiguration and regression testing.

UNDERTAKING NO. JT1.8:

TO PROVIDE THE TREND FOR GENERAL PLANT FOR 2015.

Response:

Below are the 2015 General Plant unaudited actual expenditures, as well as the other reporting categories. The table has been revised to reflect all figures as gross, with total contributions included at the bottom of the table to arrive at the net totals. The original schedule showed the 2012 Asset Management Plan figures as net.

Detailed Capital Budget Comparison

Category	2014 Actual	2016 Forecast			2013 COS	2015 Actuals (Unaudited)
		2012 Asset Management Plan	2016 Rate Application	Difference		
Municipal Substation Construction and Upgrades	$5,850	$5,784	$11,600	$5,816	$5,302	$9,193
Subtransmission Expansion	$3,514	$4,901	$2,400	-$2,501	$5,832	$3,739
Automation/SCADA Replacement and Enhancement Program	$1,863	$2,672	$3,200	$528	$1,750	$3,148
Subtotal - System Service	$11,227	$13,357	$17,200	$3,843	$12,884	$16,079
Subdivision Renewal Program	$9,307	$10,789	$13,250	$2,461	$7,847	$13,626
Overhead Distribution Renewal and Sustainment	$5,051	$2,789	$6,090	$3,301	$2,727	$8,095
Subtransmission Renewal	$0	$0	$4,200	$4,200	$0	$1
Transformer Replacement	$12,635	$1,461	$7,125	$5,664	$1,004	$12,071
Underground Distribution Renewal and Sustainment	$3,848	$3,228	$3,750	$522	$2,998	$3,258
Emergency Replacement Program	$416	$0	$320	$320	$0	$325
Subtotal - System Renewal	$31,257	$18,268	$34,735	$16,467	$14,576	$37,376
Road Projects	$580	$1,332	$3,000	$1,668	$1,687	$1,386
Light Rail Transit	$0	$0	$400	$400	$0	$0
New Subdivisions	$1,205	$1,954	$800	-$1,154	$2,247	$6,312
Industrial and Commercial Services	$4,774	$2,743	$2,600	-$143	$2,560	$6,072
Residential Service Upgrades	$0	$0	$125	$125	$0	$491
Smart Metering Large Commercial	$414	$0	$1,506	$1,506	$0	$881
Wholesale Metering	$52	$0	$1,263	$1,263	$0	$210
Metering Equipment	$1,411	$859	$1,172	$313	$695	$1,395
Smart Metering	$0	$0	$0	$0	$0	$0
Smart Metering in New Condos	$719	$887	$1,387	$500	$952	$1,687
Green Energy - FIT/MicroFIT	$319	$506	$155	-$351	$316	$197
Subtotal - System Access	$9,474	$8,281	$12,408	$4,127	$8,458	$18,631
Engineering and Asset Systems	$659	$591	$1,510	$919	$921	$802
Rolling Stock	$926	$2,300	$2,775	$475	$1,975	$2,489
Information Technology	$493	$750	$671	-$79	$886	$1,026
JDE/ERP System	$883	$1,312	$2,185	$873	$1,547	$1,594
Meter to Cash	$686	$984	$2,470	$1,486	$726	$1,435
Grounds and Buildings	$2,417	$3,169	$2,985	-$184	$6,933	$1,910
Acquisition of Administrative Building	$0	$0	$0	$0	$0	$0
Major Tools	$167	$210	$200	-$10	$200	$252
Subtotal - General Plant	$6,231	$9,317	$12,796	$3,479	$13,187	$9,508
Gross Capital Program	$58,189	$49,223	$77,139	$27,916	$49,106	$81,594
CIAC	-$4,138	-$3,015	-$2,131	$884	-$2,933	-$6,358
Net Capital Program	$54,051	$46,208	$75,008	$28,800	$46,173	$75,236

UNDERTAKING NO. JT1.9:

WITH REFERENCE TO CCC 4, TO PROVIDE MATERIALS TO BE PROVIDED TO RATEPAYERS THAT EXPLAINS THE PROJECTED RATE INCREASE.

Response:

Pursuant to direction from the OEB, Enersource has provided its customers with information about the Ontario Electricity Support Program (OESP). See the attached two-page newsletter included in customers' bills (electronic and paper) sent from November to December, 2015.

Here is also a link to the newsletter:
http://www.enersource.com/about-enersource/eNewsLetters/Residential%20Newsletter%20Fall%202015.pdf

Note that the newsletter also advises customers about the time-of-use commodity rate changes effective November 1, 2015, among other information.

Copies of the Ontario Government's brochures on OESP are in Enersource's customer lobby. Meter technicians have copies to distribute when asked by customers about the program.

Enersource also used social media to communicate about the OESP:

Tweet re OESP:

Enersource @enersourcenews 9 Dec 2015Mississauga, Ontario
You may qualify for the Ontario Electricity Support Program. For more information, please visit enersource.com/my-home/Pages/… @OntEnergyBoard
1 retweet0 likes
1

Enersource @enersourcenews 30 Oct 2015Mississauga, Ontario

See our Fall Residential Newsletter Insert (pdf) tinyurl.com/o2c9kv7 or register for our electronic version at tinyurl.com/py7329q

0 retweets0 likes

Enersource @enersourcenews 30 Oct 2015Mississauga, Ontario

Reminder: @OntEnergyBoard Winter electricity prices go into effect on Nov.1st. Details: tinyurl.com/oq8u9dr

0 retweets1 like

Ontario Energy Board @OntEnergyBoard 2 Nov 2015

Our new program helps low-income households lower electricity bills. See if you qualify and apply today at ow.ly/U2wws

With regard to government bill changes as initiated by the Ontario Government and/or OEB:

Enersource uses an internal calendar tool to track key dates and ensure timely notifications to customers. Generally, dates for sharing information are dictated by the OEB to ensure utilities are sending out messages in a co-ordinated manner. For some pieces, such as OESP, Enersource is provided with materials, e.g., bill inserts, to communicate with customers. Enersource also uses its regular newsletter, updates on its website, re-Tweets from the OEB, and Enersource's own Tweets and Facebook messages.

Enersource has and will continue to meet its communication obligations to customers in a timely manner.

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Enersource News

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Fall 2015

Ontario Energy Board

NEW ONTARIO ELECTRICITY SUPPORT PROGRAM

The Ontario Electricity Support Program helps reduce electricity bills for low-income households with a monthly on-bill credit.

The amount of the credit will depend on how many people live in your house and your combined household income. Find out if you are eligible and how to apply.

OntarioElectricitySupport.ca / 1-855-831-8151 (toll-free within Ontario)

Save Money with Conservation Coupons

Save money on everyday items with energy saving coupons that can be used at participating retailers in Mississauga until December 31, 2015. Save on a wide range of energy-efficient products including LED bulbs, power bars with integrated timers and weatherstripping. Coupons are available at participating retailers or you can print your own by visiting **www.enersource.com/coupons**

Preparing for the Cooler Weather

Start preparing for the inevitable winter chill early and make your home more energy-efficient with these helpful tips:

- Position your thermostat where it is not affected by heat and draft sources such as direct sunlight, hot air ducts, appliances, stairwells and outside doors.
- Keep heat from escaping your home by properly insulating and sealing your basement.
- Turn down the temperature! You could save approximately 2% of your annual heating costs by lowering your home's thermostat throughout the entire heating season.
- Apply plastic film to your windows to reduce air leaks.

For more energy-saving tips, please visit our website at **www.enersource.com**

New Electricity Rates in Effect November 1st

The Ontario Energy Board (OEB) has announced changes to province-wide electricity commodity rates. Effective November 1, 2015, Time-of-Use (TOU) customers in Ontario will be charged as indicated in the chart below:

Winter Rates (November 1 - April 30)

	SUN	MON	TUE	WED	THU	FRI	SAT
12 am - 7 am							
7 am - 11 am							
11 am - 5 pm							
5 pm - 7 pm							
7 pm - 12 am							

On-Peak $$$
17.5¢/kWh
up 1.4¢/kWh

Mid-Peak $$
12.8¢/kWh
up 0.6¢/kWh

Off-Peak $
8.3¢/kWh
up 0.3¢/kWh

The price change for customers represents an increase of approximately $4.42 on the "Electricity" line, or about 3.4% on the total bill for a household that consumes 800 kWh per month. Increased costs from Ontario Power Generation's (OPG) nuclear and hydro-electric power plants make up about 40% of this increase. Costs from renewable generation sources are another driver, representing about one-third of the increase.

For more information, please visit **www.ontarioenergyboard.ca**

A Report Card for Enersource – How Mississauga's Local Utility is Working for Customers

Once again, Enersource has received exceptional marks in the Ontario Energy Board (OEB) Scorecard for electricity distributors.

The OEB's Electricity Distributor Scorecard allows customers to gain a better sense of how well their local utility is performing. Measures assessed in the Scorecard include service quality, customer satisfaction, system reliability, conservation and efficiency.

To view the Scorecard, please visit: **www.enersource.com/about-enersource/FinancialDocuments/Scorecard-1.pdf**

Important Notice from the Electrical Safety Authority

Licensed Electrical Contractors are the only businesses in Ontario legally authorized to do electrical work in your home or business.

Electrical work is dangerous and always best left to a Licensed Electrical Contractor with the expertise, equipment and training to do the job safely. Hiring the wrong person can result in property damage, or even loss of life. You may know someone who can do the work cheap, but consider the real cost if something went wrong.

Always ask for an ESA/ECRA licence number to make sure you're choosing the right electrical contractor. If you are using a general contractor or other trade professional who subcontracts the electrical, the work must be completed by a Licensed Electrical Contractor. Ask your general contractor, check the status of the person working in your home or find a Licensed Electrical Contractor by visiting **https://findacontractor.esasafe.com/**

Long Term Distribution System Plan

Electricity is so important to our lifestyles that when power is lost, it becomes a significant inconvenience to those affected. It takes a team of dedicated Enersource staff to carefully plan for the future of electricity in the City. The team must take into account conservation, future modifications and expansions, system maintenance and necessary investments. This process is known as the Long Term Distribution System Plan.

A key element of the plan is to discuss future needs with our customers. Through an interactive website, Enersource will soon offer all customers an opportunity to learn more about this initiative, ask questions and provide feedback. Comments received will help us to deliver the best possible plan for the next five years.

More information about this initiative will be shared with customers before the end of the year.

UNDERTAKING NO. JT1.10:

TO ADVISE HOW MUCH WENT TO CAPITAL AND HOW MUCH WENT TO CAPITAL FROM CONTRACTORS IN 2013, 2014 AND 2015, AND THE PROJECTION FOR 2016.

Response:

Contractor % of Total Capital

	$			%				
Cost Category	**2013**	**2014**	**2015**	**2013**	**2014**	**2015**	**Average**	**2016 Budget**
Contractors	$21,796,929	$25,935,562	$35,844,960	45%	45%	44%	44%	$34,317,186
All other	$26,687,681	$32,253,565	$45,749,275	55%	55%	56%	56%	$42,821,646
GROSS CAPITAL SPEND	**$48,484,610**	**$58,189,127**	**$81,594,235**	**100%**	**100%**	**100%**	**100%**	**$77,138,831**

UNDERTAKING NO. JT1.11:

TO SUPPLY UNAUDITED FIGURES FOR 2015.

Response:

The 2015 figures noted below are unaudited and they may change.

Table 13. Reliability Statistics in 2010-2015 (without MED's)

Metric	2010	2011	2012	2013	2014	2015 Unaudited
Interruptions	2,083	1,027	923	1,087	1,159	1,504
Customers Affected	251,366	380,771	335,736	280,787	195,258	331,919
Customer Minutes	6,673,600	10,277,717	8,242,559	7,182,677	6,365,209	8,912,699
SAIDI (minutes)	35	53.3	41.91	36.01	31.7	43.98
SAIFI	1.32	1.97	1.71	1.41	0.97	1.64
CAIDI (minutes)	26.5	27	24.6	25.6	32.6	26.9

Table 14 - Cause Code Statistics in 2010-2015 (without MED's)

Cause Code	2010	2011	2012	2013	2014	2015
Unknown/Other	100,669	180,650	64,476	112,949	86,335	93,090
Foreign Interference	466,580	882,668	792,130	780,569	1,041,488	903,108
Scheduled	1,939,026	682,740	411,417	990,732	983,108	1,611,845
Loss of Supply (Hydro One)	362,222	1,893,664	236,671	964,794	19,106	1,021,148
Tree Contacts	257,916	893,379	415,925	345,010	324,014	169,516
Lightning	62,454	38,475	57,711	39,552	13,157	22,583
Defective Equipment	3,051,586	5,219,938	4,869,365	3,763,595	3,808,219	4,419,204
Weather	422,209	49,927	1,387,837	162,298	84,281	603,105
Adverse Environment	0	19,492	0	21,060	3,000	36,517
Human Element	10,938	416,784	7,027	2,118	2,501	31,284
Total	**6,673,600**	**10,277,717**	**8,242,559**	**7,182,677**	**6,365,209**	**8,912,699**

Table 15 - Equipment Failure Statistics in 2010-2015 (without MED's)

Cause Codes	2010	2011	2012	2013	2014	2015 Unaudited
Underground Cable	2,120,732	2,881,575	2,727,177	1,720,513	1,610,094	2,866,852
Fuse	39,211	38,392	50,685	27,675	7,392	25,914
Insulator	2,687	42,884	156,102	301,820	170,207	399,569
Switchgears	68,884	421,281	49,230	221,229	544,465	130,527
Overhead	230,471	1,098,335	425,638	521,462	692,494	208,503
Others/ Unknown	62,183	133,394	83,825	110,227	78,817	418,781
Splices	277,098	262,275	807,069	196,638	192,193	65,332
Switches	24,938	86,549	262,899	151,604	291,775	13,753
Elbows/Termination	55,984	62,340	70,562	219,763	39,223	133,806
Transformers	169,398	192,913	236,178	292,664	181,559	156,167
Total	**3,051,586**	**5,219,938**	**4,869,365**	**3,763,595**	**3,808,219**	**4,419,204**

UNDERTAKING NO. JT1.12:

TO PROVIDE 2012 KINECTRICS REPORT.

Response:

Please find attached a copy of Enersource's 2012 Asset Condition Assessment ("ACA") performed by Kinectrics Inc.

ENERSOURCE HYDRO MISSISSAUGA
2012 ASSET CONDITION ASSESSMENT

Kinectrics Report: K-418089-RA-0001-R01

December 20, 2012

Kinectrics Inc.
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ENERSOURCE HYDRO MISSISSAUGA
2012 PRELIMINARY RESULTS

Kinectrics Report: K-418089-RA-0001-R01

December 20, 2012

Prepared by:

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Jaming Hoang (for Andres Alvarez)

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Director – Asset Management

Dated: December 21, 2012

To: Enersource Hydro Mississauga
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Revision History

Revision Number	Date	Comments	Approved

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INTRODUCTION

In recent years, Enersource Hydro Mississauga (Enersource) recognized a need to perform an Asset Condition Assessment (ACA) on its key distribution assets. An assessment would result in a quantifiable evaluation of asset condition, aid in prioritizing and allocating sustainment resources, and facilitate the development of an Asset Management Plan. Such an undertaking is to span over several years. This is to allow Enersource to see the trend in asset condition and to incrementally improve its assessment process and asset management practices.

In early 2011, Enersource selected and engaged Kinectrics Inc (Kinectrics) to perform an ACA on Enersource's key distribution assets for four years running, beginning in 2011. The initial 2011 assessment covered Enersource's asset population based on the available condition data as of the end of 2010 and the results were presented in the report entitled "Enersource Hydro Missisauga 2011 Asset Condition Assessment", dated November 28, 2011 This report presents results for the second year assessment and is based on the available condition data as of the end of 2011.

The category and sub-categories of assets included in this study are as follows:

- Substation Transformers
  - In Service
  - Spares
- Substation Circuit Breakers
- Pole Mounted Transformers
- Pad Mounted Transformers
  - 1 Phase
  - 3 Phase
- Vault Transformers
- Pad Mounted Switchgears
- Overhead Line Switches
  - 44 kV
  - 27.6 kV
  - Inline
  - Motorized
- Underground Cables
  - Main Feeder
  - Distribution
- Poles
  - Wood
  - Concrete

For each asset category, the Health Index formulation, Health Index distribution, condition-based replacement plan, and a data assessment in terms of the data availability indicator (DAI) and data gap analysis are given.

Note that the asset condition assessment methodology remained unchanged from the initial assessment performed in 2011 and is as described in the initial Kinectrics report titled "Enersource Hydro Mississauga 2011 Asset Condition Assessment".

HEALTH INDEX RESULTS

Table 1 shows a summary of the Health Index evaluation results. Figure 1 presents the same information graphically. The population and sample size, or number of assets with sufficient data for Health Indexing, are given. Also shown are the average Health Index value, Health Index Distribution, and average DAI for each group.

It can be seen from the results that Pad Mounted Switchgear category is, on average as an asset group, in the worst condition. The average Health Index for this group is 79%, with 13% of the units in very poor condition.

Other groups of concern are Circuit Breakers, Single Phase Pad Mounted Transformers, and Vault Transformers. Although the average Health Indices for these groups are fairly high, the percentages of assets in poor or very poor condition are 6%, 6%, and 7% respectively.

CONDITION BASED REPLACEMENT PLAN

The condition-based replacement plan for the first year and the asset replacement strategy is shown for each asset group in Table 2. Table 3 shows the 40 year replacement plan. It should be noted that for some asset categories the quantity determined for the current year replacement plan, shown in Table 2, may be significantly larger than the quantities determined for near future subsequent years. This is generally the case when there is a large quantity of assets that are at or very near the end of their maximum useful lives. Because such assets would have a high failure rate, large quantities will be flagged for intervention in the first year. Since the assessment methodology assumes that all units flagged for intervention are replaced, the quantities determined for near future subsequent years may be significantly smaller than that of the first year.

It is important to note that the replacement plan suggested in this study is based solely on asset condition. It uses a probabilistic, non-deterministic, approach and as such can only show expected failures or probable number of units that are expected to be candidates for replacement. While the Condition-Based Replacement Plan can be used as a guide or input to Enersource's Asset Management Plan, it is not expected that it be followed directly or as the final deciding factor in making sustainment capital decisions. There are numerous other factors and considerations that will influence Enersource's Asset Management decisions, such as obsolescence, system expansion, regulatory requirements, municipal demands, etc.

Using the proactive replacement methodology, a large percentage of Circuit Breakers population was determined to be eligible for replacement over the next five years. This is because a large percentage of breakers are over 30 years old and/or is known to be prone to failures.

Based on the asset category's failure rates and general overall health, approximately 6% of the Vault Transformers population and approximately 6% of the Single Phase Pad Mounted Transformers population are expected to be replaced in the first year.

A summary of the results is shown in the tables and figures below.

Table 1 Health Index Results Summary

Asset Category		Population	Sample Size	Average Health Index	Health Index Distribution					Average Age	Average DAI
					Very Poor (< 25%)	Poor (25 - <50%)	Fair (50 - <70%)	Good (70 - <85%)	Very Good (>= 85%)		
Substation Transformers	In Service	104	104	84%	0%	< 1%	11%	37%	52%	22	74%
	Spares	12	12	92%	0%	0%	0%	17%	83%	28	31%
Circuit Breakers		497	474	91%	6%	< 1%	1%	4%	88%	24	46%
Pole Mounted Transformers		5384	5384	93%	3%	2%	1%	5%	89%	21	100%
Pad Mounted Transformers	1 Phase	14196	14196	90%	4%	2%	2%	3%	89%	20	100%
	3 Phase	1755	1755	91%	3%	2%	2%	1%	92%	16	100%
Vault Transformers		3891	3891	87%	4%	3%	7%	13%	73%	26	35%
Pad Mounted Switchgear		781	781	79%	7%	6%	9%	20%	57%	20	34%
Overhead Switches	44 kV	346	346	90%	0%	< 1%	4%	25%	71%	18	90%
	27.6 kV	224	224	94%	0%	< 1%	2%	17%	81%	16	71%
	Inline	1884	1880	96%	< 1%	< 1%	2%	6%	91%	18	79%
	Motorized	88	88	89%	0%	0%	6%	25%	69%	15	62%
Underground Cables *Note that results are given in terms of conductor-km	Main Feeder	2242	2242	97%	< 1%	< 1%	< 1%	1%	97%	16	100%
	Distribution	4004	4004	90%	< 1%	< 1%	2%	3%	94%	19	100%
Poles	Wood	12766	12766	94%	0%	< 1%	4%	11%	85%	24	100%
	Concrete	7854	7854	99%	0%	0%	< 1%	< 1%	100%	18	100%

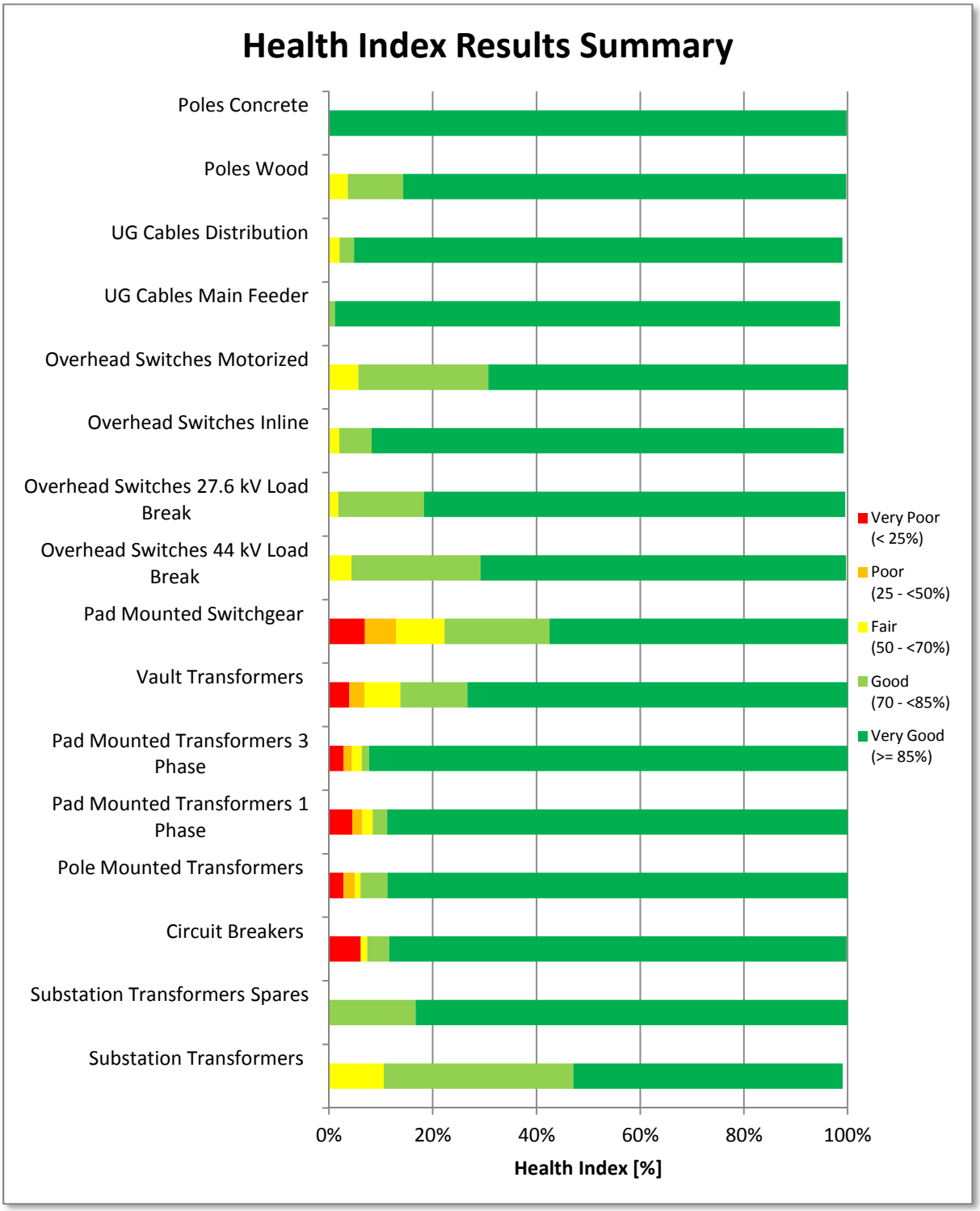

Figure 1 Health Index Results Summary (Graphical)

Table 2 Condition-Based Replacement Plan for Year 1

Asset Category		Condition-Based Replacement Plan for Year 1 [Number of Units]	Replacement Strategy
Substation Transformers	In Service	4	proactive
	Spares	N/A	N/A
Circuit Breakers		34	proactive
Pole Mounted Transformers		99	reactive
Pad Mounted Transformers	1 Phase	830	reactive
	3 Phase	68	reactive
Vault Transformers		240	reactive
Pad Mounted Switchgear		30	reactive
Overhead Switches	44 kV	4	reactive
	27.6 kV	1	reactive
	Inline	10	reactive
	Motorized	0	reactive
Underground Cables *Note that results are given in terms of conductor-km	Main Feeder	9	reactive
	Distribution	30	reactive
Poles	Wood	67	proactive
	Concrete	4	proactive

Table 3 Forty-Year Condition-Based Replacement Plan

Replacement Year	Asset Category															
	Substation Transformers		Circuit Breakers	Pole Mounted Transformers	Pad Mounted Transformers		Vault Transformers	Pad Mounted Switchgear	Overhead Switches				Underground Cables *Note that results are given in terms of conductor-km		Poles	
	In Service	Spares			1 Phase	3 Phase			44 kV	27.6 kV	Inline	Motorized	Main Feeder	Distribution	Wood	Concrete
1	4	N/A	34	99	830	68	240	30	4	1	10	0	9	30	67	4
2	0	N/A	0	101	416	44	173	24	4	1	9	0	10	33	74	5
3	1	N/A	1	101	424	48	181	21	6	1	11	0	11	36	83	5
4	0	N/A	0	100	436	54	193	20	8	1	11	0	12	39	93	9
5	1	N/A	0	99	495	59	203	20	11	1	15	0	13	43	95	10
6	0	N/A	0	98	609	80	208	23	13	2	19	2	14	45	111	11
7	2	N/A	11	99	680	90	208	23	12	3	19	3	15	48	118	15
8	1	N/A	3	102	735	95	202	24	16	5	20	2	16	51	125	17
9	1	N/A	1	105	758	98	190	25	17	6	23	4	17	53	134	21
10	2	N/A	9	109	725	91	176	23	19	7	24	3	19	56	145	27
11	5	N/A	10	112	624	76	158	25	21	7	27	5	20	59	154	30
12	2	N/A	3	113	499	51	139	24	21	7	28	4	22	62	163	32
13	1	N/A	0	113	417	33	128	26	19	7	26	4	24	66	172	37
14	5	N/A	11	111	405	25	123	24	18	8	24	5	26	69	181	41
15	1	N/A	17	108	430	22	124	26	14	6	24	3	28	73	191	48
16	4	N/A	1	102	447	25	129	26	12	3	26	2	30	77	200	55
17	1	N/A	21	96	459	25	132	24	8	4	27	3	33	82	209	59
18	2	N/A	2	90	445	27	130	24	6	3	27	3	36	86	212	62
19	1	N/A	10	86	413	29	125	23	4	3	27	3	39	90	219	70
20	1	N/A	13	83	356	31	115	22	2	2	26	2	42	95	229	72

Replacement Year	Asset Category															
	Substation Transformers		Circuit Breakers	Pole Mounted Transformers	Pad Mounted Transformers		Vault Transformers	Pad Mounted Switchgear	Overhead Switches				Underground Cables *Note that results are given in terms of conductor-km		Poles	
	In Service	Spares			1 Phase	3 Phase			44 kV	27.6 kV	Inline	Motorized	Main Feeder	Distribution	Wood	Concrete
21	0	N/A	1	83	305	31	103	21	1	3	31	3	45	99	233	73
22	0	N/A	15	85	256	29	87	20	1	1	31	2	49	103	241	77
23	1	N/A	0	88	211	28	65	21	1	3	29	1	53	107	245	83
24	0	N/A	22	93	183	28	49	21	0	3	31	3	57	111	248	90
25	3	N/A	11	98	168	30	37	19	1	2	35	4	61	114	254	95
26	2	N/A	11	103	169	30	30	18	1	3	33	4	65	116	254	96
27	2	N/A	34	108	174	31	25	16	1	4	35	3	69	118	256	92
28	3	N/A	12	111	175	33	21	15	1	4	37	4	72	119	255	91
29	0	N/A	12	114	176	35	15	17	1	3	41	1	75	119	252	98
30	0	N/A	27	116	175	36	16	17	2	4	42	4	77	118	259	95
31	1	N/A	14	117	173	36	15	18	1	3	46	1	79	118	258	93
32	0	N/A	10	119	179	37	17	17	1	2	50	2	81	118	252	97
33	4	N/A	18	120	181	34	19	18	2	3	54	1	83	118	256	99
34	3	N/A	21	120	195	34	29	20	2	4	52	1	86	119	255	101
35	2	N/A	25	120	209	35	35	20	4	5	54	1	87	120	255	102
36	3	N/A	1	119	235	38	43	19	4	3	56	0	88	120	252	108
37	1	N/A	17	117	270	41	55	20	4	3	59	1	88	119	253	111
38	0	N/A	7	115	295	41	71	20	4	7	55	1	85	116	251	118
39	1	N/A	3	113	345	49	87	20	5	6	59	0	80	112	251	129
40	3	N/A	17	111	391	52	107	20	5	6	57	0	74	105	247	137

DATA ASSESSMENT

Data assessment includes determining the data availability indicator (DAI) of each unit, as well as identifying the data gaps for each asset group. Data availability is a measure of the amount of data that an individual unit has in comparison with the set of data currently available in for its respective asset category. Data gaps are items that are indicators of asset degradation, but are currently not collected or available for any asset in an asset category. The more minimal the data gaps, the higher the quality of available condition data and Health Index formulas.

Most of the required condition data for Substation Transformers was available. At 74%, the average of DAI of this group is slightly better than in the previous year. There has been an improvement in the collection of Doble test and inspection data. More than 50% of the population has such data, whereas only 40% of Doble and inspections were available last year. The data gaps remain the same as the past year (refer to the report "Enersource Hydro Mississauga 2011 Asset Condition Assessment") and includes infrared thermography and grounding condition.

Data for Circuit Breakers included age, contact resistance, and inspection results. The average DAI for this asset group improved from 40% last year to 46% this year. Age is available for all units, contact resistance measurement availability remains at approximately 50%, and inspection record availability improved from 11% to approximately 30%. No new data types have been collected so the data gaps remain the same as those given in 2011 ACA report.

Because the assessment is age-based and the age of all Pole Mounted Transformers is known, the average DAI for this asset category is 100%. Since the 2011 assessment, infra red inspection data was collected and incorporated in the 2012 Health Index formulation. The data gaps noted in the 2011 report, however, remain to be addressed.

The assessment of Pad Mounted Transformers is age-based and because the age of all units is known, the average DAI for this asset category is 100%. In the spring of 2012, Enersource launched a visual inspection program for this asset group. As such, the data gaps noted in the 2011 report are well on the way to being addressed.

The average data availability indicator for Vault Transformers improved from 23% last year to 35% this year. Age is available for the entire population and inspections were available for 24% of the population. Since the 2011 assessment, the PCB content of vault transformers was collected and included in the Health Index assessment. The data gaps noted in the 2011 report, however, remain to be addressed.

In addition to condition data, replacement records are being collected for pole, pad, and vault transformers. These records will be used in developing Enersource-specific failure curves.

The average DAI for the Pad Mounted Switchgear group is 34%, a 7% improvement over last year's 27%. Age was available for all units. Inspection data, gathered from linemen inspections and dry ice cleaning, was available for approximately 24% of the population. There are no data gaps for this asset group because all condition data required by the Health Index formula are being collected through linemen inspections and dry ice cleaning. It should be noted, however,

that only 24% of the population has inspection data. Such data should be collected for the remainder of the population.

Age and inspections were available for Overhead Line Switches. For 44 kV switches, the average DAI is 90%. Age was known for all units; inspection records were available for approximately 80% of the population. For 27.6 kV switches, the average DAI is 71%. Age was known for all units; inspection records were available for approximately 42% of the population. The average DAI for the In Line switch sub-category is 79%. Age was known for nearly all units; approximately 86% of the population was found to have a solid blade switch inspection record. Note that the solid blade switch inspection records were not available last year. The average DAI for the Motorized switch sub-category is 62%. Age was known for all units; inspection records were available for approximately 24% of the population.

Although the solid blade inspections have now been incorporated and inspection data is available for more switches, no other new types of condition data have been collected and the data gaps noted in the 2011 report remain to be addressed.

Age data was available for Underground Cables and because age was known for all segments, the average DAI for both Main Feeder and Distribution Cables sub-categories is 100%. Since the 2011 assessment, failure data was collected and incorporated as a de-rating factor in the 2012 Health Index formulation. The data gaps noted in the 2011 report, however, remain to be addressed.

Only age is available for Wood and Concrete Poles. Because the assessment is age based and the age of all poles is known, the DAIs of both sub-categories is 100%. Since last year's assessment, no new data types have been collected for this asset category and the data gaps noted in the 2011 report remain to be addressed.

CONCLUSIONS AND RECOMMENDATIONS

1. An Asset Condition Assessment was conducted for nine of Enersource's key distribution assets. In this second year's assessment Pad Mounted Switchgears were divided into two sub-categories: 1) 27.6 kV units, 2) 4.16 kV with 13.8 kV units. As well, a new sub-category, Motorized Switches, was added to the Overhead Line Switches category. For each asset class, the Health Index distribution was determined and a condition-based replacement plan was developed.

2. The Pad Mounted Switchgear category is, on average as an asset group, in the worst condition. The average Health Index for this group is 79%, with 13% of the units in very poor condition.

3. Other groups of concern are Circuit Breakers, Single Phase Pad Mounted Transformers, and Vault Transformers. Although the average Health Indices for these groups are fairly high, the percentages of assets in poor or very poor condition are 6%, 6%, 7% and 6% respectively.

4. A large percentage of Circuit Breakers population was determined to be eligible for replacement in the next five years.

5. Approximately 6% of the Vault Transformers population and approximately 6% of the Single Phase Pad Mounted Transformers population is expected to be replaced in the first year.

6. At 74%, the average DAI for Substation Transformers improved slightly over last year. Doble test and inspection data were available for more units.

7. The average DAI for Circuit Breakers improved from 40% last year to 46% this year because the number of units with inspection records increased. However, because no new data types have been collected, the data gaps remain the same as those given in the 2011 ACA report.

8. Since the 2011 assessment, infra red inspection data was collected and incorporated in the Pole Mounted Transformer 2012 Health Index formulation. The other data gaps noted in the 2011 report, however, remain to be addressed.

9. In the spring of 2012, Enersource launched a visual inspection program for Pad Mounted Transformers. Although the inspection data were not yet used in the 2012 assessment, the data gaps noted in the 2011 report are on the way to being addressed.

10. The average data availability indicator for Vault Transformers improved from 23% last year to 35% this year. This year the PCB content of vault transformers was collected and included in the Health Index assessment. The data gaps noted in the 2011 report, however, remain to be addressed.

11. In addition to condition data, replacement records are being collected for distribution transformers. These records will be used in developing Enersource-specific failure curves.

12. Age, inspections and dry ice cleaning records are available for Pad-Mounted Switchgear. The average DAI of all units improved from 27% last year to 34% this year. Although all condition parameter data used in the Health Index formula are already being collected, such data are only available for approximately 24% of the population.

13. The average DAIs for 44 kV, 27.6 kV, In Line, and Motorized switches are 90%, 71%, 79%, and 62% respectively. Although the solid blade inspections have now been incorporated for the In Line switch sub-category and inspection data are available for more switches, no other new types of condition data have been collected and the data gaps noted in the 2011 report remain to be addressed.

14. Age data were available for Underground Cables and because age was known for all segments, the average DAI for both Main Feeder and Distribution Cables sub-categories is 100%. Since the 2011 assessment, failure data were collected and incorporated as a de-rating factor in the 2012 Health Index formulation. The data gaps noted in the 2011 report, however, remain to be addressed.

15. Only age is available for Wood and Concrete Poles. Because the assessment is age based and the age of all poles is known, the DAIs of both sub-categories is 100%. Since last year's assessment, no new data types have been collected for this asset category and the data gaps noted in the 2011 report remain to be addressed.

16. It is recommended that the data availability indicator (DAI) for each asset class be maintained at 100% or improved with the goal of achieving 100%. This is done by ensuring all information currently being collected for an asset category be collected for all the units. For example, Doble test data are only available for 50% of substation transformers. Ensuring that all substation transformers have Doble data will improve the overall DAI of that asset category.

17. For each asset category it is recommended that the data gaps be addressed in order of the priority given in the "Enersource Hydro Mississauga 2011 Asset Condition Assessment" report.

18. It is recommended that Metal-Clad Switchgear be included as an asset category and that the Circuit Breaker assessment be incorporated into such assessment.

19. Because only limited failure statistics was available at this time, an exponentially increasing failure rate and corresponding probability of failure model were assumed in this study. It is recommended that Enersource continue to collect failure statistics so that Enersource-specific failure models can be developed and used in future assessments. Note that this is already being done for distribution transformers and underground cables. Similar collection of failure data should be extended to all asset classes.

20. It is important to note that the replacement plan presented in this study is based solely on asset condition and that there are numerous other considerations that may influence Enersource's Asset Management Plan, such as obsolescence, system growth, regulatory requirements, municipal initiatives, etc.

APPENDIX A: RESULTS FOR EACH ASSET CATEGORY

1. SUBSTATION TRANSFORMERS

1.1. Health Index Formula

Assume a parameter scoring system of 0 though 4, where 0 and 4 represent the "worst" and "best" scores respectively. Thus, the maximum score for any condition or sub-condition parameter (maximum CPS and CPF) is "4".

1.1.1. Condition and Sub-Condition Parameters

Table 1-1 Condition Parameter and Weights

m	Condition Parameter	WCP_m	Sub-Condition Parameters
1	Insulation	6	Table 1-2
2	Cooling	1	Table 1-3
3	Sealing & Connection	3	Table 1-4
4	Service Record	3	Table 1-5

Table 1-2 Insulation Sub-Condition Parameters and Weights (m=1)

n	Sub-Condition Parameter	$WCPF_n$	Condition Criteria Table
1	Oil Quality	8	Table 1-6
2	Oil DGA	10	Table 1-7
3	Winding Doble	10	Table 1-8
4	Bushing (worst case condition of primary and secondary bushing)	5	Table 1-9

Table 1-3 Cooling Sub-Condition Parameters and Weights (m=2)

n	Sub-Condition Parameter	$WCPF_n$	Condition Criteria Table
1	Winding Temp Gauge	1	Table 1-9
2	Oil Temp Gauge	1	Table 1-9
3	Mech Box – Fan Supply	1	Table 1-9

Table 1-4 Sealing & Connection Sub-Condition Parameters and Weights (m=3)

n	Sub-Condition Parameter	$WCPF_n$	Condition Criteria Table
1	Corrosion / Paint Condition	1	Table 1-9
2	Tank Oil Level	2	Table 1-9
3	Gasket (worst case condition of conservator cover, rad)	3	Table 1-9

Table 1-5 Service Record Sub-Condition Parameters and Weights (m=4)

n	Sub-Condition Parameter	$WCPF_n$	Condition Criteria Table
1	Loading	5	Table 1-10
2	Age	3	Figure 1-1

1.1.2. Condition Criteria

Oil Quality

The "Oil Quality" parameter is a composite of the following oil properties: moisture, dielectric strength, interfacial tension, color, and acidity.

Table 1-6 Oil Quality Test Criteria

Score	Description
4	Overall Factor is less than 1.2
3	Overall Factor between 1.2 and 1.5
2	Overall Factor is between 1.5 and 2.0
1	Overall Factor is between 2.0 and 3.0
0	Overall Factor is greater than 3.0

Where the Overall factor is the weighted average of the following gas scores:

		Scores				
		1	2	3	4	**Weight**
Moisture PPM (T °C Corrected) (From DGA test)		<=20	<=30	<=40	>40	4
Dielectric Str. [kV] D877		>40	>30	>20	Less than 20	3
Interfacial Tension (IFT)* [dynes/cm]	230 kV ≤ V	>32	25-32	20-25	Less than 20	2 *
	69 kV <V< 230	>30	23-30	18-23	Less than 18	
	V ≤ 69 kV	>25	20-25	15-20	Less than 15	
Color		Less than 1.5	1.5-2	2-2.5	> 2.5	2
Acid Number*	230 kV ≤ V	Less than 0.03	0.03-0.07	0.07-0.1	>0.1	1 *
	69 kV <V< 230	Less than 0.04	0.04-0.1	0.1-0.15	>0.15	
	V ≤ 69 kV	Less than 0.05	0.05-0.1	0.1-0.2	>0.2	

* Select the row applicable to the equipment rating

$$\text{Overall Factor} = \frac{\sum Score_i \times Weight_i}{\sum Weight}$$

$$\text{For example if all data is available, Overall Factor} = \frac{\sum Score_i \times Weight_i}{12}$$

Oil DGA

Table 1-7 Transformer DGA Criteria

Score	Description
4	DGA overall factor is less than 1.2
3	DGA overall factor between 1.2 and 1.5
2	DGA overall factor is between 1.5 and 2.0
1	DGA overall factor is between 2.0 and 3.0
0	DGA overall factor is greater than 3.0

In the case of a score other than 4, check the variation rate of DGA parameters. If the maximum variation rate (among all the parameters) is greater than 30% for the latest 3 samplings or 20% for the latest 5 samplings, overall Health Index is multiplied by 0.9 for score 3, 0.85 for score 2, 0.75 for score 1 and 0.5 for score 0.

Where the DGA overall factor is the weighted average of the following gas scores:

Dissolved Gas	Scores						
	1	2	3	4	5	6	Weight
H2	<=100	<=200	<=300	<=500	<=700	>700	**2**
CH4(Methane)	<=120	<=150	<=200	<=400	<=600	>600	**3**
C2H6(Ethane)	<=65	<=100	<=150	<=250	<=500	>500	**3**
C2H4(Ethylene)	<=50	<=80	<=150	<=250	<=500	>500	**3**
C2H2(Acetylene)	<=3	<=7	<=35	<=50	<=80	>80	**5**
CO	<=350	<=700	<=900	<=1100	<=1300	>1300	**1**
CO2	<=2500	<=3000	<=4000	<=4500	<=5000	>5000	**1**

$$\text{Overall Factor} = \frac{\sum Score_i \times Weight_i}{\sum Weight}$$

Winding Doble Test

Table 1-8 Winding Doble Test Criteria

Score	Description
4	power factor reading $\leq$ 0.3%
3	0.3% < power factor reading $\leq$ 0.5%
2	0.5% < power factor reading $\leq$ 0.7%
1	0.7% < power factor reading $\leq$ 1.0%
0	power factor reading > 1.0%

Age

Assume that the failure rate Substation Transformers exponentially increases with age and that the failure rate equation is as follows:

$$f = e^{\beta(t-\alpha)}$$

f	= failure rate of an asset (percent of failure per unit time)
t	= time
α, β	= constant parameters that control the rise of the curve

The corresponding survivor function is therefore:

$$S_f = 1 - \ P_f = e^{-(f-e^{-\alpha\beta})/\beta}$$

S_f	= survivor function
P_f	= cumulative probability of failure

Assuming that at the ages of 40 and 60 years the probability of failures (P_f) for Substation Transformers are 20% and 99% respectively results in the survival curve shown below. It follows that the Score for Age is the survival curve normalized to the maximum Score of 4 (i.e. 4*Survival Curve). The Score vs. Age is also shown in the figure below.

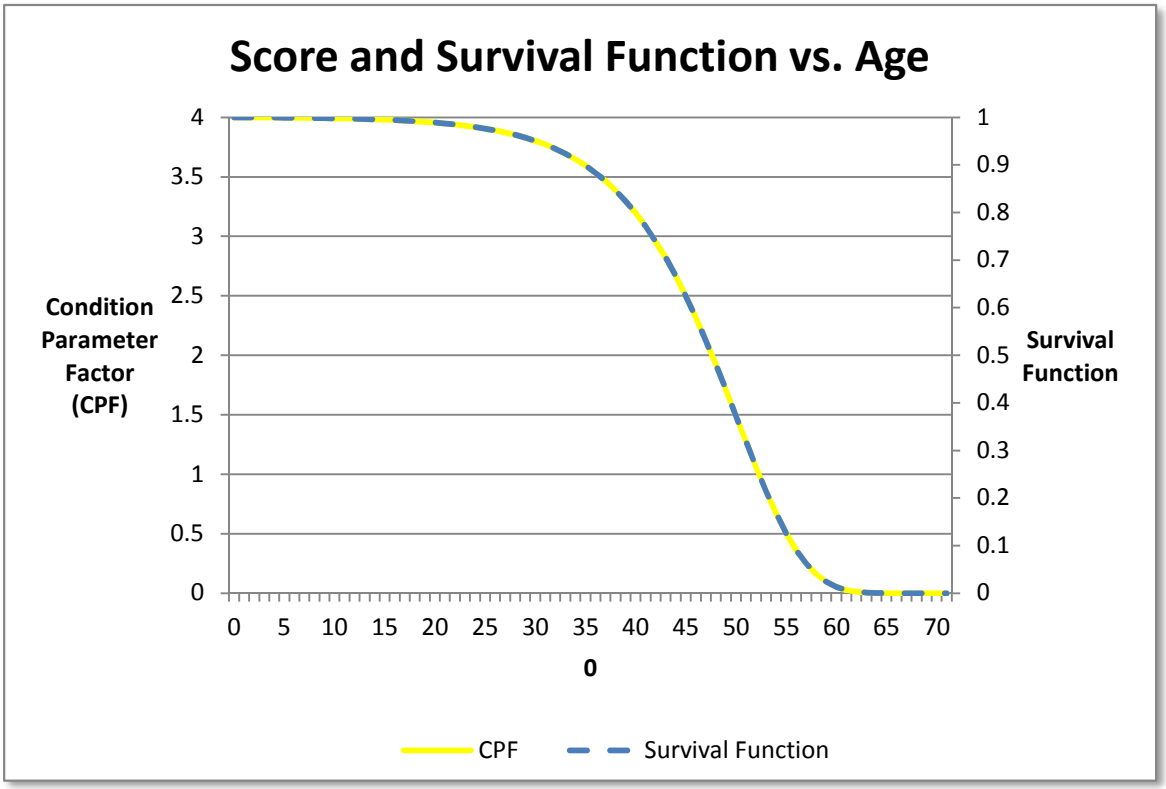

Figure 1-1 Substation Transformers Age Criteria

Visual Inspections

Table 1-9 Visual Inspection Criteria

Score	Condition Description
4	OK
0	Not OK

Loading History

Table 1-10 Loading History

Data: S1, S2, S3, …, SN recorded data (average daily loading)
SB= rated MVA NA=Number of Si/SB which is lower than 0.6 NB= Number of Si/SB which is between 0.6 and 0.8 NC= Number of Si/SB which is between 0.8 and 1.0 ND= Number of Si/SB which is between 1 and 1.2 NE= Number of Si/SB which is greater than 1.2 Score = $\frac{NA \times 4 + NB \times 3 + NC \times 2 + ND \times 1}{N}$
Note: If there are 2 numbers in NA to NE greater than 1.5, then Score should be multiplied by 0.6 to show the effect of overheating.

1.2. Age Distribution

The average age of all in service units is 22. The age distribution for in service Substation Transformers is as follows: Approximately 17% of all units are 40 or older.

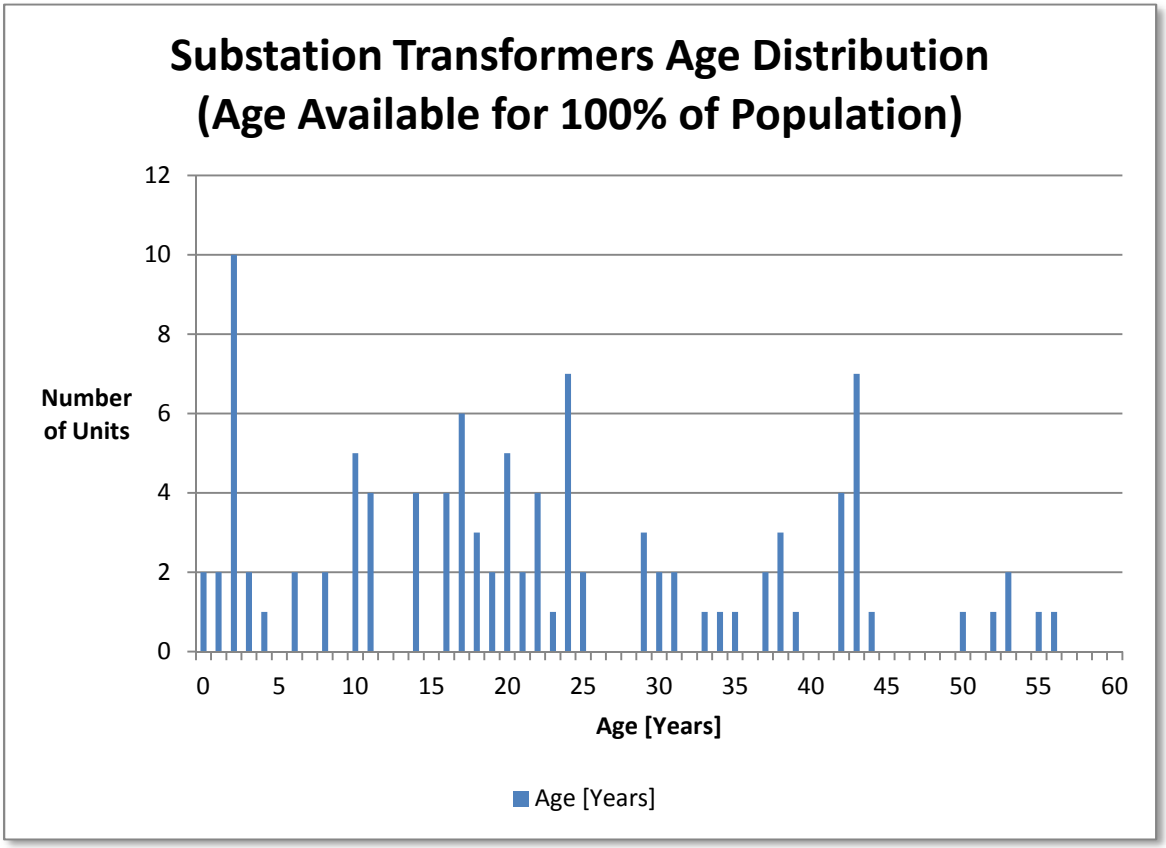

Figure 1-2 Substation Transformers Age Distribution

1.3. Health Index Results

There are 104 in service Substation Transformers at EHM. Of these, there are 104 units with sufficient data for a Health Indexing.

The Health Index Distribution in terms of number of units and percentage of units are shown:

The average Health Index for this asset group is 84% No units were found to be in poor or very poor condition.

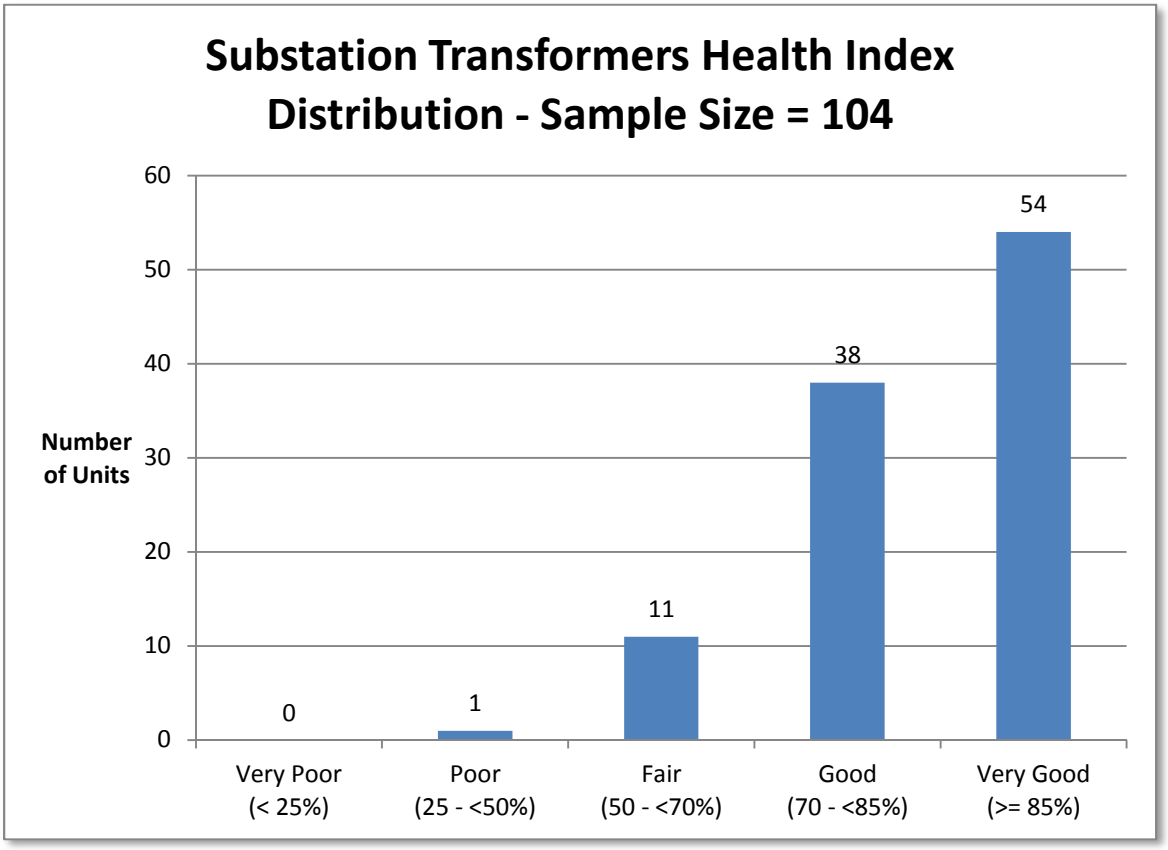

Figure 1-3 Substation Transformers Health Index Distribution (Unit)

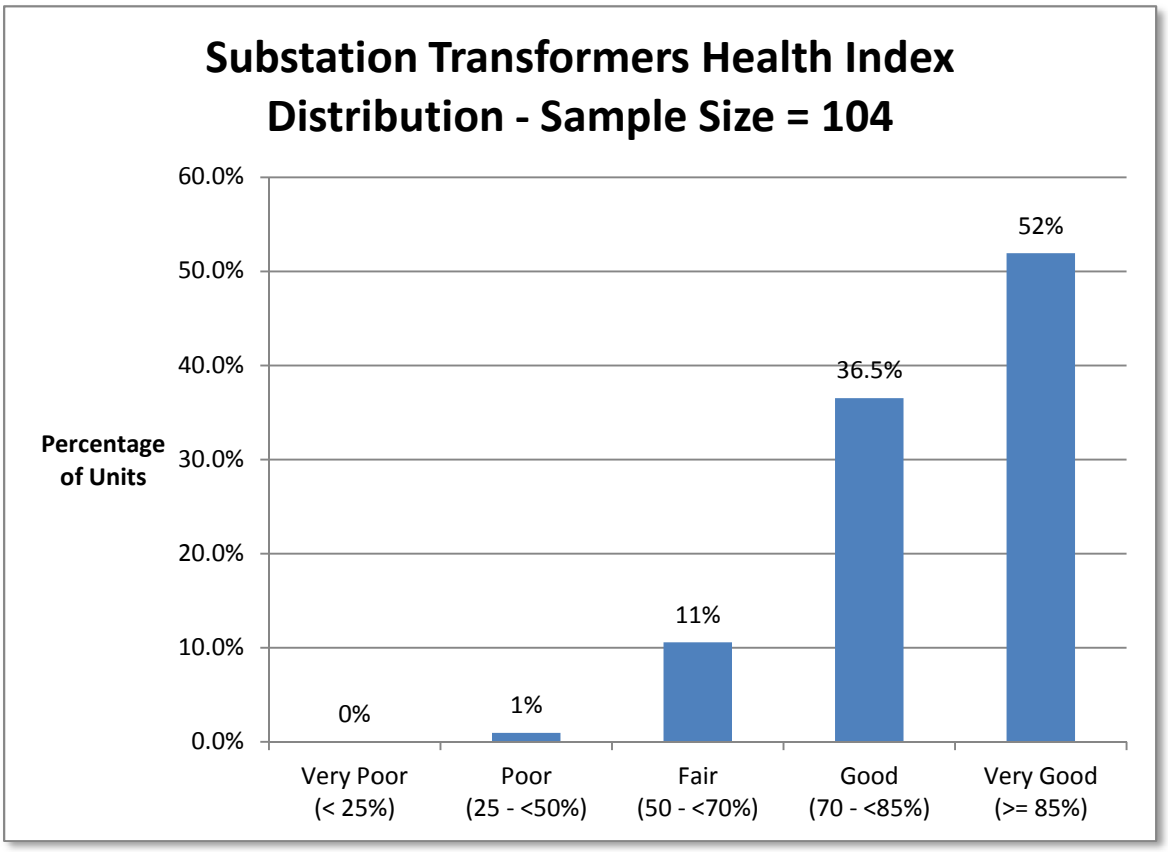

Figure 1-4 Substation Transformers Health Index Distribution (Percentage)

1.4. Condition-Based Replacement Plan

It is assumed that Substation Transformers are proactively replaced.

A unit becomes a candidate for replacement when the product of its probability of failure and criticality is greater than or equal to one.

The minimum criticality, $Criticality_{min}$, is 1.25. This value is selected such that a unit with a probability of failure of 80% becomes a candidate for replacement (i.e. 80% * 1.25 = 1). The maximum criticality, $Criticality_{max,}$ is twice the base criticality ($Criticality_{max,}$ = 1.25*2 = 2.5).

Each unit's criticality is defined as follows:

$$Criticality = (Criticality_{max} - Criticality_{min}) * Criticality\_Multiple + Criticality_{min}$$

where the Criticality_Multiple (CM) is defined by criticality factors, weights, and scores:

$$CM = \frac{\sum_{CF=1}^{\forall CF} (CFS_{CF} \times WCF_{CF})}{\sum_{CF=1}^{\forall CF} (WCF_{CF})}$$

The factors, weights and the score system of each factor are as follows:

Criticality Factor (CF)	Weight (WCF)	Score (CFS)
Number of Customers	25	Low=0 High=1
Oil Containment	10	Yes=0 No=1
Location (near water creeks)	50	No=0 Yes=1
Transformer Primary Protection	15	Breaker =0 Fuse=1

The table below shows examples of criticalities for three separate units.

	Example 1			Example 2			Example 3		
Criticality Factor	**Values**	**CFS**	**CFS x WCF**	**Values**	**CFS**	**CFS x WCF**	**Values**	**CFS**	**CFS x WCF**
Number of Customers	Low	0	0	High	1	25	High	1	25
Oil Containment	Yes	0	0	No	1	10	No	1	10
Location (near water creeks)	No	0	0	No	0	0	Yes	1	50
Transformer Primary Protection	Breaker	0	0	Breaker	0	0	Fuse	1	15
	Criticality Multiple		0	Criticality Multiple		0.35	Criticality Multiple		1
	Criticality		(2.5-1.25)*0 + 1.25 = **1.25**	**Criticality**		(2.5-1.25) *0.35 + 1.25 = **1.6875**	**Criticality**		(2.5-1.25)*1 + 1.25 =**2.5**

As previously noted a unit becomes a candidate for replacement when the product of its probability of failure and criticality is greater than or equal to one. The replacement plan for in service Substation Transformers is as follows:

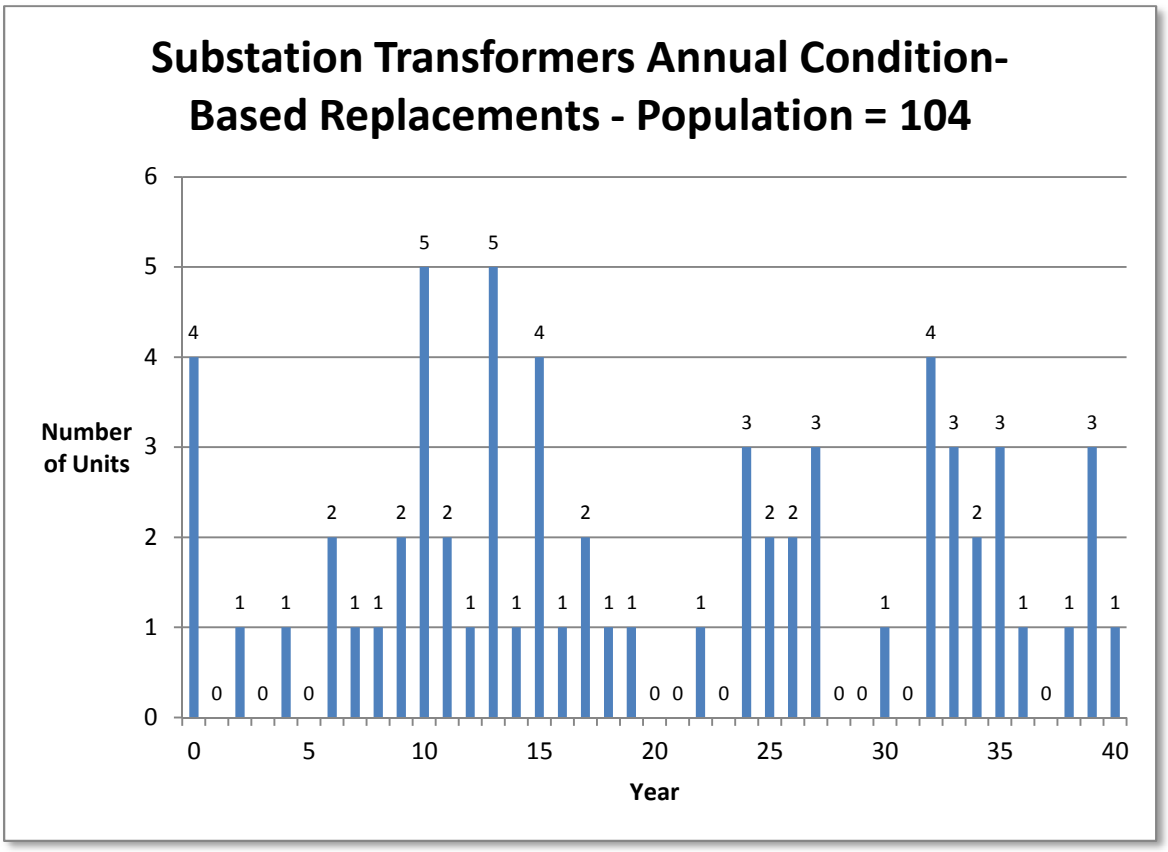

Figure 1-5 Substation Transformers Condition-Based Replacement Plan

1.5. Spare Substation Transformers

There are 12 Spare Substation Transformers at EMH. Their age distribution is as follows. Approximately 33% of all units are 40 or older.

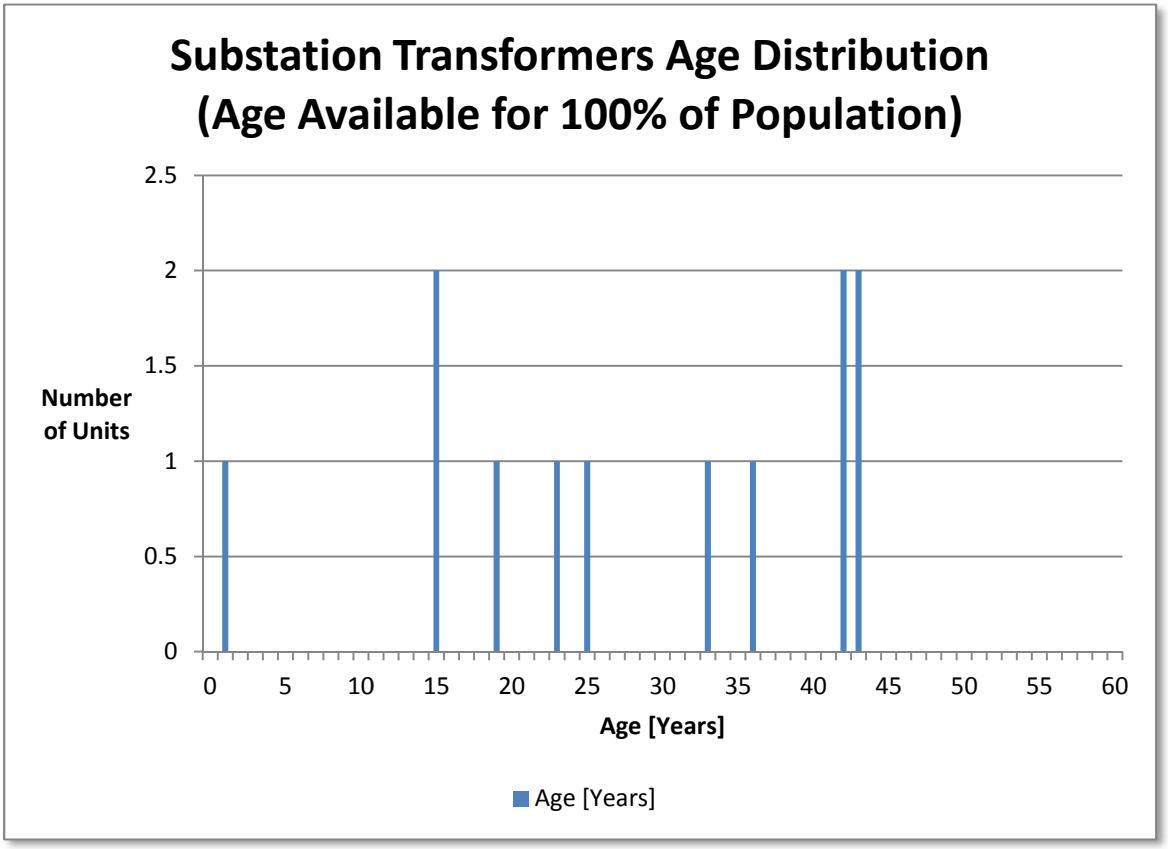

Figure 1-6 Spare Substation Transformers Age Distribution

Of the 12 Spare Substation Transformers at EHM, there are 12 units with sufficient data for a Health Indexing.

The Health Index Distribution in terms of number of units and percentage of units are shown below. The average Health Index for this asset group is 92%.

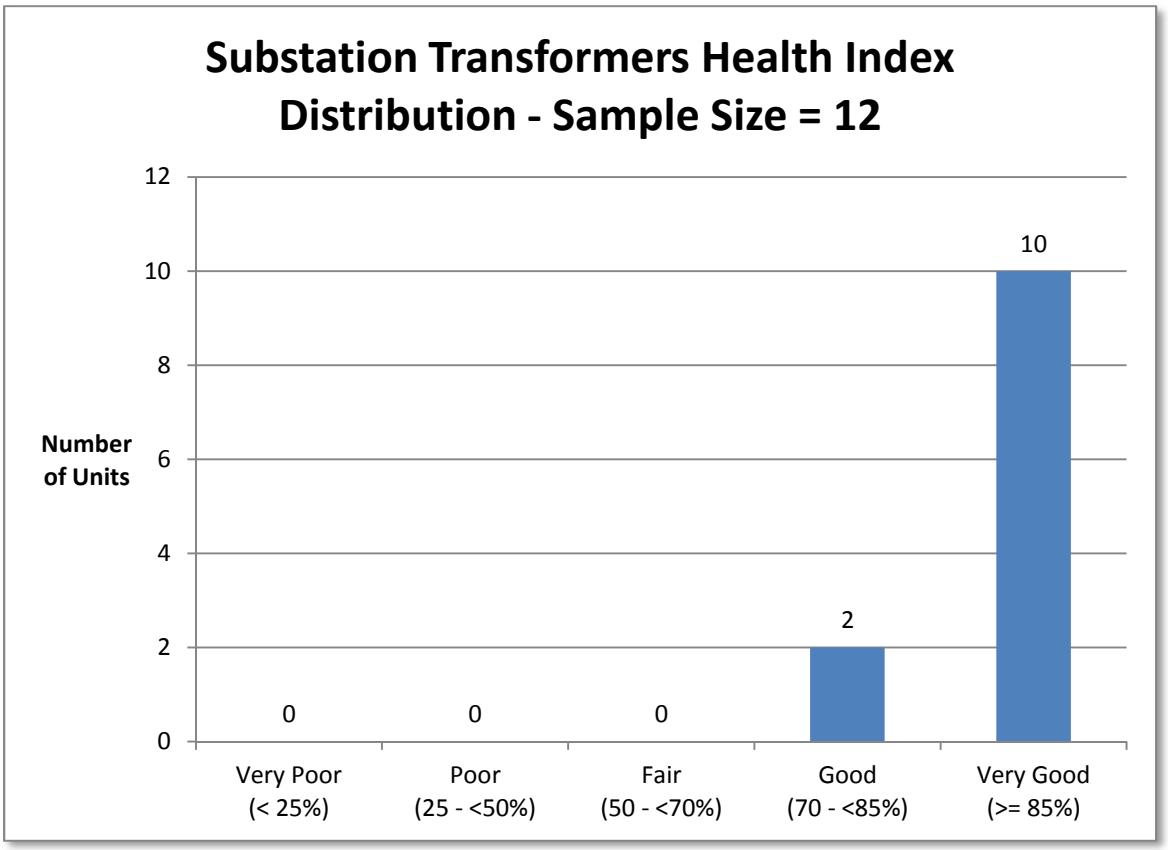

Figure 1-7 Spare Substation Transformers Health Index Distribution (Unit)

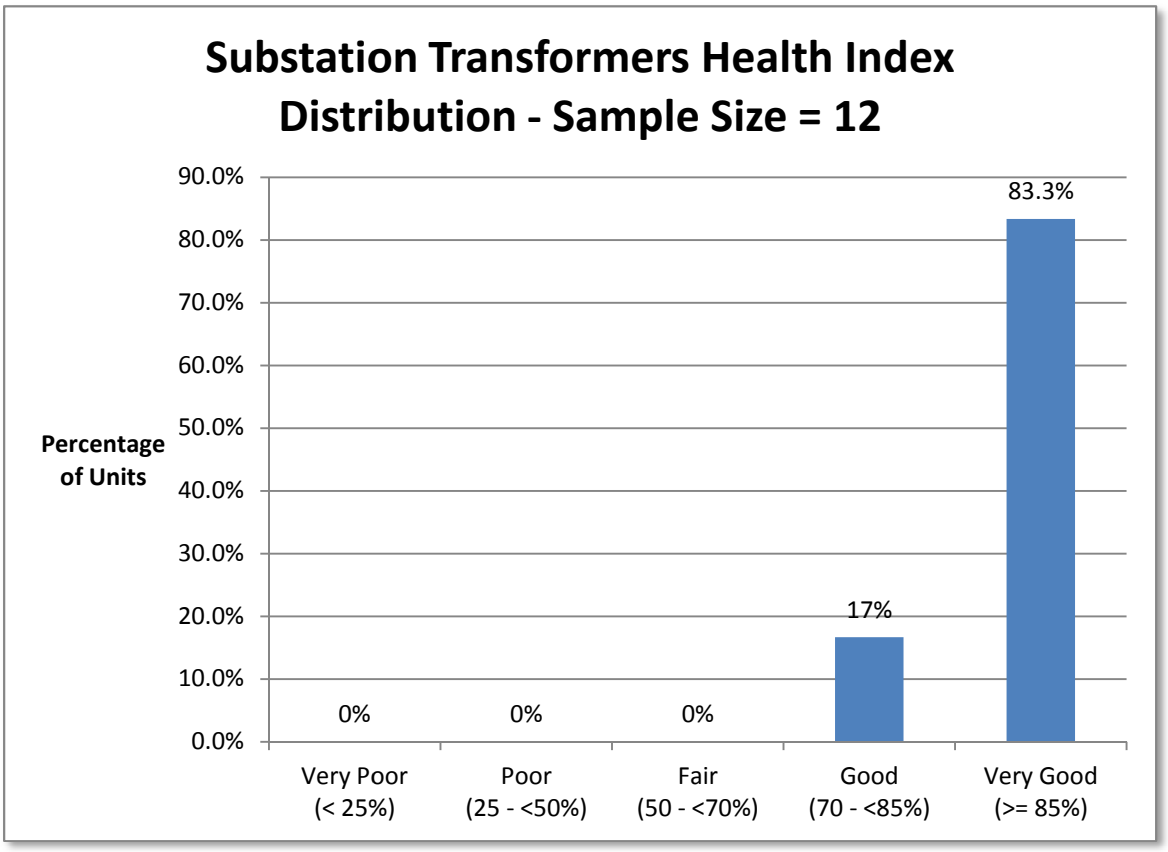

Figure 1-8 Spare Substation Transformers Health Index Distribution (Percentage)

1.6. Data Assessment

The data for in service Substation Transformers includes inspection results, loading, age, and oil quality, dissolved gas analysis, and Doble tests.

Data Availability Indicator

The data availability distribution for the entire population is as follows:

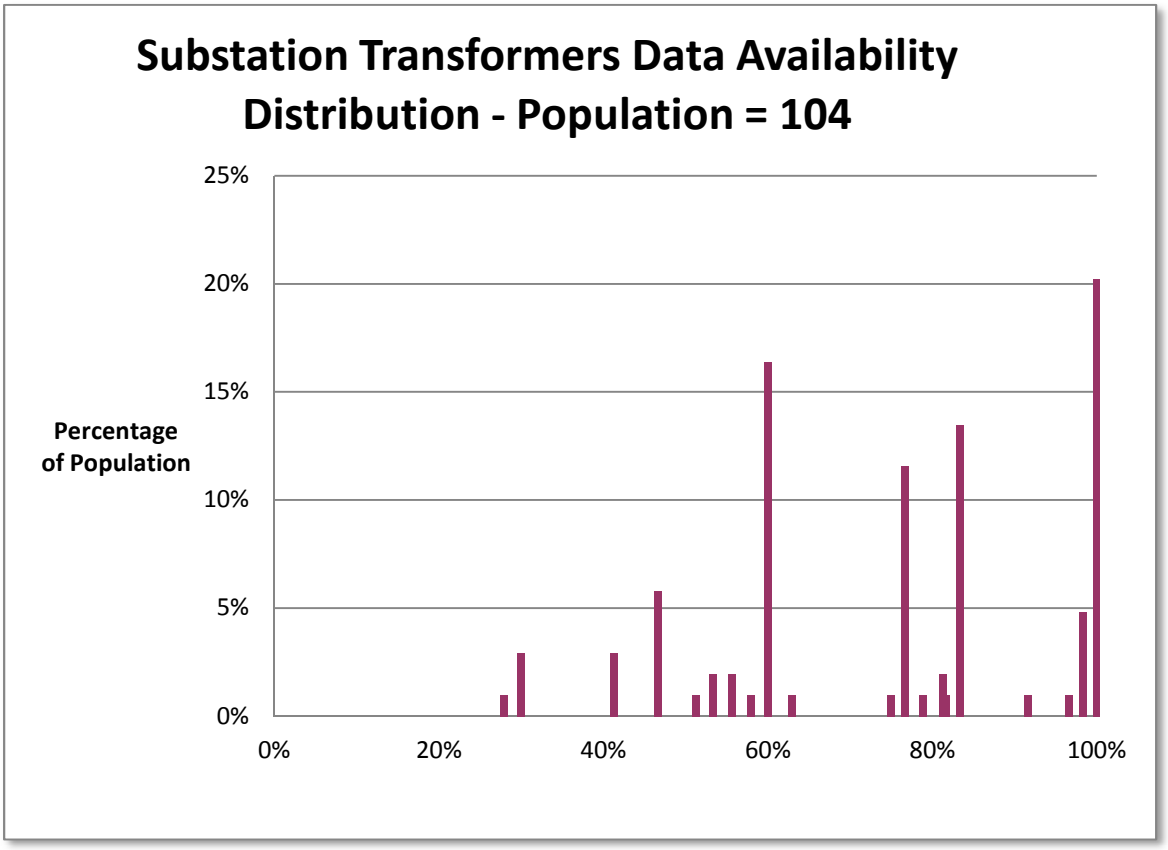

Figure 1-9 Substation Transformers Data Availability Distribution

At 74%, the average of DAI of this group is slightly better as compared to the previous year. There has been an improvement in the collection of Doble test and inspection data. More than 50% of the population has such data, whereas only 40% of Doble and inspections were available last year.

Data Gap

The data gaps for this asset category remain the same as last year. Most of the critical data are already available and included in the Health Index formula. The data gaps include infrared thermography and grounding condition.

Data Gap (Sub-Condition Parameter)	**Parent Condition Parameter**	**Priority**	**Object or Component Addressed**	**Description**	**Source of Data**
Infrared (IR) Thermography	Sealing & Connection	☆ ☆ ☆	Cooling system	Poor ventilation/circulation	IR camera scan
			Transformer connection	Poor connection	
Grounding		☆	Grounding electrode conductor	Poor connection	Visual inspection

2. CIRCUIT BREAKERS

2.1. Health Index Formula

Assume a parameter scoring system of 0 though 4, where 0 and 4 represent the "worst" and "best" scores respectively. Thus, the maximum score for any condition or sub-condition parameter (maximum CPS and CPF) is "4".

2.1.1. Condition and Sub-Condition Parameters

Table 2-1 Condition Parameter and Weights

m	Condition Parameter	WCP_m				Sub-Condition Parameters
		Oil	SF6	Vacuum	Air Magnetic	
1	Operating Mechanism	14	11	7	14	Table 2-2
2	Contact Performance	7	7	7	7	Table 2-3
3	Arc Extinction	9	5	2	5	Table 2-4
4	Insulation	2	2	2	2	Table 2-5
5	Service Record	5	5	5	5	Table 2-6
De-Rating Factor (DRF)	De-rate based on: Manufacturer					Table 2-11

Table 2-2 Operating Mechanism Sub-Condition Parameters and Weights (m=1)

n	Sub-condition Parameter	$WCPF_n$				Condition Criteria Table
		Oil	SF6	Vacuum	Air Magnetic	
1	Lubrication	9	7	5	9	Table 2-7
2	Linkage	5	4	2	5	Table 2-7
De-Rating	De-rate based on: Mechanism Type					Table 2-10

Table 2-3 Contact Performance Sub-Condition Parameters and Weights (m=2)

n	Sub-Condition Parameter	$WCPF_n$	Condition Criteria Table
1	Contact Resistance	1	Table 2-9
2	Contact (Inspection)	1	Table 2-7

Table 2-4 Arc Extinction Sub-Condition Parameters and Weights (m=3)

n	Sub-condition Parameter	$WCPF_n$				Condition Criteria Table
		Oil	SF6	Vacuum	Air Magnetic	
1	Tank	1	1			Table 2-7
2	Arc Chute				1	Table 2-7

Table 2-5 Insulation Sub-Condition Parameters and Weights (m=4)

n	Sub-Condition Parameter	$WCPF_n$	Condition Criteria Table
1	Insulation	1	Table 2-7

Table 2-6 Service Record Sub-Condition Parameters and Weights (m=5)

n	Sub-Condition Parameter	$WCPF_n$	Condition Criteria Table
1	Age	1	Figure 2-1

2.1.2. Condition Criteria

Visual Inspection

Table 2-7 Visual Inspection Criteria

Score	Condition Description
4	OK
0	Not OK

Measurement

Breaker timing and contact resistance measurements indicate the proper function of the breaker as designed. It is crucial that the breaker meets these specifications for proper and reliable operation

Table 2-8 Resistance Test Criteria

Score	Condition Description
4	Measurement <= 80% Specification limit *
3	Measurement (80%, 100%] specification limit
1	Measurement (100%, 120%] specification limit
0	Measurement > 120% specification limit

* CB type dependent (see Table 2-9)

Table 2-9 Contact Resistance Specification Limit

Breaker Type	Contact Resistance Specification Limit [μΩ]			
	<= 69 kV	110 – 230 kV	345 kV	765 kV
Oil	300	600	900	
Gas	150	150	150	300
Vacuum & Air Magnetic	250	250	250	250

Operating Mechanism

Table 2-10 Multiplier for Operating Mechanism

Multiplier	Operating Type
1	Solenoid
0.9	Spring

Age

Assume that the failure rate Circuit Breakers exponentially increases with age and that the failure rate equation is as follows:

$$f = e^{\beta(t-\alpha)}$$

f	= failure rate of an asset (percent of failure per unit time)
t	= time
α, β	= constant parameters that control the rise of the curve

The corresponding survivor function is therefore:

$$S_f = 1 - \ P_f = e^{-(f-e^{-\alpha\beta})/\beta}$$

S_f	= survivor function
P_f	= cumulative probability of failure

Assuming that at the ages of 40 and 60 years the probability of failures (P_f) for Circuit Breakers are 20% and 99% respectively results in the survival curve shown below. It follows that the Score for Age is the survival curve normalized to the maximum Score of 4 (i.e. 4*Survival Curve). The Score vs. Age is also shown in the figure below.

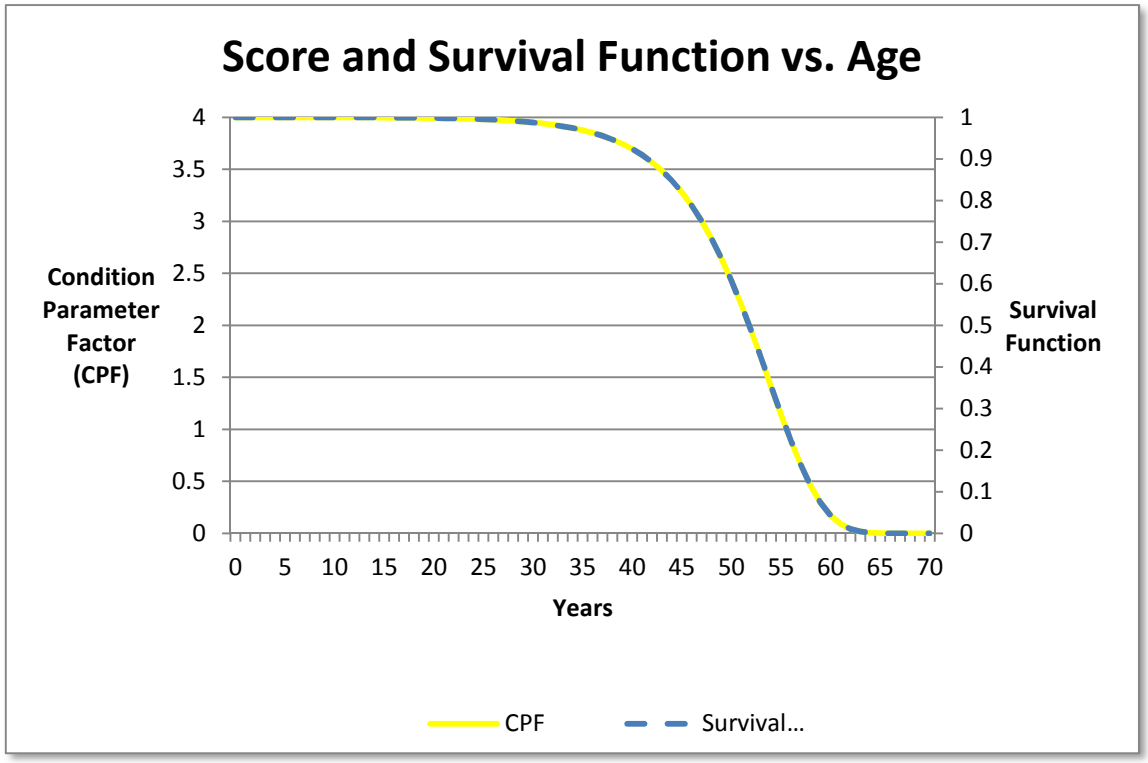

Figure 2-1 Circuit Breakers Age Criteria

De-Rating Factor (DRF)

Table 2-11 De-Rating Criteria

n	Parameter	De-Rating Multiplier (DR_n)	DRF
1	Manufacturer	Table 2-12	DRF = DR_1

Table 2-12 Manufacturer De-Rating Multiplier (DR_1)

n	Manufacturer	De-Rating Multiplier
1	Manufacturer X	.25 (Very Poor)
2	Manufacturer Y	.25 (Very Poor)
3	All Other Manufacturers	1

2.2. Age Distribution

The age distribution for this asset class is shown on the figure below. The average age of the population is 24 years old; however, 18% of the population is 40 years or older.

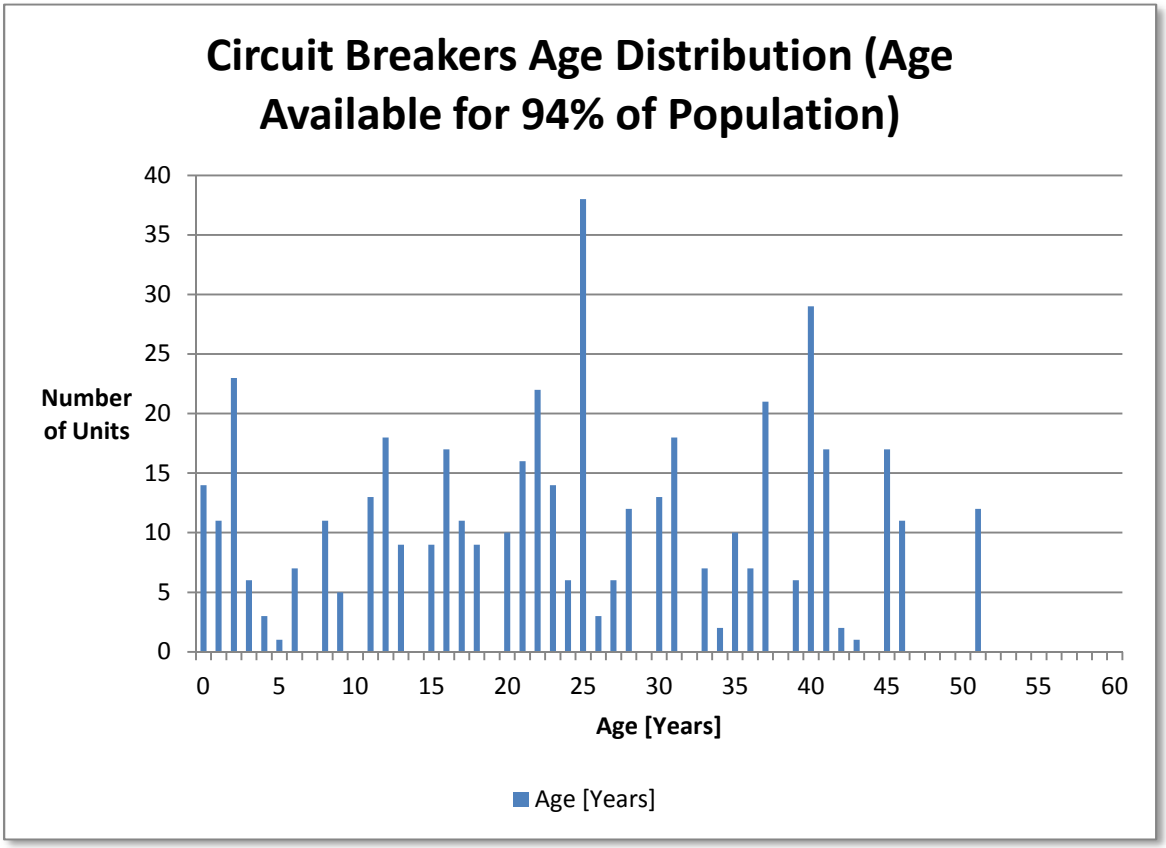

Figure 2-2 Circuit Breakers Age Distribution

2.4. Health Index Results

There are 497 Circuit Breakers at EHM. Of these, there are 474 units with sufficient data for a Health Indexing.

The Health Index Distribution in terms of number of units and percentage of units are shown:

The average Health Index for this asset group is 91%. Approximately 6% of the population is found to be in poor or very poor condition.

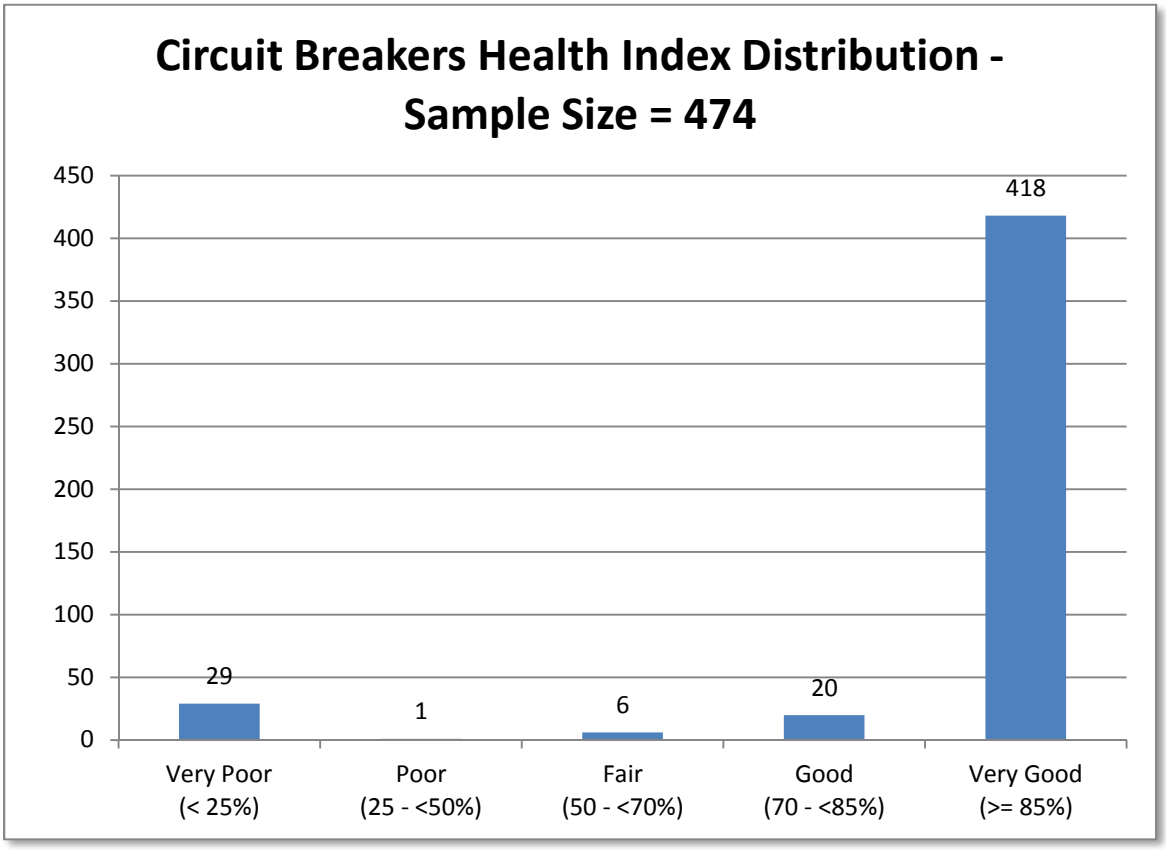

Figure 2-3 Circuit Breakers Health Index Distribution (Unit)

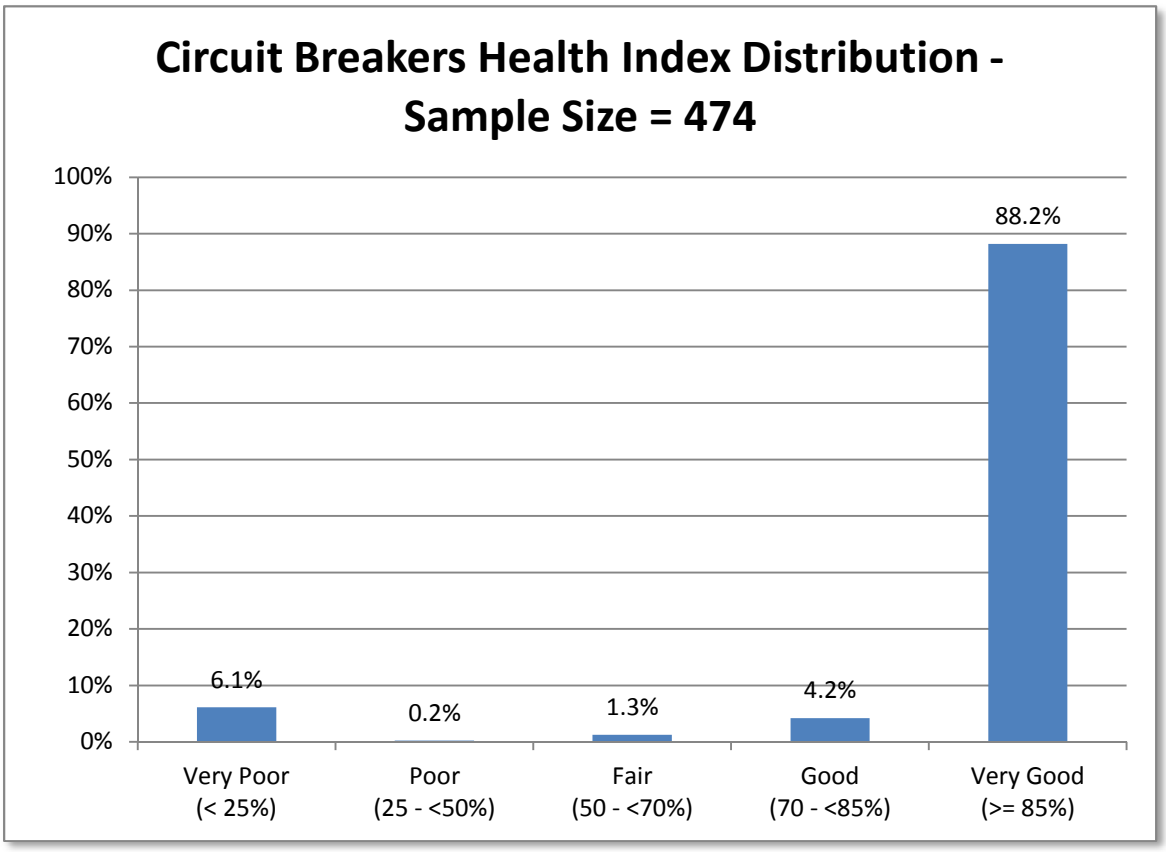

Figure 2-4 Circuit Breakers Health Index Distribution (Percentage)

2.5. Condition-Based Replacement Plan

It is assumed that Circuit Breakers are proactively replaced.

A unit becomes a candidate for replacement when the product of its probability of failure and criticality is greater than or equal to one. All units are assumed to have equal criticalities, selected such that a unit with a probability of failure of 80% becomes a candidate for replacement. i.e. $Criticality_{min} = Criticality_{max} = 1.25$.

The replacement plan is for Circuit Breakers is given below:

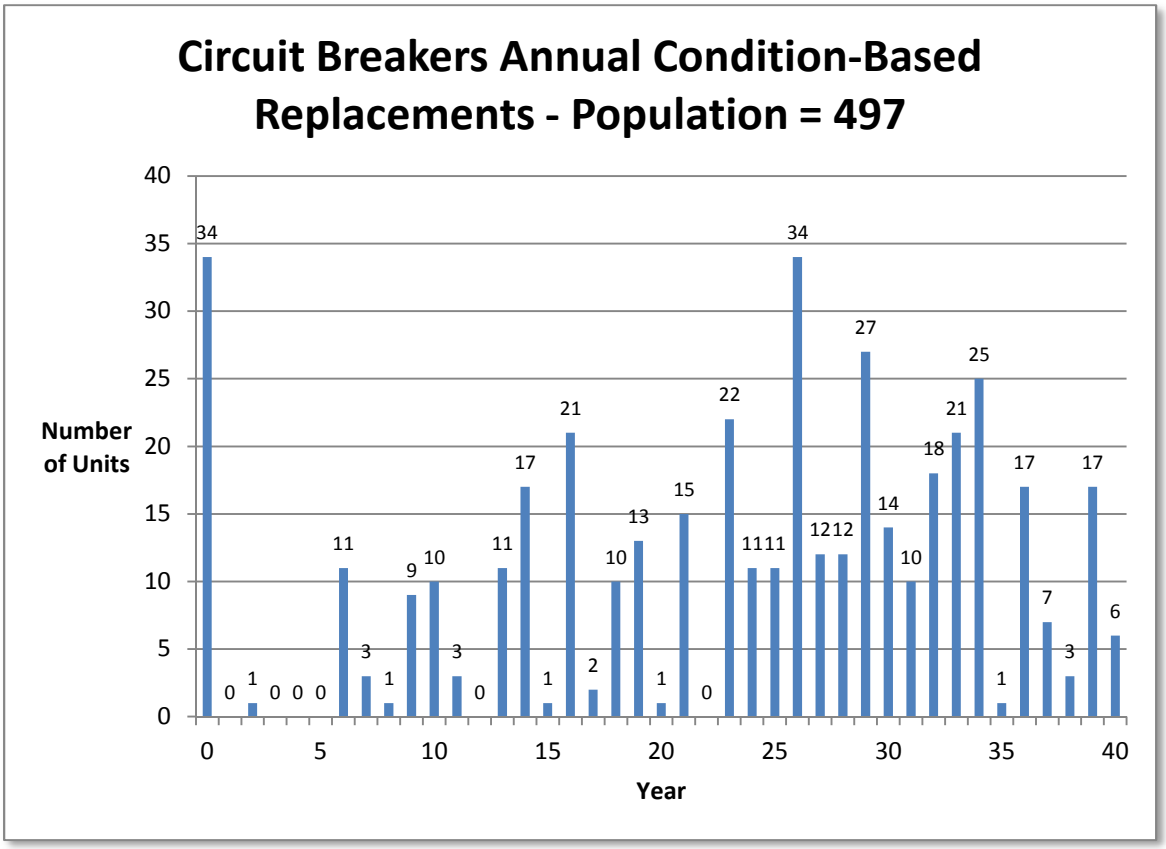

Figure 2-5 Circuit Breakers Condition-Based Replacement Plan

Note that the large number of replacements in the first year. This is a due to the large percentage of units that are either 40 years or older or that are of a certain type that has been found to be prone to failures.

2.6. Data Analysis

The data available for this asset category includes age, contact resistance, and inspection results.

Data Availability Indicator

The data availability distribution for the entire population is as follows:

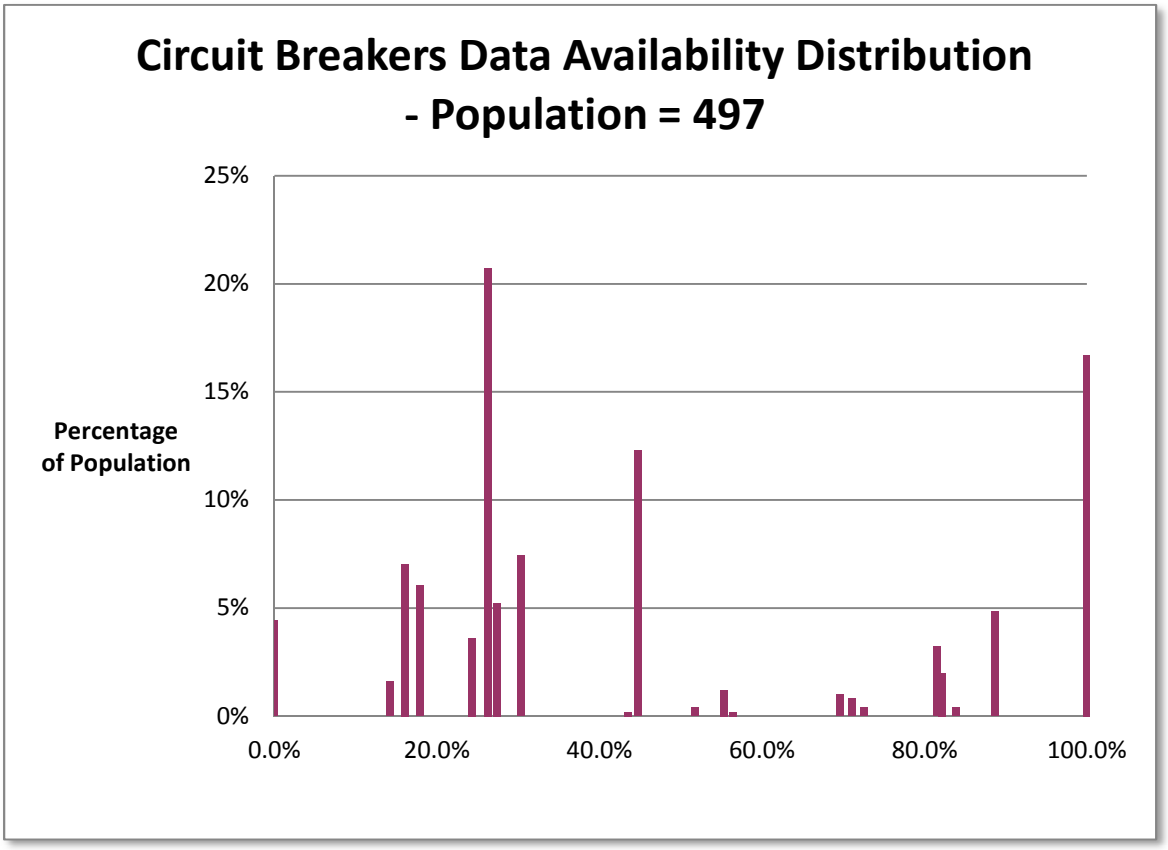

Figure 2-6 Circuit Breakers Data Availability Distribution

The average DAI for this asset group has improved from 40% last year to 46% this year. Age is available for all units, contact resistance measurement availability remains at approximately 50%, and inspection record availability improved from 11% to approximately 30%.

Data Gap

No new data types have been collected for this asset group. The data gaps remain the same as the past year.

Data Gap (Sub-Condition Parameter)	Parent Condition Parameter	Priority	Object or Component Addressed	Description	Source of Data
Timing Test Results	Contact Performance	★ ★ ★	Close/Trip timing	Trip time too long Close time too long	On-site testing
Arc Contact		★	Arc contact	Contact erosion	Visual inspection or on-site testing
Vacuum Bottle	Arc Extinction	★ ★ ★	Vacuum bottle	Vacuum pressure low	On-site testing
Insulation	Insulation	★ ★	Insulator	Insulation damage	Visual inspection
Operating Counter	Service Record	★	Circuit breaker	Number of operation cycles a CB has completed since installation	On-site reading (Using breaker operation counter)
Loading		★	CB load	Loading History: e.g. hourly peak loads	Operation record

3. POLE MOUNTED TRANSFORMERS

3.1. Health Index Formula

Assume a parameter scoring system of 0 though 4, where 0 and 4 represent the "worst" and "best" scores respectively. Thus, the maximum score for any condition or sub-condition parameter (maximum CPS and CPF) is "4".

3.1.1. Condition and Sub-Condition Parameters

Table 3-1 Condition Parameter and Weights

m	Condition Parameter	WCP_m	Sub-Condition Parameters
1	Service Record	1	Table 3-2
De-Rating Factor (DRF)	De-rate based on: Manufacturer, PCB Content, IR		Table 3-3

Table 3-2 Service Record Sub-Condition Parameters and Weights (m=1)

n	Sub-Condition Parameter	$WCPF_n$	Condition Criteria Table
1	Age	1	Figure 3-1

3.1.2. Condition Criteria

Age

Assume that the failure rate Pole Mounted Transformers exponentially increases with age and that the failure rate equation is as follows:

$$f = e^{\beta(t-\alpha)}$$

f = failure rate of an asset (percent of failure per unit time)
t = time
α, β = constant parameters that control the rise of the curve

The corresponding survivor function is therefore:

$$S_f = 1 - \ P_f = e^{-(f-e^{-\alpha\beta})/\beta}$$

S_f = survivor function
P_f = cumulative probability of failure

Assuming that at the ages of 45 and 60 years the probability of failures (P_f) for this asset are 20% and 99% respectively results in the survival curve shown below. It follows that the Score for Age is the survival curve normalized to the maximum Score of 4 (i.e. 4*Survival Curve). The Score vs. Age is also shown in the figure below.

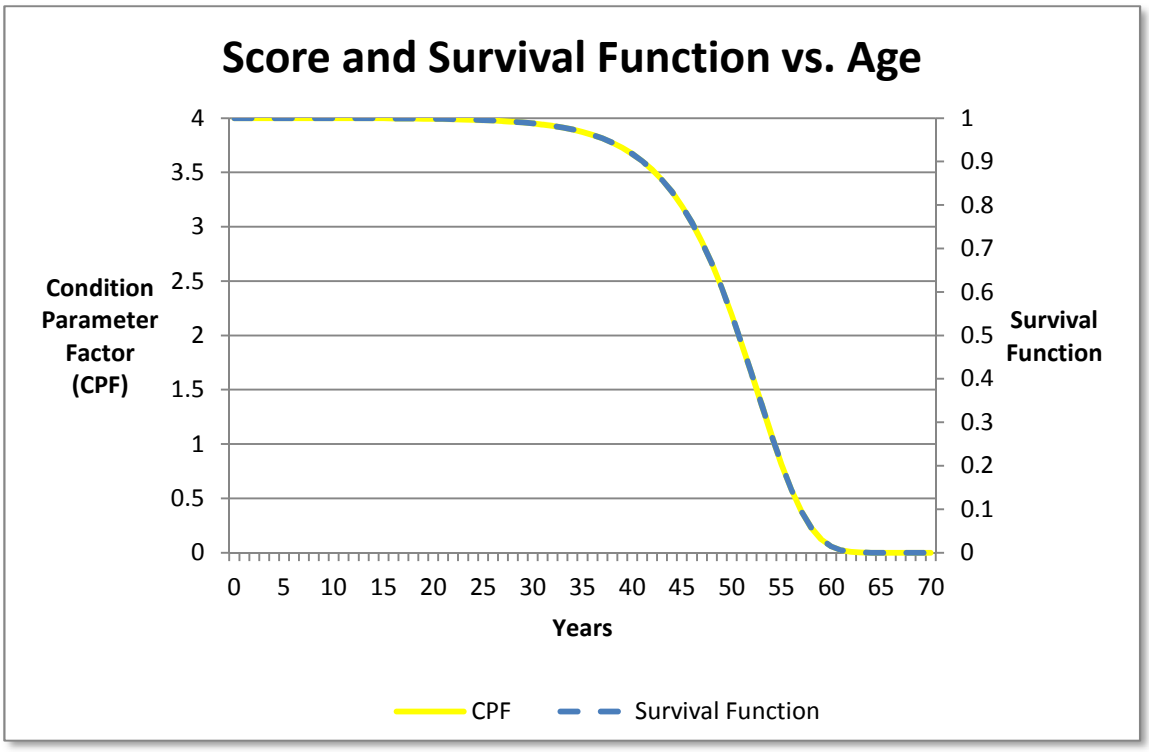

Figure 3-1 Pole Mounted Transformers Age Criteria

De-Rating Factor (DRF)

Table 3-3 De-Rating Criteria

n	Parameter	De-Rating Multiplier (DR_n)	DRF
1	Manufacturer	Table 3-4	DRF = MIN(DR_1 , DR_2 , DR_3)
2	PCB Content	Table 3-5	
3	IR	Table 3-6	

Table 3-4 Manufacturer De-Rating Multiplier (DR_1)

Manufacturer	De-Rating Multiplier
Manufacturer X	.9
Manufacturer Y	.9
All Other Manufacturers	1

Table 3-5 PCB De-Rating Multiplier (DR_2)

PCB Content	De-Rating Multiplier
0 < PCB < 2 ppm	1
2 < PCB < 50 ppm	.95
PCB > = 50 ppm	0.25

Table 3-6 IR De-Rating Multiplier (DR_3)

IR Priority	De-Rating Multiplier
Red priority	0.7
Yellow priority	0.85
White priority	0.95

3.2. Age Distribution

The average age of the population is 21. Approximately 6% of the population is 45 years or older. The age distribution for this asset class is as follows:

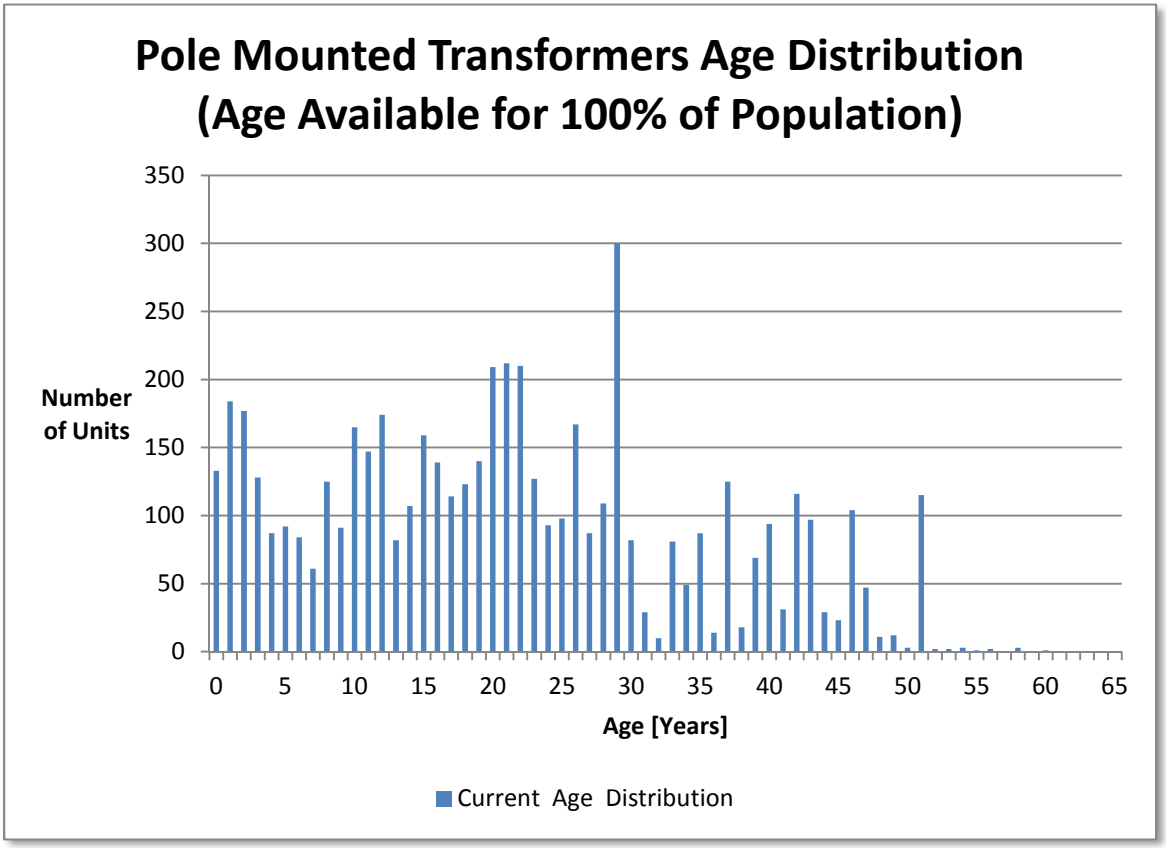

Figure 3-2 Pole Mounted Transformers Age Distribution

3.4. Health Index Results

There are 5384 Pole Mounted Transformers at EHM. Of these, there are 5384 units with sufficient data for a Health Indexing.

The average Health Index for this asset group is 93%. Approximately 5% of the population is found to be in poor or very poor condition.

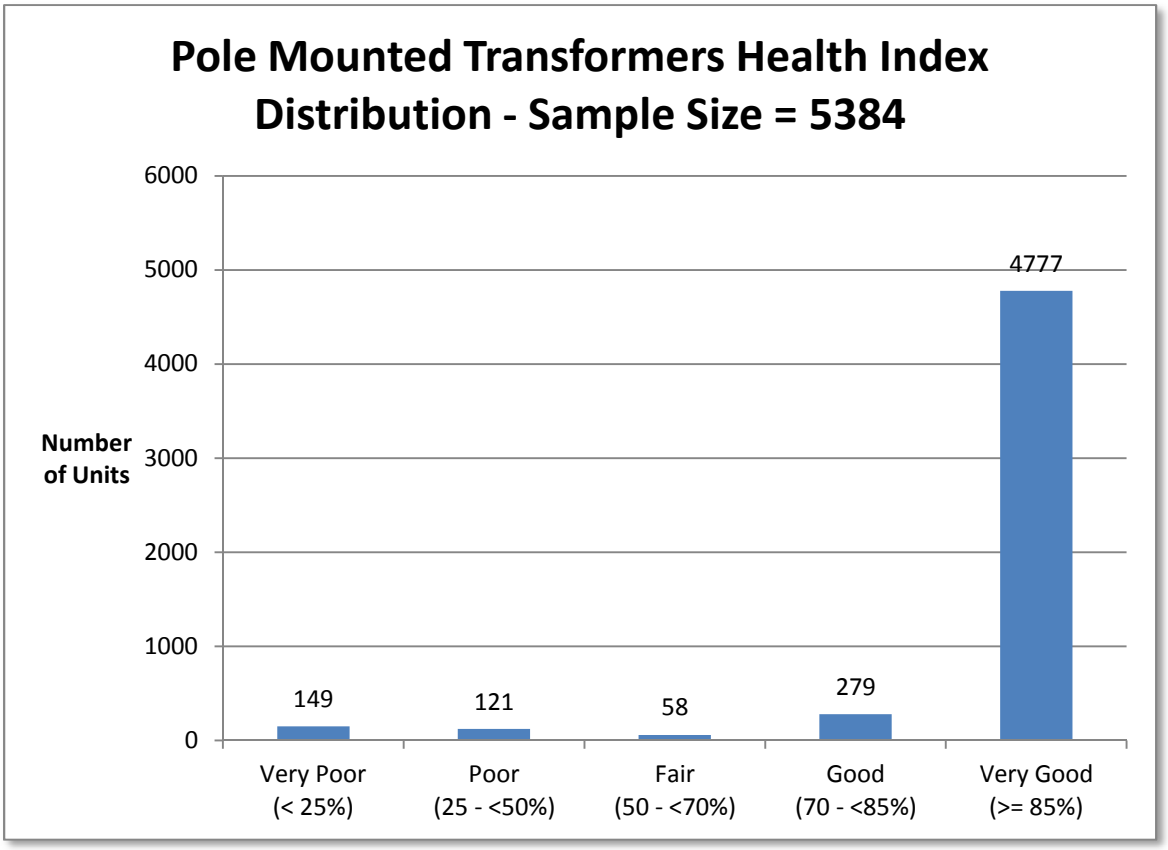

Figure 3-3 Pole Mounted Transformers Health Index Distribution (Unit)

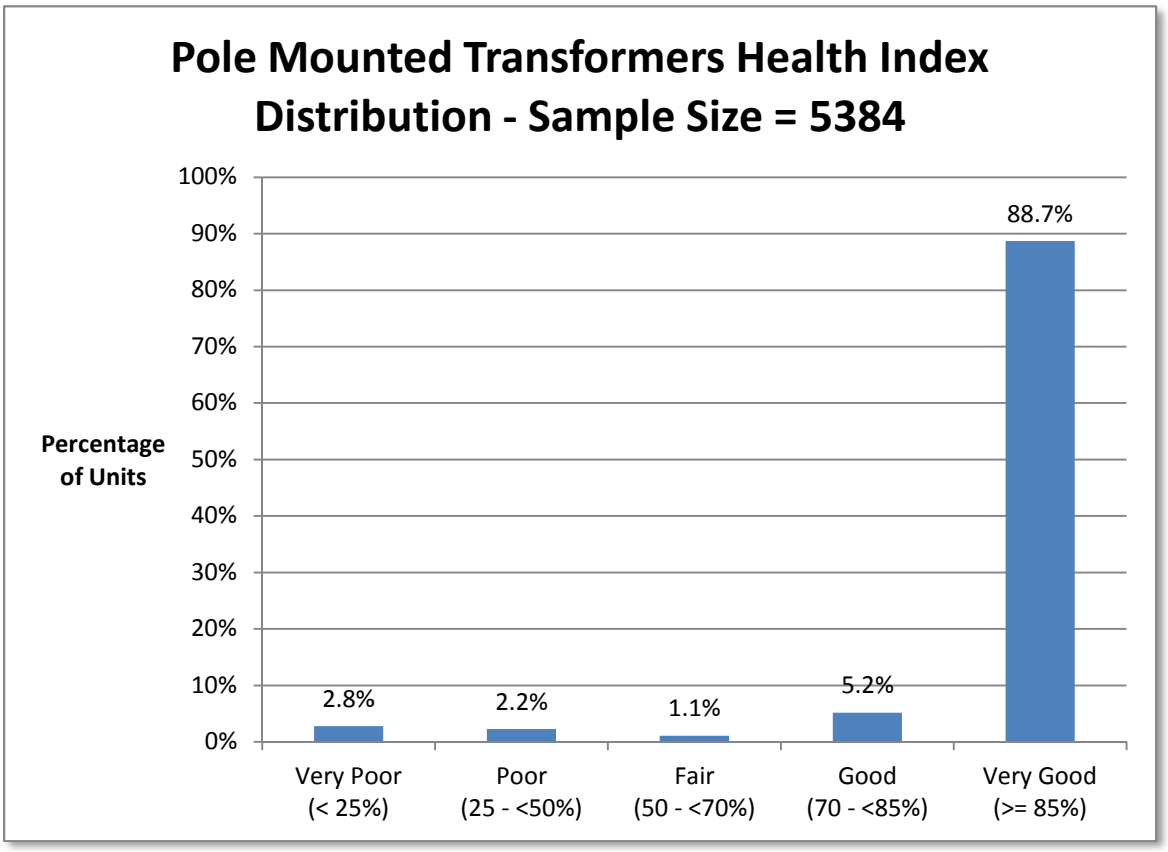

Figure 3-4 Pole Mounted Transformers Health Index Distribution (Percentage)

3.5. Condition-Based Replacement Plan

As it is assumed that Pole Mounted Transformers are reactively replaced, the replacement plan is based on the asset failure rate, f(t).

The replacement plan for Pole Mounted Transformers is as follows:

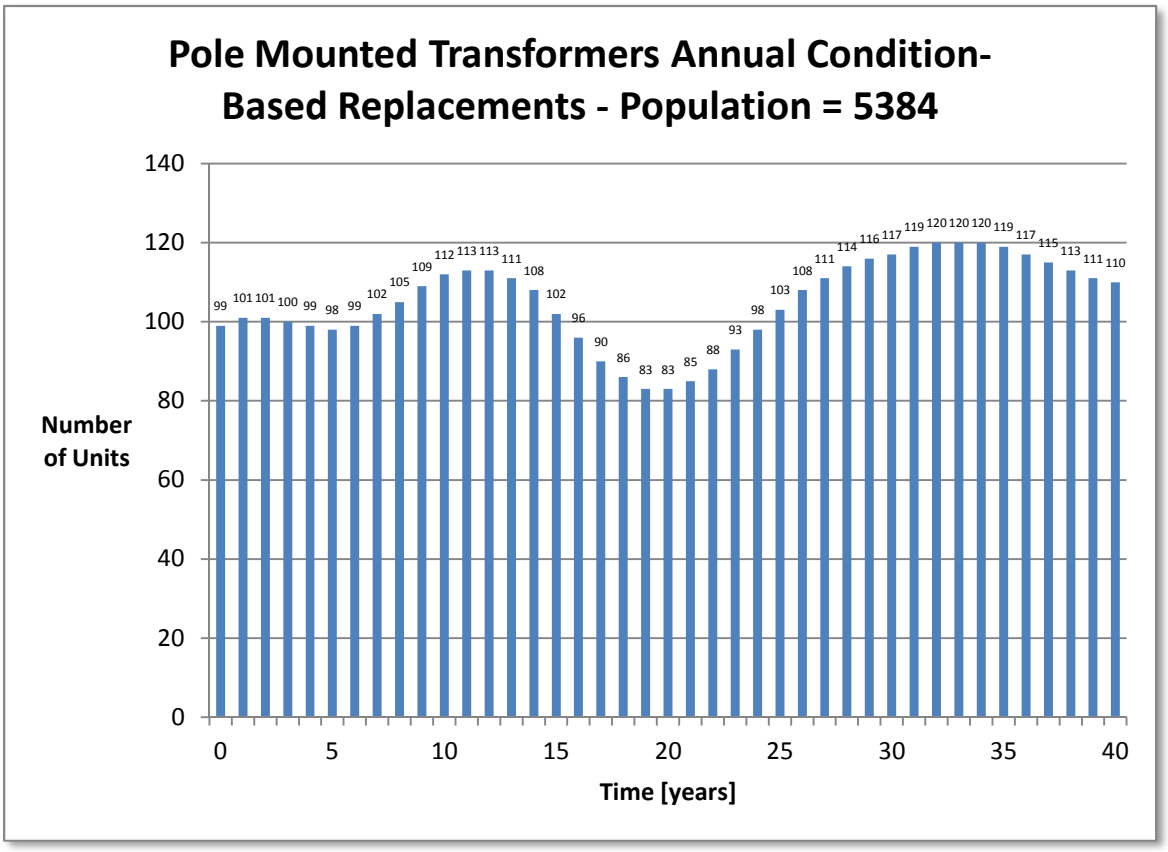

Figure 3-5 Pole Mounted Transformers Condition-Based Replacement Plan

3.6. Data Analysis

Age was the only condition data available for this asset group. The assessment is age-based only and because the age of all units is known, the average DAI for this asset category is 100%.

Since the 2011 assessment, infra red inspection data was collected and incorporated in the 2012 Health Index formulation. The data gaps noted in the 2011 report, however, remain to be addressed.

Data Gap (Sub-Condition Parameter)	**Parent Condition Parameter**	**Priority**	**Object or Component Addressed**	**Description**	**Source of Data**
Tank Corrosion	Physical Condition	☆☆	Transformer oil tank	Tank surface rust or deterioration due to environmental factors	Visual inspection
Oil Leak	Connection & Insulation	☆☆☆	Transformer tank	Leakage	Visual inspection
Connection		☆☆	Transformer connection	Poor connection	Visual inspection
Grounding		☆	Transformer tank	Poor grounding wire connection	Visual inspection
Bushing		☆☆	Porcelain	Crack / Dirt	Visual inspection
Overall	Service Record	☆	Transformer	General status evaluation based on routine operation and inspection	Operation record
Loading		☆☆	Transformer load	Loading History: e.g. hourly peak loads	Operation record

4. PAD MOUNTED TRANSFORMERS

4.1. Health Index Formula

Assume a parameter scoring system of 0 though 4, where 0 and 4 represent the "worst" and "best" scores respectively. Thus, the maximum score for any condition or sub-condition parameter (maximum CPS and CPF) is "4".

4.1.1. Condition and Sub-Condition Parameters

Table 4-1 Condition Parameter and Weights

m	Condition Parameter	WCP_m	Sub-Condition Parameters
1	Service Record	1	Table 4-2
De-Rating Factor (DRF)	De-rate based on: Manufacturer, PCB Content		Table 4-3

Table 4-2 Service Record Sub-Condition Parameters and Weights (m=1)

n	Sub-Condition Parameter	$WCPF_n$	Condition Criteria Table
1	Age	1	Figure 4-1

4.1.2. Condition Criteria

Age

Assume that the failure rate Pad Mounted Transformers exponentially increases with age and that the failure rate equation is as follows:

$$f = e^{\beta(t-\alpha)}$$

f = failure rate of an asset (percent of failure per unit time)
t = time
α, β = constant parameters that control the rise of the curve

The corresponding survivor function is therefore:

$$S_f = 1 - \ P_f = e^{-(f-e^{-\alpha\beta})/\beta}$$

S_f = survivor function
P_f = cumulative probability of failure

Assuming that at the ages of 35 and 45 years the probability of failures (P_f) for this asset are 20% and 99% respectively results in the survival curve shown below. It follows that the Score for Age is the survival curve normalized to the maximum Score of 4 (i.e. 4*Survival Curve). The Score vs. Age is also shown in the figure below.

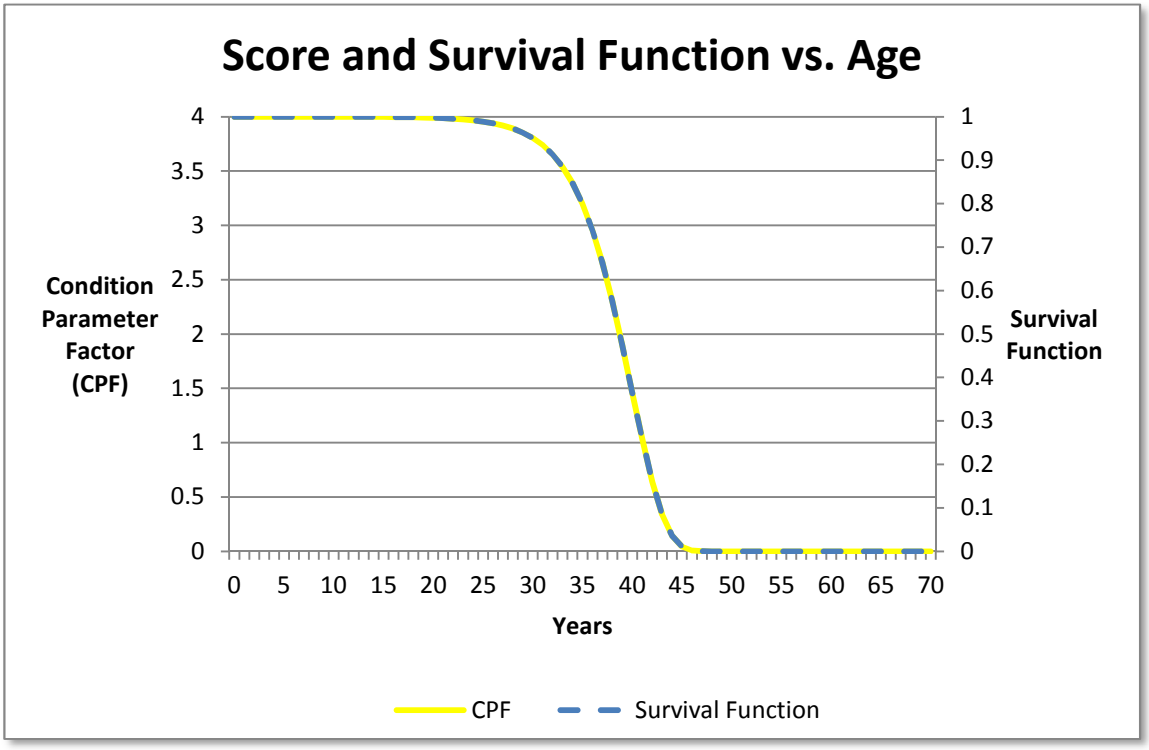

Figure 4-1 Pad Mounted Transformers Age Criteria

De-Rating Factor (DRF)

Table 4-3 De-Rating Criteria

n	Parameter	De-Rating Multiplier (DR_n)	DRF
1	Manufacturer	Table 4-4	DRF = MIN(DR_1 , DR_2)
2	PCB Content	Table 4-5	

Table 4-4 Manufacturer De-Rating Multiplier (DR_1)

Manufacturer	De-Rating Multiplier
Manufacturer X	.7
Manufacturer Y	.7
Manufacturer Z	.7
All Other Manufacturers	1

Table 4-5 PCB De-Rating Multiplier (DR_2)

PCB Content	De-Rating Multiplier
0 < PCB < 2 ppm	1
2 < PCB < 50 ppm	.95
PCB > = 50 ppm	0.25

4.2. Age Distribution

Single Phase Pad Mounted Transformers

The average age of all single phase units is 20 years. Approximately 9% of the population is 35 years or older.

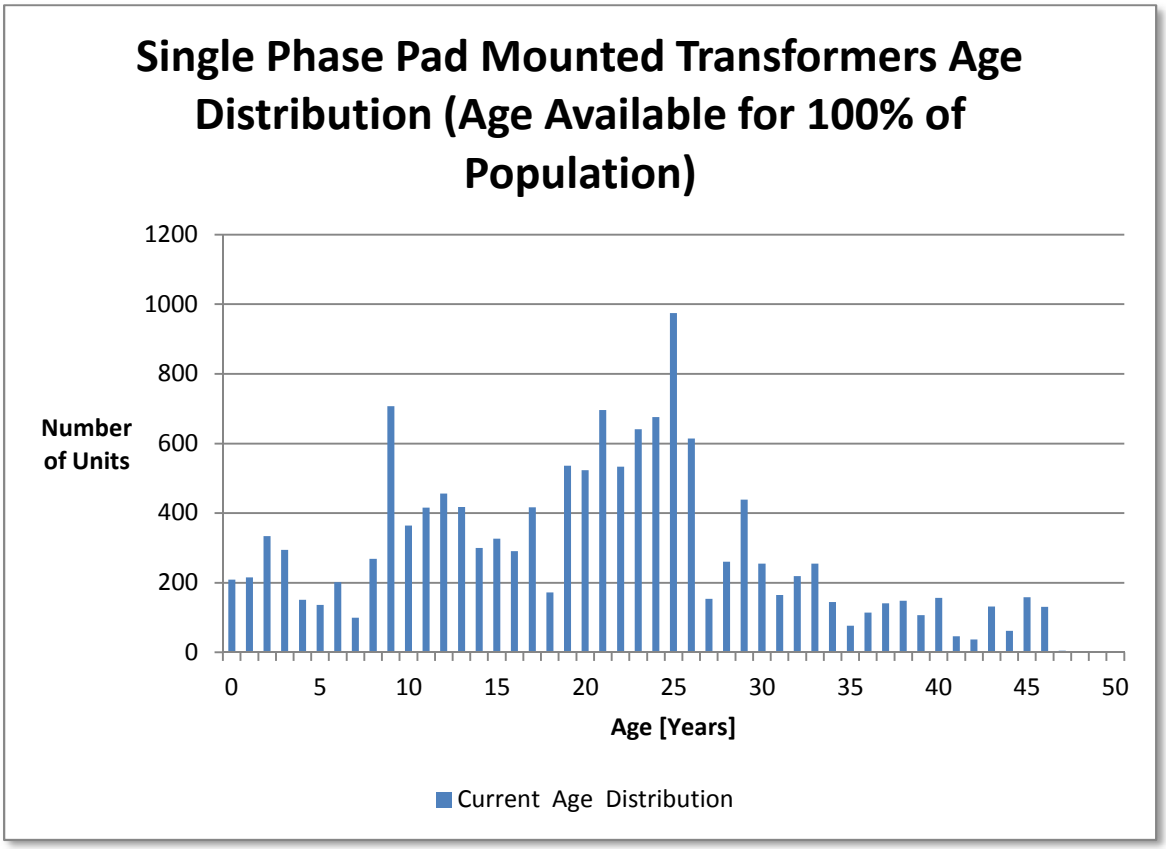

Figure 4-2 Single Phase Pad Mounted Transformers Age Distribution

Three Phase Pad Mounted Transformers

The average age of all three phase units is 16 years. Approximately 7% of the population is 35 years or older.

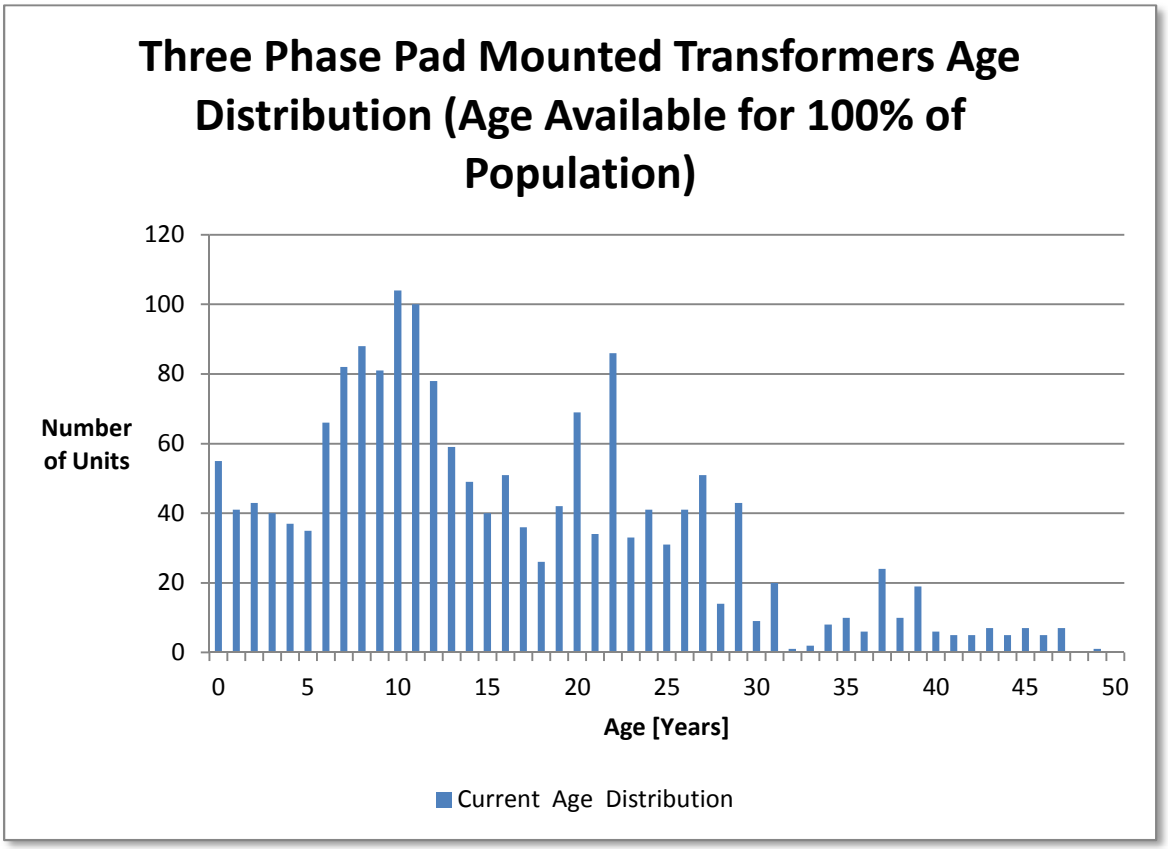

Figure 4-3 Three Phase Pad Mounted Transformers Age Distribution

4.3. Health Index Results

Single Phase Pad Mounted Transformers

There are a total of 14196 Single Phase Pad Mounted Transformers at EHM. Of these, there are 14196 units with sufficient data for a Health Indexing.

The average Health Index for this asset group is 90%. Approximately 6% of the population was found to be in poor or very poor condition.

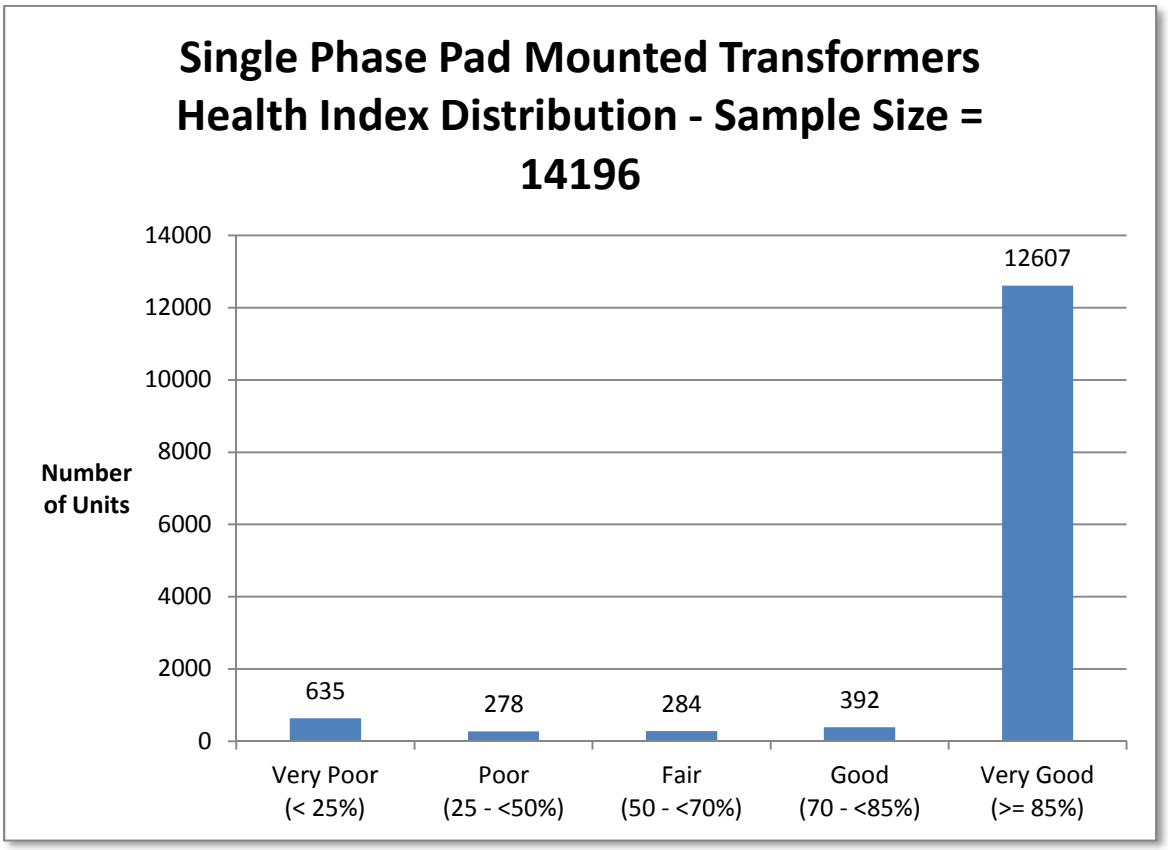

Figure 4-4 Single Phase Pad Mounted Transformers Health Index Distribution (Unit)

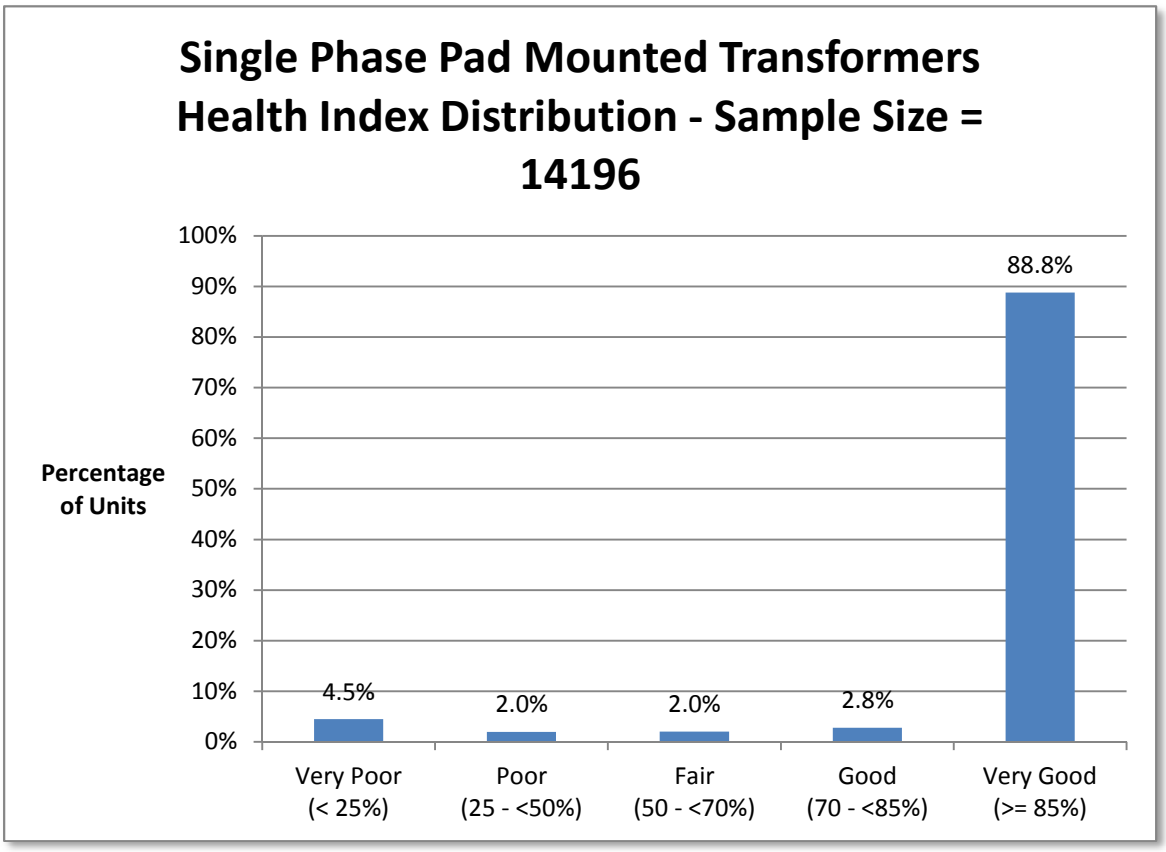

Figure 4-5 Single Phase Pad Mounted Transformers Health Index Distribution (Percentage)

Three Phase Pad Mounted Transformers

There are a total of 1755 Three Phase Pad Mounted Transformers at EHM. Of these, there are 1755 units with sufficient data for a Health Indexing.

The average Health Index for this asset group is 91%. Nearly 4% of the population was found to be in poor or very poor condition.

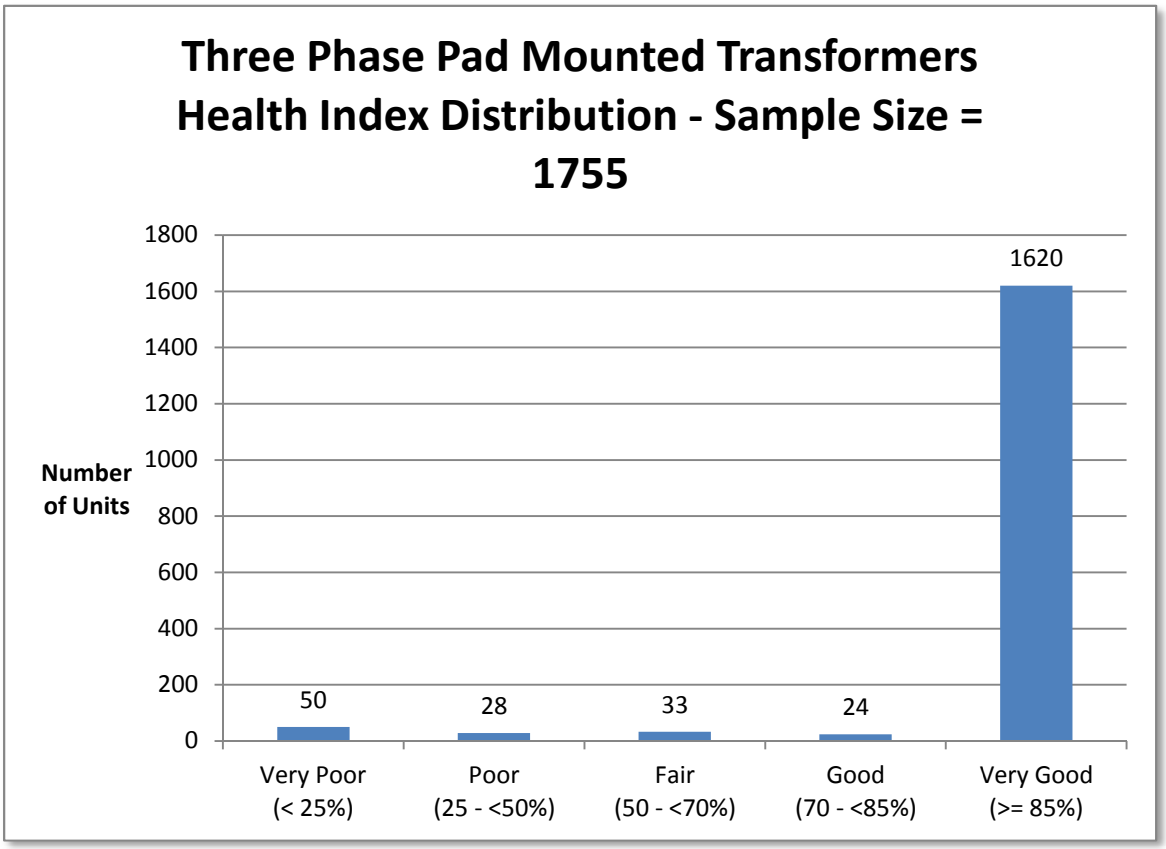

Figure 4-6 Three Phase Pad Mounted Transformers Health Index Distribution (Unit)

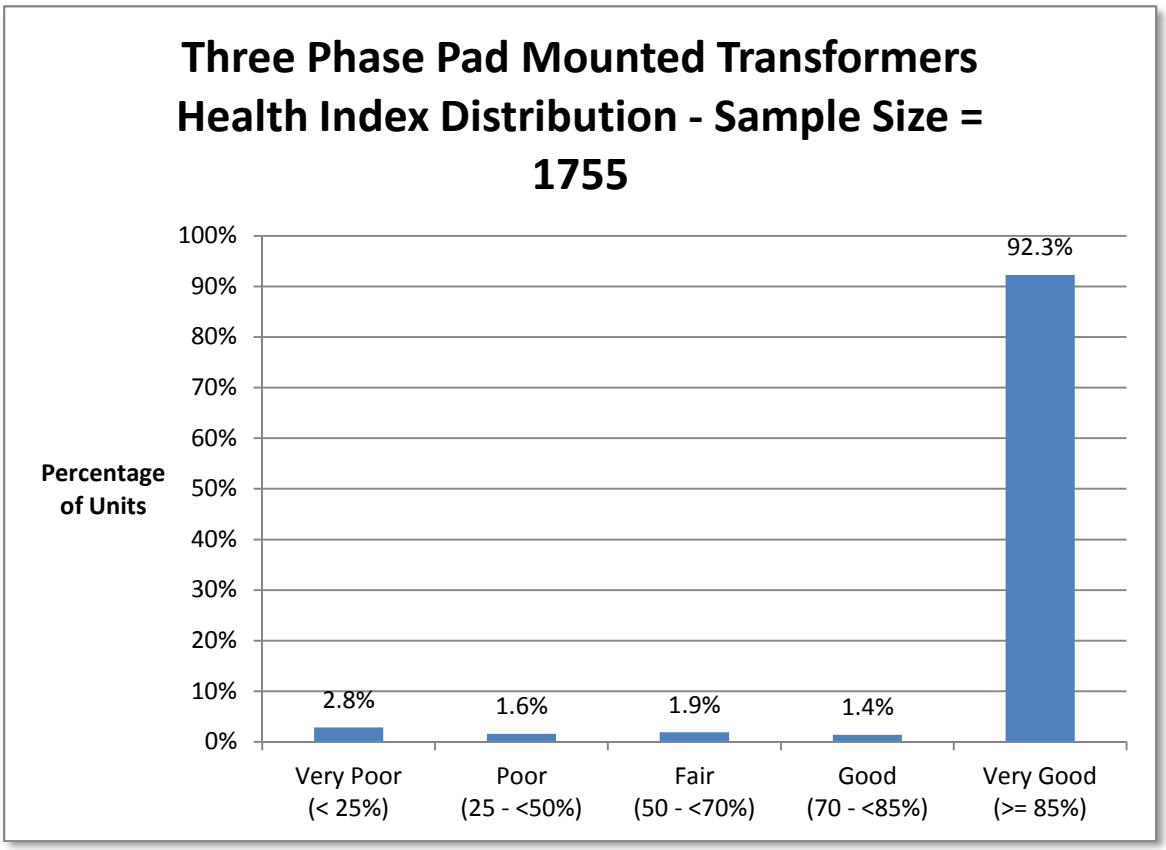

Figure 4-7 Three Phase Pad Mounted Transformers Health Index Distribution (Percentage)

4.4. Condition-Based Replacement Plan

As it is assumed that Pad Mounted Transformers are reactively replaced, the replacement plan is based on the asset failure rate, f(t).

Single Phase Pad Mounted Transformers

The replacment plan is as follows:

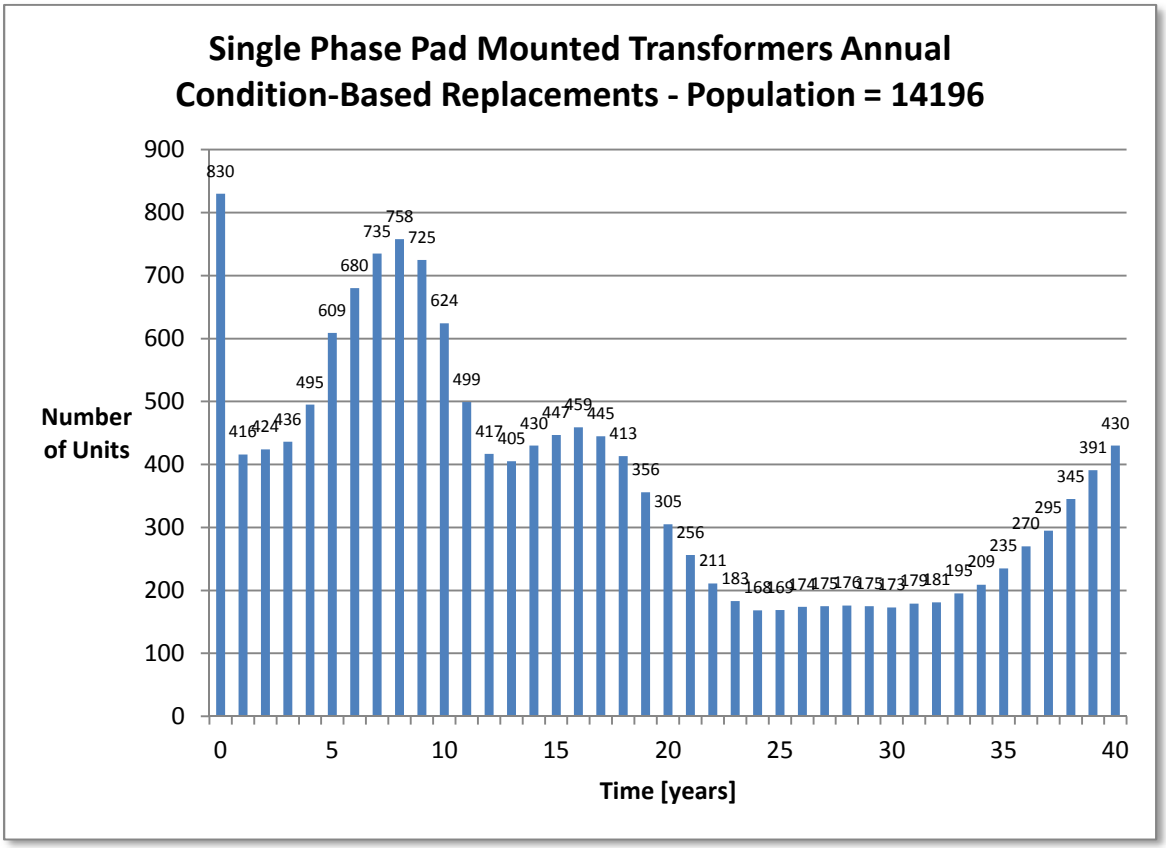

Figure 4-8 Single Phase Pad Mounted Transformers Condition-Based Replacement Plan

Three Phase Pad Mounted Transformers

The replacment plan is as follows:

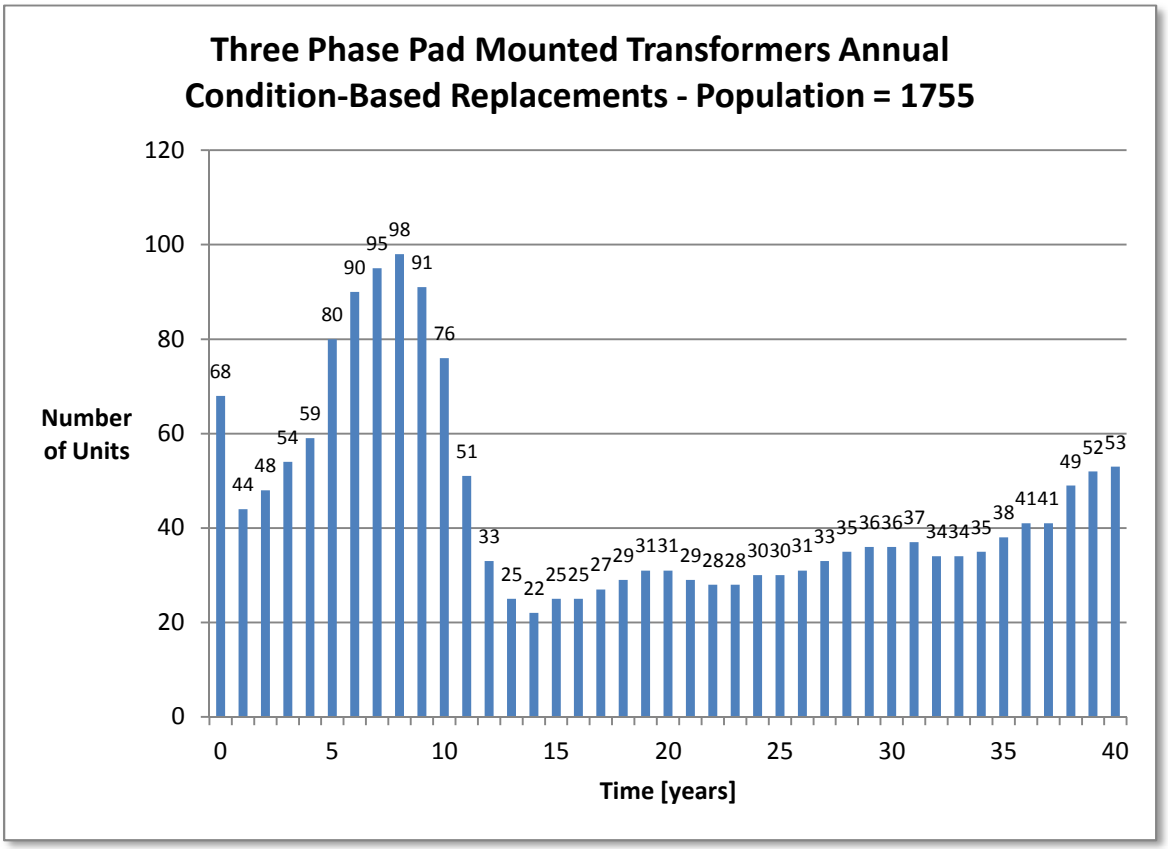

Figure 4-9 Three Phase Pad Mounted Transformers Condition-Based Replacement Plan

4.5. Data Analysis

Age was the only condition data available for this asset group. The assessment is age-based only and because the age of all units is known, the average DAI for this asset category is 100%.

In the spring of 2012, Enersource launched a visual inspection program for this asset group. As such, the data gaps noted in the 2011 report, "Enersource Hydro Mississauga 2011 Asset Condition Assessment", as shown on the subsequent table, are well on the way to being addressed. It is expected that such data can be incorporated into the next year's condition assessment.

Data Gap (Sub-Condition Parameter)	**Parent Condition Parameter**	**Priority**	**Object or Component Addressed**	**Description**	**Source of Data**
Tank Corrosion	Physical Condition	☆☆	Transformer tank	Tank surface rust or deterioration due to environmental factors	Visual inspection
Oil Leak	Connection & Insulation	☆☆☆	Transformer tank	Leakage	Visual inspection
Connection		☆☆☆	Transformer connection	Poor connection / hot spots	Visual inspection or IR scan
Grounding		☆	Transformer tank	Poor grounding wire connection	Visual inspection
Access		☆	Transformer case	Corrosion / Obstruction to work	Visual inspection
Base		☆	Transformer foundation	Erosion	Visual inspection
Bushing		☆☆	Porcelain	Crack / Dirt	Visual inspection
Overall	Service Record	☆	Transformer	General status evaluation based on routine operation and inspection	Operation record
Loading		☆☆	Transformer load	Loading History: e.g. hourly peak loads	Operation record

5. VAULT TRANSFORMER

5.1. Health Index Formula

Assume a parameter scoring system of 0 though 4, where 0 and 4 represent the "worst" and "best" scores respectively. Thus, the maximum score for any condition or sub-condition parameter (maximum CPS and CPF) is "4".

5.1.1. Condition and Sub-Condition Parameters

Table 5-1 Condition Parameter and Weights

m	Condition Parameter	WCP_m	Sub-Condition Parameters
1	Physical condition	7	Table 5-2
2	Connection and Insulation	5	Table 5-3
3	Service Record	5	Table 5-4

Table 5-2 Physical Condition Sub-Condition Parameters and Weights (m=1)

n	Sub-Condition Parameter	$WCPF_n$	Condition Criteria Table
1	Corrosion	3	Table 5-5
2	Housekeeping	5	Table 5-5

Table 5-3 Connection & Insulation Sub-Condition Parameters and Weights (m=2)

n	Sub-Condition Parameter	$WCPF_n$	Condition Criteria Table
1	Oil Leak	1	Table 5-5
2	Bushing	2	Table 5-5

Table 5-4 Service Record Sub-Condition Parameters and Weights (m=3)

n	Sub-Condition Parameter	$WCPF_n$	Condition Criteria Table
1	Overall	1	Table 5-5
2	Age	1	Figure 5-1

5.1.2. Condition Criteria

Visual Inspections

Table 5-5 Visual Inspection Criteria

Score	Condition Description
4	OK
0	Not OK

Age

Assume that the failure rate Vault Transformer exponentially increases with age and that the failure rate equation is as follows:

$$f = e^{\beta(t-\alpha)}$$

f	= failure rate of an asset (percent of failure per unit time)
t	= time
α, β	= constant parameters that control the rise of the curve

The corresponding survivor function is therefore:

$$S_f = 1 - \ P_f = e^{-(f-e^{-\alpha\beta})/\beta}$$

S_f	= survivor function
P_f	= cumulative probability of failure

Assuming that at the ages of 35 and 45 years the probability of failures (P_f) for this asset are 20% and 99% respectively results in the survival curve shown below. It follows that the Score for Age is the survival curve normalized to the maximum Score of 4 (i.e. 4*Survival Curve). The Score vs. Age is also shown in the figure below.

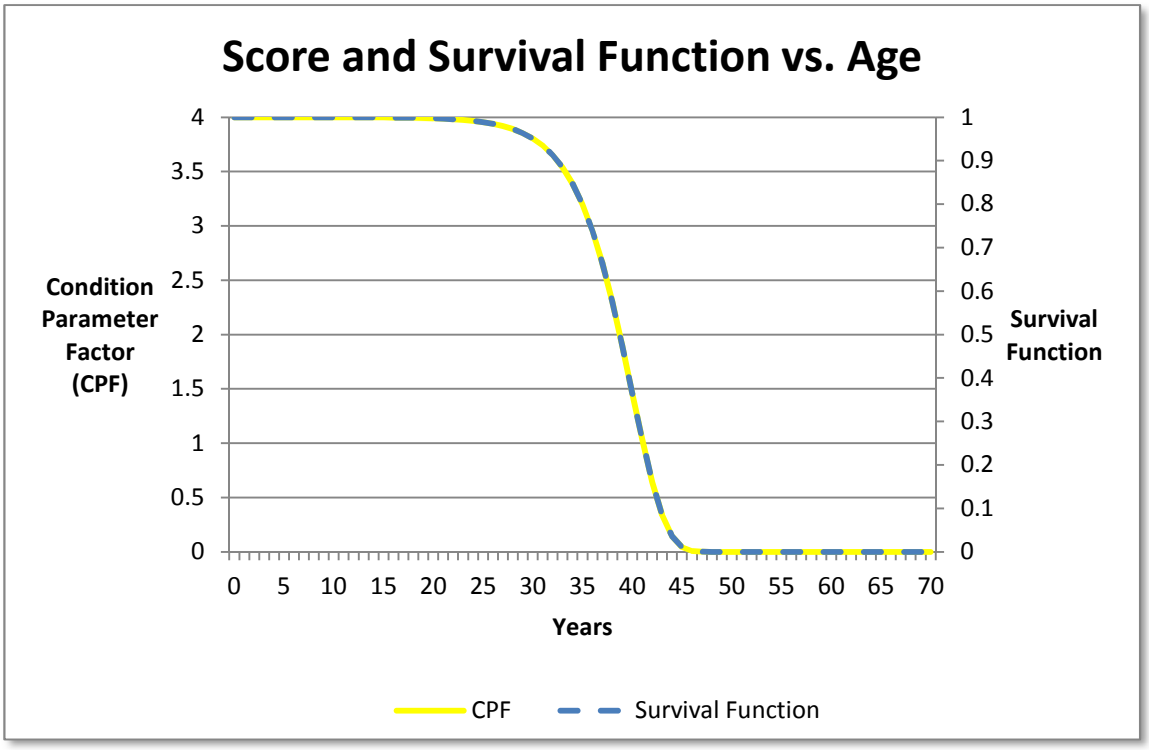

Figure 5-1 Vault Transformer Age Criteria

5.2. Age Distribution

The average age of all single phase units is 26 years. Approximately 22% of the population is 35 years or older.

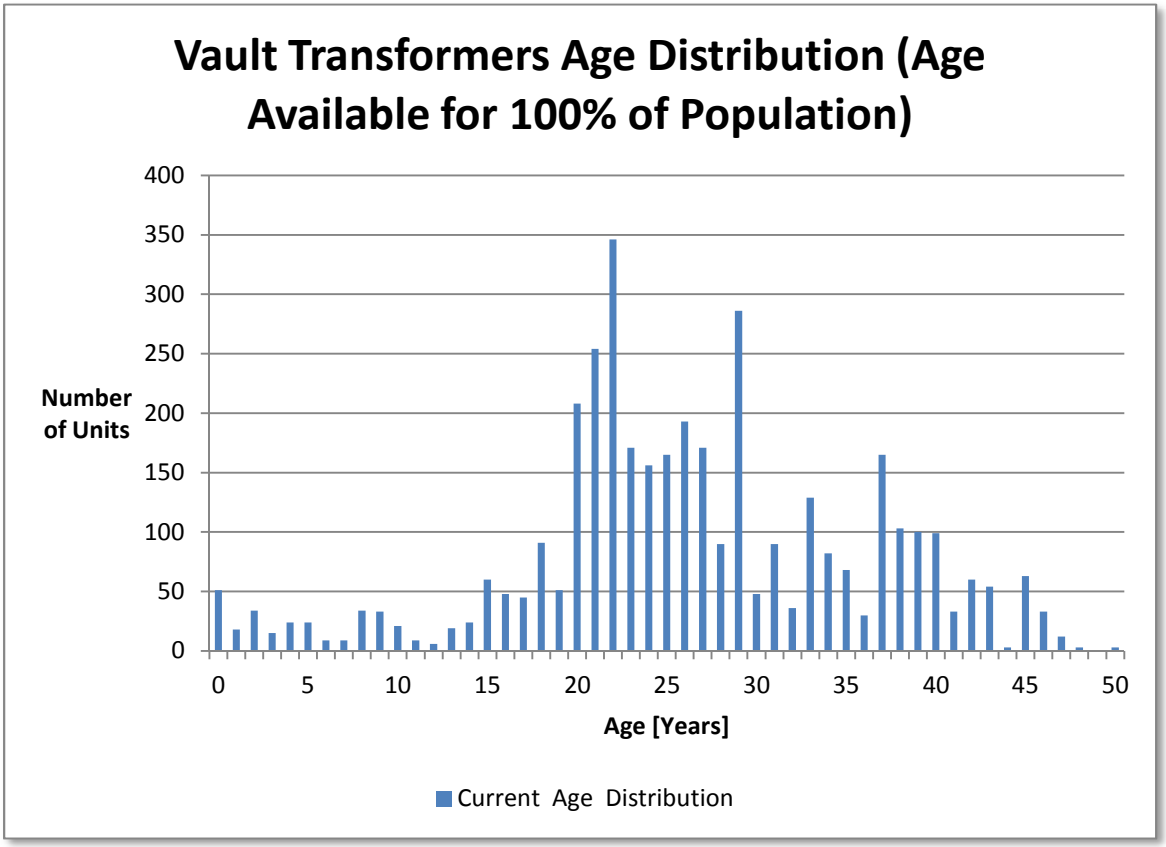

Figure 5-2 Vault Transformer Age Distribution

5.3. Health Index Results

There are 3891 Vault Transformers at EHM. Of these, there are 3891 units with sufficient data for a Health Indexing.

The average Health Index for this asset group is 87%. Approximately 7% of the population is in poor or very poor condition.

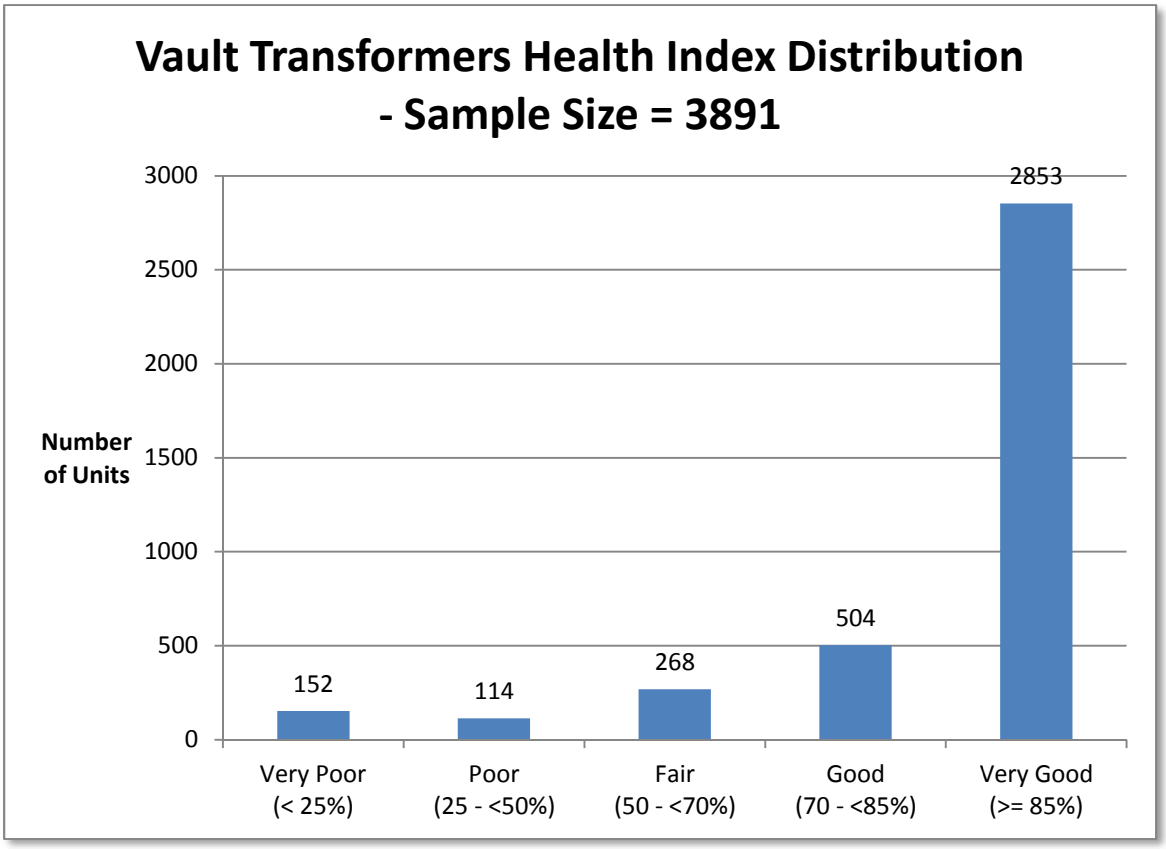

Figure 5-3 Vault Transformer Health Index Distribution (Unit)

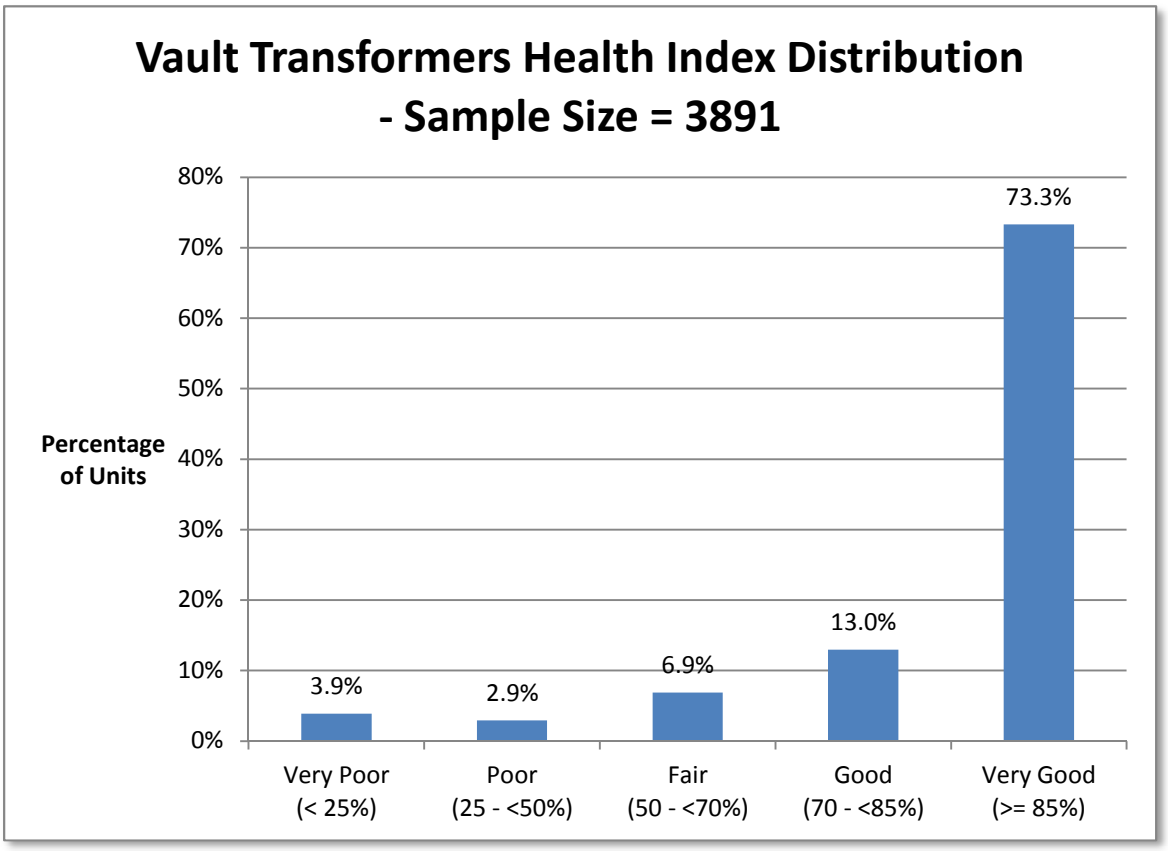

Figure 5-4 Vault Transformer Health Index Distribution (Percentage)

5.4. Condition-Based Replacement Plan

As it is assumed that Vault Transformer are reactively replaced, the replacement plan is based on the asset failure rate, f(t).

The condition-based replacement plan is as follows:

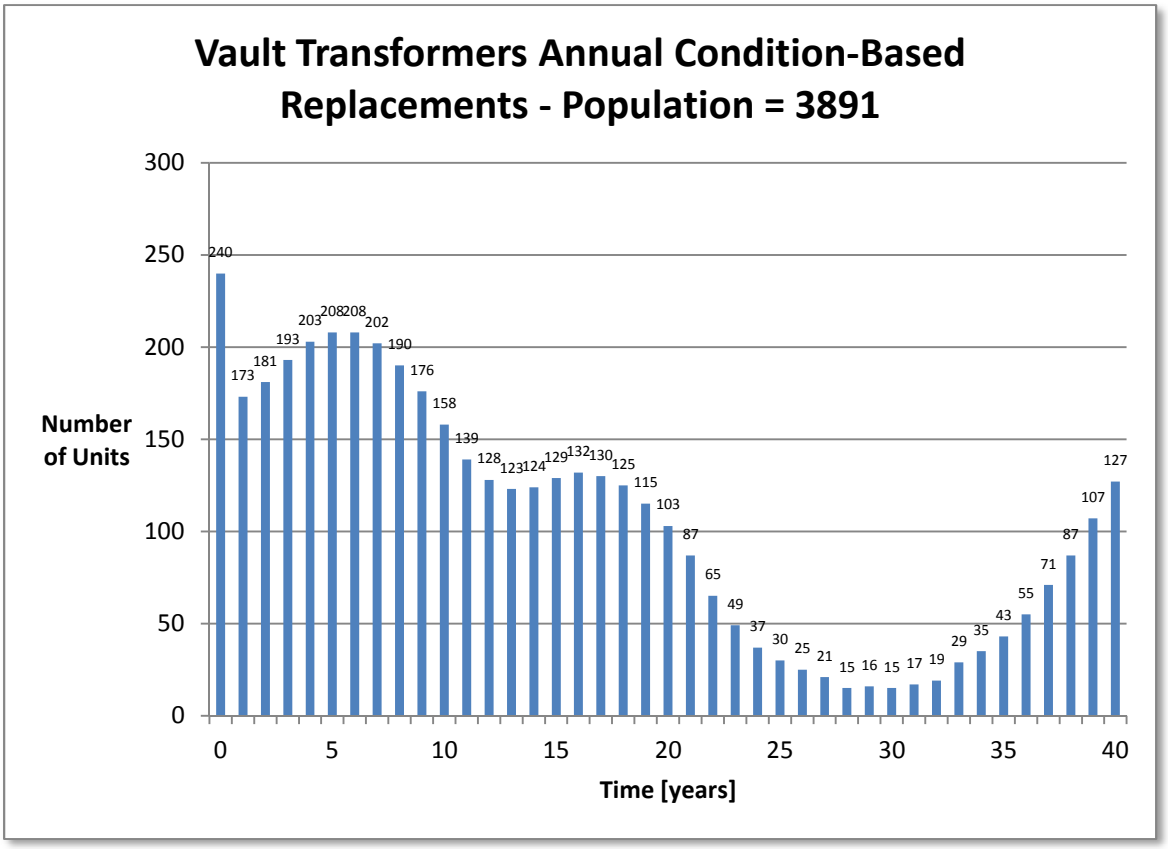

Figure 5-5 Vault Transformer Condition-Based Replacement Plan

5.5. Data Analysis

The condition data for this asset category includes visual inspection results and age.

Data Availability Indicator

The data availability distribution for this asset class is as follows.

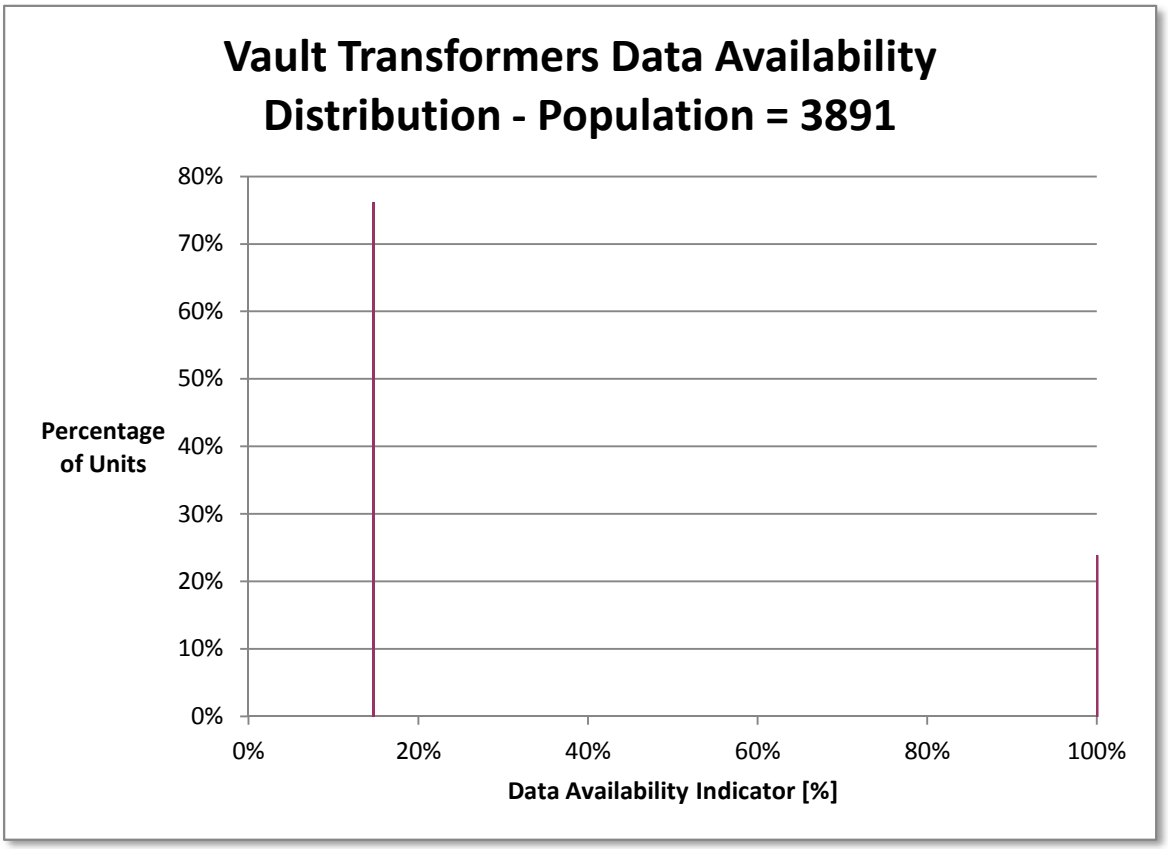

Figure 5-6 Vault Transformer Data Availability Distribution

The average data availability indicator for this asset category is improved from 23% last year to 35% this year. Age is available for the entire population and inspections were available for 24% of the population.

Data Gap

Since the 2011 assessment, the PCB content of vault transformers was collected and included in the Health Index assessment. The data gaps noted in the 2011 report, however, remain to be addressed. Please refer to "Enersource Hydro Mississauga 2011 Asset Condition Assessment" for details.

Data Gap (Sub-Condition Parameter)	**Parent Condition Parameter**	**Priority**	**Object or Component Addressed**	**Description**	**Source of Data**
Access	Connection & Insulation	☆	Transformer vault	Obstruction to work inside	Visual inspection
Connection		☆ ☆ ☆	Transformer connection	Poor connection / hot spots	Visual inspection or IR scan
Loading	Service Record	☆ ☆	Transformer load	Loading History: e.g. hourly peak loads	Operation record

6. PAD MOUNTED SWITCHGEAR

6.1. Health Index Formula

Assume a parameter scoring system of 0 though 4, where 0 and 4 represent the "worst" and "best" scores respectively. Thus, the maximum score for any condition or sub-condition parameter (maximum CPS and CPF) is "4".

6.1.1. Condition and Sub-Condition Parameters

Table 6-1 Condition Parameter and Weights

m	Condition Parameter	WCP_m	Sub-Condition Parameters
1	Physical Condition	6	Table 6-2
2	Switch/Fuse Condition	3	Table 6-3
3	Insulation	3	Table 6-4
4	Service Record	8	Table 6-5

Table 6-2 Physical Condition Sub-Condition Parameters and Weights (m=1)

n	Sub-Condition Parameter	$WCPF_n$	Condition Criteria Table
1	Corrosion	4	Table 6-6
2	Access	1	Table 6-6
3	Debris/Dirt	1	Table 6-6
4	Paint	1	Table 6-6
5	Base (Grade/Fill)	1	Table 6-6

Table 6-3 Switch/Fuse Sub-Condition Parameters and Weights (m=2)

n	Sub-Condition Parameter	$WCPF_n$	Condition Criteria Table
1	Switch	1	Table 6-6
2	Arc Suppressor	1	Table 6-6

Table 6-4 Insulation Sub-Condition Parameters and Weights (m=3)

n	Sub-Condition Parameter	$WCPF_n$	Condition Criteria Table
1	Insulator	2	Table 6-6
2	Barriers	1	Table 6-6

Table 6-5 Service Record Sub-Condition Parameters and Weights (m=4)

n	Sub-Condition Parameter	$WCPF_n$	Condition Criteria Table
1	Overall	3	Table 6-7
2	Age	1	Figure 6-1

6.1.2. Condition Criteria

Visual Inspections

Table 6-6 Visual Inspection Criteria (OK/Not OK)

Score	Condition Description
4	OK
0	Not OK

Table 6-7 Visual Inspection Criteria (Life Grade)

Score	Condition Description (per Enersource Inspection Records)
4	5 (Best)
3	4
2	3
1	2
0	1 (Worst)

Age

Assume that the failure rate Pad Mounted Switchgear exponentially increases with age and that the failure rate equation is as follows:

$$f = e^{\beta(t-\alpha)}$$

f = failure rate of an asset (percent of failure per unit time)
t = time
α, β = constant parameters that control the rise of the curve

The corresponding survivor function is therefore:

$$S_f = 1 - \ P_f = e^{-(f-e^{-\alpha\beta})/\beta}$$

S_f = survivor function
P_f = cumulative probability of failure

Assuming that at the ages of 25 and 45 years the probability of failures (P_f) for this asset are 20% and 99% respectively results in the survival curve shown below. It follows that the Score for Age is the survival curve normalized to the maximum Score of 4 (i.e. 4*Survival Curve). The Score vs. Age is also shown in the figure below.

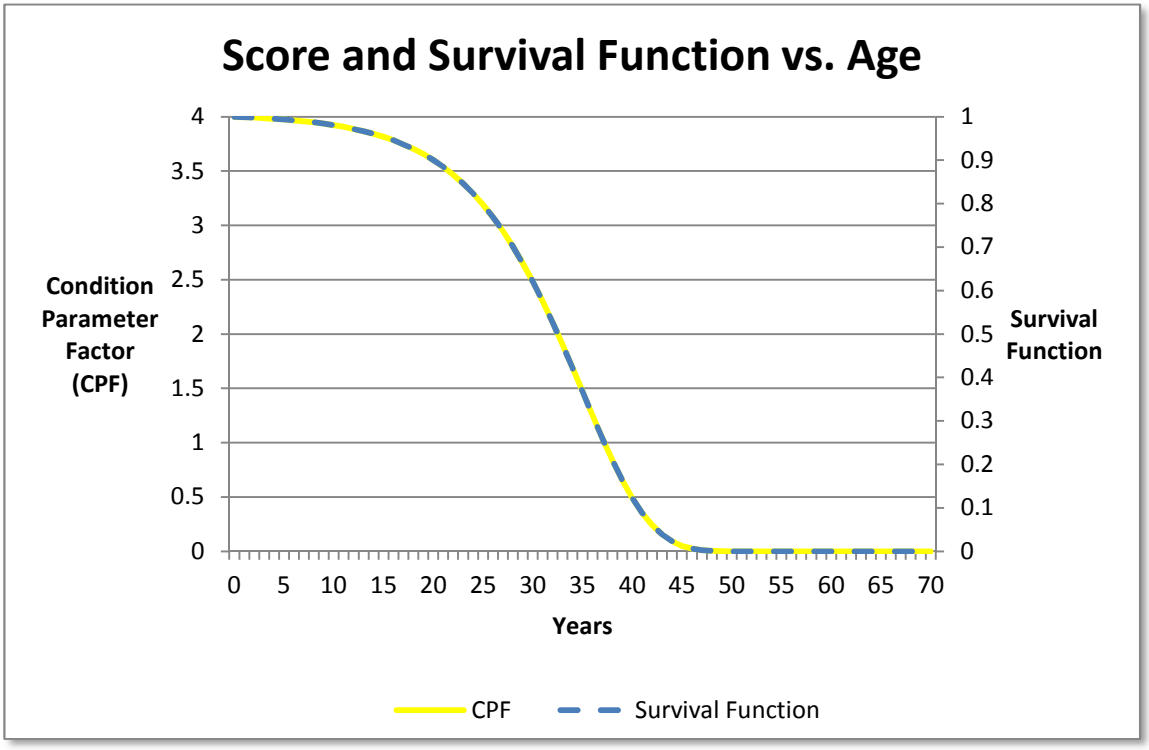

Figure 6-1 Pad Mounted Switchgear Age Criteria

6.2. Age Distribution

The average age of all units is 20 years. Approximately 30% of the population is 25 years or older.

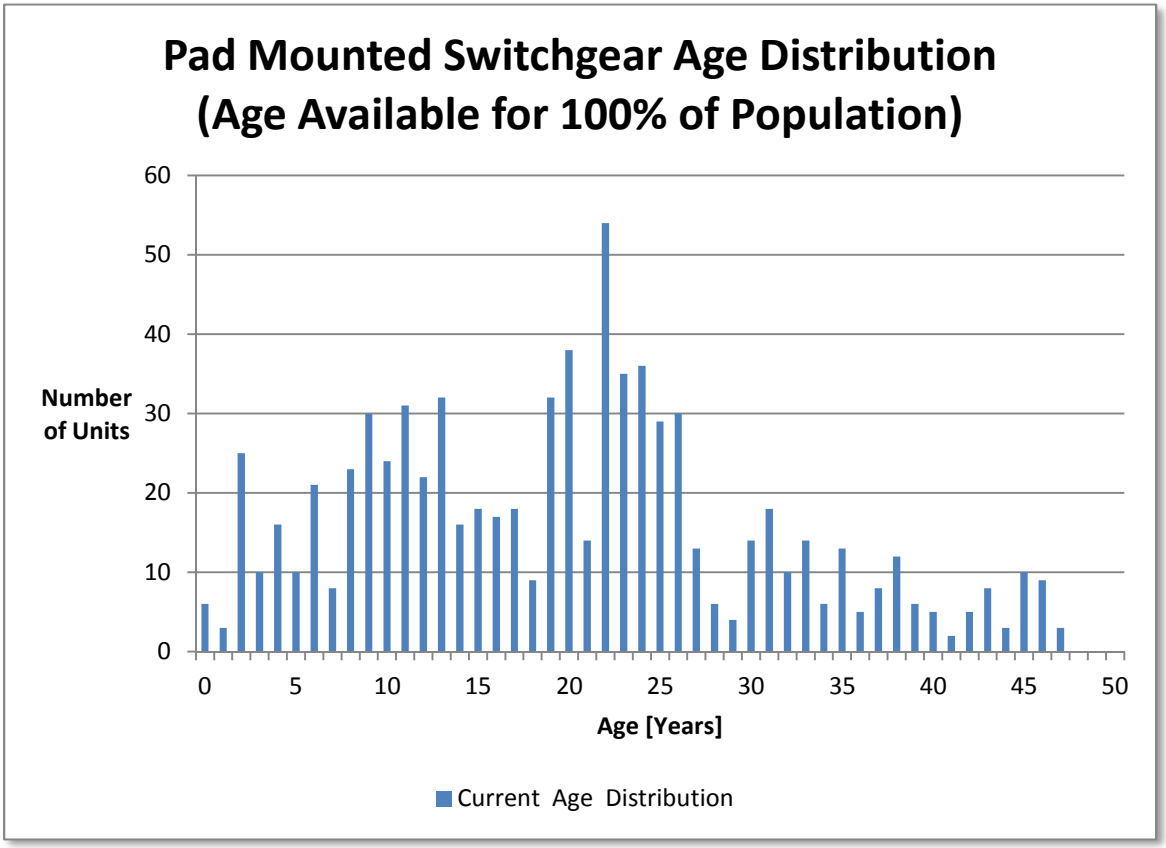

Figure 6-2 Pad Mounted Switchgear Age Distribution

6.3. Health Index Results

There are 781 Pad Mounted Switchgear at EHM. Of these, there are 781 units with sufficient data for a Health Indexing.

The average Health Index for this asset group is 79%. About 13% of the population is in poor or very poor condition.

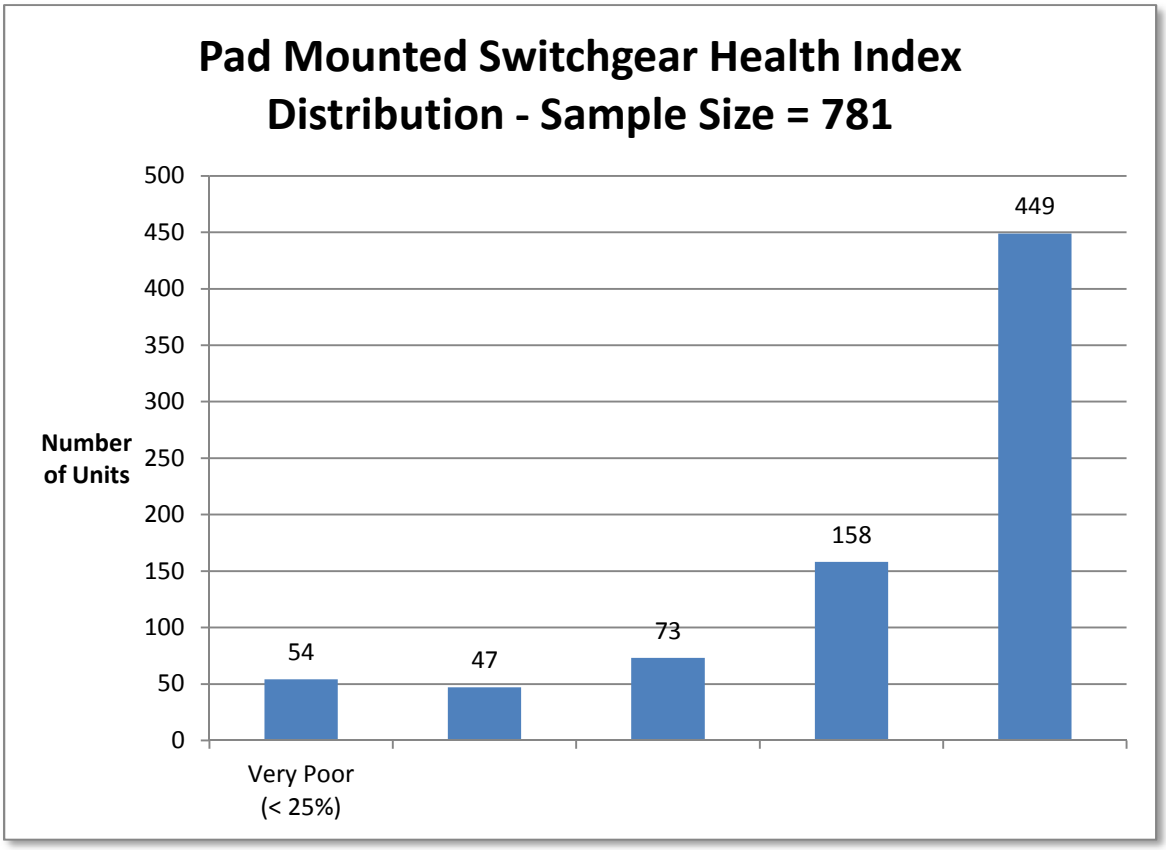

Figure 6-3 Pad Mounted Switchgear Health Index Distribution (Unit)

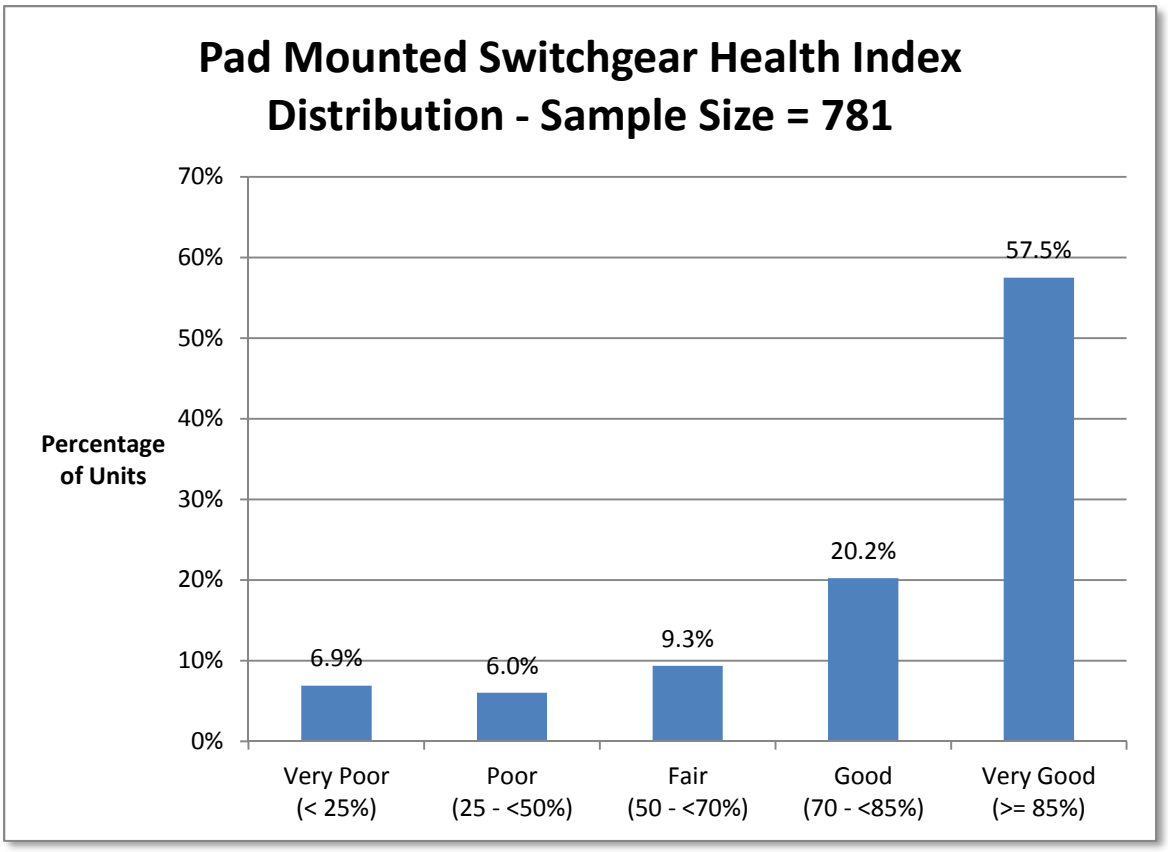

Figure 6-4 Pad Mounted Switchgear Health Index Distribution (Percentage)

6.4. Condition-Based Replacement Plan

As it is assumed that Pad Mounted Switchgear are reactively replaced, the replacement plan is based on the asset failure rate, f(t).

The condition-based replacement plan is as follows:

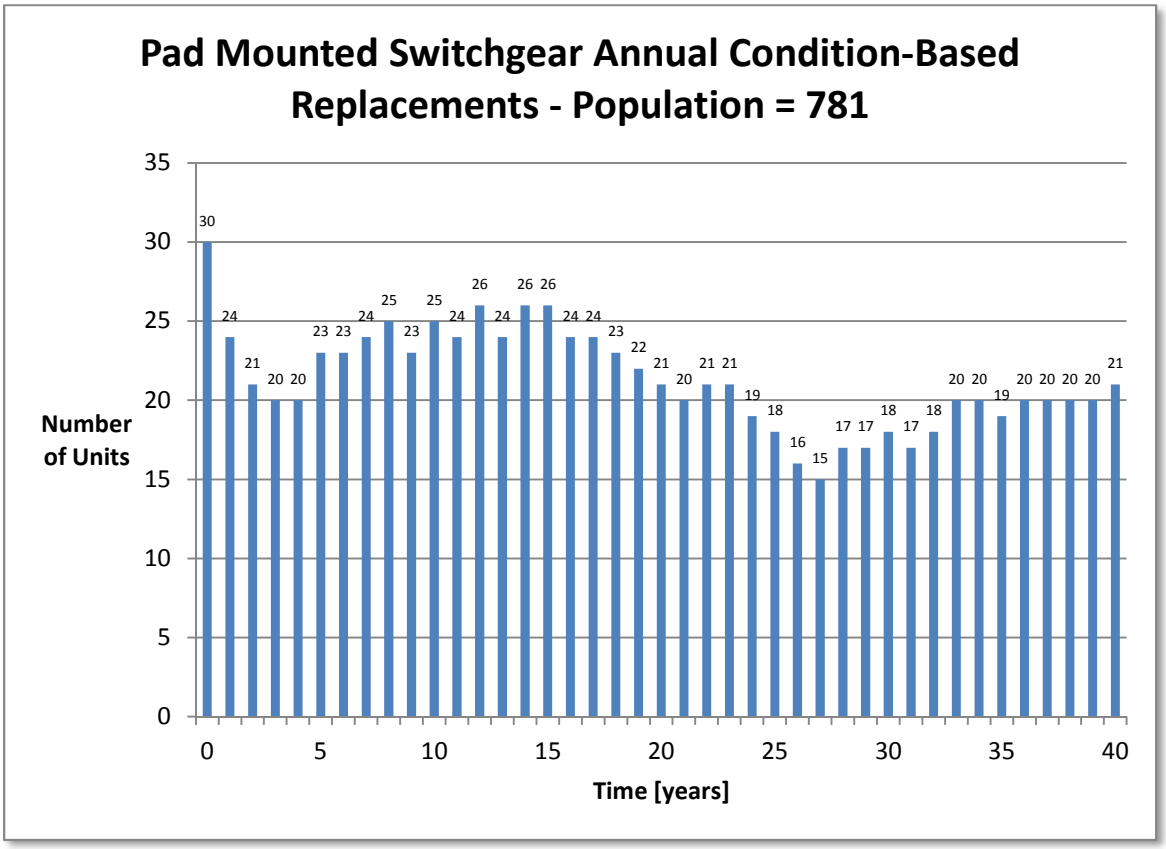

Figure 6-5 Pad Mounted Switchgear Condition-Based Replacement Plan

6.5. Data Analysis

The data for this asset category includes visual inspection results and age.

Data Availability Indicator

The data availability distribution for this asset class is as follows.

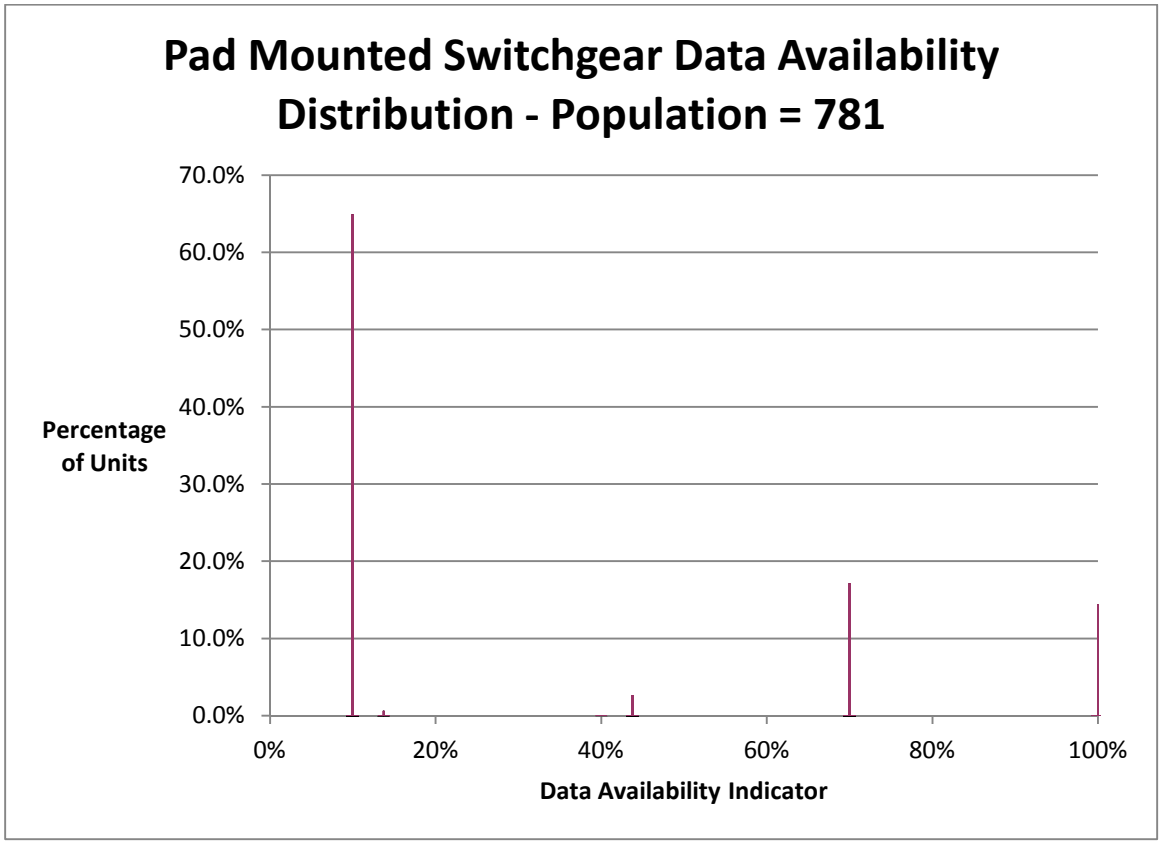

Figure 6-6 Pad Mounted Switchgear Data Availability Distribution

The average DAI of all units is 34%, a 7% improvement over last year's 27%. Age was available for all units. Inspection data, gathered from linemen inspections and dry ice cleaning, was available for approximately 24% of the population.

Data Gap

There are no data gaps for this asset group because all condition data required by the Health Index formula are being collected through inspections and dry ice cleaning. It should be noted, however, that only 24% of the population has inspection data. Such data should be collected for the remainder of the population.

7. OVERHEAD LINE SWITCHES

This study includes four sub-categories of overhead line switches: 44 kV, 27.6 kV, Inline, and Motorized. The Motorized sub-category is new to the 2012 assessment.

Note that Enersource continues to validate the classification and population counts of its overhead line switches. This assessment is based on the best available information to date.

7.1. Health Index Formula

Assume a parameter scoring system of 0 though 4, where 0 and 4 represent the "worst" and "best" scores respectively. Thus, the maximum score for any condition or sub-condition parameter (maximum CPS and CPF) is "4".

7.1.1. Condition and Sub-Condition Parameters

Table 7-1 Condition Parameter and Weights

m	Condition parameter	WCP_m		Sub-Condition Parameters
		Manual	Motorized	
1	Service Record	1	1	Table 7-2
De-Rating Factor (DRF)*	De-rate based on: Switch Type (R9/R10), IR Scan			Table 7-5

*For Load Break Switches only (44 kV and 27.6 kV)

Table 7-2 Service Record Sub-Condition Parameters and Weights (m=1)

n	Sub-Condition Parameter	$WCPF_n$	Condition Criteria Table
1	Age	6	Figure 7-1
2	Overall Switch Condition	4	Table 7-4
3	Missing Parts*	1	Table 7-3
4	Damaged Parts*	1	Table 7-3

* For Load Break Switches only (44 kV and 27.6 kV)

7.1.2. Condition Criteria

Visual Inspections (OK / Not OK)

Table 7-3 Visual Inspection Criteria (OK / Not OK)

Score	Condition Description
4	OK
0	Not OK

Table 7-4 Visual Inspection Criteria (Good / Bad)

Score	Condition Description (per Enersource Inspection Records)
4	Good
3	Okay
0	Bad

Age

Assume that the failure rate Overhead Line Switches exponentially increases with age and that the failure rate equation is as follows:

$$f = e^{\beta(t-\alpha)}$$

f = failure rate of an asset (percent of failure per unit time)
t = time
α, β = constant parameters that control the rise of the curve

The corresponding survivor function is therefore:

$$S_f = 1 - \ P_f = e^{-(f-e^{-\alpha\beta})/\beta}$$

S_f = survivor function
P_f = cumulative probability of failure

Assuming that at the ages of 40 and 55 years the probability of failures (P_f) for 27.6 kV, 44 kV, and Inline Switches are 80% and 99% respectively results in the survival curve shown below. It follows that the Score for Age is the survival curve normalized to the maximum Score of 4 (i.e. 4*Survival Curve). The Score vs. Age is also shown in the figure below.

For motorized switches, the ages of 25 and 55 are used.

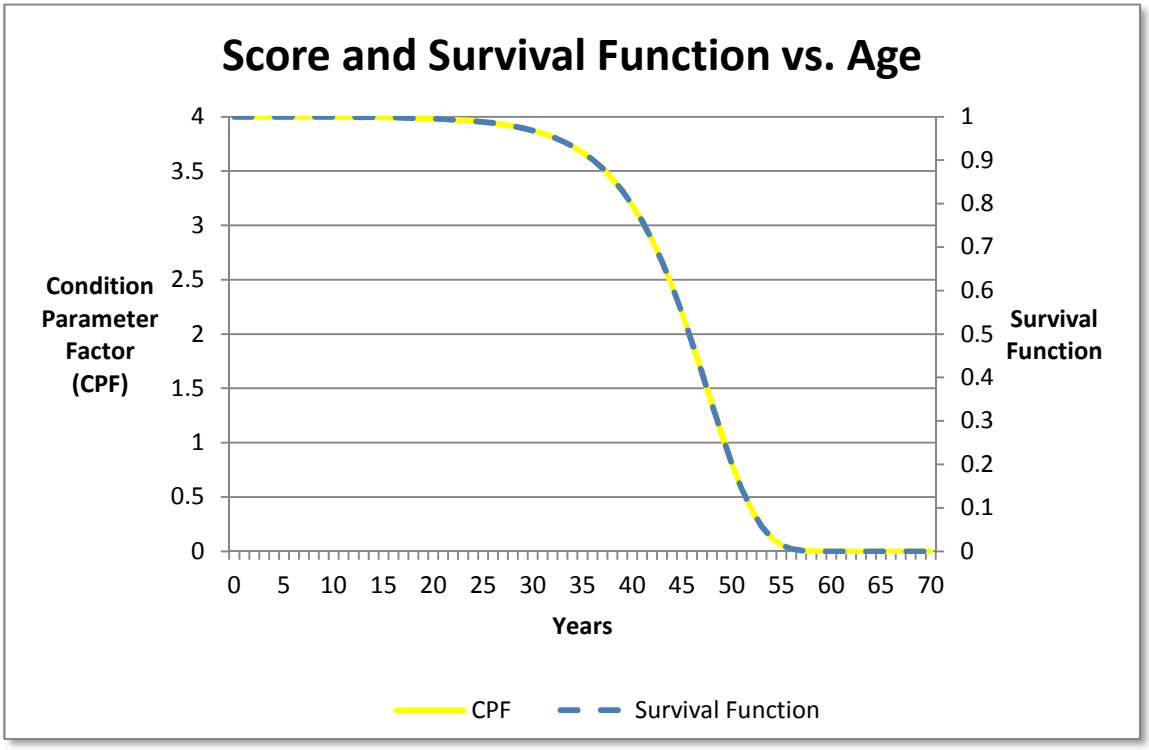

Figure 7-1 Overhead Line Switches Criteria (Non-Motorized and Inline)

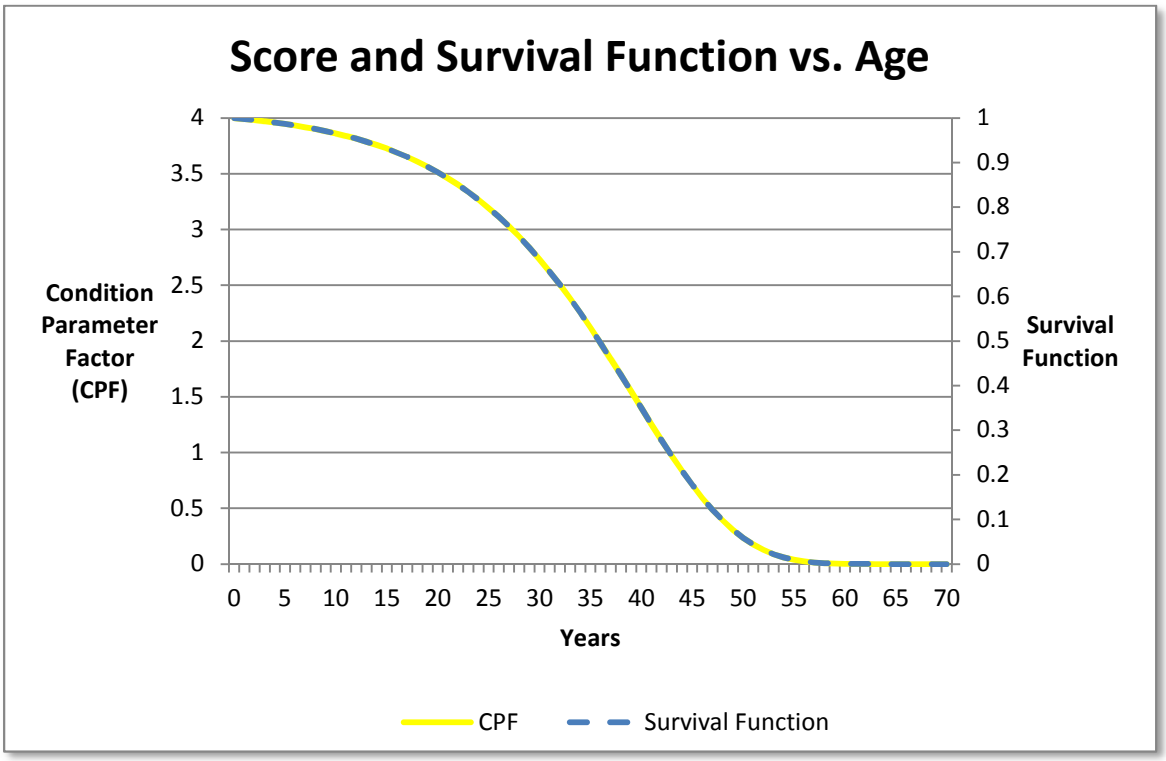

Figure 7-2 Overhead Line Switches Criteria (Motorized)

De-Rating Factor (DRF)

Table 7-5 De-Rating Criteria

n	Parameter	De-Rating Multiplier (DR_n)	DRF
1	Switch Type	Table 7-6	DRF = MIN(DR_1, DR_2)
1	IR Scan	Table 7-7	

Table 7-6 Switch Type De-Rating Multiplier (DR_1)

Switch Type	De-Rating Multiplier
R9	.9
All Others	1

Table 7-7 IR De-Rating Multiplier (DR_2)

IR Priority	De-Rating Multiplier
Red priority	0.7
Yellow priority	0.85
White priority	0.95

7.2. Age Distribution

44 kV Load Break Switches

The average age of all units is 18 years. Approximately 7% of the population is 40 years or older.

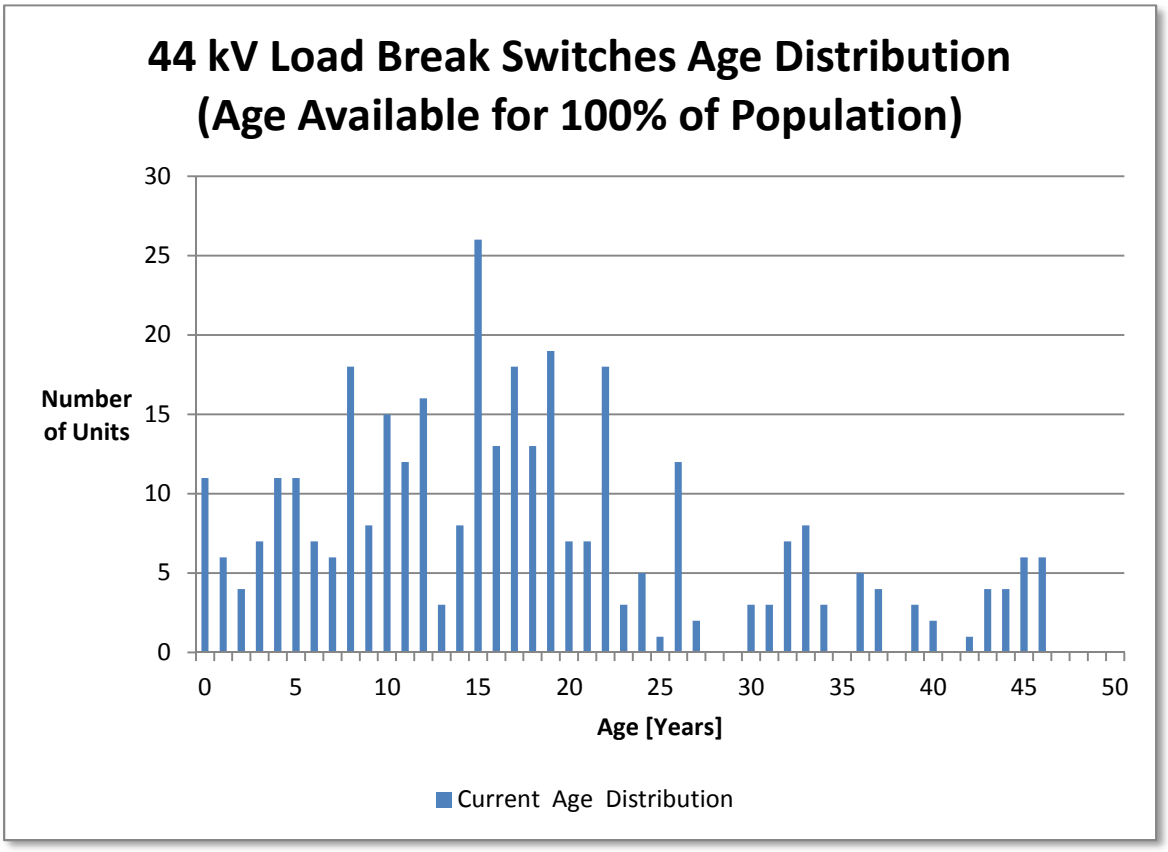

Figure 7-3 44 kV Load Break Switches Age Distribution

27.6 kV Load Break Switches

The average age of all units is 16 years. Approximately 5% of the population is 40 years or older.

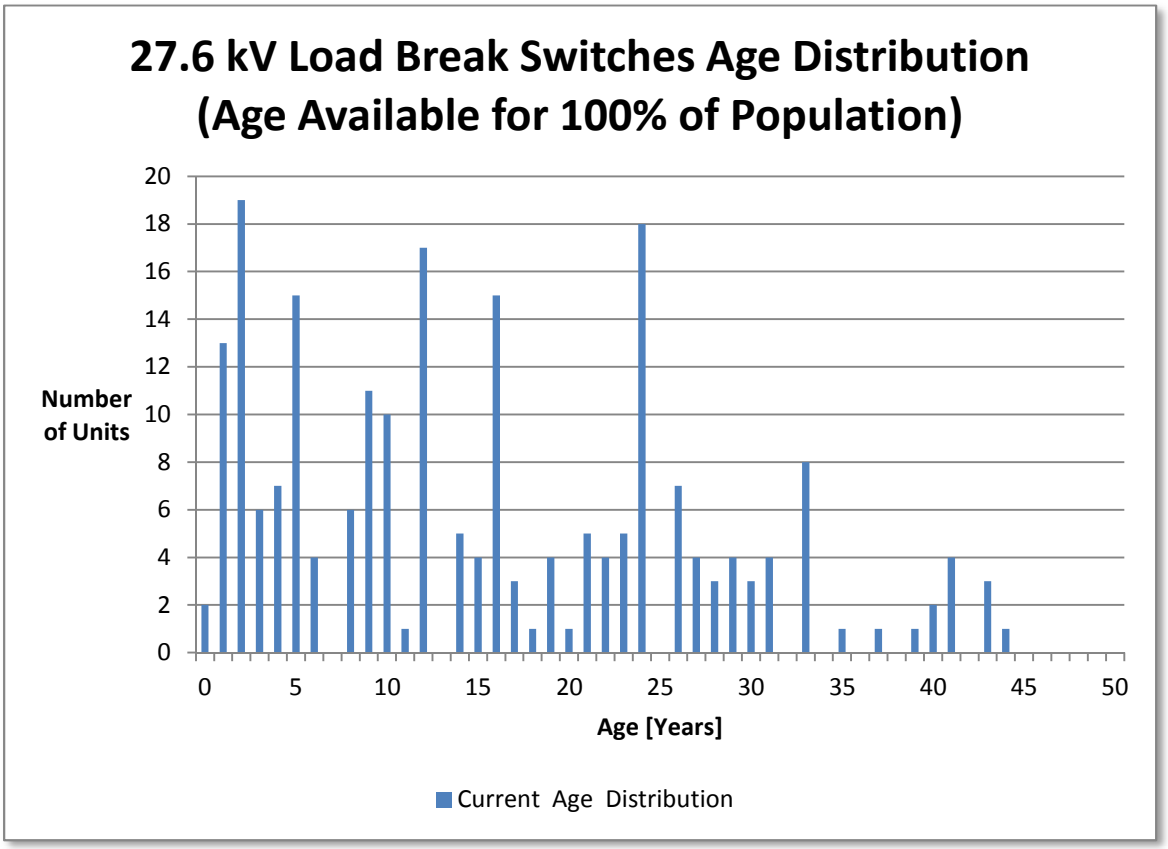

Figure 7-4 27.6kV Load Break Switches Age Distribution

In Line Switches

The average age of all units is 18 years. Approximately 10% of the population is 40 years or older.

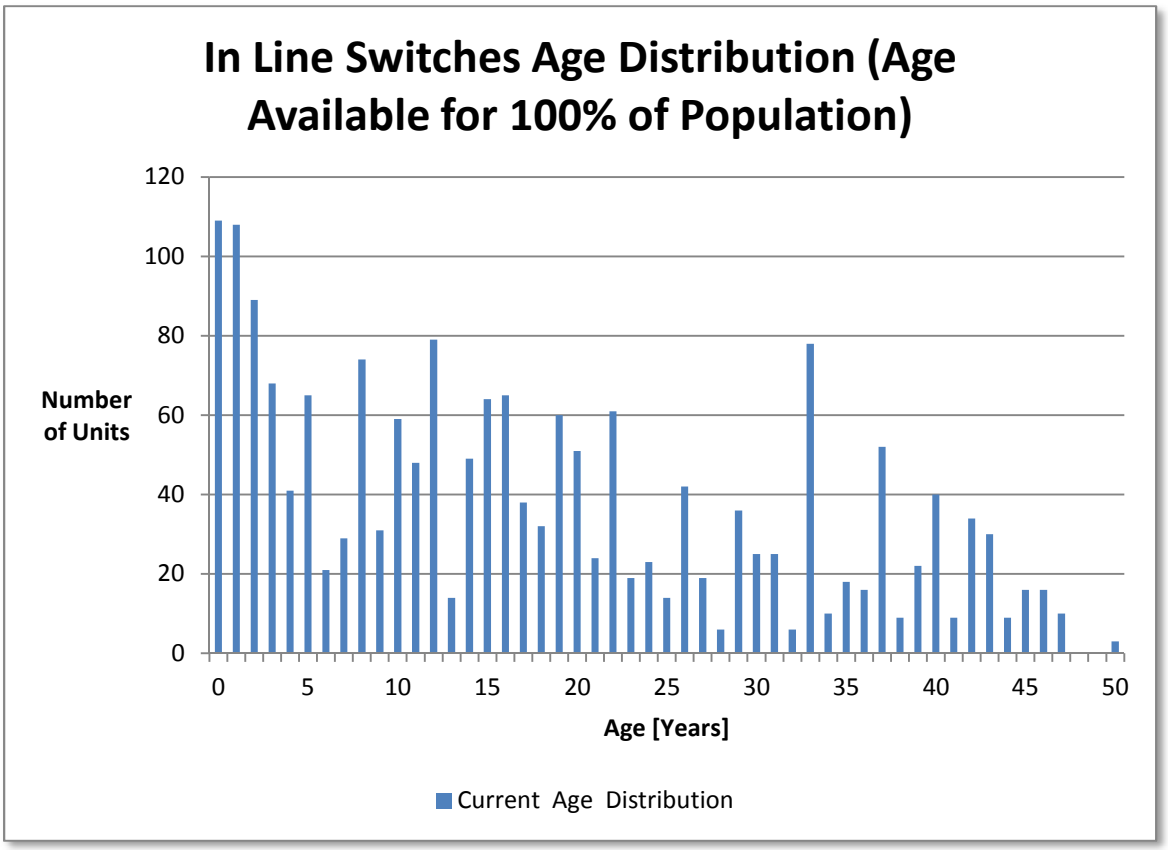

Figure 7-5 In Line Switches Age Distribution

Motorized Switches

The average age of all units is 15 years. Approximately 3% of the population is 25 years or older.

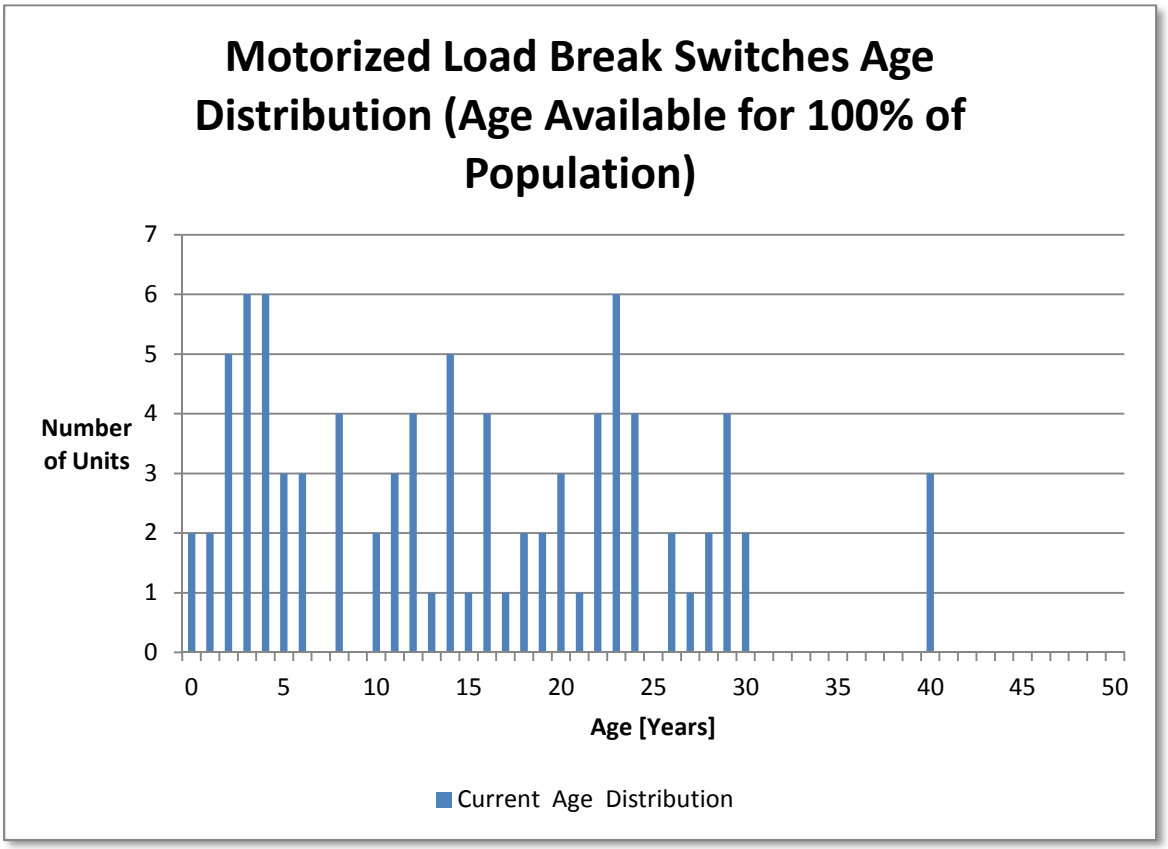

Figure 7-6 Motorized Switches Age Distribution

7.3. Health Index Results

44 kV Load Break Switches

There are 346 *44 kV Load Break Switches* at EHM. Of these, there are 346 units with sufficient data for a Health Indexing.

The average Health Index for this asset group is 90%. Approximately <1% were in poor or very poor condition.

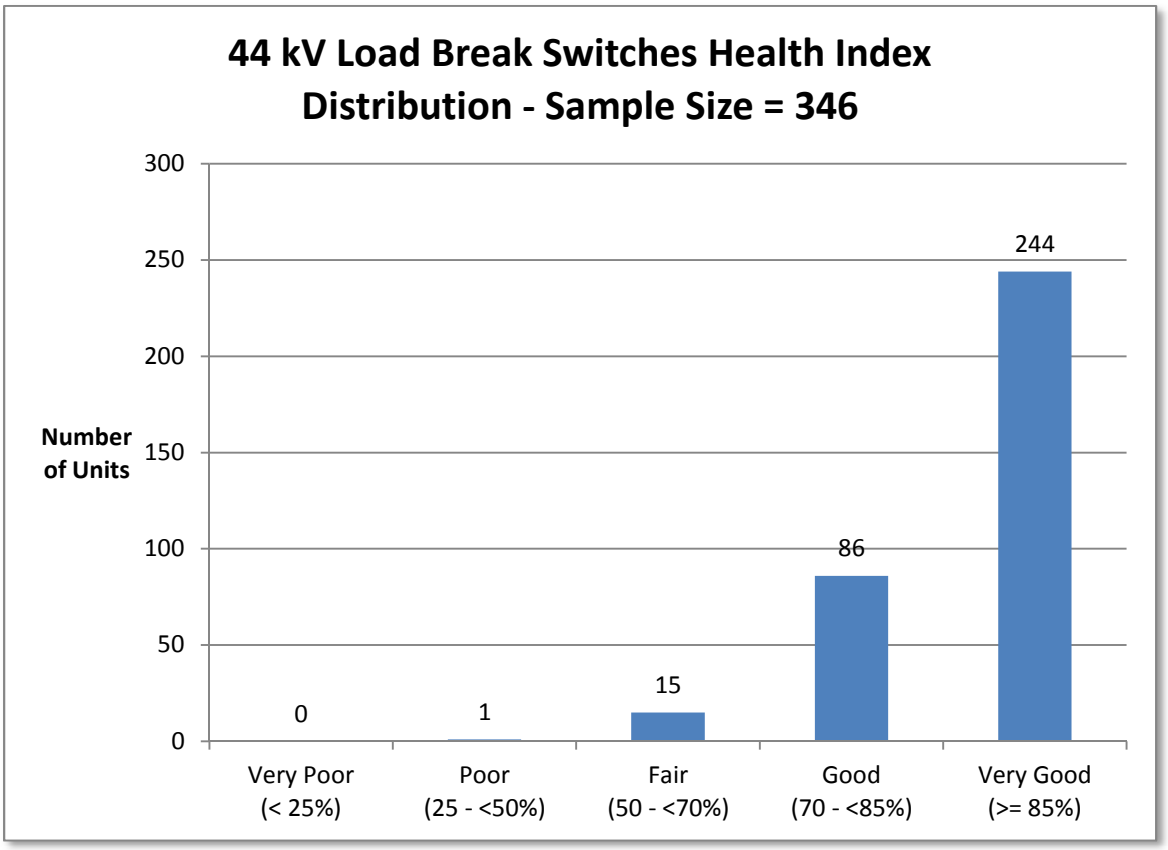

Figure 7-7 44 kV Load Break Switches Health Index Distribution (Unit)

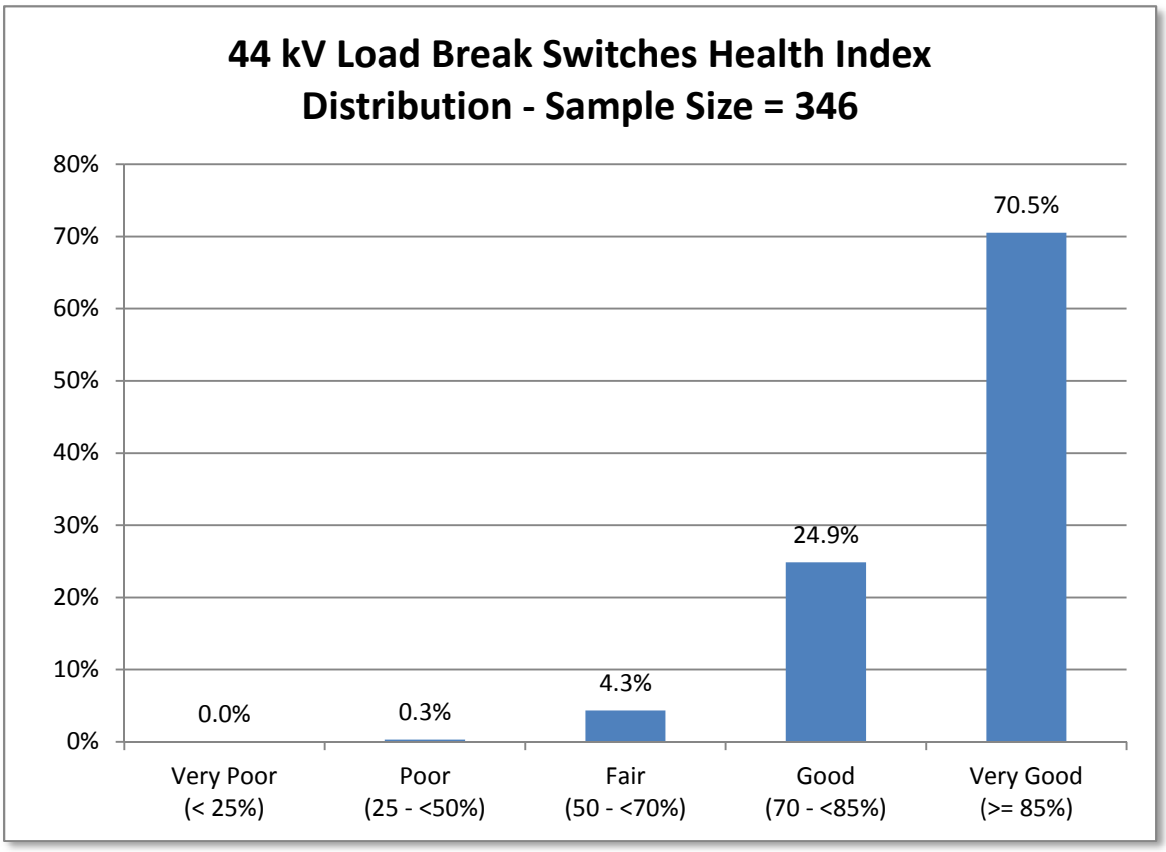

Figure 7-8 44 kV Load Break Health Switches Index Distribution (Percentage)

27.6 kV Load Break Switches

There are 224 *27.6 kV Load Break Switches*. Of these, there are 224 units with sufficient data for a Health Indexing.

The average Health Index for this asset group is 94%. Approximately <1% of the population is in poor or very poor condition.

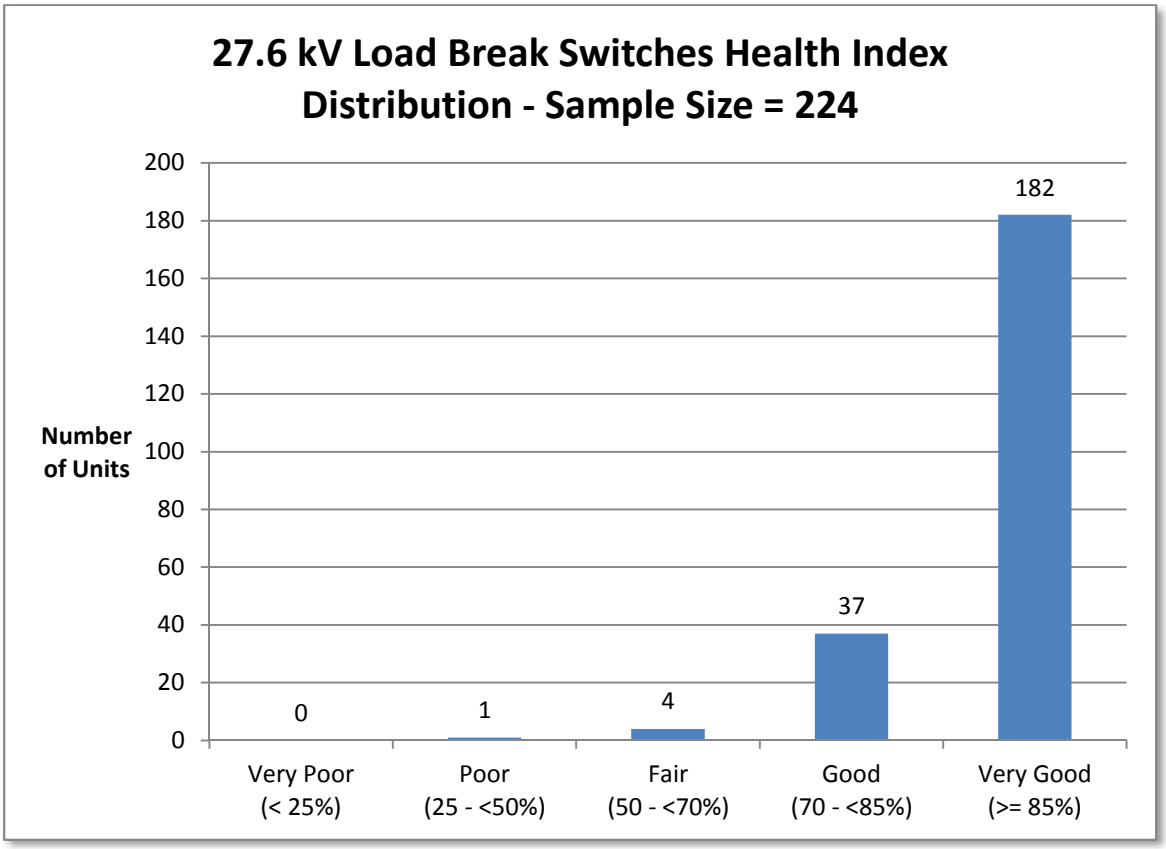

Figure 7-9 27.6kV Load Break Switches Health Index Distribution (Unit)

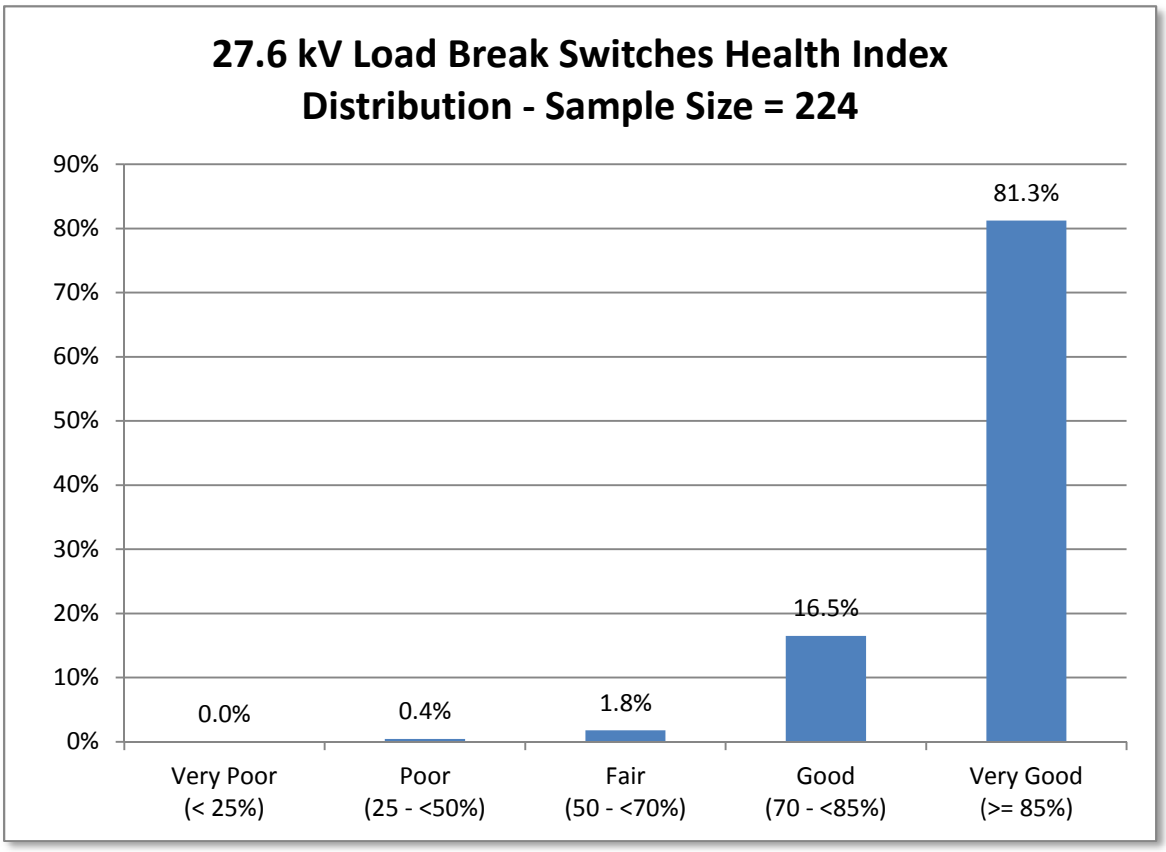

Figure 7-10 27.6kV Load Break Switches Health Index Distribution (Percentage)

In Line Switches

There are 1884 *In Line Switches* at EHM. Of these, there are 1880 units with sufficient data for a Health Indexing.

The average Health Index for this asset group is 96%. Approximately <1% of the population is in poor or very poor condition.

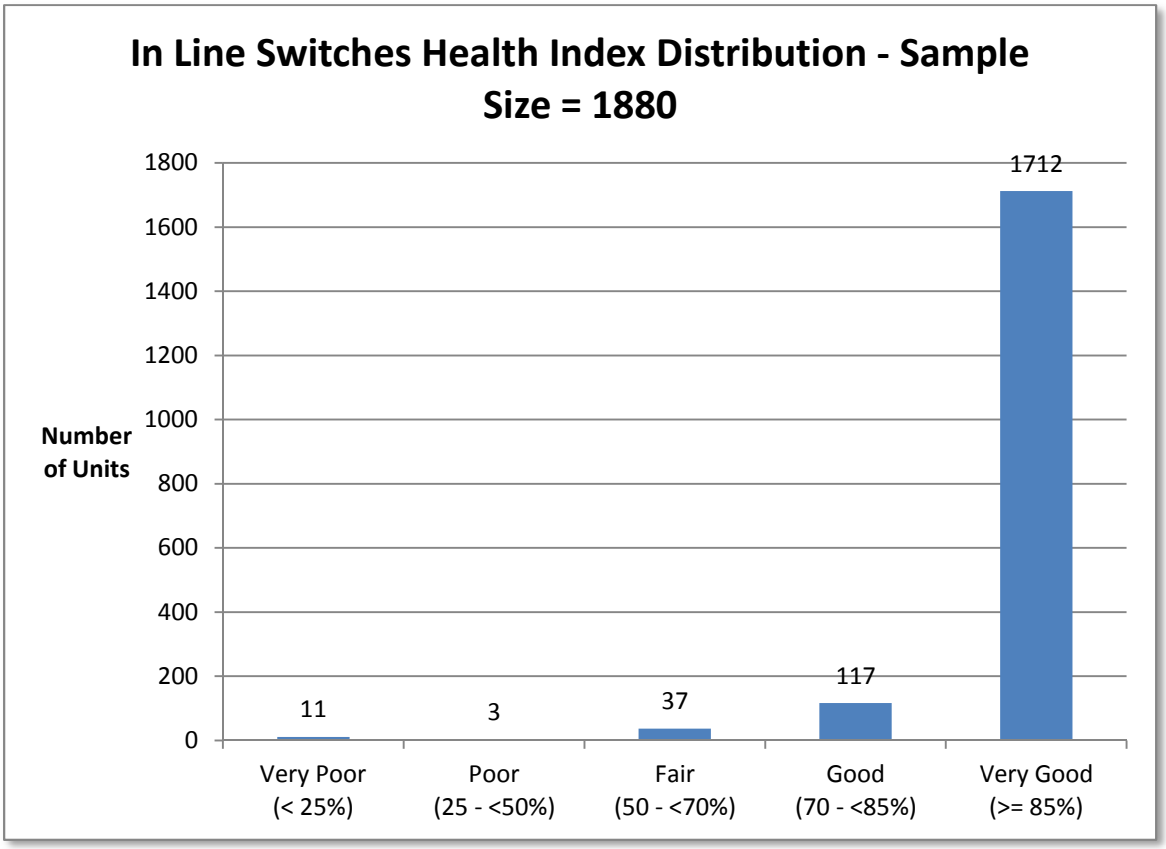

Figure 7-11 In Line Switches Health Index Distribution (Unit)

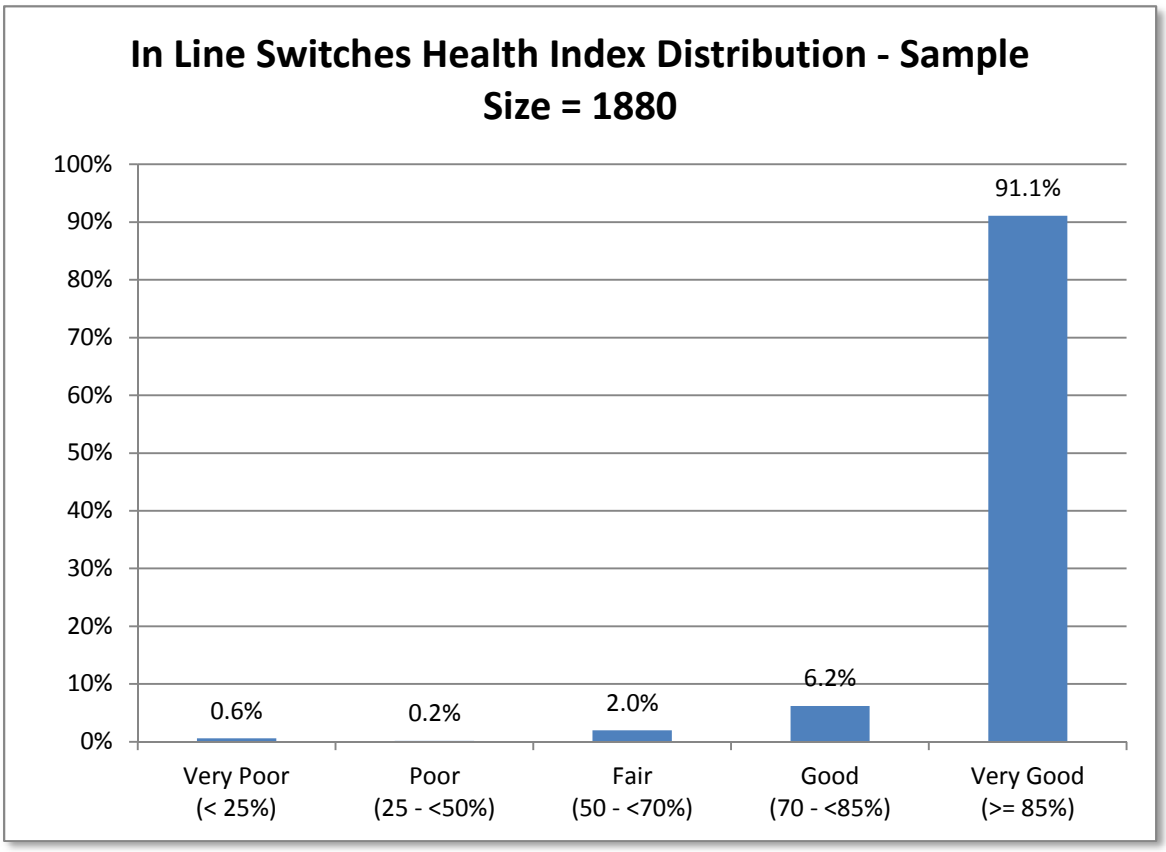

Figure 7-12 In Line Switches Health Index Distribution (Percentage)

Motorized

There are 88 Motorized Switches at EHM. Of these, there are 88 units with sufficient data for a Health Indexing.

The average Health Index for this asset group is 89%. None are in poor or very poor condition.

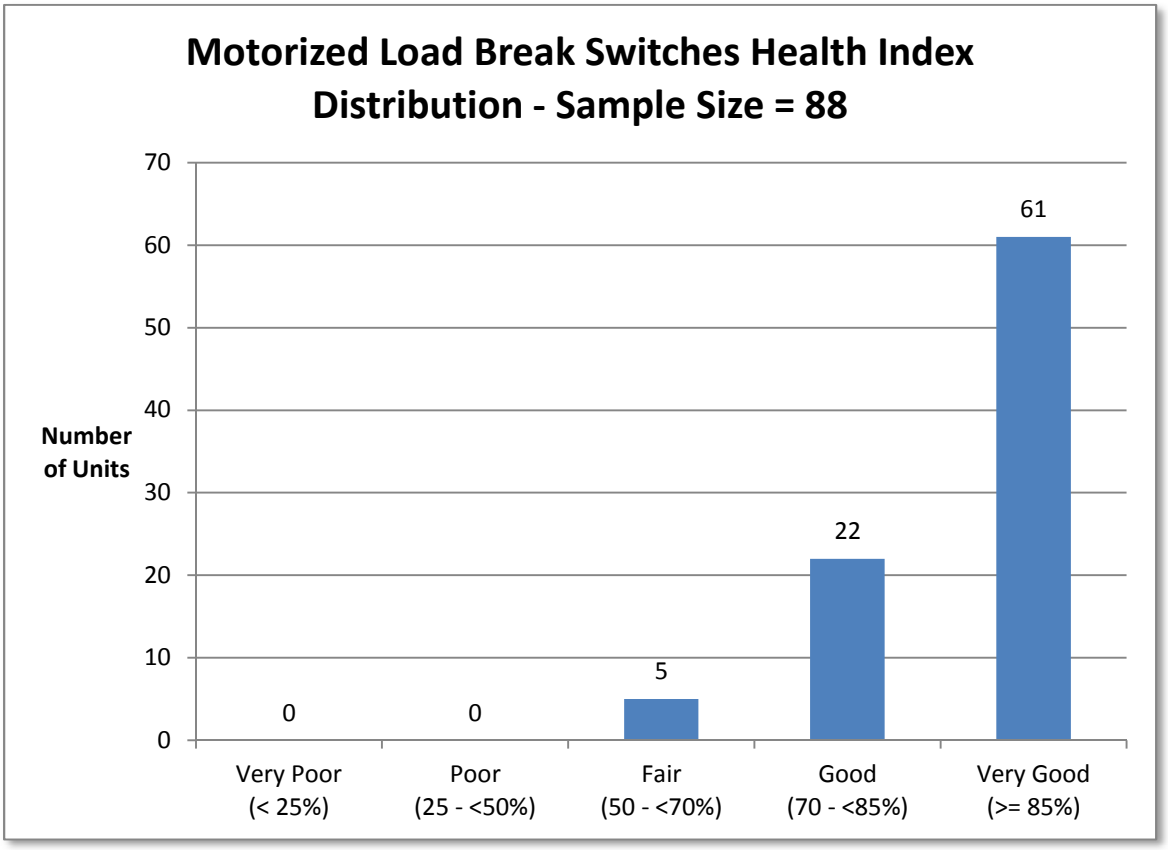

Figure 7-13 Motorized Switches Health Index Distribution (Unit)

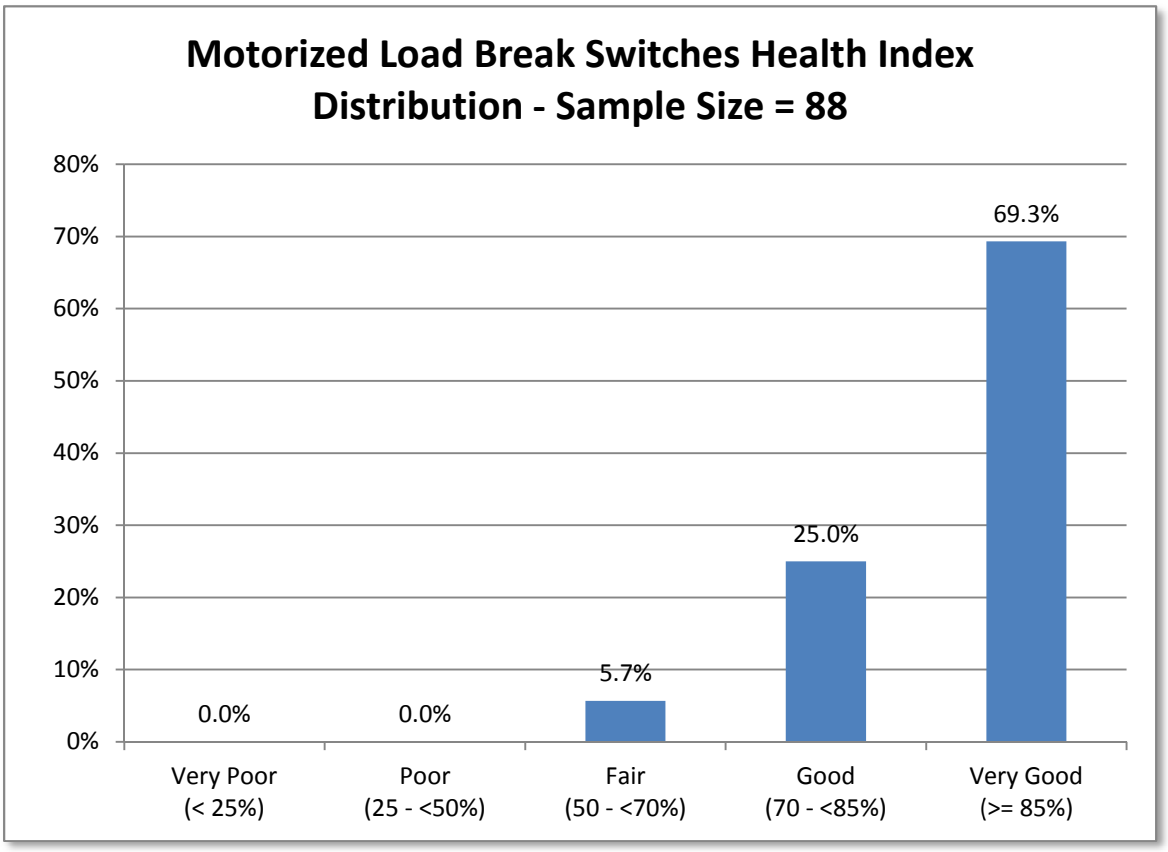

Figure 7-14 Motorized Health Index Distribution (Percentage)

7.4. Condition-Based Replacement Plan

As it is assumed that Overhead Line Switches are reactively replaced, the replacement plan is based on the asset failure rate, f(t).

The condition-based replacement plan is as follows:

44 kV Load Break Switches

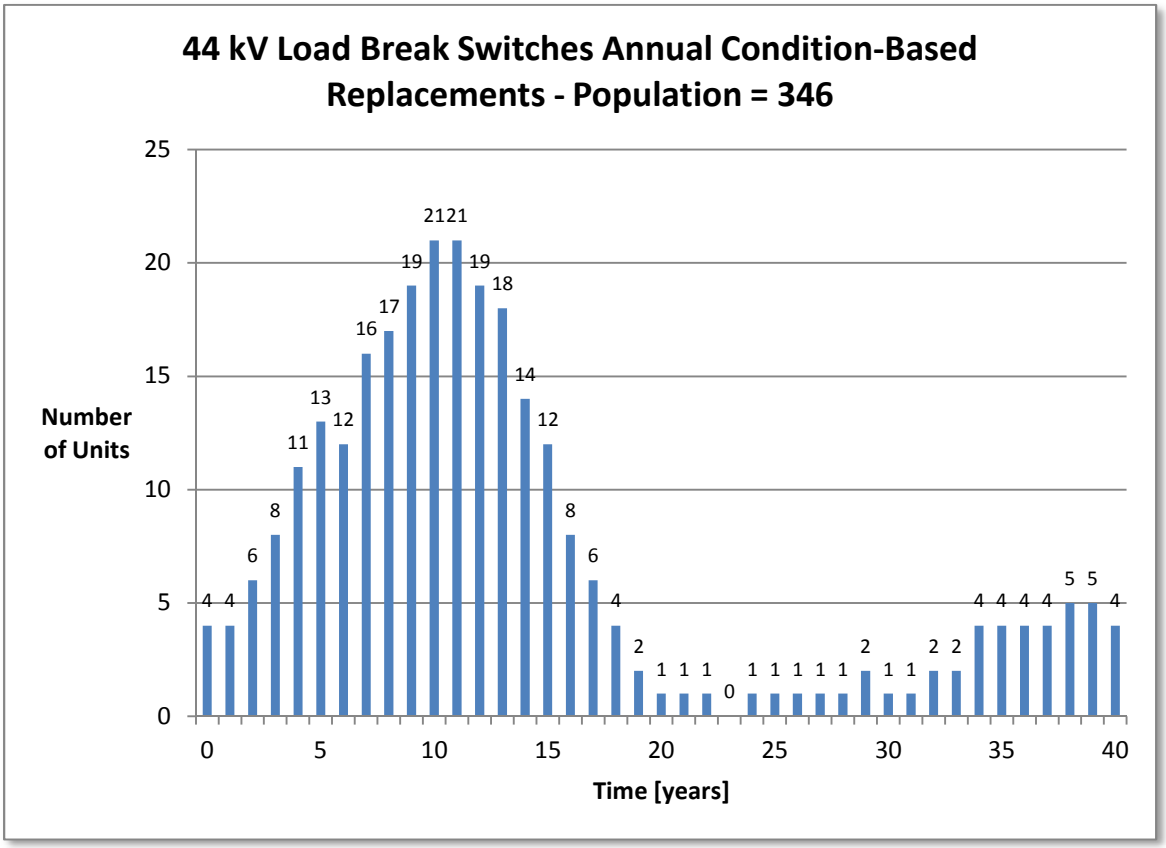

Figure 7-15 44 kV Load Break Switches Condition-Based Replacement Plan

27.6 kV Load Break Switches

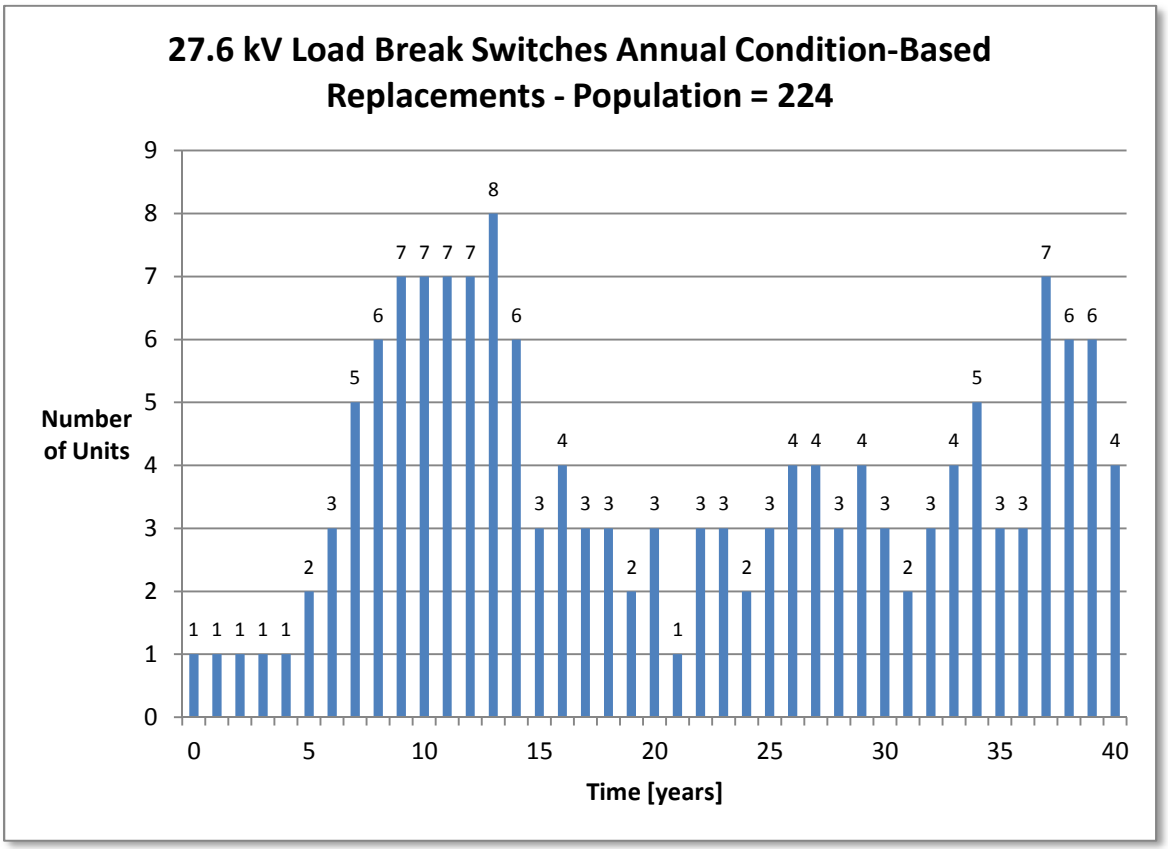

Figure 7-16 27.6kV Load Break Switches Condition-Based Replacement Plan

In Line Switches

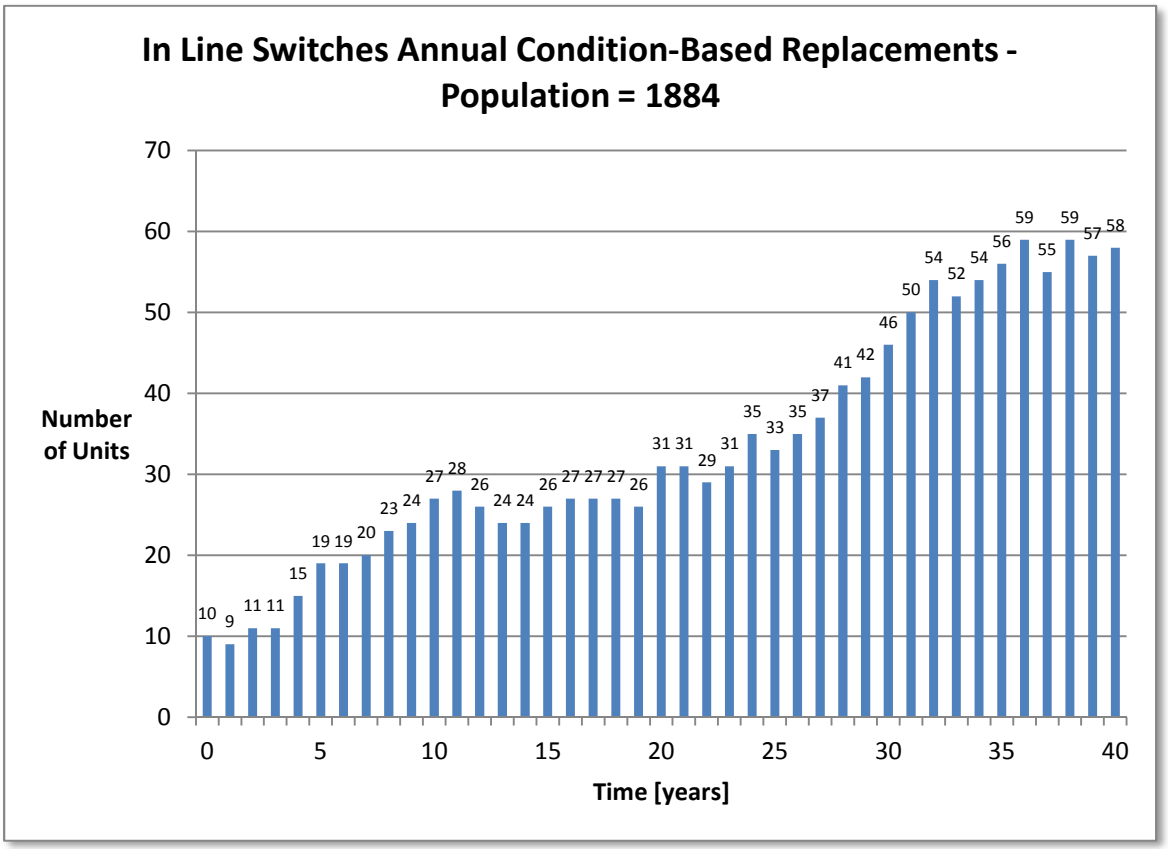

Figure 7-17 In Line Switches Condition-Based Replacement Plan

Motorized Switches

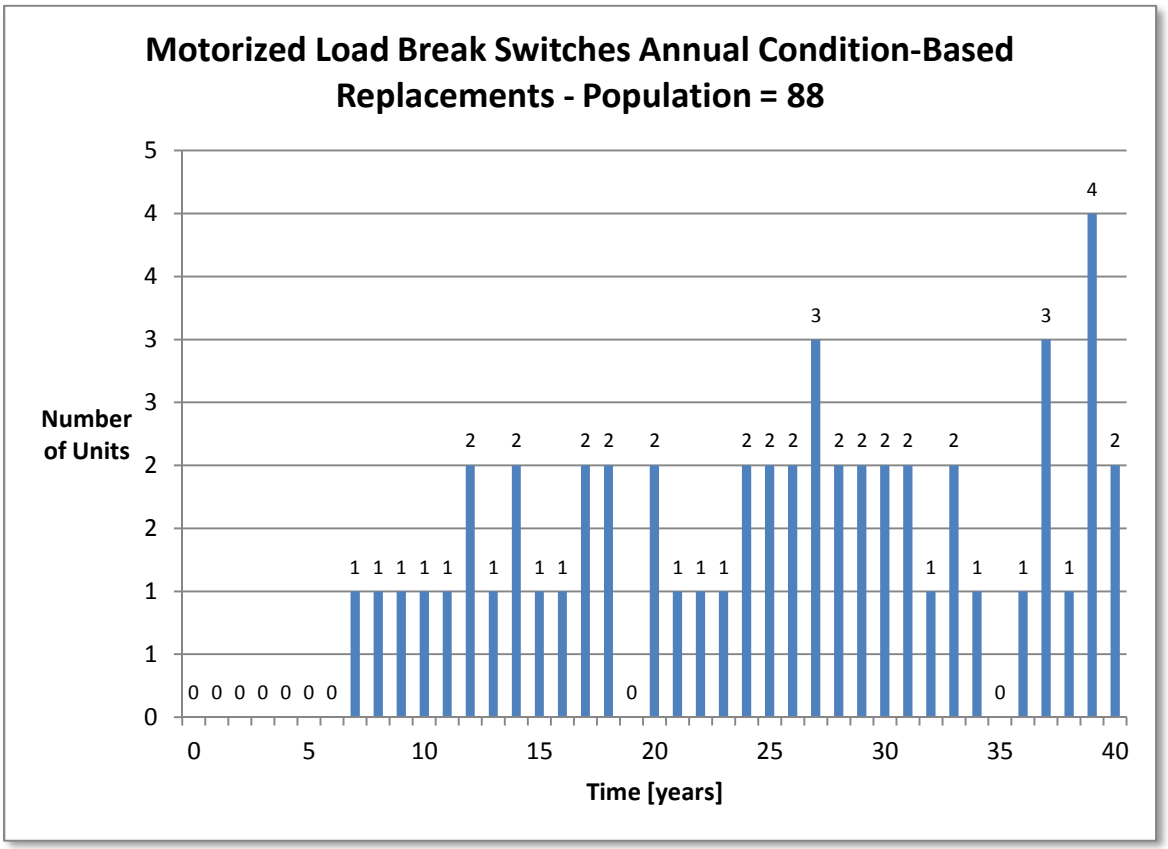

Figure 7-18 Motorized Condition-Based Replacement Plan

7.5. Data Analysis

Age and inspection data were available for this asset category.

Data Availability Indicator

The data availability distribution for this asset class is as follows.

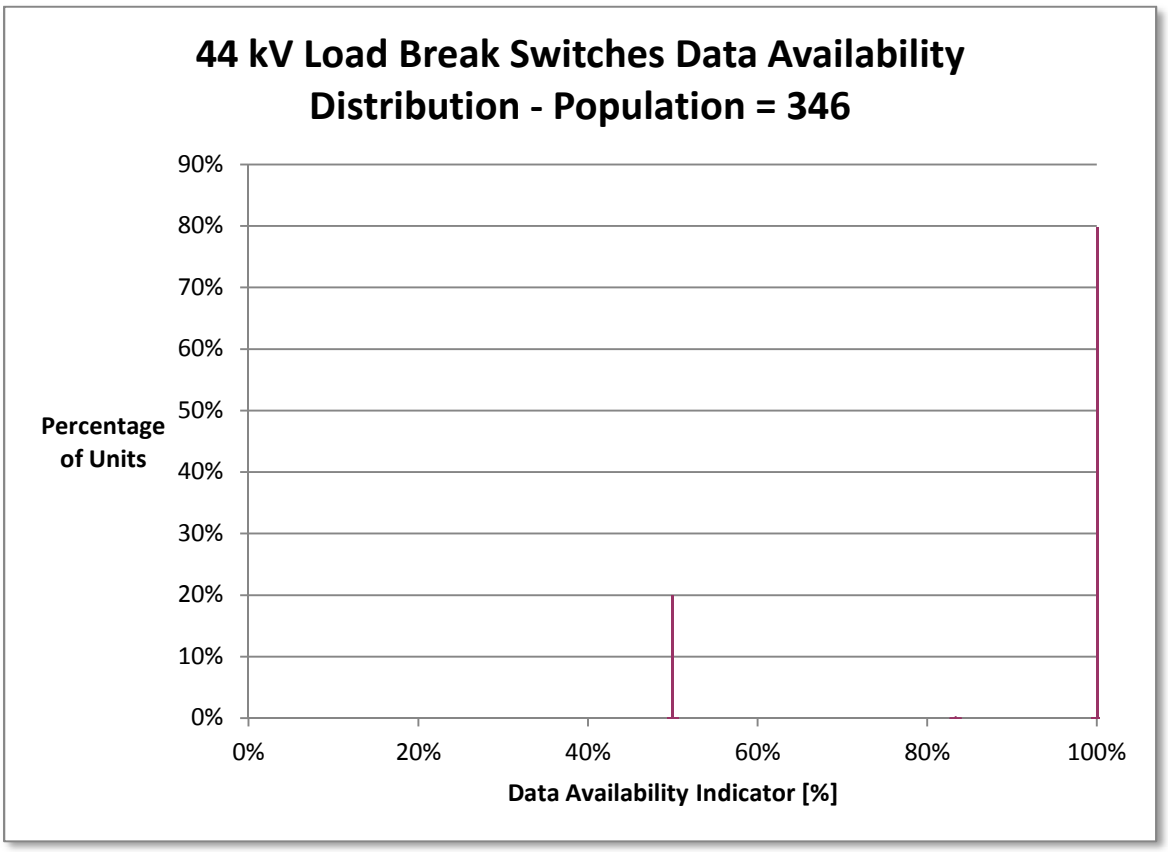

Figure 7-19 44 kV Load Break Switches Data Availability Distribution

The average DAI for this sub-category is 90%. Age was known for all units; inspection records were available for approximately 80% of the population.

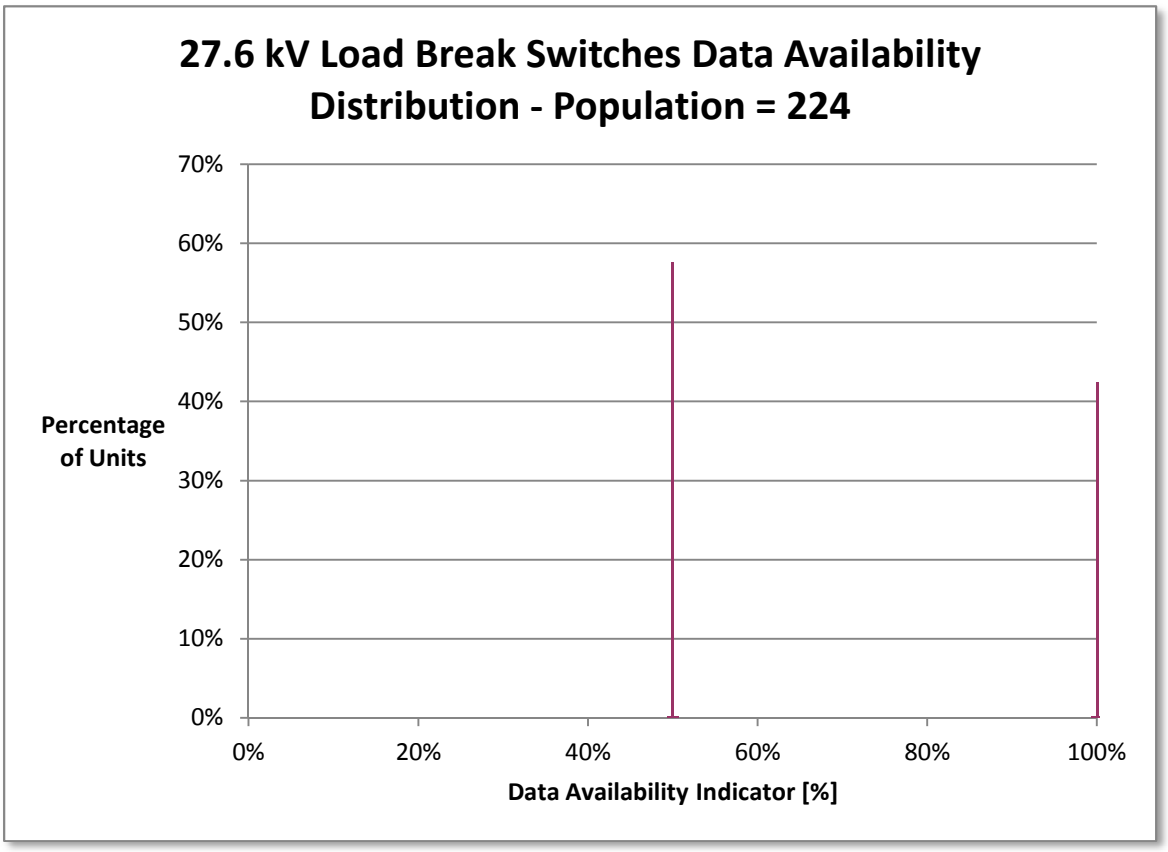

Figure 7-20 44 kV Load Break Switches Data Availability Distribution

The average DAI for this sub-category is 71%. Age was known for all units; inspection records were available for approximately 42% of the population.

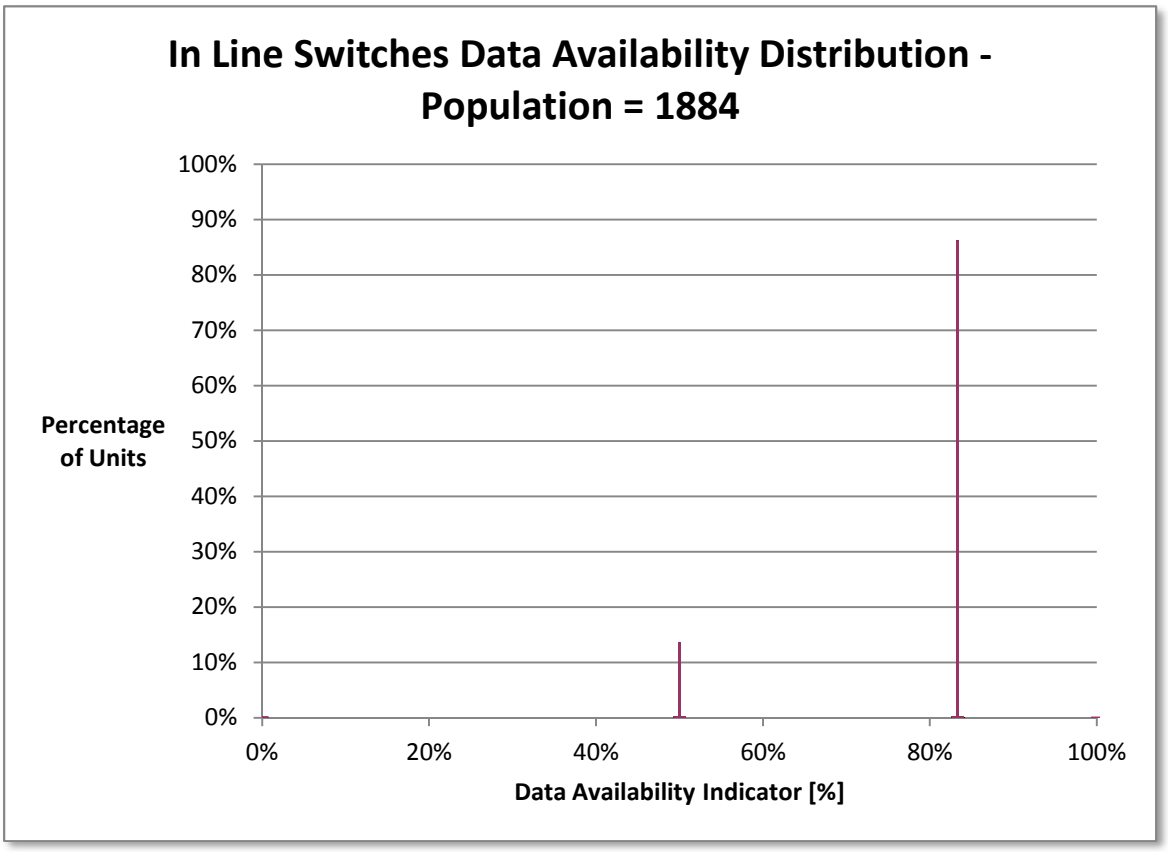

Figure 7-21 In Line Switches Data Availability Distribution

The average DAI for this sub-category is 79%. Age was known for nearly all units. Approximately 86% of the population was found to have a solid blade switch inspection record.

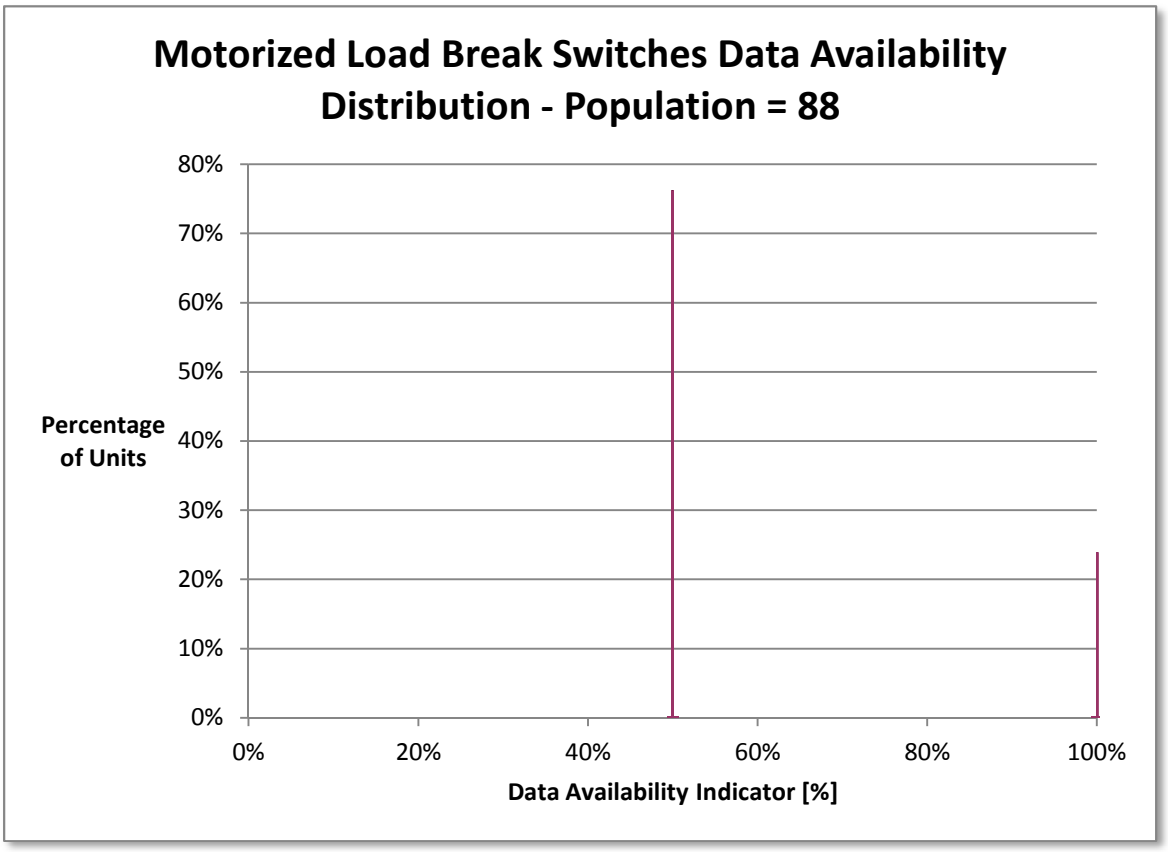

Figure 7-22 Motorized Switches Data Availability Distribution

The average DAI for this sub-category is 62%. Age was known for all units; inspection records were available for approximately 24% of the population.

Data Gap

Although the solid blade inspections have now been incorporated and inspection data is available for more switches, no other new types of condition data have been collected and the data gaps noted in the 2011 report remain to be addressed. Please refer to "Enersource Hydro Mississauga 2011 Asset Condition Assessment" for details.

Data Gap (Sub-Condition Parameter)	**Parent Condition Parameter**	**Priority**	**Object or Component Addressed**	**Description**	**Source of Data**
Motor/Manual Operation	Operation Mechanism	☆☆☆	Switch Operating system	Mechanical part and linkage issue	On-site manual inspection
Mechanical Support		☆	Switch support	Loose installation	On-site visual inspection
Arc Horn	Arc Extinction	☆	Switch operation	Arc horn surface worn-out	On-site visual inspection
Arc Interrupter		☆☆	Switch arc extinction	Arc extinction part surface worn-out	On-site visual inspection
Insulator	**Insulation**	☆	Support insulator	Crack	On-site visual inspection
Switch Condition	**Service Record**	☆☆☆	Blade	Blade condition	On-site visual inspection

8. UNDERGROUND PRIMARY CABLES

8.1. Health Index Formula

Assume a parameter scoring system of 0 though 4, where 0 and 4 represent the "worst" and "best" scores respectively. Thus, the maximum score for any condition or sub-condition parameter (maximum CPS and CPF) is "4".

8.1.1. Condition and Sub-Condition Parameters

Table 8-1 Condition Parameter and Weights

m	Condition Parameter	WCP_m	Sub-Condition Parameters
1	Service Record	1	Table 8-2
DRF	De-Rating based on number of failures		Table 8-3

Table 8-2 Service Record Sub-Condition Parameters and Weights (m=1)

n	Sub-Condition Parameter	$WCPF_n$	Condition Criteria Table
1	Age	1	Figure 8-1

8.1.2. Condition Criteria

Age

Assume that the failure rate Underground Primary Cables exponentially increases with age and that the failure rate equation is as follows:

$$f = e^{\beta(t-\alpha)}$$

f = failure rate of an asset (percent of failure per unit time)
t = time
α, β = constant parameters that control the rise of the curve

The corresponding survivor function is therefore:

$$S_f = 1 - \ P_f = e^{-(f-e^{-\alpha\beta})/\beta}$$

S_f = survivor function
P_f = cumulative probability of failure

Assuming that at the ages of 40 and 55 years the probability of failures (P_f) for this asset are 20% and 99% respectively results in the survival curve shown below. It follows that the Score for Age is the survival curve normalized to the maximum Score of 4 (i.e. 4*Survival Curve). The Score vs. Age is also shown in the figure below.

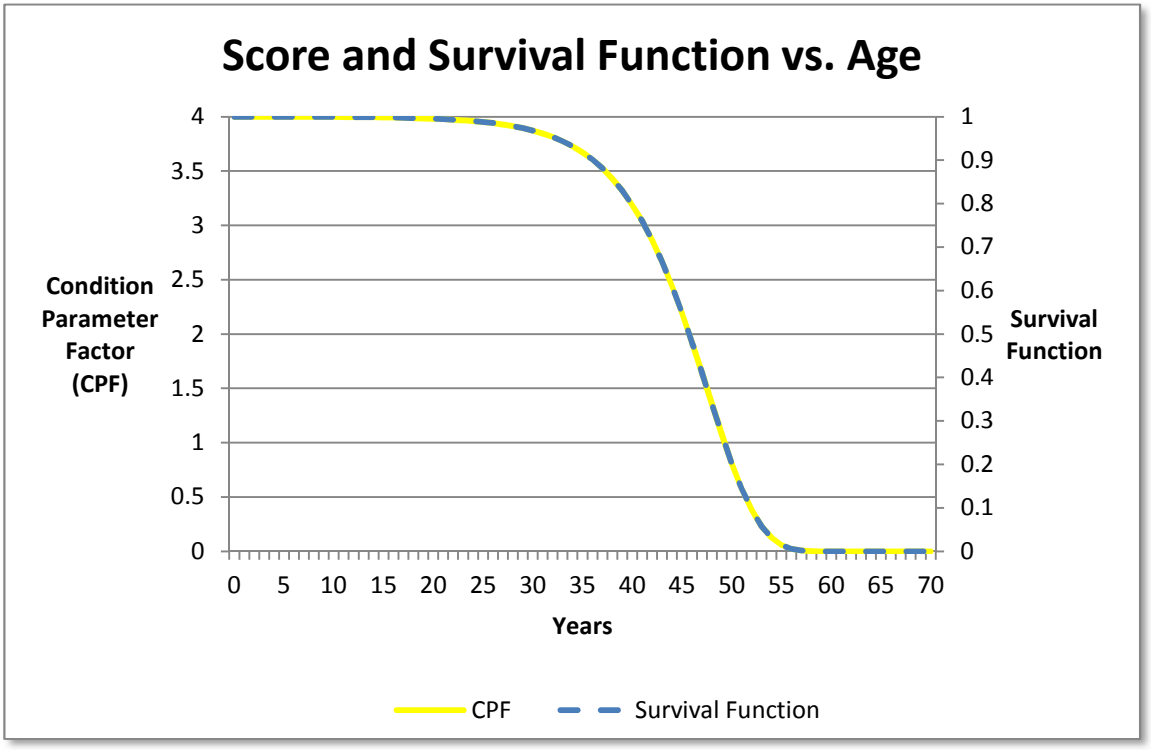

Figure 8-1 Underground Primary Cables Age Criteria

De-Rating Factor (DRF)

Table 8-3 Number of Failures De-Rating Criteria

Number of Failures in 5 Years	De-Rating Multiplier
0	1
1	0.95
2	0.9
3	0.85
4	0.8

8.2. Age Distribution

Main Feeder Cables

The average age is 16 years / conductor-km. Approximately 2% are 40 years or older. The age distribution for this asset class is as follows:

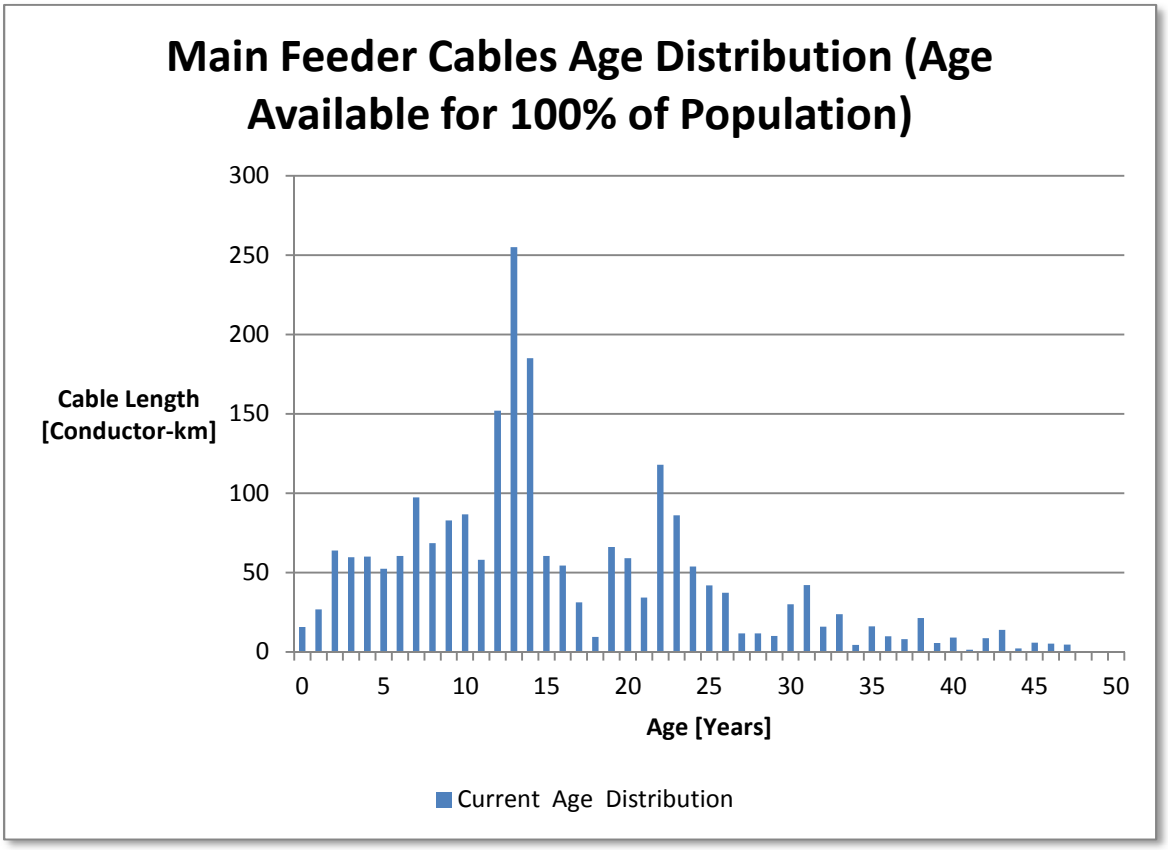

Figure 8-2 Main Feeder Cables Age Distribution

Distribution Cables

The average age is 19 years / conductor-km. Approximately 5% are 40 years or older.

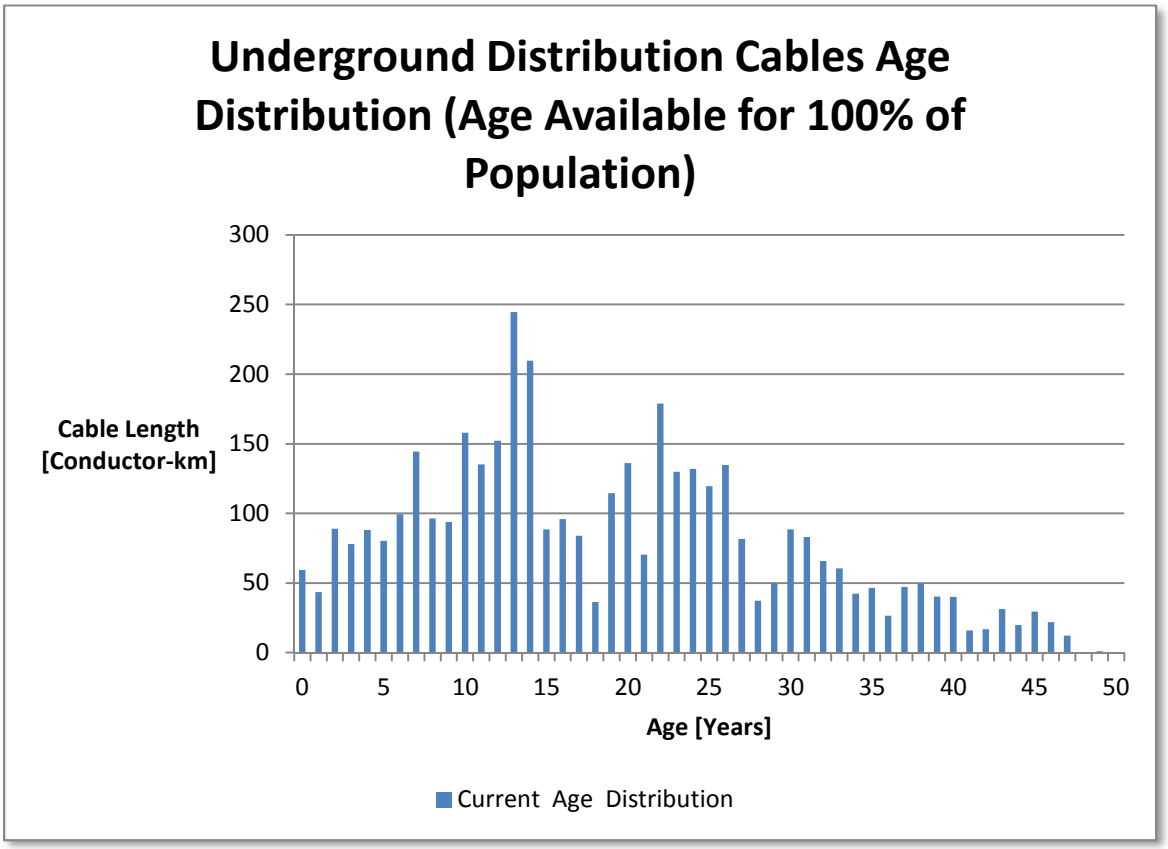

Figure 8-3 Distribution Cables Age Distribution

8.3. Health Index Results

Main Feeder

A total of 2242 conductor-km of Main Feeder Cables had sufficient data for a Health Indexing.

The average Health Index for this asset group is 97%. Approximately <1% were in poor or very poor condition.

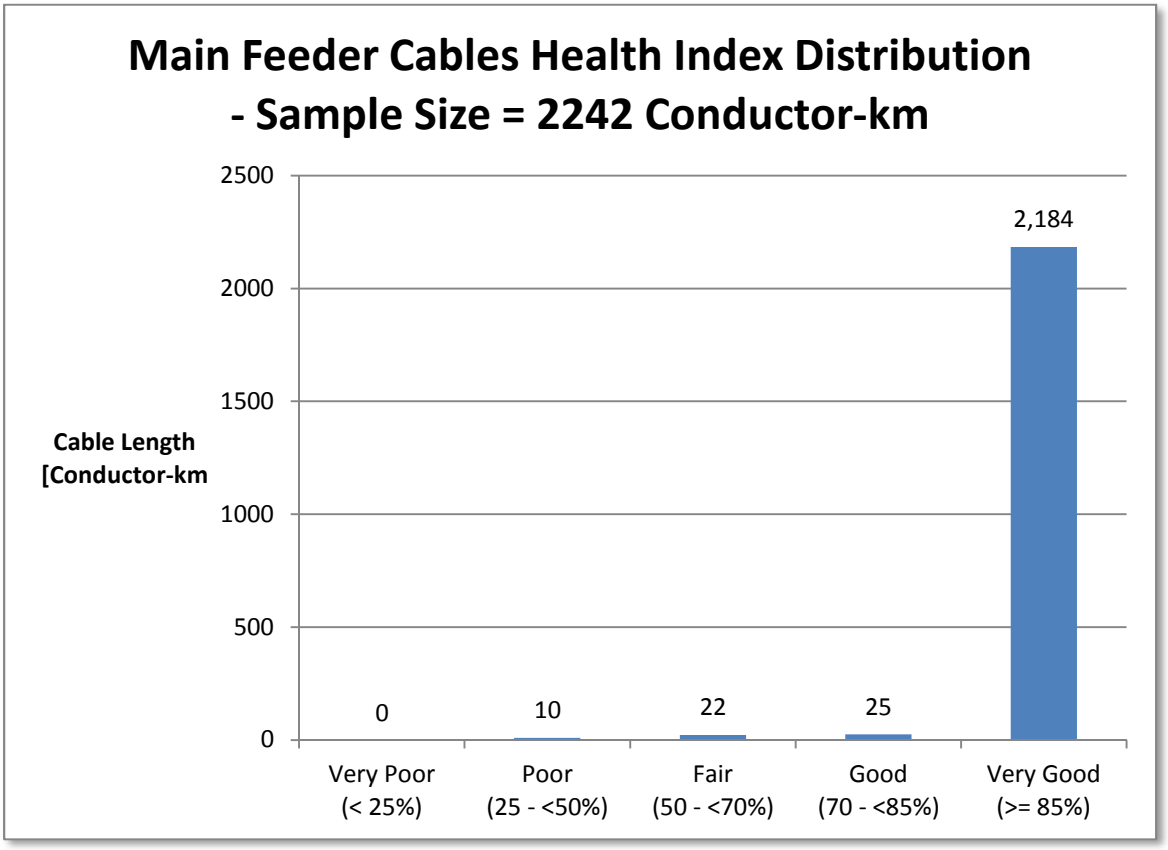

Figure 8-4 Main Feeder Cables Health Index Distribution (Unit)

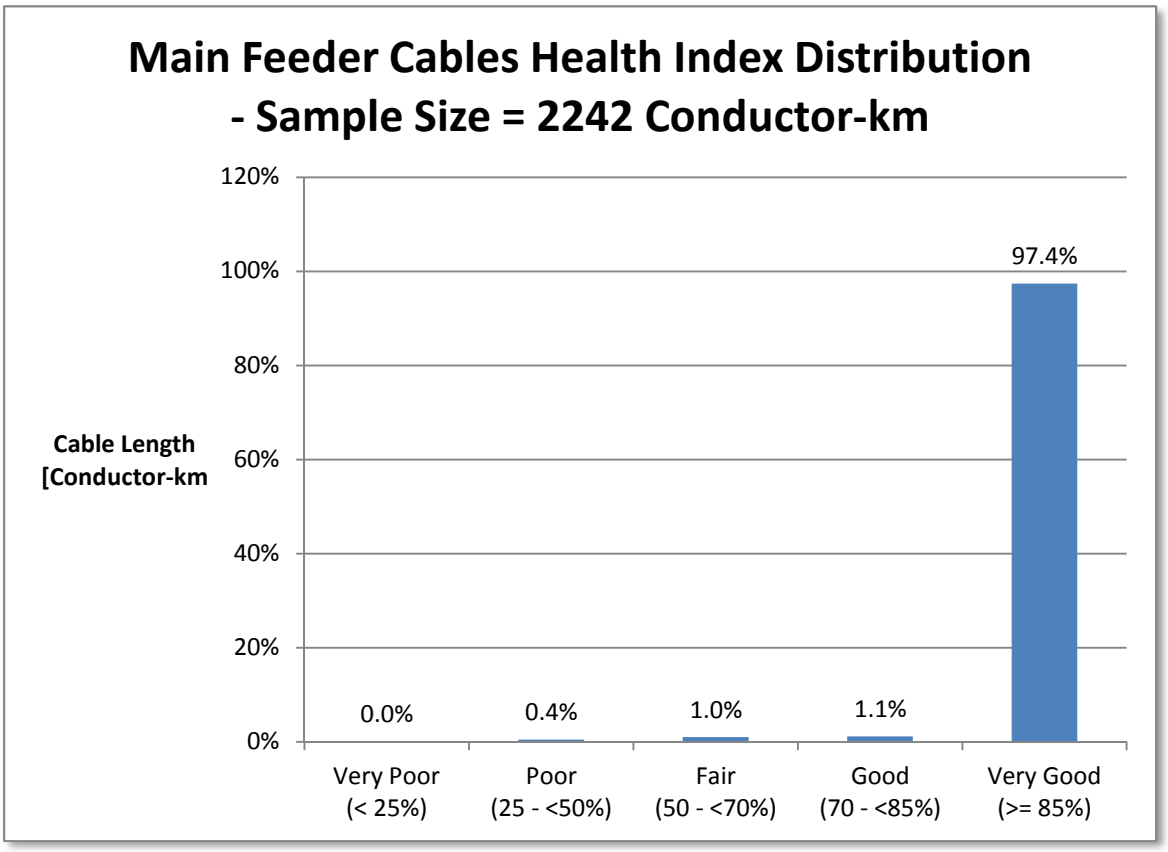

Figure 8-5 Main Feeder Cables Health Index Distribution (Percentage)

Distribution Cables

A total of 4004 conductor-km of Distribution Cables had sufficient data for a Health Indexing.

The average Health Index for this asset group is 90%. Approximately <1% of the samples are in poor or very poor condition.

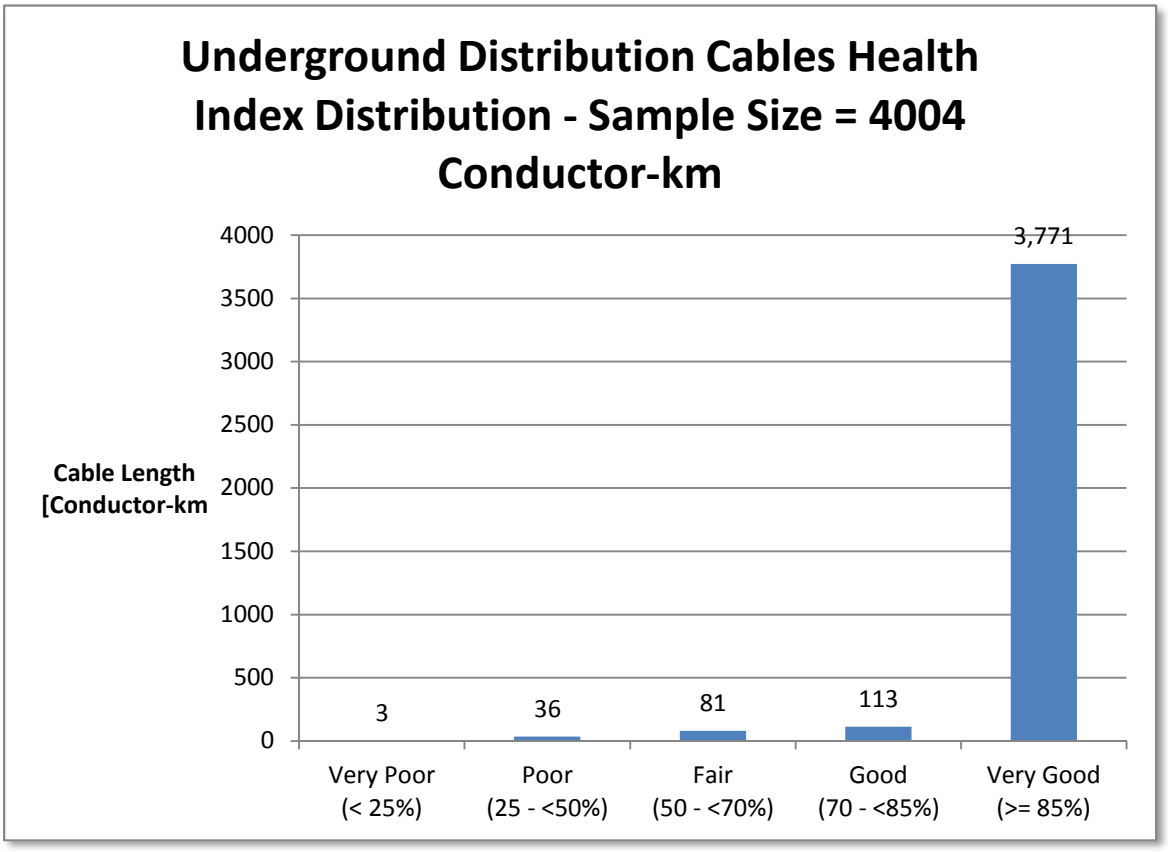

Figure 8-6 Distribution Cables Health Index Distribution (Unit)

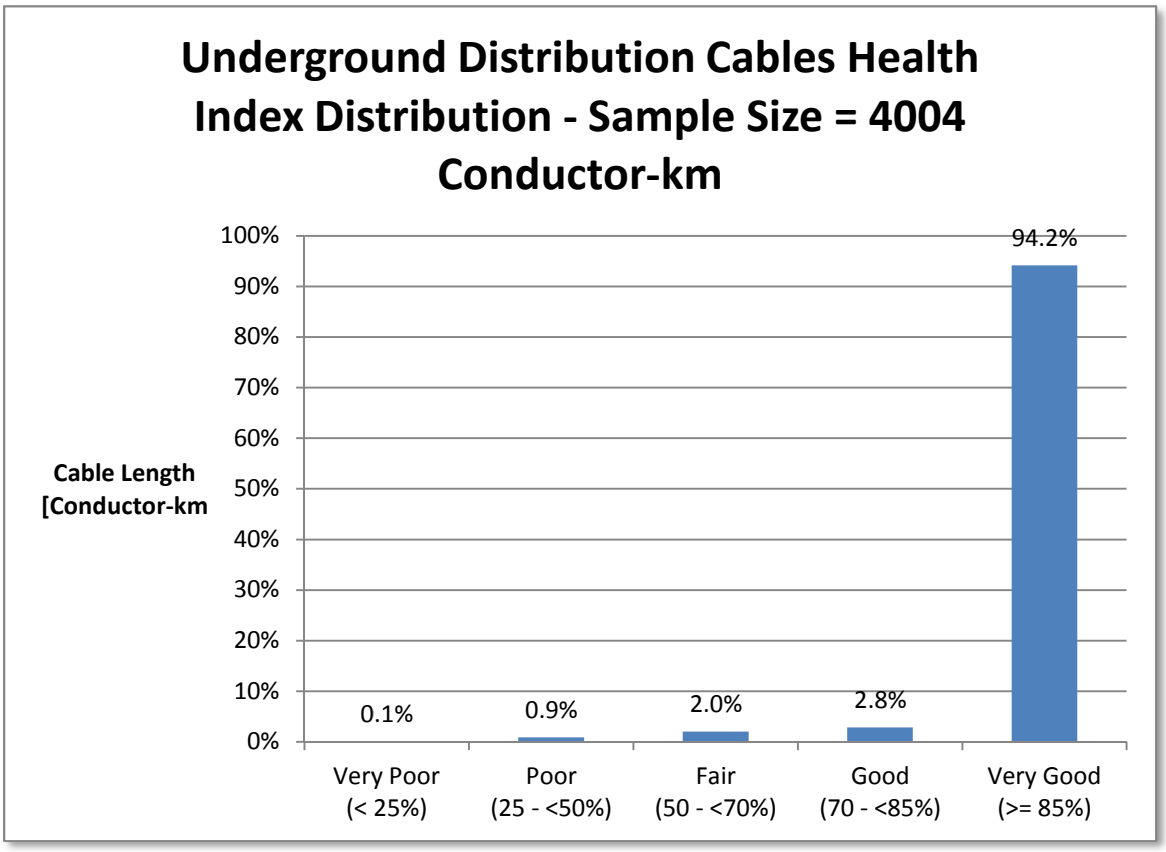

Figure 8-7 Distribution Cables Health Index Distribution (Percentage)

8.4. Condition-Based Replacement Plan

As it is assumed that Underground Primary Cables are reactively replaced, the replacement plan is based on the asset failure rate, f(t).

Main Feeder Cables

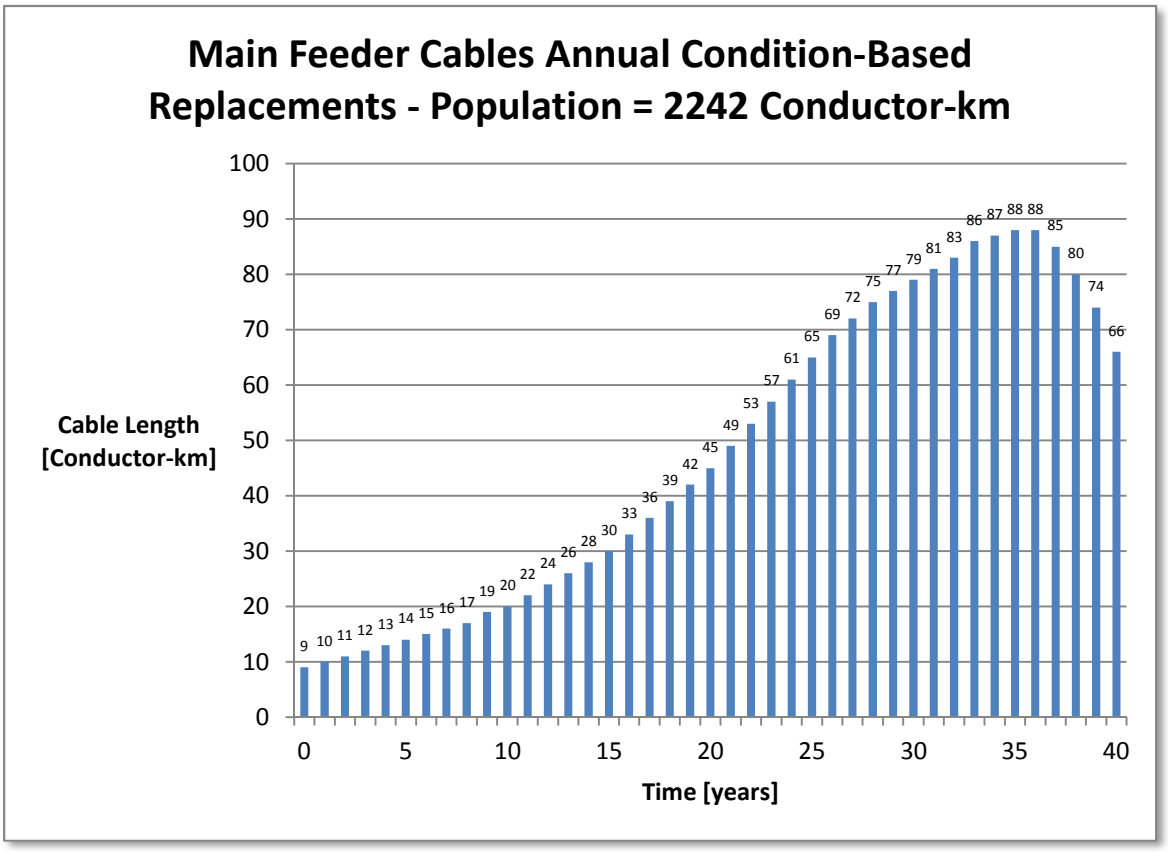

Figure 8-8 Main Feeder Cables Condition-Based Replacement Plan

Distribution Cables

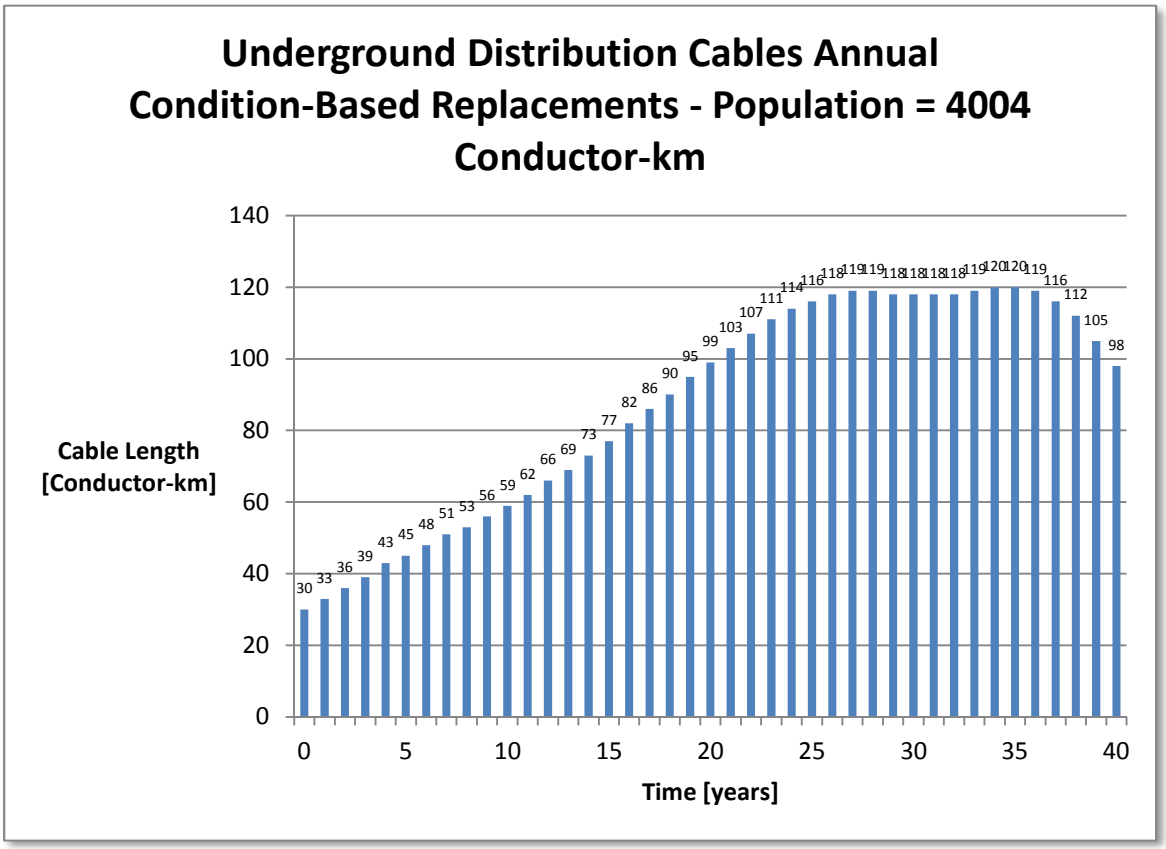

Figure 8-9 Distribution Cables Condition-Based Replacement Plan

8.5. Data Analysis

Age was the only condition data available for this asset group. Only segments with known ages, for both Main Feeder and Distribution Cables, were assessed. As such, the DAI for all segments was 100%.

Since the 2011 assessment, failure data was collected and incorporated in the 2012 Health Index formulation. The data gaps noted in the 2011 report, however, remain to be addressed. Please refer to "Enersource Hydro Mississauga 2011 Asset Condition Assessment" for details.

Data Gap (Sub-Condition Parameter)	**Parent Condition Parameter**	**Priority**	**Object or Component Addressed**	**Description**	**Source of Data**
Splice & Termination	Physical Condition	☆☆	Cable splice	Under/over-compressed connector	On-site visual inspection
				Improper ground connection	
				Loose bolt	
			Cable termination	Sealing issue	
				Insulation erosion	
Overall		☆☆	Cable segment	Count of total corrective maintenance work orders issued on cable segment during a specific time window	Operation record
Loading	Operation Condition	☆☆☆	Cable segment	Loading History: e.g. hourly peak Loads	Operation record

9. POLES

9.1. Health Index Formula

Assume a parameter scoring system of 0 though 4, where 0 and 4 represent the "worst" and "best" scores respectively. Thus, the maximum score for any condition or sub-condition parameter (maximum CPS and CPF) is "4".

9.1.1. Condition and Sub-Condition Parameters

Table 9-1 Condition Parameter and Weights

m	Condition Parameter	WCP_m	Sub-Condition Parameters
1	Service Record	1	Table 9-2

Table 9-2 Service Record Sub-Condition Parameters and Weights (m=1)

n	Sub-Condition Parameter	$WCPF_n$	Condition Criteria Table
1	Age	1	Figure 9-1 Figure 9-2

9.1.2. Condition Criteria

Age

Assume that the failure rate Poles exponentially increases with age and that the failure rate equation is as follows:

$$f = e^{\beta(t-\alpha)}$$

f	= failure rate of an asset (percent of failure per unit time)
t	= time
α, β	= constant parameters that control the rise of the curve

The corresponding survivor function is therefore:

$$S_f = 1 - \ P_f = e^{-(f-e^{-\alpha\beta})/\beta}$$

S_f	= survivor function
P_f	= cumulative probability of failure

Assuming that at the ages of 45 and 75 years the probability of failures (P_f) for Wood Poles are 20% and 99% respectively results in the survival curve shown below. It follows that the Score for Age is the survival curve normalized to the maximum Score of 4 (i.e. 4*Survival Curve). The Score vs. Age is also shown in the figure below.

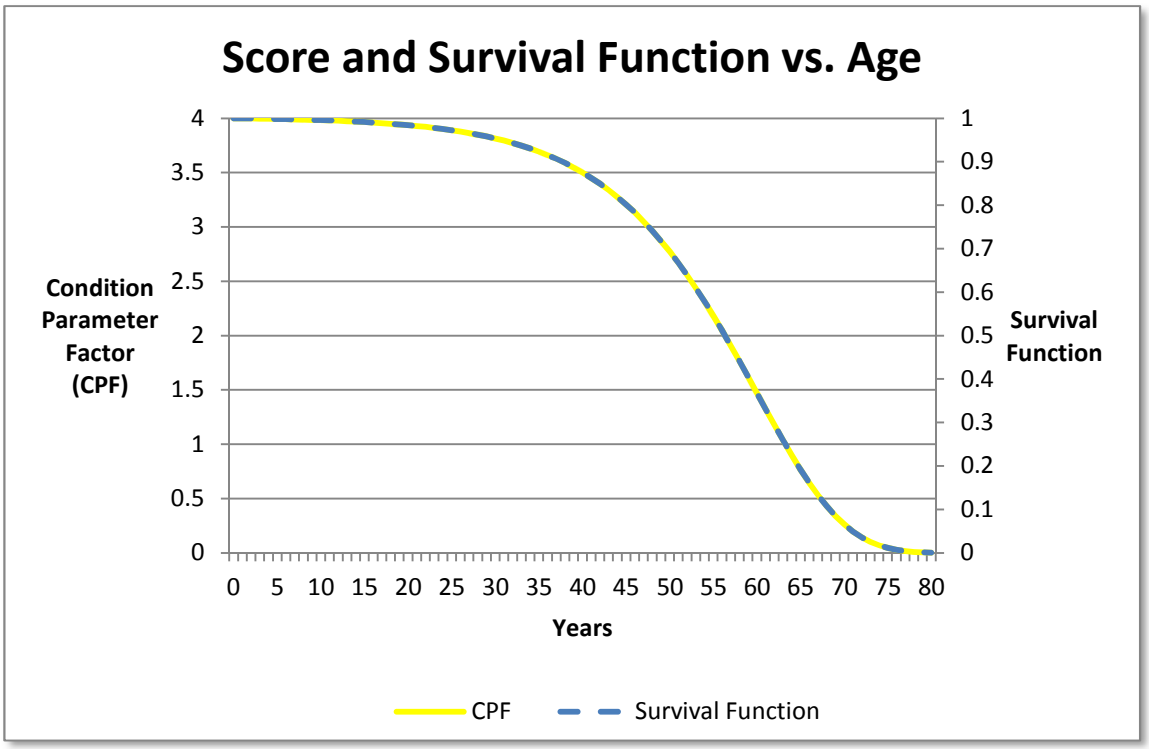

Figure 9-1 Wood Pole Age Criteria

For Concrete Poles, the ages at 20% and 99% probabilities of failure are 55 and 80 years, respectively.

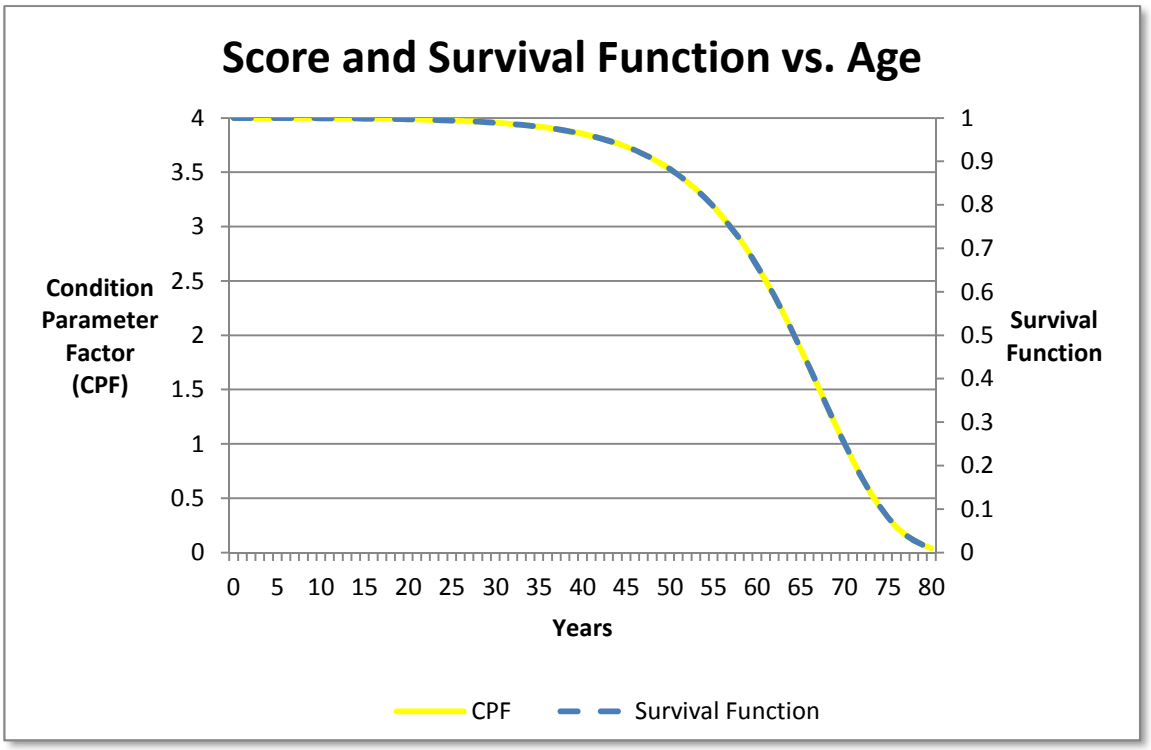

Figure 9-2 Concrete Pole Age Criteria

9.2. Age Distribution

The age distribution for this asset class is as follows:

Wood Poles

The average age for wood poles is 24. Approximately 8% of the population is 45 years or older.

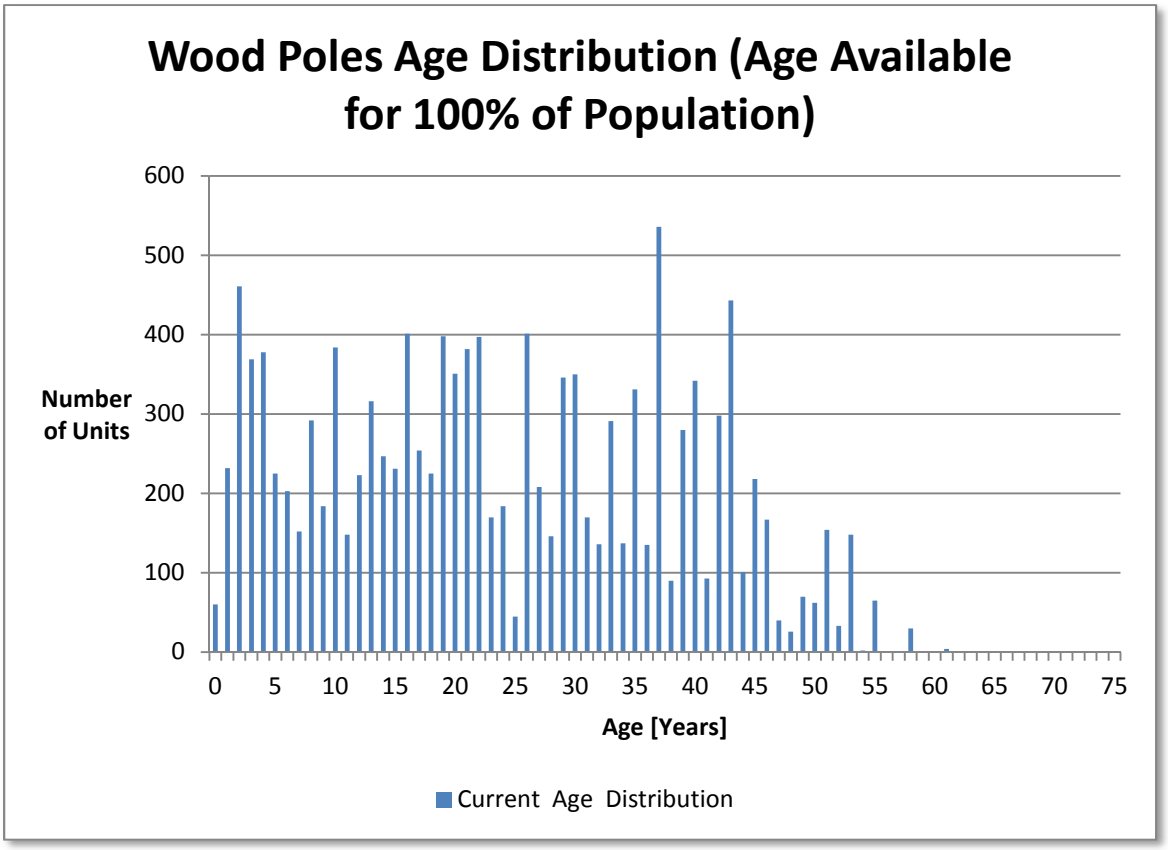

Figure 9-3 Wood Poles Age Distribution

Concrete Poles

The average age for concrete poles is 18 years. Less than 1% of all poles are 55 years or older.

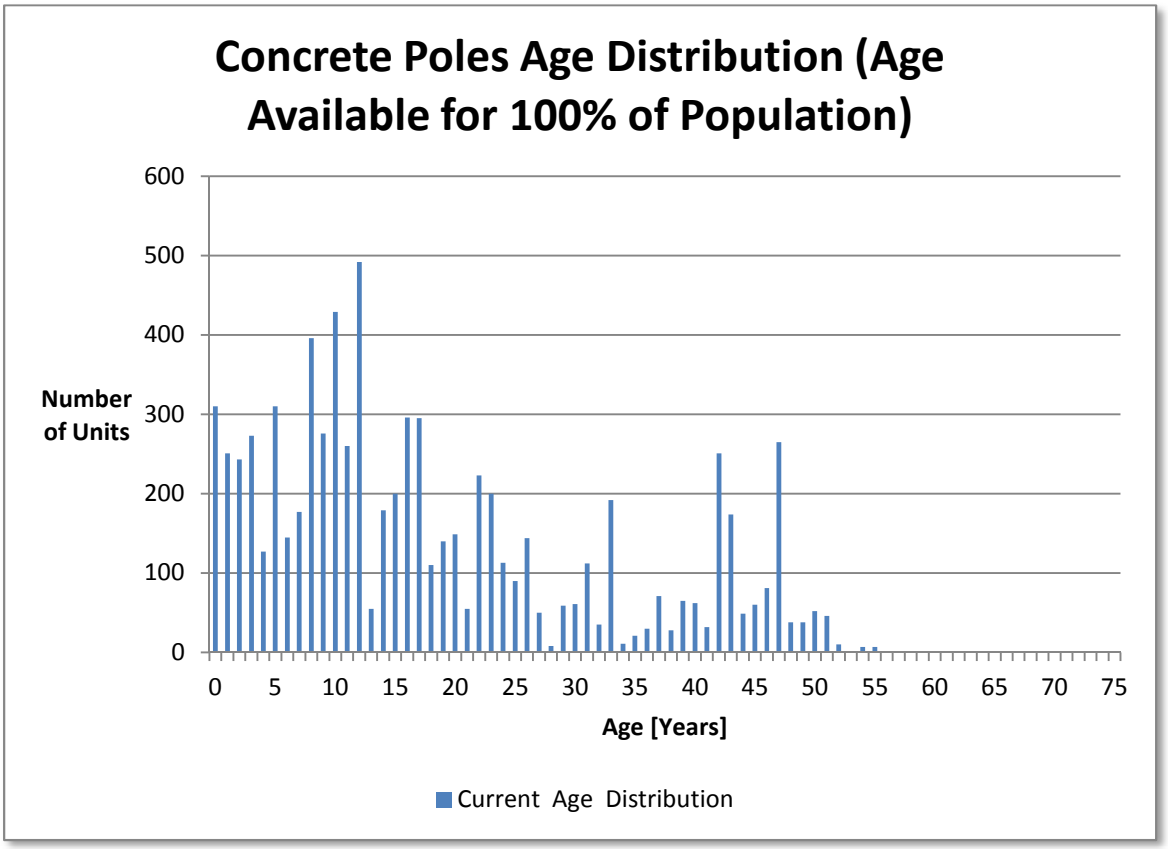

Figure 9-4 Concrete Poles Age Distribution

9.3. Health Index Results

Wood Poles

There are 12766 Wood Poles at EHM. Of these, there are 12766 units with sufficient data for a Health Indexing.

The average Health Index for this asset group is 94%. Approximately <1% of the samples are in poor or very poor condition.

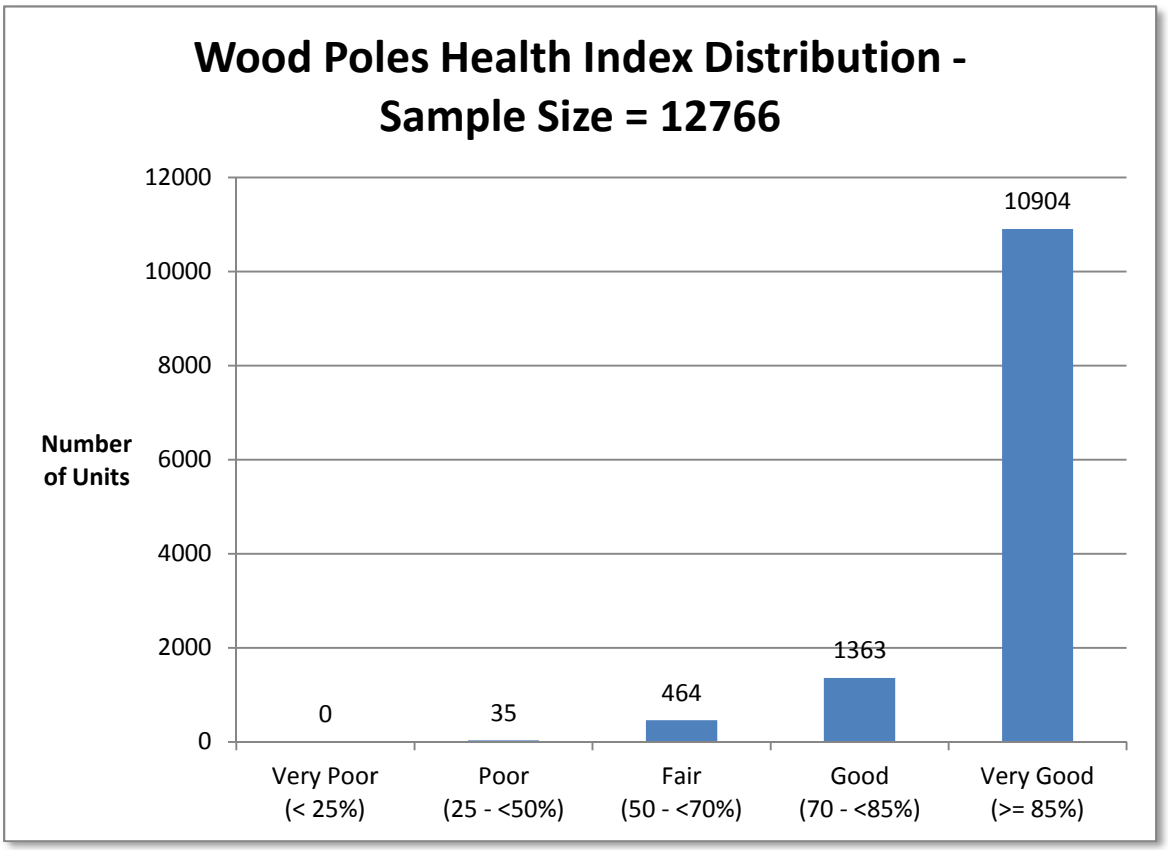

Figure 9-5 Wood Poles Health Index Distribution (Unit)

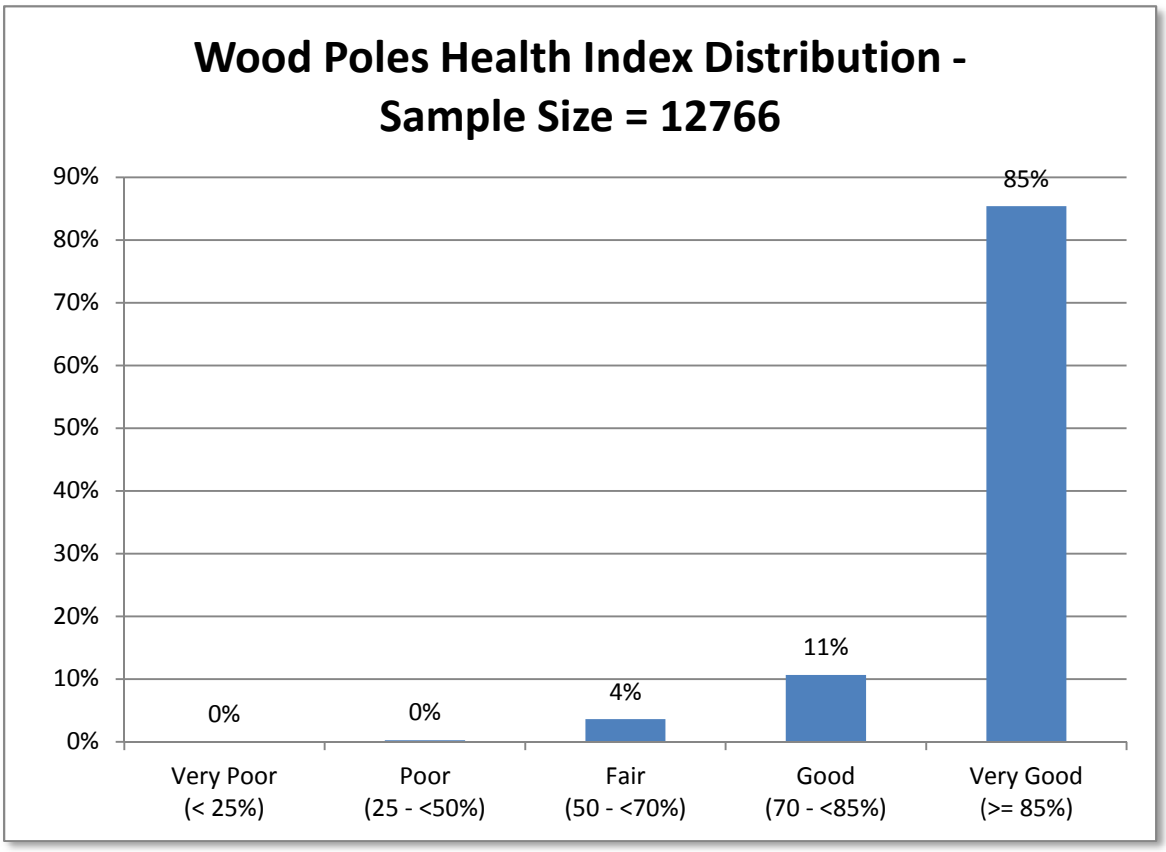

Figure 9-6 Wood Poles Health Index Distribution (Percentage)

Concrete Poles

There are 7854 Concrete Poles at EHM. Of these, there are 7854 units with sufficient data for a Health Indexing.

The average Health Index for this asset group is nearly 99%. None of the samples are in poor or very poor condition.

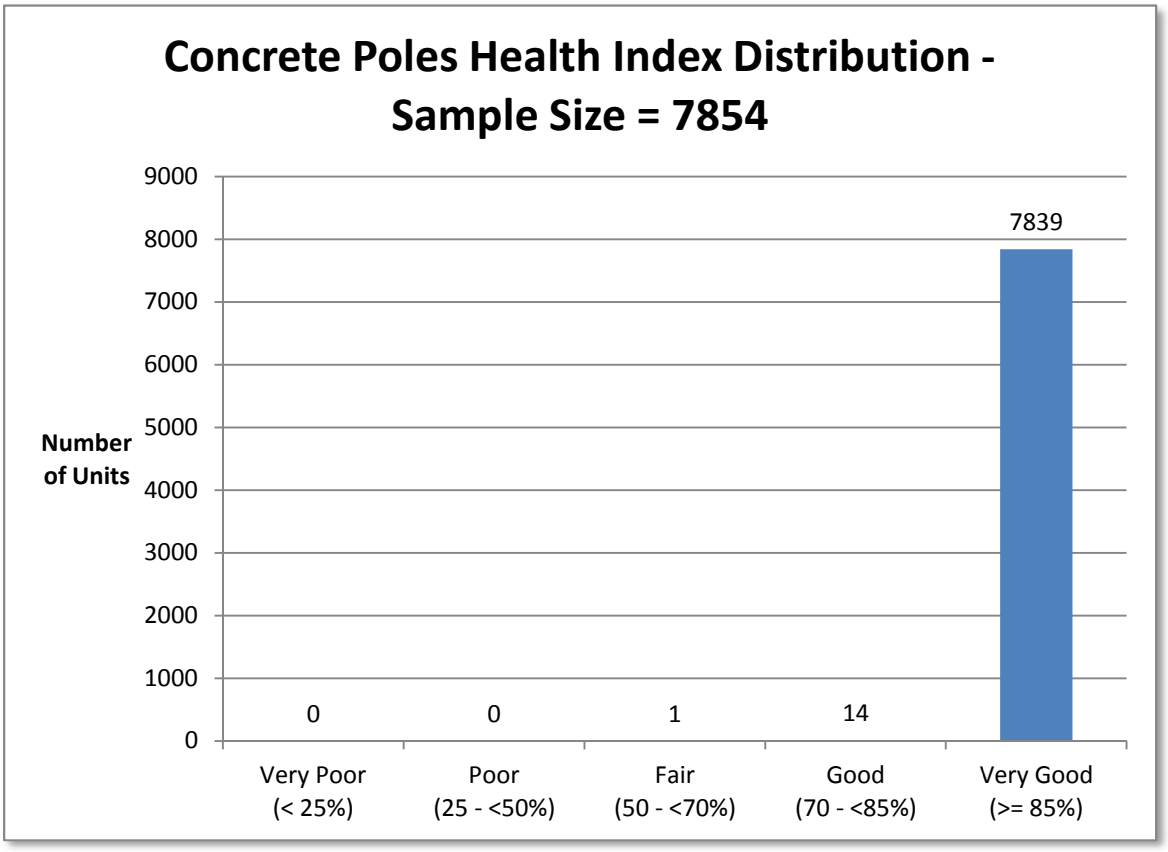

Figure 9-7 Concrete Poles Health Index Distribution (Unit)

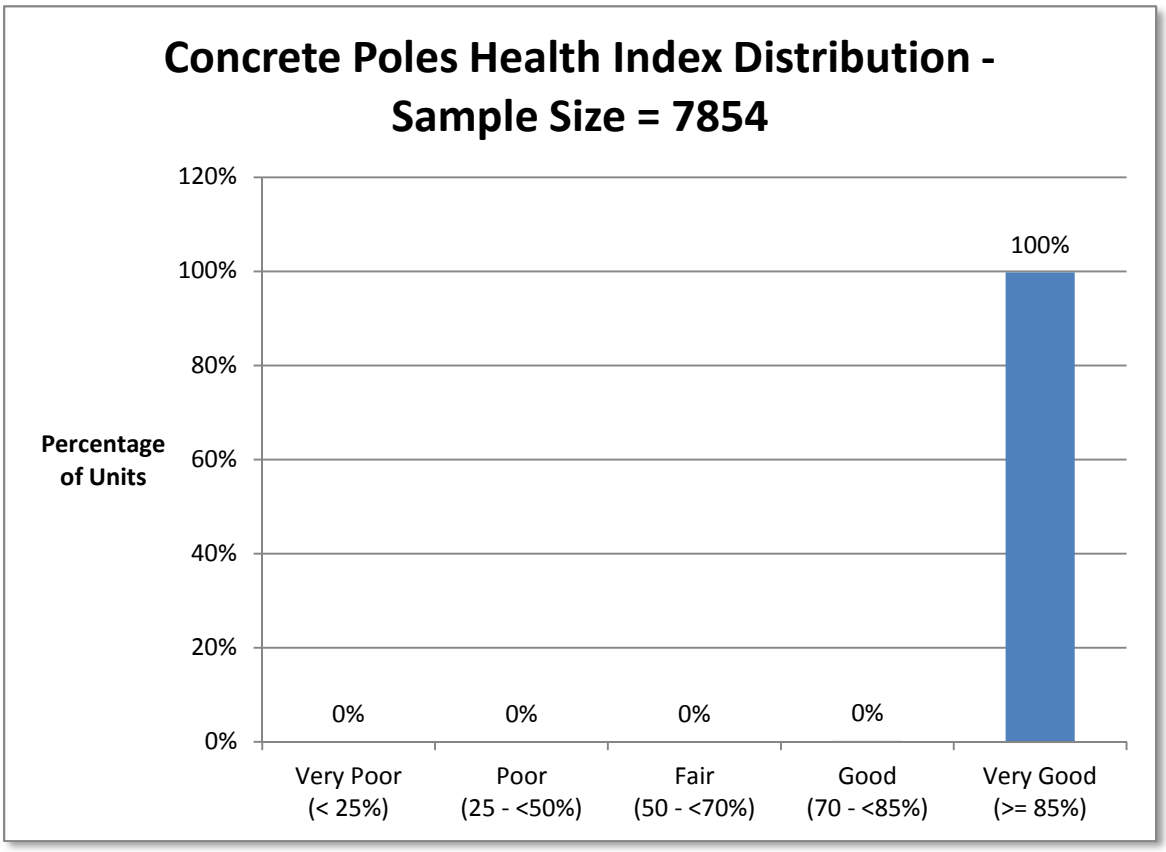

Figure 9-8 Concrete Poles Health Index Distribution (Percentage)

9.4. Condition-Based Replacement Plan

The number of units that are estimated to fail is based on the failure rate. In addition, since Poles are proactively replaced, the replacement plan also includes a planned replacement of 1% of units that are over 45 years old and 55 years old for Wood and Concrete Poles respectively.

Wood Poles

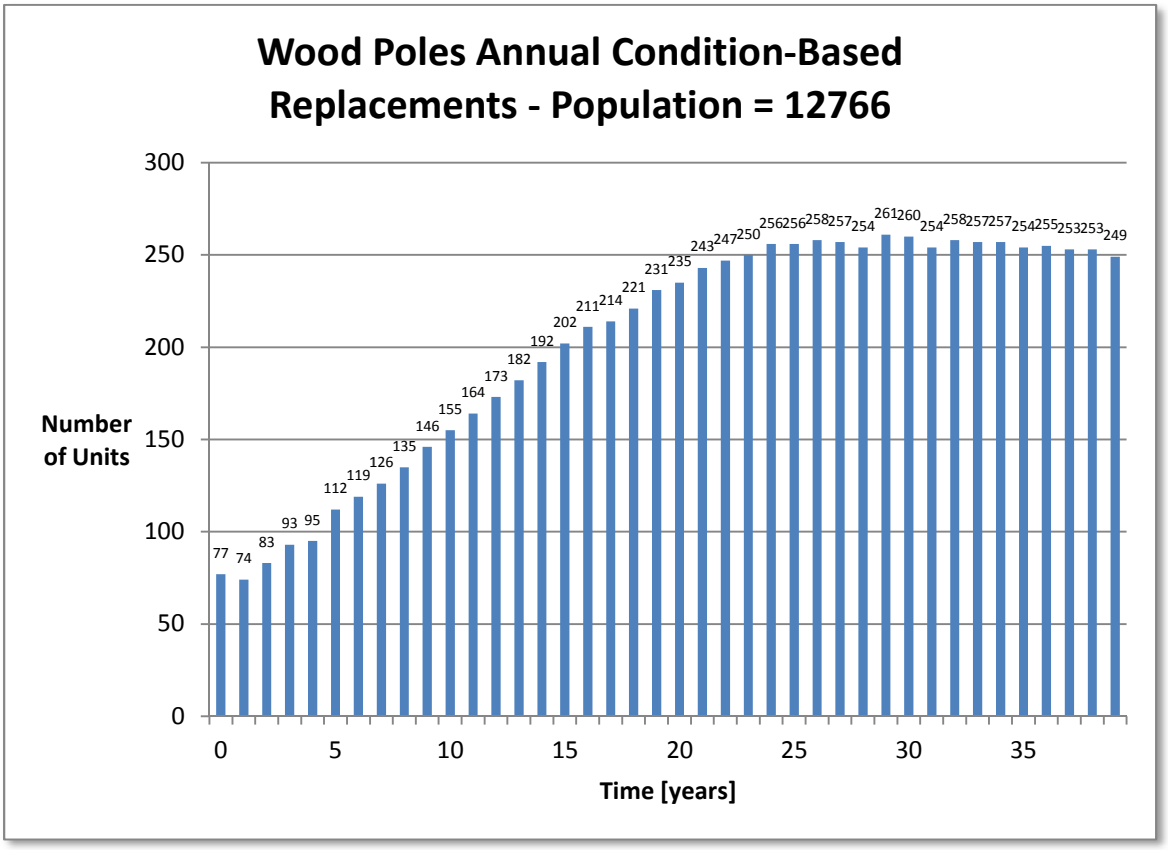

Figure 9-9 Wood Poles Condition-Based Replacement Plan

Concrete Poles

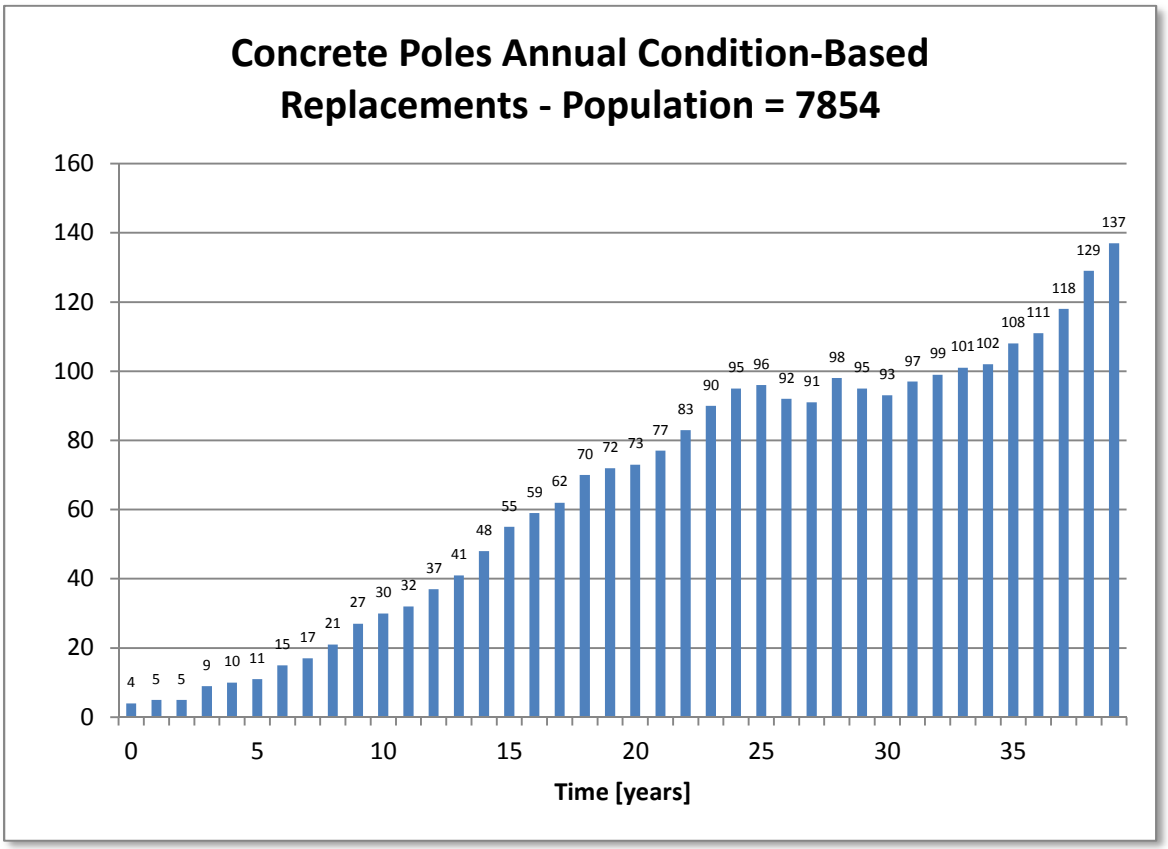

Figure 9-10 Concrete Poles Condition-Based Replacement Plan

9.5. Data Analysis

Age was the only condition data available for this asset group. The age of all poles is known, giving DAIs of 100% for both wood and concrete poles.

Since last year's assessment, no new data types have been collected for this asset category. The data gaps noted in the "Enersource Hydro Mississauga 2011 Asset Condition Assessment" remain to be addressed.

Data Gap (Sub-Condition Parameter)	**Parent Condition Parameter**	**Priority**	**Object or Component Addressed**	**Description**	**Source of Data**
Pole Strength (Wood Poles only)	Pole Strength	☆ ☆ ☆	Pole	Ratio of actual circumference over the original circumference	On-site testing
Physical Damage	Physical Condition	☆ ☆	Pole	Damage due to external forces (vehicle, lightning etc.)	On-site visual inspection
				Biological damage (ant, woodpecker etc)	
Physical Status		☆ ☆	Pole	Rot	On-site visual inspection
				Separation	
				Void	
				Lean	
Cross Arm	Pole Accessory	☆ ☆	Cross arm	Deterioration or other damages	On-site visual inspection
				Misalignment	

Data Gap (Sub-Condition Parameter)	**Parent Condition Parameter**	**Priority**	**Object or Component Addressed**	**Description**	**Source of Data**
Riser		✯	Riser	Deterioration or other damages	On-site visual inspection
Grounding		✯	Pole	Deterioration of grounding wire	On-site visual inspection

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UNDERTAKING NO. JT1.13:

TO PROVIDE A LIVE VERSION OF THE EXCEL SPREADSHEET AT AMPCO 9, APPENDIX A.

Response:

The requested files are being submitted as live excel files on RESS. Please refer to Enersource_Undertaking JT1.13_AMPCO-9_Appendix A.

UNDERTAKING NO. JT1.14 (ADDITIONAL):

TO ADD A COLUMN OF BOARD-APPROVED 2013 TO THE SEC COMPARISON CHART.

Response:

The 2013 Board-approved funds for 2013 are included below. All business unit spends are shown as gross, with total contributions included at the bottom of the table.

Detailed Capital Budget Comparison

Category	2014 Actual	2016 Forecast			2013 COS	2015 Actuals (Unaudited)
		2012 Asset Management Plan	2016 Rate Application	Difference		
Municipal Substation Construction and Upgrades	$5,850	$5,784	$11,600	$5,816	$5,302	$9,193
Subtransmission Expansion	$3,514	$4,901	$2,400	-$2,501	$5,832	$3,739
Automation/SCADA Replacement and Enhancement Program	$1,863	$2,672	$3,200	$528	$1,750	$3,148
Subtotal - System Service	$11,227	$13,357	$17,200	$3,843	$12,884	$16,079
Subdivision Renewal Program	$9,307	$10,789	$13,250	$2,461	$7,847	$13,626
Overhead Distribution Renewal and Sustainment	$5,051	$2,789	$6,090	$3,301	$2,727	$8,095
Subtransmission Renewal	$0	$0	$4,200	$4,200	$0	$1
Transformer Replacement	$12,635	$1,461	$7,125	$5,664	$1,004	$12,071
Underground Distribution Renewal and Sustainment	$3,848	$3,228	$3,750	$522	$2,998	$3,258
Emergency Replacement Program	$416	$0	$320	$320	$0	$325
Subtotal - System Renewal	$31,257	$18,268	$34,735	$16,467	$14,576	$37,376
Road Projects	$580	$1,332	$3,000	$1,668	$1,687	$1,386
Light Rail Transit	$0	$0	$400	$400	$0	$0
New Subdivisions	$1,205	$1,954	$800	-$1,154	$2,247	$6,312
Industrial and Commercial Services	$4,774	$2,743	$2,600	-$143	$2,560	$6,072
Residential Service Upgrades	$0	$0	$125	$125	$0	$491
Smart Metering Large Commercial	$414	$0	$1,506	$1,506	$0	$881
Wholesale Metering	$52	$0	$1,263	$1,263	$0	$210
Metering Equipment	$1,411	$859	$1,172	$313	$695	$1,395
Smart Metering	$0	$0	$0	$0	$0	$0
Smart Metering in New Condos	$719	$887	$1,387	$500	$952	$1,687
Green Energy - FIT/MicroFIT	$319	$506	$155	-$351	$316	$197
Subtotal - System Access	$9,474	$8,281	$12,408	$4,127	$8,458	$18,631
Engineering and Asset Systems	$659	$591	$1,510	$919	$921	$802
Rolling Stock	$926	$2,300	$2,775	$475	$1,975	$2,489
Information Technology	$493	$750	$671	-$79	$886	$1,026
JDE/ERP System	$883	$1,312	$2,185	$873	$1,547	$1,594
Meter to Cash	$686	$984	$2,470	$1,486	$726	$1,435
Grounds and Buildings	$2,417	$3,169	$2,985	-$184	$6,933	$1,910
Acquisition of Administrative Building	$0	$0	$0	$0	$0	$0
Major Tools	$167	$210	$200	-$10	$200	$252
Subtotal - General Plant	$6,231	$9,317	$12,796	$3,479	$13,187	$9,508
Gross Capital Program	$58,189	$49,223	$77,139	$27,916	$49,106	$81,594
CIAC	-$4,138	-$3,015	-$2,131	$884	-$2,933	-$6,358
Net Capital Program	$54,051	$46,208	$75,008	$28,800	$46,173	$75,236

UNDERTAKING NO. JT1.14:

TO PROVIDE A LIVE VERSION OF THE EXCEL SPREADSHEET AT AMPCO 12.

Response:

The requested files are being submitted as live excel files on RESS. Please refer to Enersource_Undertaking JT1.14_AMPCO-12_Appendix D.

UNDERTAKING NO. JT1.15:

WITH REFERENCE TO STAFF 11, TO IDENTIFY IF THERE ARE ANY PROJECTS ON THAT LIST THAT WERE IN THE 2013 BOARD-APPROVED.

Response:

No projects in Enersource's 2016 ICM list were in the 2013 Board-approved Cost of Service application. Please also see the response to JT1.2.

UNDERTAKING NO. JT1.16:

TO FILE THE PRESENTATION.

Response:

Please find attached summary results of customer consultation entitled, "Enersource Hydro Mississauga Inc. Research-Based Customer Long Term Plan Consultation".

The Bottom Line [see slide 12]:

- When Customers had an opportunity to understand the electricity system and then think through the components of Enersource's LTP [Long Term Plan – Enersource's terminology for the Distribution System Plan] and the rationale, most judged the proposed investments to be both critical and appropriate.
- Through their dialogue with Enersource Executives in the IDST™ [unique customer consultation protocol designed by consultants, Decision Partners and MedRespond, with Enersource input] they were able to think about what needs to be done and why. When they did so, for most, the proposed LTP activities and required investments made sense.
- **Nearly all Customers (90%) expressed a "Medium" or "High" level of confidence that Enersource would do what is necessary to continue to provide safe, reliable, cost effective electricity by implementing the investments described in the LTP.**
- The IDST™ results were somewhat more positive than the Mental Models [trademarked consultation via interviews protocol of Decision Partners] results, perhaps because Customers were engaging with "real" Enersource people or because the IDST™ provided more context around the LTP.
- The IDST™ experience appears to have been a positive one for most Customers:
  - » *"It seems like your numbers and facts are legitimate. It is evident a lot of work went into this website and planning for the increases."*
  - » *"I think the team looks well prepared and serious about this venture. By merely reaching to public/consumers to get feedback /inputs in itself shows the nature of Enersource seriousness to get inputs and map accordingly the priorities."*
  - » *"Because you ran this survey, I believe you'll live up to your word and to your clients' expectations! Good luck!"*
  - » *"Going through this module, I can see how thorough and well thought the plan is. My experience with Enersource has also been one full of care for its customers. I appreciate plain and honest information like the information presented here."*

Appropriateness of Overall Increase In Investment [see slide 17]

- **When asked to rate how appropriate the 35% overall increase in investments in the LTP, most Customers (77%) believed that the level of investment was *"Very"* or *"Somewhat"* appropriate:**
  - » *"A 35% increase over a five year timeline seems like a small price to pay to have peace of mind that the system is going to run effectively and efficiently."*

DECISION PARTNERS

Enersource Hydro Mississauga, Inc. Research-Based Customer Long Term Plan Consultation

Customer Consultation

Phase 2: Interactive Decision Support Technology™ Research Engagement

Report on IDST™ Research

January 7, 2016

Contents

IDST™ Research Background

IDST™ Need

- **The results of foundational Mental Models research demonstrated that most Residential and Non-Residential Customers did not have a sufficient understanding of the electricity system and Enersource's role in the system to provide meaningful input into the Long Term Plan (LTP).**

- **An intervention based on informed insight and customized to address Customers' values, interests and priorities was required to effectively communicate the implications of the LTP for customers over the next five years and to improve the meaningfulness of any customer feedback on the LTP.**

- **The original design – to use the results of the mental models research to conduct a web survey with customers – was inadequate.**

IDST™ Approach

- **Decision Partners, and its Interactive Decision Support Technology™ (IDST™) partner, MedRespond, working with the Enersource Team, designed, developed and hosted a state-of-the-science IDST™ web site.**
- **The IDST™ content was based on the results of the Mental Models research – what Customers knew, did not know, misunderstood and wanted to know.**
- **The Synthetic Interview simulated a one-on-one conversation with Enersource leaders through a combination of streaming video and artificial intelligence designed to replicate the feel of a direct engagement with the video hosts.**
- **Through the IDST™ Enersource hosts first clarified the company's power delivery role within the larger electricity system, then engaged Residential and Non-Residential Customers in thoughtful "conversations" about components of the LTP.**

IDST™ Design

- **While Customers could customize their engagement through the IDST™ to a degree, the following topics were offered as the core of the engagement:**
  - Greeting and Introduction to the IDST™
    - (Optional) Fundamentals of the Electricity System – overview video
  - Enersource's Shared Priorities for management of the distribution system
    - Priority #1 – Reliability
    - (Optional) Priority #2 – Environmental Responsibility
    - (Optional) Priority #3 – Affordability
    - (Optional) Priority #4 – Safety
  - Long Term Plan
    - System Service and System Access Plan
    - System Renewal Plan
    - General Plant Investments Plan
    - LTP Benefits/Value
- **Customers were able to make comments or ask questions. If appropriate pre-recorded video responses were available, answers to the questions were provided.**
- **Customers were also provided a link to contact Enersource if they had additional questions for which they wanted a direct response.**

Invitation to Participate in the IDST™

- **Enersource invited its approximately 200,000 Residential and Non-Residential Customers to participate in the Enersource IDST™ to provide feedback to help shape the future of electricity distribution in Mississauga. Invitations were sent through many channels:**
  - » Press Release sent and posted on the website, November 23, 2015
  - » Invitation sent via Email to about 60,000 Customers whose email addresses were on file. (Invitation sent December 11 and reminder sent December 18)
  - » Invitation sent in customer bill inserts mailed between November 30 and December 23.
  - » Multiple Twitter announcements (7) between November 24 and December 23.

- **Customers were given the option to request a printed survey if they did not want to participate in the online engagement. No one requested a printed survey.**

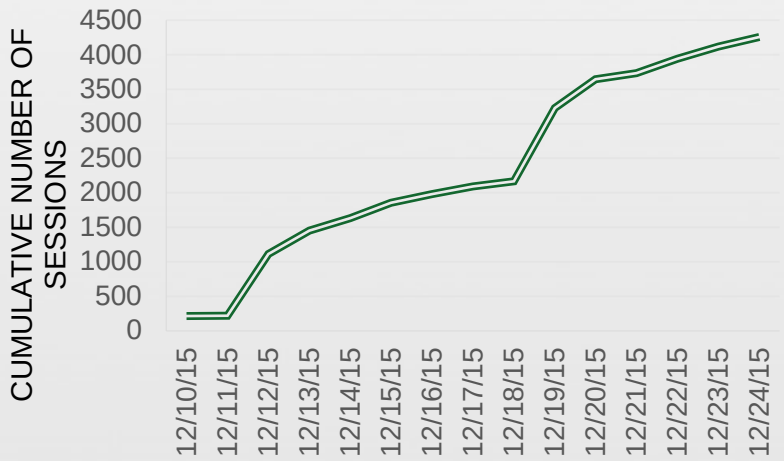
Incentive to Participate in the IDST™

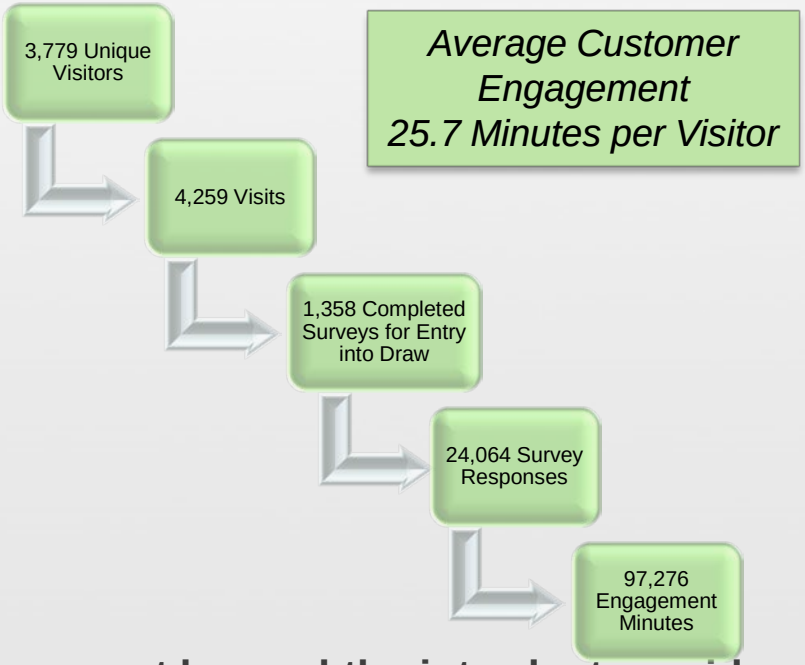
- **As an incentive to participate, Customers who answered all of the 11 core survey questions within the IDST™ about the Long Term Plan by the end of day December 23rd, were entered into a draw for one of eight Samsung Galaxy tablet computers.**

- **Winner Selection Process:**
  1. Respondents who reported as Enersource Customers and had completed the required questions were separated from those who were not customers, or who did not complete all of the required questions.
  2. Each eligible respondent was assigned an index number from 1 to 1358 – the total number of eligible respondents.
  3. Two sets of 8 unique random numbers between 1 and 1358 (winners and alternates) were generated from the website www.randomizer.org
  4. Respondents whose assigned index number matched the random numbers were provided to Enersource.
  5. Enersource verified that the respondents were customers and contacted the winners.

IDST™ Sample

- **The IDST™ was launched November 23 and Customer feedback was collected through December 30, 2015*.**





- **Of the 3779 unique visitors, 2206 Customers went beyond the introductory videos to data collection segments of the IDST™. Of those: 2157 were Residential Customers and 49 were Non-Residential Customers. In addition 43 non-Customer Guest Users visited the site and provided feedback (which was not included in the analysis).**
- **Nineteen Customers contacted MedRespond, the administrator of the IDST™, for technical assistance in using the site.**

*** The IDST™ site remained active until January 7, 2016.**

How to Read the Report

- **This Report presents the results of Customers' feedback on the *criticality* of the LTP components and the *appropriateness* of the proposed increases in investments in each area.**
- **Specific findings are supported with example comments from Customers to illustrate the finding being presented and provide more in-depth insight into Customers' thinking.**
- **Not all Customers answered all questions in the IDST™, so the total number of respondents (n) for any particular finding may vary.**
- **The number of Non-Residential customers who participated in the IDST™ is too small to identify any significant variances between Residential and Non-Residential Customers, but illustrative quotes are identified as coming from Residential or Non-Residential Customers.**

Summary of Research Findings on Customer Perceptions of Long Term Plan Components

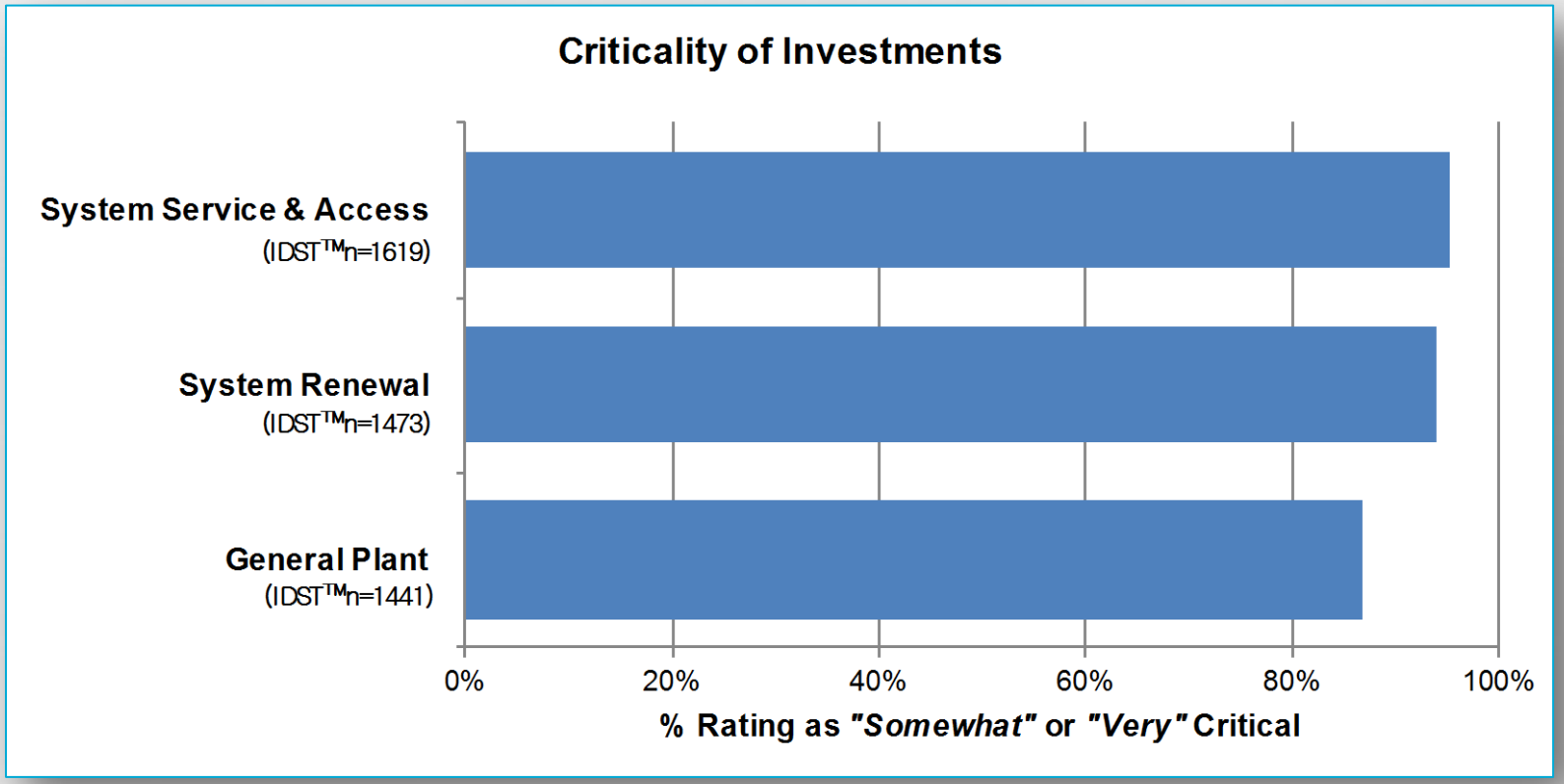
The Bottom Line

- **When Customers had an opportunity to understand the electricity system and then think through the components of Enersource's LTP and the rationale, most judged the proposed investments to be both critical and appropriate.**
- **Through their dialogue with Enersource Executives in the IDST™ they were able to think about what needs to be done and why. When they did so, for most, the proposed LTP activities and required investments made sense.**
- **Nearly all Customers (90%) expressed a "Medium" or "High" level of confidence that Enersource would do what is necessary to continue to provide safe, reliable, cost effective electricity by implementing the investments described in the LTP.**
- **The IDST™ results were somewhat more positive than the Mental Models results, perhaps because Customers were engaging with "real" Enersource people or because the IDST™ provided more context around the LTP.**
- **The IDST™ experience appears to have been a positive one for most Customers:**
  - *"It seems like your numbers and facts are legitimate. It is evident a lot of work went into this website and planning for the increases."*
  - *"I think the team looks well prepared and serious about this venture. By merely reaching to public/consumers to get feedback /inputs in itself shows the nature of Enersource seriousness to get inputs and map accordingly the priorities."*
  - *"Because you ran this survey, I believe you'll live up to your word and to your clients' expectations! Good luck!"*
  - *"Going through this module, I can see how thorough and well thought the plan is. My experience with Enersource has also been one full of care for its customers. I appreciate plain and honest information like the information presented here."*

Bottom Line Up Front

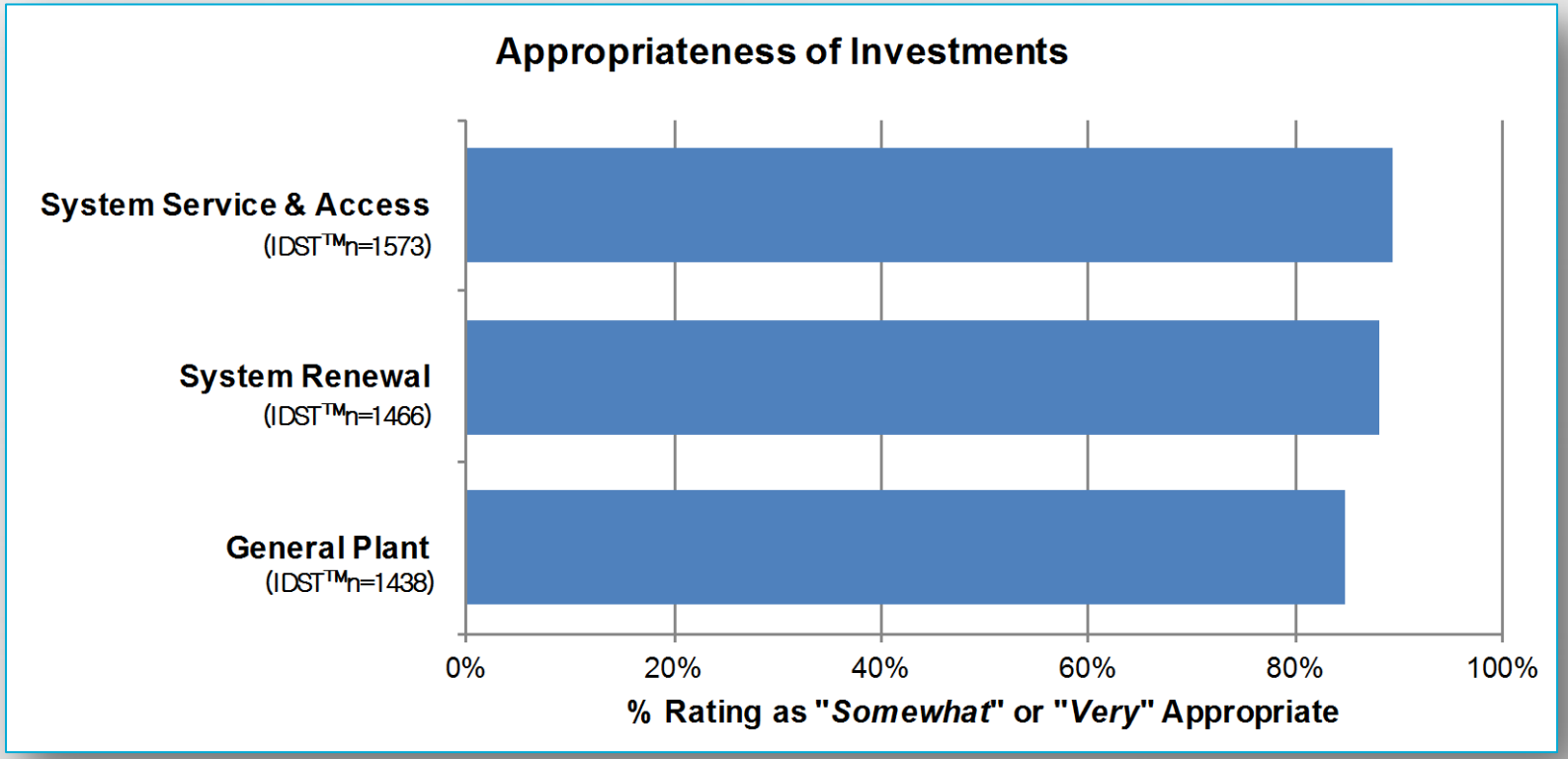
Criticality of Investment

- **After hearing the description of each of the components of the Long Term Plan and the level of investment required, nearly all Customers judged Enersource's planned investments to be *"Somewhat"* or *"Very"* critical:**



Appropriateness of Level of Investment

- **After hearing the description of each of the components of the Long Term Plan and the level of investment required, nearly all Customers judged the level of investment in all three areas of the LTP were *"Somewhat"* or *"Very"* Appropriate:**



Enersource Hydro Mississauga Inc.
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Technical Conference Undertakings Responses
Filed: January 18, 2016
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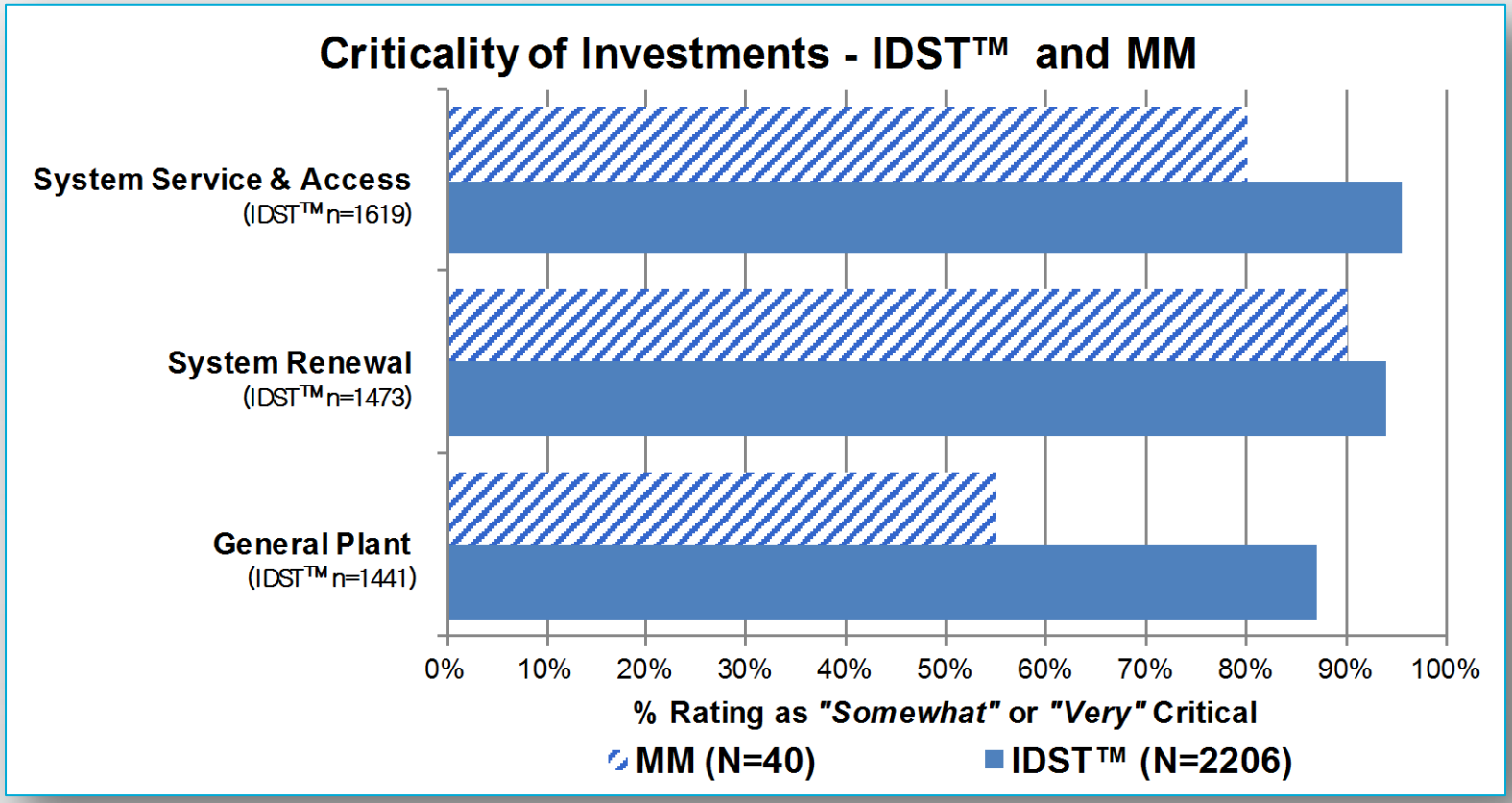
Criticality of Investment – IDST™ and MM

- **The chart below compares Customers' assessment of criticality of investment from the Mental Models research and the IDST™:**



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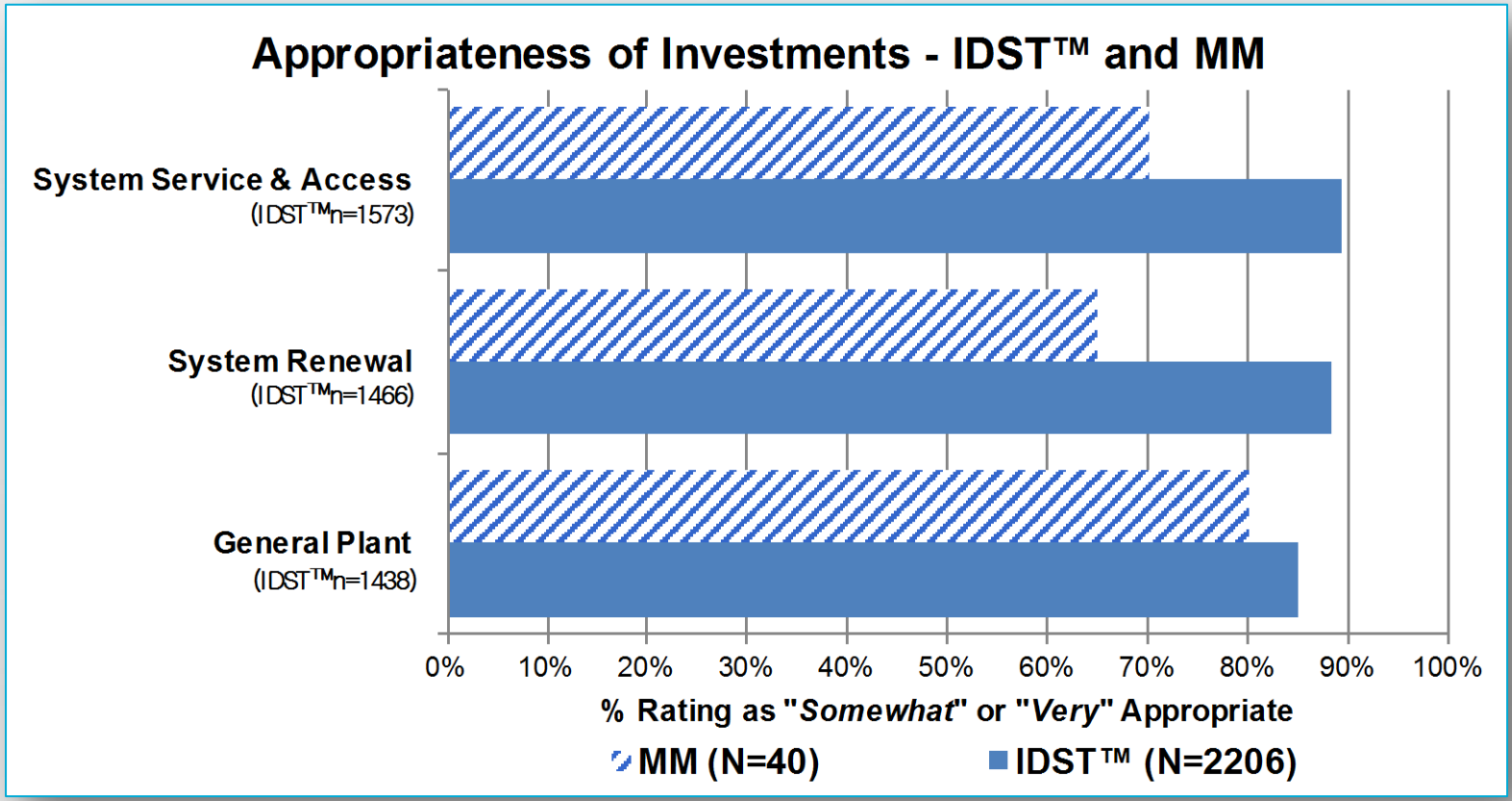
Appropriateness of Level of Investment – IDST™ and MM

- **The chart below compares Customers' assessment of appropriateness of investment from the Mental Models research and the IDST™:**



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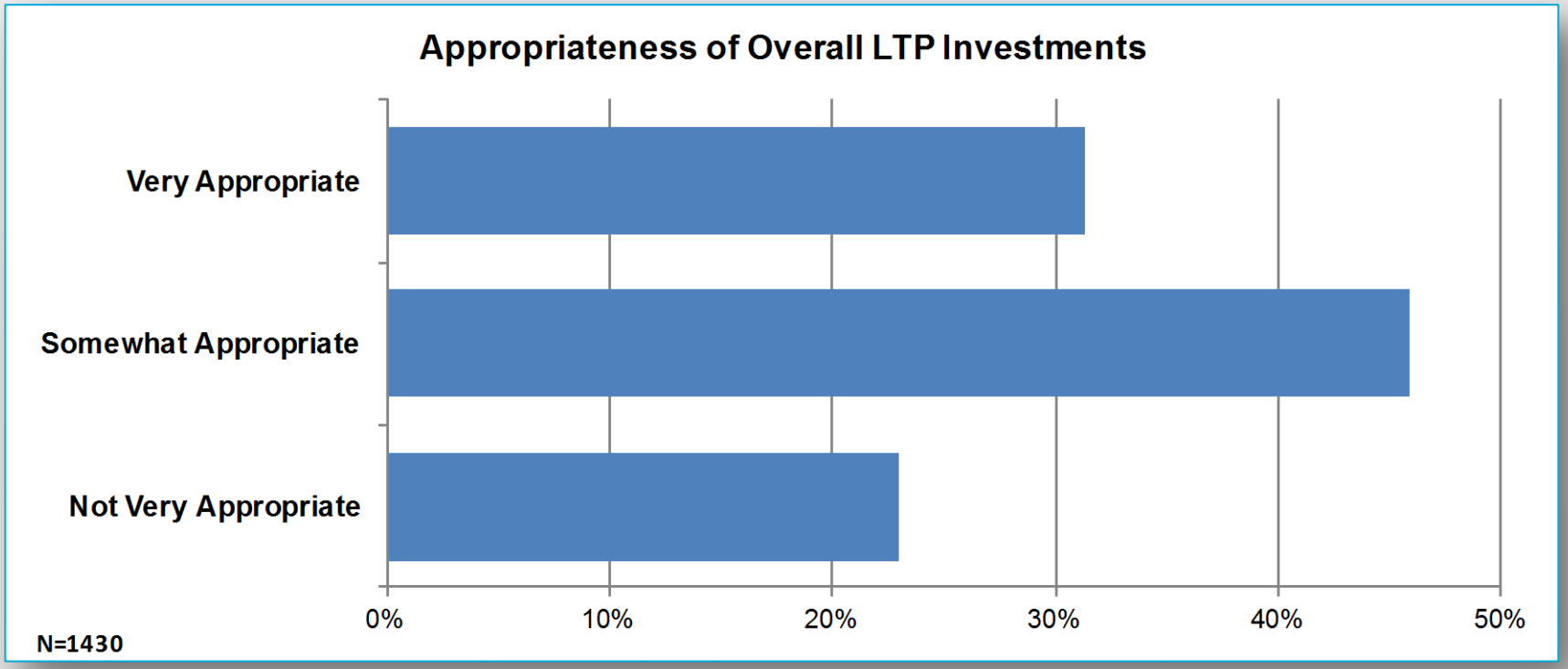
Appropriateness of Overall Increase In Investment

- **When asked to rate how appropriate the 35% overall increase in investments in the LTP, most Customers (77%) believed that the level of investment was *"Very"* or *"Somewhat"* appropriate:**
  - *"A 35% increase over a five year timeline seems like a small price to pay to have peace of mind that the system is going to run effectively and efficiently."* (Res)



Bottom Line Up Front

Confidence in Enersource

- **Nearly All Customers (90%) said they had a *"High" or "Medium"* degree of confidence in Enersource in continuing to do a good job of providing safe, reliable, cost effective electricity by implementing the investments associated with the LTP:**

Residential Customers

» ***"It seems well thought out. The information presented here increases my confidence. I know more now with the information provided."***

» ***"Enersource is seemingly trying to be transparent. We will see what the actual increase in the cost of electricity will be over the next 5 years, and I hope that in looking back, this doesn't turn out to be an empty effort to communicate with your customers."***

» ***"Reliability and safety is forefront. Cost effectiveness is shown in the proactive approach as related to replacing aged infrastructure, willingness to spread out the cost to minimize impact; long term planning in place with ongoing review, which is key to being flexible and agile in dealing with developments."***

Non-Residential Customers

» ***"In general your services are excellent and therefore I have high degree of confidence that your team is able to exceed such expectations."***

» ***"Enersource made a similar promise some 5-6 years ago.... and definitely delivered on the proposed reliability plan to replace end of life equipment with minimal interruption. Keep up the great job you do!"***

Positive Comments re: IDST™

- **When speaking about their *"High Level"* of confidence in Enersource, some Customers made positive comments about the IDST™:**

  - ***"It seems like your numbers and facts are legitimate. It is evident a lot of work went into this website and planning for the increases."***
  - ***"This website and the people in the videos. All seems very credible."***
  - ***"Because you ran this survey and I believe you'll live up to your word and to your clients' expectations! Good luck!"***
  - ***"Very clear presentation. Very user-friendly system. Plan had clear goals and investments were for a variety of different upgrades and efficiencies. Very professional."***
  - ***"Firstly, I like this survey as it is getting your customers involved and it will be our money that is going to go from our pocket but since you are preparing us in advance of this increase in cost, there is no problem. We also know how Enersource works and they are the best."***
  - ***"You seem to have taken this process very seriously, based on the efforts taken to solicit input. This survey/information project clearly took a lot of effort by many members of your team."***
  - ***"Going through this module, I can see how thorough and well thought out the plan is. I appreciate plain and honest information like the information presented here."***

Overview of the LTP

- **To introduce the components of the Long Term Plan, the video host presented the following overview:**

  There are three parts to our Long Term Plan: First, System Service and System Access which covers converting higher voltage electricity from the grid to the lower voltage electricity that you use. It also covers connecting new customers, and things like moving sections of our system to make way for expanded roads or the new Light Rail Transit system. System Service and System Access costs are expected to increase about 30% in total over the next 5 years, compared to spending in these areas over the previous five years. Next, System Renewal, which covers repairing and maintenance of our current distribution system. We expect our costs here to increase about 20% over the next 5 years. And finally, what we call General Plant, which covers things like our buildings, trucks, employee costs, training, computer equipment and other operating costs. This will use about 15% of our capital budget. We haven't planned any large, new investments in this area in the next five years, so there is no increase in this part.

Perceptions of LTP Components

- **After presenting the overview, the IDST™ video host engaged the Customers on each component of the LTP:**
  - » Presenting a description of the focus of the component;
  - » Asking for Customers' unprompted thoughts about investments in the area;
  - » Asking Customers to rate how critical they thought the investments in the area were; and
  - » Asking Customers to rate the appropriateness of the proposed level of investment in each area.

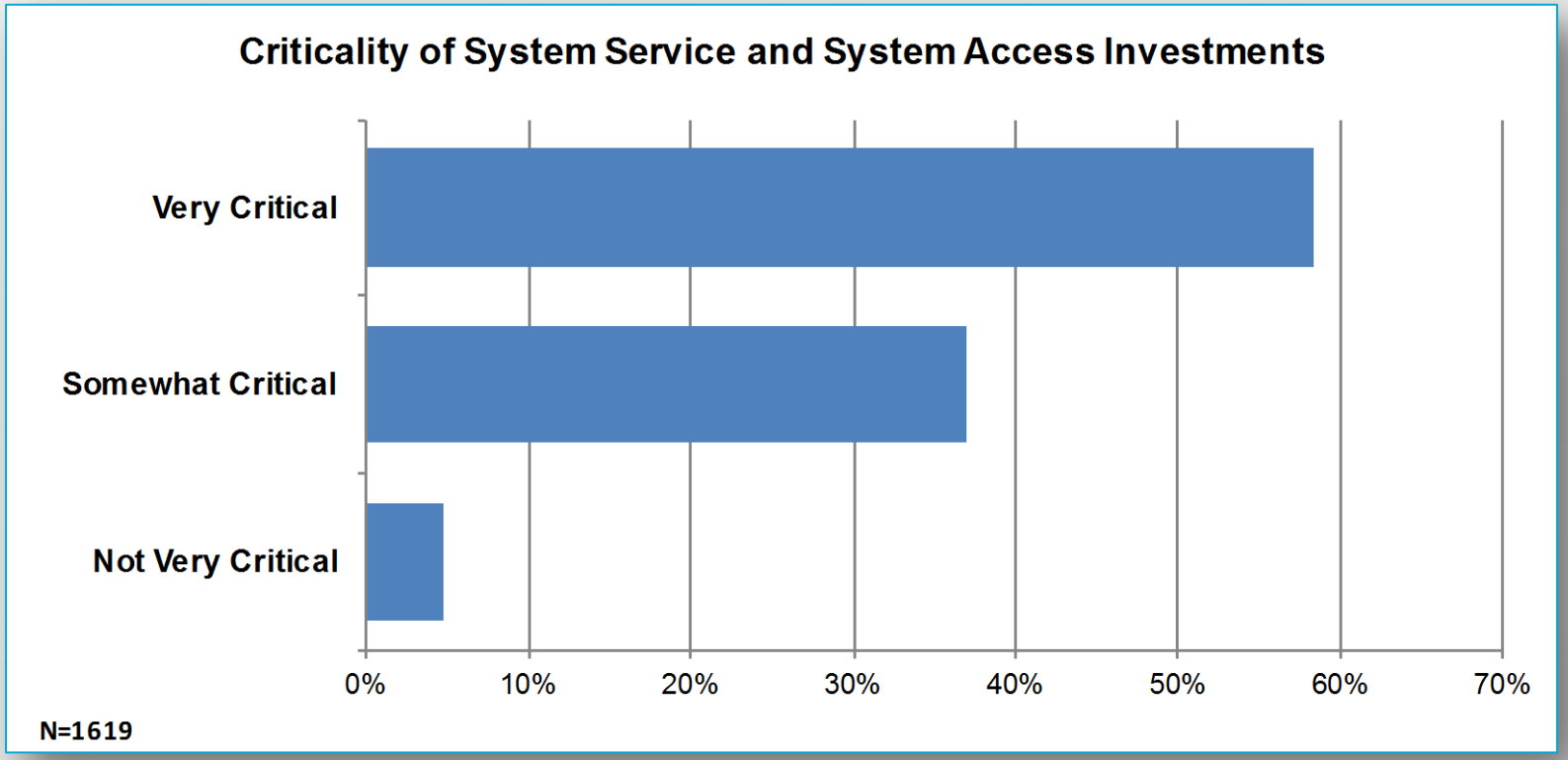
System Service and System Access

- **The IDST™ video host presented the following description of the System Service and System Access component of the Enersource LTP:**

  The System Service and System Access plan covers improvements and upgrades to our distribution system that will assure the delivery of electricity safely and reliability. To prepare for increased demand in Mississauga, our Plan covers the need to expand our system of substations, lines, and other equipment to connect new homes, especially condo developments, and businesses. And we need to tie in small renewable energy sources such as wind turbines and rooftop solar powered systems. These investments are among the most basic of the activities that we do as they are required to assure that we deliver electricity safely and reliably as we move forward.

Criticality of System Service & Access Investment

- **When asked how critical investments in the System Service and System Access area of the LTP were, nearly all Customers (95%) rated the investments "Very" or "Somewhat" critical:**



Criticality of System Service & Access Investment

- **Most Customers (58%) rated investments in the System Service and System Access area of the LTP *"Very Critical":***

Residential Customers

- ***"Because if you don't make investments you will likely not be able to keep up with demand. The world is reliant on, if not addicted to, energy."***
- ***"Without the appropriate infrastructure the entire grid is in jeopardy. We need to ensure we have the most reliable and best system service and system access possible."***

Non-Residential Customers

- ***"We need a dependable and consistent supply of energy."***
- ***"Electricity is the next big thing. Everything is going electric so we have to cope with the market demand."***
- ***"We need to ensure a sustainable system."***

Criticality of System Service & Access Investment

- **Some Customers (37%) rated investments in the System Service and System Access area of the LTP as *"Somewhat Critical"*:**

Residential Customers

» ***"System already functions well."***
» ***"Mississauga is changing especially near the Square One area and it will create stress to our system if we aren't ready."***
» ***"With everyone going more low energy with things like LED lights, there will be less burden on the system. Even with growth."***

Non-Residential Customers

» ***"You need to be able to continue to provide service to existing customers, and new customers that will be added."***
» ***"Not sure how important it is."***

Criticality of System Service & Access Investment

- **A few Customers (5%) rated investments in the System Service and System Access area of the LTP as *"Not Very Critical"*:**

Residential Customers

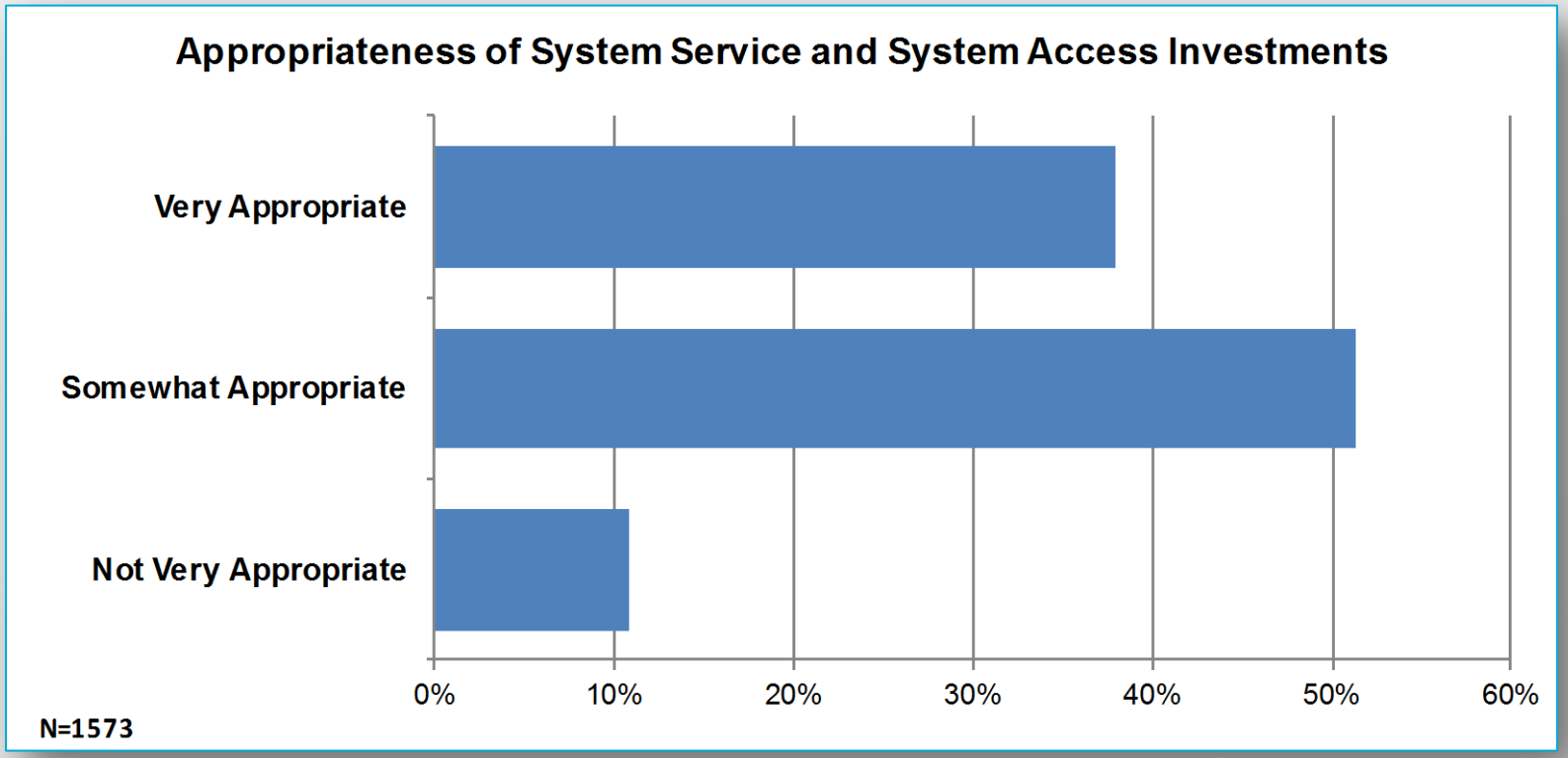
» ***"You didn't do anything to make the price lower."***
» ***"As long as it will not sacrifice any of the promised services to the Consumers, any endeavours of the Company without any compromise in terms of providing the service to the people, for sure it would not make any problems."***

Non-Residential Customers

» ***"Because you want to justify future price increases, now!"***
» ***"Don't see this as a key priority."***

Appropriateness of System Service & Access Investment

- **Customers were next asked how appropriate the proposed 30% increase in investment over the next 5 years in System Service and System Access was. Nearly all Customers (89%) believed the level of investment was "Very" or "Somewhat" appropriate.**



Appropriateness of System Service & Access Investment

- **Some Customers (38%) rated the level of investment in the System Service and System Access area of the LTP as *"Very Appropriate"*:**

Residential Customers

» ***"If we didn't invest now, we will have to pay more in the future."***
» ***"The proposed LRT and adoption of electric vehicles makes a significant investment appropriate to support future needs."***

Non-Residential Customers

» ***"Like anything, if don't plan and prepare for changes when outages and lack of demand are affected, by then it is too late."***
» ***"Seems like a good proportional investment."***
» ***"I run a company the relies on delivering 100% uptime. If power from Enersource is stable (this can only be achieved by having the right amount of capacity to demand ratio). Any degradation of power causes havoc for my customers and Enersource. The determination of a percentage of required efforts was based on previous growth and demand as well as end of life replacements. I feel it is extremely justified."***

Appropriateness of System Service & Access Investment

- **Many Customers (51%) rated the level of investment in the System Service and System Access area of the LTP as *"Somewhat Appropriate"*:**

Residential Customers

- ***"30% seems drastic, but it would depend on the funding sources. The costs cannot all be passed onto the consumer."***
- ***"The investment is understandable for the City of Mississauga; however, could be costly to residents."***
- ***"I am concerned of the cost that will be passed on to the consumer. This plan should have been in place long ago with costs more gradual to the consumer."***

Non-Residential Customers

- ***"It is necessary but its costs will also increase."***
- ***"The percentage of increase should be balanced by other key steps in the plan."***
- ***"30% is a lot of investment."***

Appropriateness of System Service & Access Investment

- **A few Customers (11%) rated the level of investment in the System Service and System Access area of the LTP as *"Not Very Appropriate"*:**

Residential Customers

» ***"Expensive, no money."***
» ***"Cost should be recovered from the builder unless it is for the City as a whole."***
» ***"If that will be passed on to residential users, it's too high."***

Non-Residential Customers

» ***"You should have been investing as the City was growing, not now. It's too late."***

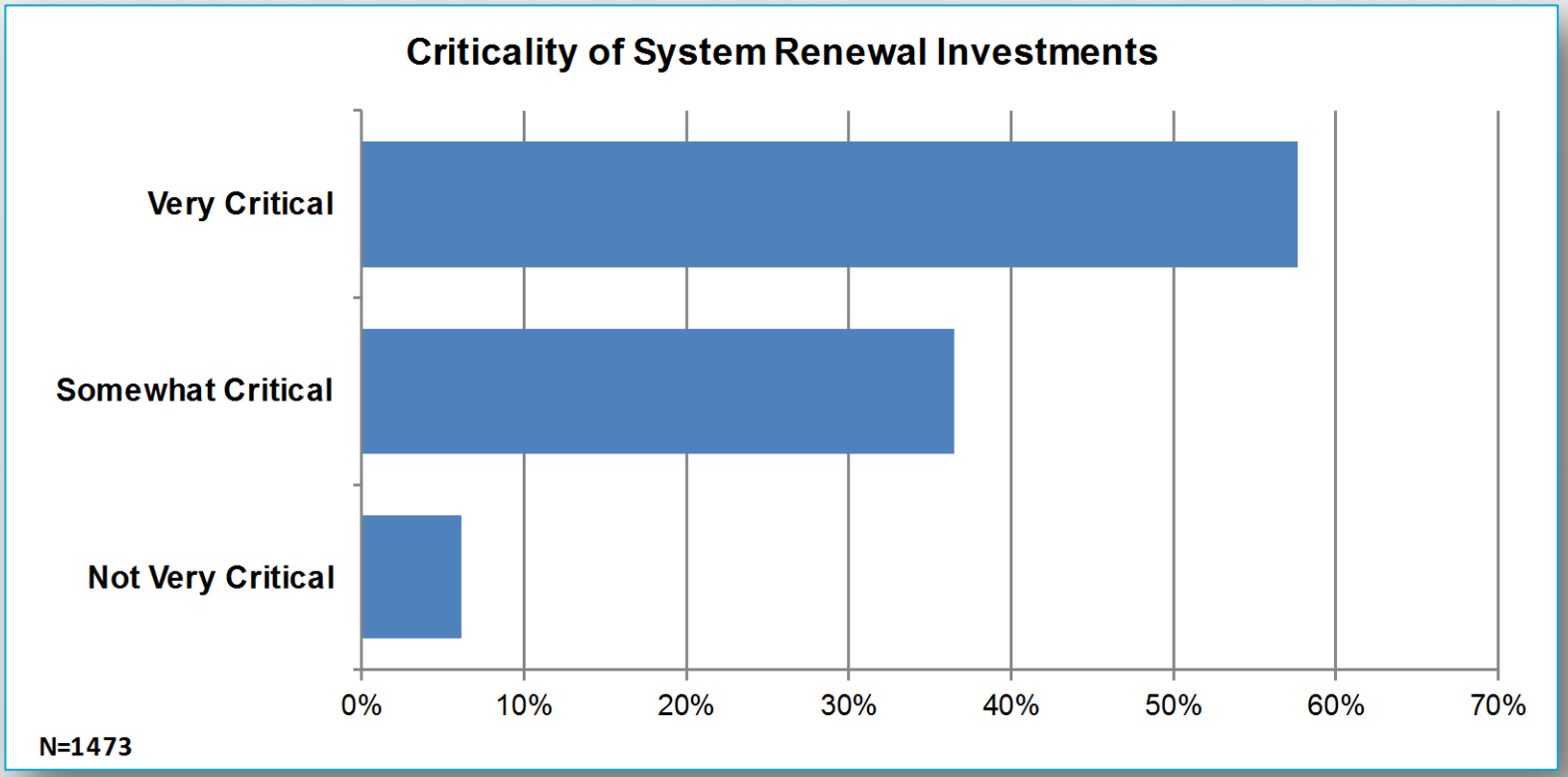
System Renewal

- **The IDST™ video host presented the following description of the System Renewal component of the Enersource LTP:**

  The System Renewal plan covers repairs and replacement of lines, and equipment that was installed 20-40 years ago and is now wearing out. Earlier James spoke with you about how most of the outages and voltage fluctuations people experience are caused by aging equipment. These investments will allow us to continue to provide safe and reliable power to you in an environmentally-friendly way.

Criticality of System Renewal Investment

- **When asked how critical investments in the System Renewal area of the LTP were, nearly all Customers (94%) rated the investments *"Very"* or *"Somewhat"* critical:**



Criticality of System Renewal Investment

- **Most Customers (58%) rated investments in the System Renewal area of the LTP *"Very Critical"*:**

Residential Customers

- ***"I would rather pay as the each year goes by than be hit in the future with costs that are disproportional, so the children in the future end up paying for our bad decisions."***
- ***"I live in a very mature area of Mississauga that is often impacted by weather, aging wires and many trees. It is very important to our family that Enersource is prepared for as many of these situations as possible. While we do not need electricity for a medical appliance, we do have an active sump pump and it is comforting to know that there is ongoing awareness and plans to upgrade our systems, so when an outage occurs, we are as ready as we can be."***

Non-Residential Customers

- ***"Reliability is key!"***
- ***"The fluctuations in power and outages greatly affect business and the lives of residents. It has also caused costly repairs on our properties."***
- ***"Proactive approach is more cost effective as well as more reliable."***

Criticality of System Renewal Investment

- **Some Customers (36%) rated investments in the System Renewal area of the LTP as *"Somewhat Critical"*:**

Residential Customers

- ***"While it's important to do regular maintenance on infrastructure, there is some leeway in terms of timing of repairs."***
- ***"The system will always need maintenance and renewal to keep pace with demand."***
- ***"Having invested this much in a survey about your Long Term Plan, it's hard to imagine that equipment has reached a state where it is extremely critical to replace it. On the other hand, you mention that some equipment is 40 years old. That seems quite outdated and more efficient equipment must be available."***

Non-Residential Customers

- ***"Not clear where systems are still okay but could be improved vs in dire need of repair."***
- ***"Only if it completely fails, then renew. Just like all of our home equipment, only if it's dead, then home owners choose to buy."***
- ***"Need a balance in upgrading the system while maintaining reasonable rates."***

Criticality of System Renewal Investment

- **A few Customers (6%) rated investments in the System Renewal area of the LTP as *"Not Very Critical"*:**

Residential Customers

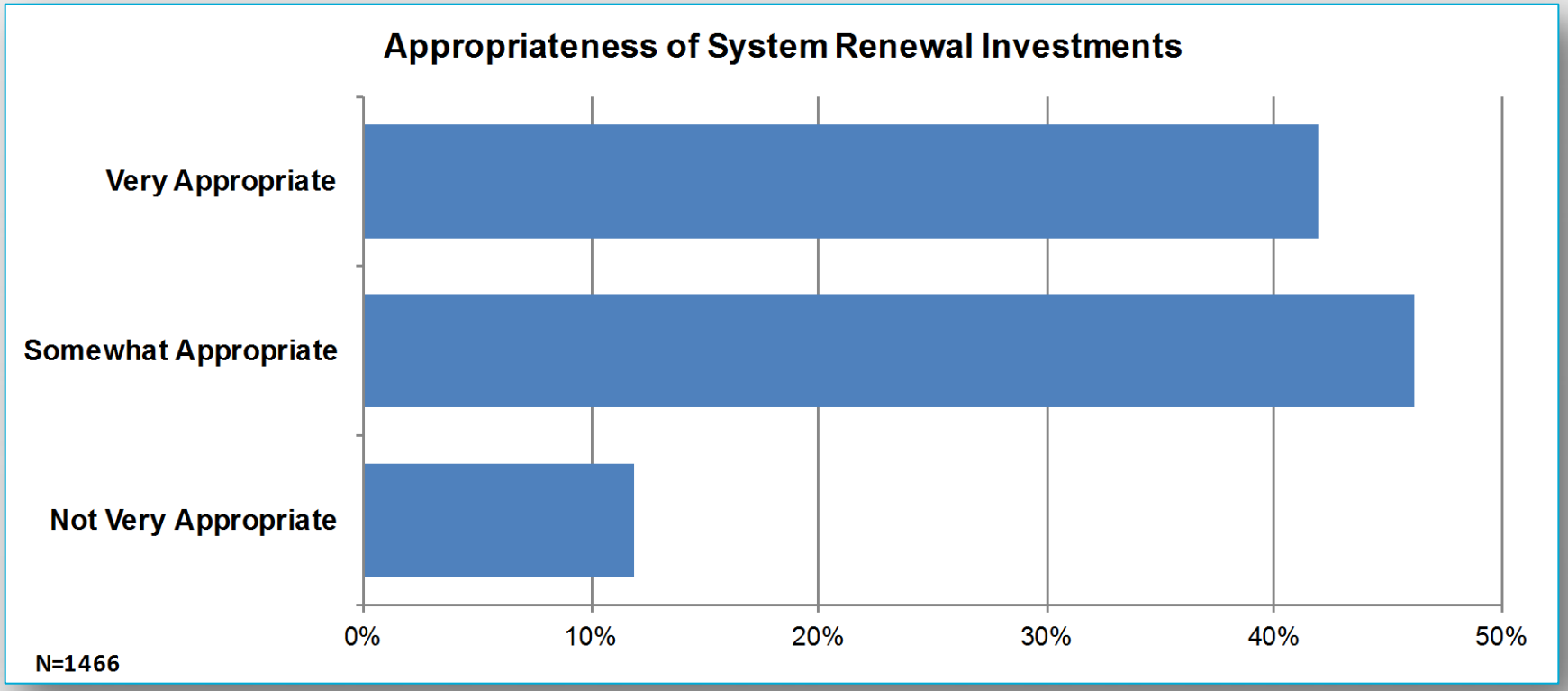
- ***"Because this will increase costs."***
- ***"Not critical until the system fails."***
- ***"Because Wynne will sell you for few bucks."***

Non-Residential Customers

- ***"Because everybody knows that is very critical. The reason that you are collecting that answer (very critical) is because in the future when you will gouge me even more then now, you will tell me that I asked for it. So the answer is NO."***

Appropriateness of System Renewal Investment

- **Customers were next asked how appropriate the proposed 20% increase in investment over the next 5 years in System Renewal was. Nearly all Customers (86%) believed that the level of investment was *"Very"* or *"Somewhat"* appropriate.**



Appropriateness of System Renewal Investment

- **Many Customers (42%) rated the level of investment in the System Renewal area of the LTP as *"Very Appropriate"*:**

Residential Customers

- ***"Renewal work always ends up costing more as surprises occur."***
- ***"We need to catch up with a lot of our infrastructure issues and as long as the expenses are managed appropriately, I think we need to have a plan to update, upgrade and better prepare for the future."***

Non-Residential Customers

- ***"This will help reduce our material costs by curtailing our scrap rate."***
- ***"20% seems to reflect a projected trend I also follow. The cost of ensuring having the right tools, equipment and back up plans are necessary and the allocated spend is more than justified."***
- ***"Need to ensure that reliable and affordable energy is available."***

Appropriateness of System Renewal Investment

- **Many Customers (46%) rated the level of investment in the System Renewal area of the LTP as *"Somewhat Appropriate"*:**

Residential Customers

- ***"Fiscal conservatism is paramount at this time."***
- ***"Would rather spend gradually now than pass the more expensive cost into the future."***
- ***"Need to balance sourcing and focusing more on operational efficiencies."***

Non-Residential Customers

- ***"Difficult to answer without knowing extent of repair/renewal work that needs to be done."***
- ***"There are other areas in the City which require investments, such as roads and sewage, etc. Therefore, all investments should be balanced."***

Appropriateness of System Renewal Investment

- **A few Customers (12%) rated the level of investment in the System Renewal area of the LTP *as "Not Very Appropriate"*:**

Residential Customers

» ***"Does 20% of the system fail or in need of renewal? Don't think so."***
» ***"The price is already high."***

Non-Residential Customers

» ***"What have you been doing for the past 50 years? The system should not be outdated! Period! Oh wait, the big fat bonuses. How could I forget that?"***
» ***"You should privatize a portion of your company to a private company for investment."***

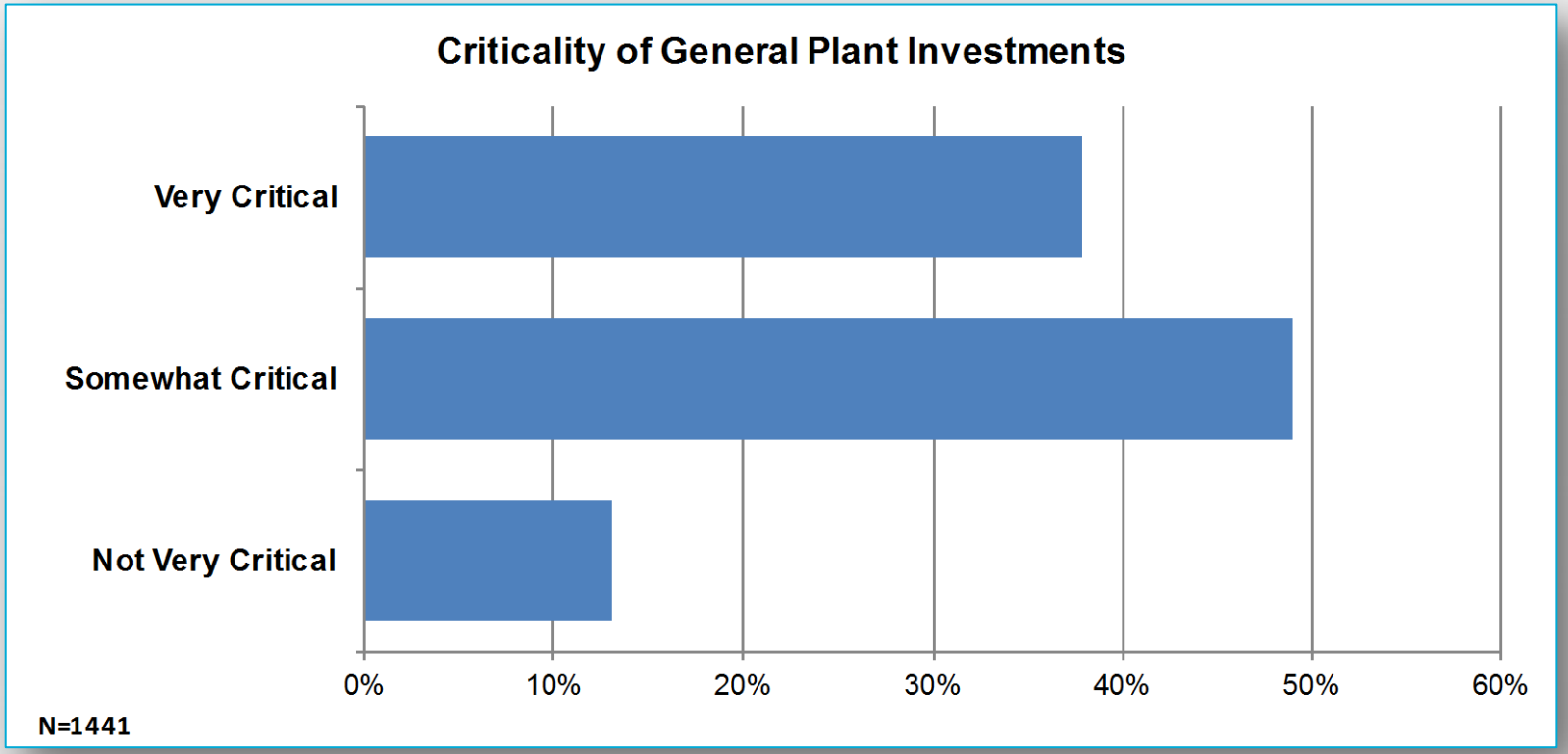
General Plant Investment

- **The IDST™ video host presented the following description of the General Plant Investment component of the Enersource LTP:**

  The General Plant plan describes the investments in things that are not direct parts of the distribution system, such as land and buildings, tools and equipment, the fleet of trucks and other vehicles, and software used to support our day-to-day business. Our reliability depends on having the systems to prevent outages and track maintenance and repairs. Our safety depends on tree trimming and the equipment that our crews use.

Criticality of General Plant Investment

- **When asked how critical were investments in the General Plant area of the LTP, nearly all Customers (87%) rated the investments as *"Very"* or *"Somewhat"* critical:**



Criticality of General Plant Investment

- **Some Customers (38%) rated investments in the General Plant area of the LTP as *"Very Critical"*:**

Residential Customers

- ***"This an area where costs can be controlled, especially with pending mergers with other utilities."***
- ***Updates mean faster service to the consumer in case of power outages or emergencies."***
- ***"I like peace of mind. I like the thought that if something bad happens, there will be qualified, organized, trained people who will help me in my time of need."***

Non-Residential Customers

- ***"Keeping things running well is important. Vehicles, worker safety, and back up power plans are critical. So a need to invest here is very critical."***
- ***"Without current tools and technology front line and support workers cannot meet the demands of their work."***
- ***"Consumers don't often think of the tools, software, vehicle fleet, offices/warehouses required in the background to ensure the correct response to problems, issues or simply giving the workforce the right tools to get the job done right as quickly as possible."***

Criticality of General Plant Investment

- **Many Customers (49%) rated investments in the General Plant area of the LTP as *"Somewhat Critical"*:**

Residential Customers

» ***"It's important to have the appropriate software and trucks to ensure you're able to handle a problem on the grid."***

» ***"Need to save for the rainy days and ensure you have what you need for future because you cannot predict what will come. You can never ensure you have enough – and taking too much is not right either – finding the right balance is important."***

Non-Residential Customers

» ***"This area is not directly linked to the quality of services we are getting but these plans may be important as back up to those services."***

» ***"It depends on the capital cost of new systems and replacements."***

Criticality of General Plant Investment

- **A few Customers (15%) rated investments in the General Plant area of the LTP as *"Not Very Critical"*:**

Residential Customers

» ***"Don't have a clear idea of what current problems are (if any). Should be able to maintain with current programming and resources without major investments when so much is already being asked for already."***

» ***"Fleet maintenance could probably be done for less by local garages."***

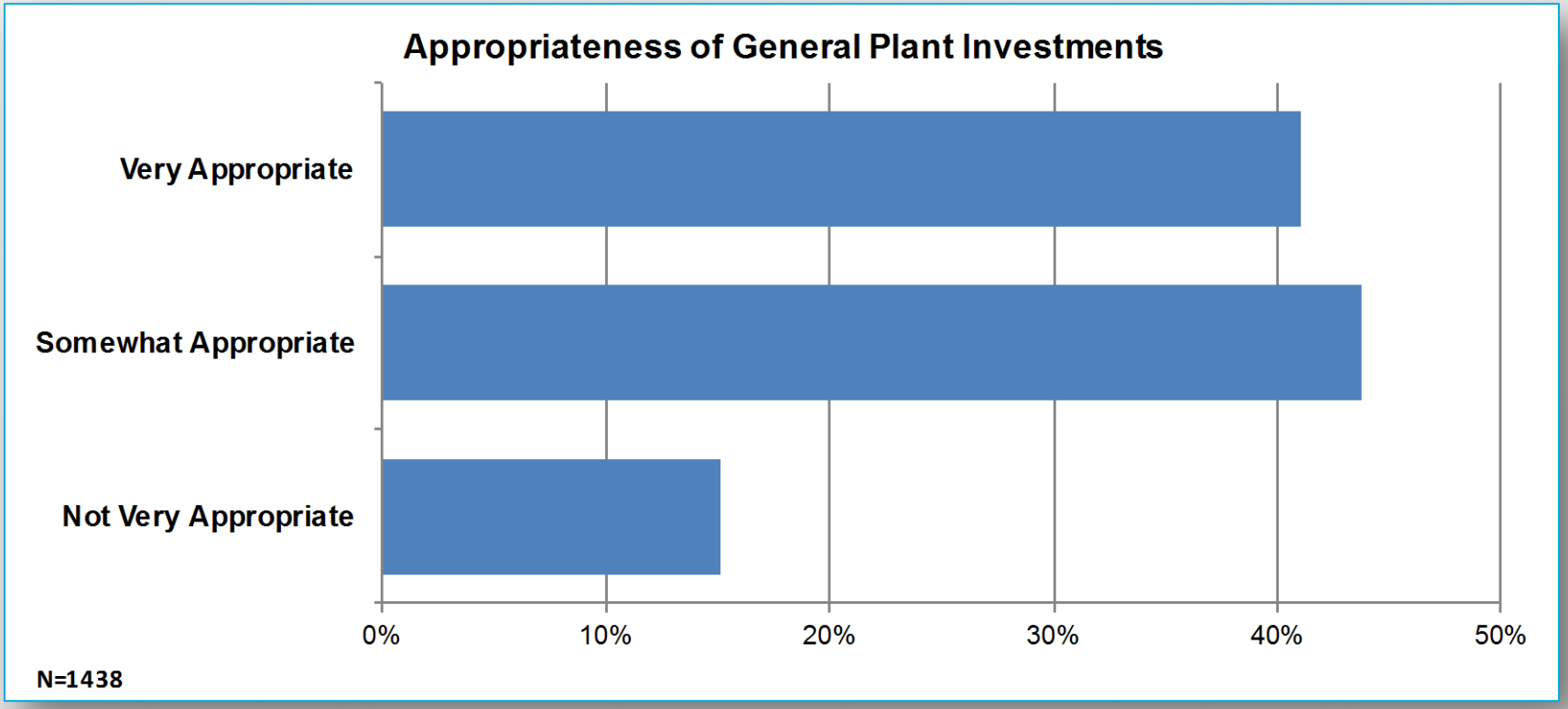
Non-Residential Customers

» ***"Give me affordable hydro, (and I will tell you what affordable is) and then you think about investment. Simple math. You are charging me exorbitant amounts of money for hydro now, yet you need my approval for some massive spending. If you can't make money now, how much will you increase my Hydro to break even after this investments? Very scary."***

» ***"If anything, the focus should be on reduction, not investment. Invest in talent quality, not quantity. Reduce real estate where possible."***

Appropriateness of General Plant Investment

- **Customers were next asked how appropriate the unchanged level of investment over the next 5 years in System Renewal was. Nearly all Customers (85%) believed the level of investment was *"Very"* or *"Somewhat"* appropriate.**



Appropriateness of General Plant Investment

- **Many Customers (41%) rated the level of investment in the General Plant area of the LTP as *"Very Appropriate"*:**

Residential Customers

- ***"New building provides space for expansion and pending mergers should allow a reduction in overhead expenses and increased productivity."***
- ***"The proposed merger will bring in economies of scale."***

Non-Residential Customers

- ***"If it is sufficient for now, do not need to change."***
- ***"We are in a time where there is definitely more elders than not and if the elders can depend on a lower charge ... I'm all for that."***
- ***"Funding for this plan is required and deferment to another time or budget cuts would absolutely hinder the other components of the Long Term Plan if not properly coordinated and budgeted. The General Plant described investments in things that are not part of distribution systems. Real estate, tools and equipment, vehicles and trucks as well as software to support day-to-day operations. Reliable equipment to prevent or minimize outages and the right tools for the crews to do their jobs, such as trimming trees, are required."***

Appropriateness of General Plant Investment

- **Many Customers (44%) rated the level of investment in the General Plant area of the LTP as *"Somewhat Appropriate"*:**

Residential Customers

- ***"As long as the expenses are well managed and deemed to be necessary, we need to have trust in Enersource to make the required change as necessary."***
- ***"Change is always necessary in order to keep current. As long as there is minimal 'wasted spending', this type of investment is worthwhile."***

Non-Residential Customers

- ***"Investments should be balanced. All expenses should tracked and be in line with other type of industries."***
- ***"Tools and resources change and should they not be maintained, updated or replaced, workers cannot perform tasks efficiently."***
- ***"There needs to be a balance in maintaining the general plant on how it will affect rate increases."***
- ***"Every system needs to be upgraded to reduce costs in the future."***

Appropriateness of General Plant Investment

- **A few Customers (15%) rated the level of investment in the General Plant area of the LTP as *"Not Very Appropriate"*:**

Residential Customers

» ***"Can't keep up-to-date with technology."***

» ***"Rising costs and requirements would probably have an impact of the monetary implications of managing and maintaining the general plant elements. So I find it a little confusing as to the non-increase in the investment."***

Non-Residential Customers

» ***[No substantive comments]***

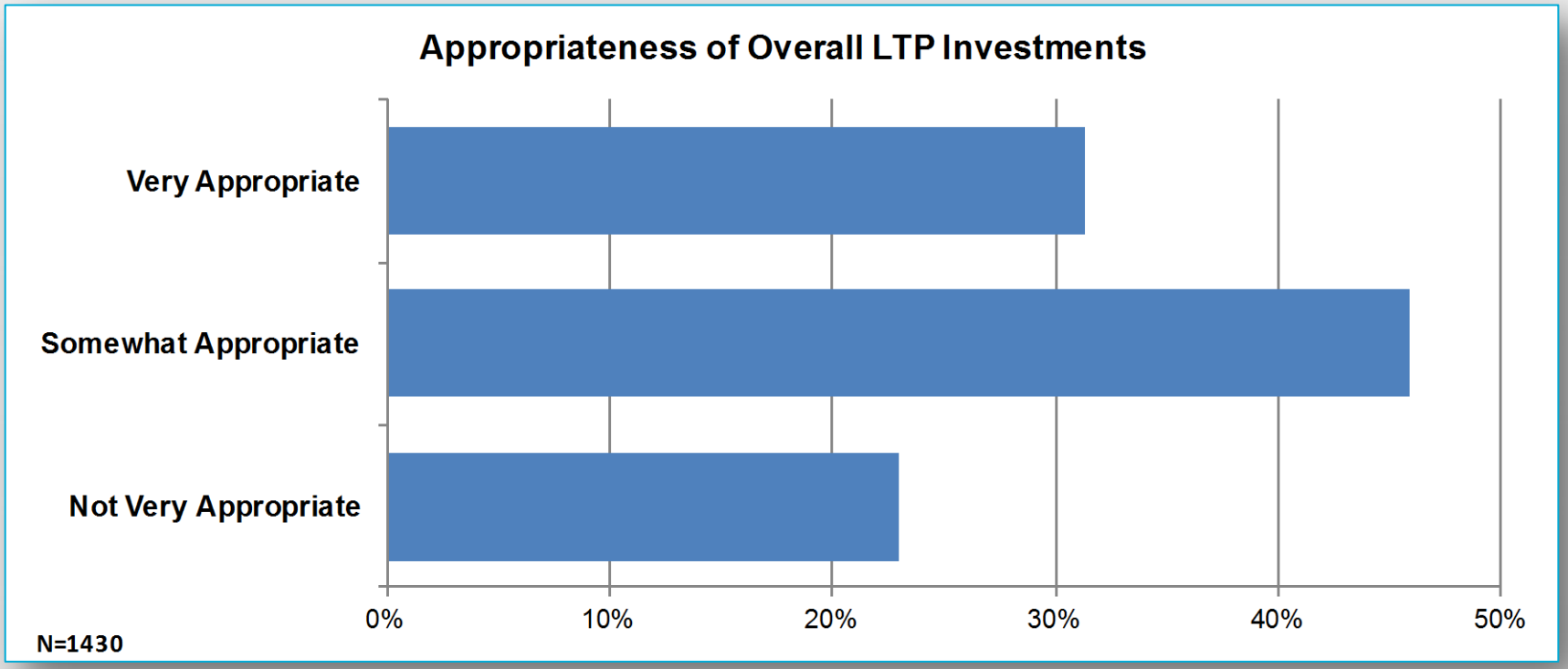
Overall Cost Impact of LTP

- **The IDST™ video host then presented the following description of the overall cost impact of the Enersource LTP:**

We know our customers are keeping a close eye on their electricity bills, so you're probably wondering how these improvements are going to affect your bill. Controlling our costs and the impact on our customers' bills is a critical part of our proposed plan. Basically, we are asking the Ontario Energy Board to approve an increase of 35% over five years on one section of your bill. Allow me to explain how the billing system works. First your total electricity bill includes charges from the three different parts of the system: the generators who make the electricity, the high voltage transmission companies, and then our charges which cover the cost of bringing electricity across our low voltage distribution lines to your home or business. Our charges account for approximately 20% of your total bill. The 35% increase aligned in our Long Term Plan only applies to that one section of the bill. For the typical residential customer who consumes 800 kilowatt hours of electricity per month, this change will represent $2.00 on their total bill.

Appropriateness of Overall Increase In Investment

- **When asked to rate how appropriate the 35% overall increase in investments in the LTP was, most Customers (77%) believed that the level of investment to be *"Very"* or *"Somewhat"* appropriate:**



Judgment of Overall Increase in Investment

- **Some Customers (31%) rated the overall increase in investments in the LTP as *"Very Appropriate"*:**

Residential Customers

- ***"I have not always agreed with the provincial government's decisions on generation, as those decisions affect utilities as your own. But it is very important to have reasonable cost reliable system."***
- ***"A 35% increase over a five year timeline seems like a small price to pay to have peace of mind that the system is going to run effectively, and efficiently."***
- ***"Kudos on the succinct explanation. "35%" is a significant amount and at first, the proposition seems to apply to the whole bill (which would be outrageous). I believe in responsible investment... IF this applies solely to the single section - and would represent an approximate increase of $2/month to the average user, this seems reasonable to me."***
- ***"The total proposed cost that would affect my bill on a regular basis being only $2 is acceptable for the proposed changes."***

Non-Residential Customers

- ***"During winter times, our continuous production plant is badly affected by the power outrages and we have seen an increase in the number of incidents happened. So with a little increase in costs, we can be better off if that increase in investment in your infrastructure provides us continuous and uninterrupted services during this period."***
- ***"You need to keep everything running smoothly and also consider the cost of inflation. I feel it's reasonable."***

Judgment of Overall Increase in Investment

- **Many Customers (46%) rated the overall increase in investments in the LTP as *"Somewhat Appropriate"*:**

Residential Customers

- ***"Again, do not have the detailed information to determine actual percentage increase but agree increases will be required. Who funds these increases will be important . Developers of City Centre who benefit from buildings and LRT should contribute their fair share and it should not be all tacked onto the residential consumer."***
- ***"I would like to see added transparency regarding the allocation of the increased amount. It might be beneficial to detail them on the bill. It would also be expected to see these increases disappear once the infrastructure has been implemented. If the infrastructure needs to be enhanced to service new users, the revenue from these new users should offset the added maintenance cost."***

Non-Residential Customers

- ***"Still not clear exactly where the money is going, in terms of amounts (understand reasoning behind, but not actual $$ figures), as well as where the accountability will be to ensure it does go to those programs."***
- ***"Although this may be in line with inflation rates and demand, Enersource should consider reinvesting profits instead of over-payment to internal staff starting at the top."***
- ***"Not clear what 35% represents in dollars, and how the cost is being allocated. Are bigger users getting a bigger share of the cost? How much is the LRT absorbing?"***
- ***"It was explained that the 35% would only be applied to a small portion of the bill, not the generator, not the high voltage portion. Not crazy about an increase, but cost of living goes up, $2 on approximately 800kW/hours seems fair."***

Judgment of Overall Increase in Investment

- **Some Customers (23%) rated the overall increase in investments in the LTP as *"Not Very Appropriate"*:**

Residential Customers

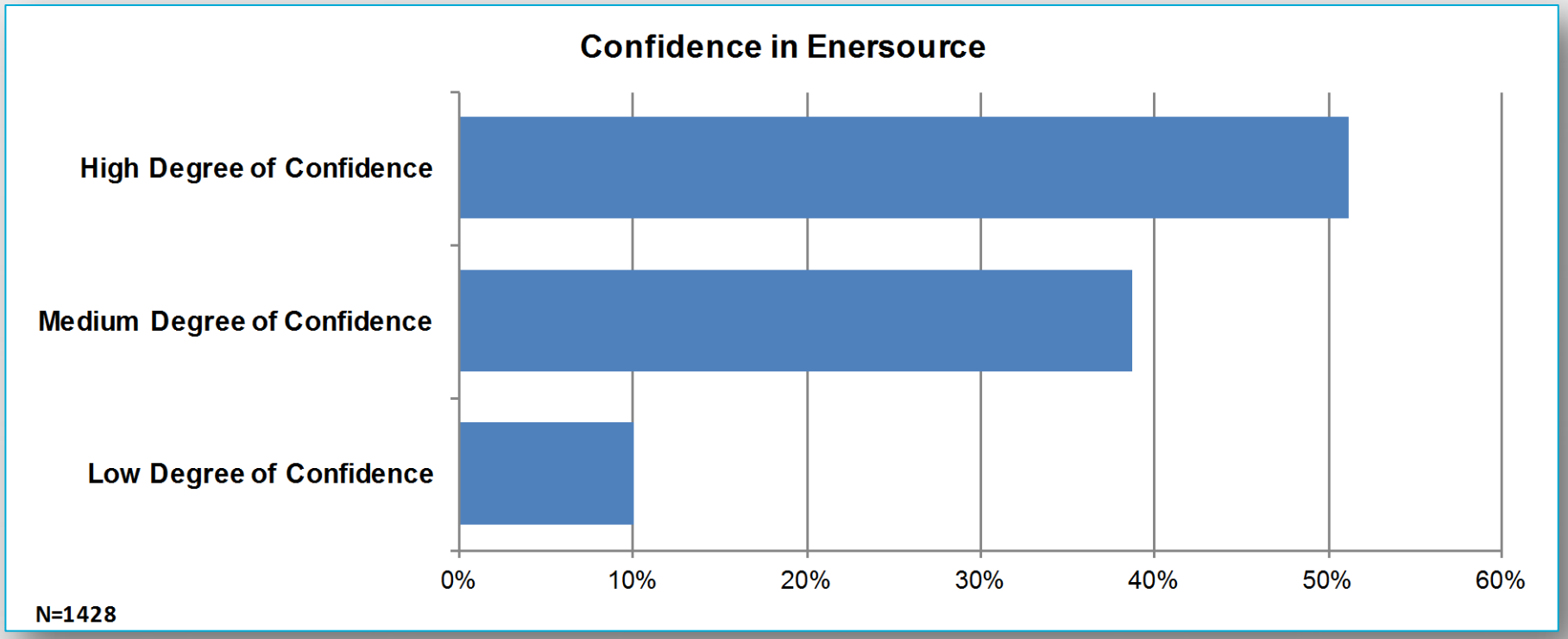
- ***"Energy costs are driving business base from Ontario. I don't agree in any plan to increase costs. Work on optimizing your cost base."***
- ***"7% per year for 5 years is excessive."***
- ***"It will [increase] my bill and the company does not help stay-at-home parents because they are being penalized for doing things during the day. They have to save things for at night which defeats the purpose of being a stay-at-home parent."***

Non-Residential Customers

- ***"You are gouging me! While you are constantly increasing the price, I have to run a business where I am losing most of my work to China, and my prices are in decline, my income is in decline. Now there is only one way out for me. And that is to leave the province. For example, why did you move from your location on Mavis Road, and how much did that cost? Second, you are not an equal opportunity employer? And it just goes on and on. Your salaries, your bonuses etc. etc."***
- ***"The 10% benefit was already lost, and the proposed increase would cause additional costs to all consumers."***
- ***"People are struggling to pay their utility bills and saving by not using too much or shutting down during certain hours. What will we do when the cost rises by 35%?"***

Confidence in Enersource

- **Considering all of the aspects of the LTP, Interviewees were asked to rate their level of confidence that the Enersource team will continue to do a good job of providing safe, reliable, cost effective electricity by implementing the investments associated with the LTP. Nearly all Customers (90%) had a *"High"* or "*Medium"* degree of confidence.**



Confidence in Enersource

- **Many Customers (51%) said they had a *"High Degree"* of confidence in Enersource in implementing the investments:**

Residential Customers

- ***"It seems well thought out. The information presented here increases my confidence. I know more now with the information provided."***
- ***"Enersource is seemingly trying to be transparent. We will see what the actual increase in the cost of electricity will be over the next 5 years, and I hope that in looking back, this doesn't turn out to be an empty effort to communicate with your customers."***
- ***"Our City wouldn't be so beloved and admired by the rest of the country if it wasn't for the professionalism that our utility companies display."***

Non-Residential Customers

- ***"In general your services are excellent and therefore I have high degree of confidence that your team is able to exceed such expectations."***
- ***"I have only been in Mississauga for 1 year, so I do not have historical data to compare to. But things have remained reliable at my facility, and I am pleased with the service. I have no reason to doubt that you guys know what is best for delivering, safe and reliable electricity."***
- ***"Reliability and safety is forefront. Cost effectiveness is shown in the proactive approach as related to replacing aged infrastructure, willingness to spread out the cost to minimize impact; long term planning in place with ongoing review, which is key to being flexible and agile in dealing with developments."***
- ***"Enersource made a similar promise some 5-6 years ago ... and definitely delivered on the proposed reliability plan to replace end of life equipment with minimal interruption. Keep up the great job you do!"***

Confidence in Enersource

- **Some Customers (39%) said they had a *"Medium Degree"* of confidence in Enersource in implementing the investments:**

Residential Customers

- ***"I have a high degree of confidence in existing management but I'm concerned that a larger regional utility may not be as focused on Mississauga's needs."***
- ***"Because just like politicians those giving the speeches are receiving substantial salaries with little to no accountability/responsibility. Regular employees are held accountable for the work they perform and show initiative."***

Non-Residential Customers

- ***"Hope that you will do what you have discussed, but accountability hasn't been discussed."***
- ***"Consumers don't have a choice of service so cost increases are out of their control. Focus should be more on reducing energy consumption and renewable energy."***

Confidence in Enersource

- **A few Customers (10%) said they had a *"Low Degree"* of confidence in Enersource in implementing the investments:**

Residential Customers

- ***"Short on detail, long on cost increase."***
- ***"Look at our electrical costs today!"***
- ***"Enersource employees cannot answer simple questions from house painters without playing phone tag and ignoring inquiries and the company is too reliant on outside technical support to perform technical operations such as design, advice, and installation work."***

Non-Residential Customers

- ***"What you are saying in your question is that you did a good job so far. No you did not, and you are not to say that. I am the customer. For the past 10 years in business I have blackouts on average 2 times a week, at my business. Good Job!"***
- ***"Thinking of the "gas plant" situation and Liberal party involvement in this scheme, my confidence now is low in any proposed plans."***

Positive Comments re: IDST™

- **Some Customers when speaking of their *"High Level"* of confidence in Enersource made positive comments about the IDST™:**

  Residential Customers

  - ***"It seems like your numbers and facts are legitimate. It is evident a lot of work went into this website and planning for the increases."***
  - ***"This website and the people in the videos. All seems very credible. Plan appears to be well thought out."***
  - ***"I think the team looks well prepared and serious about this venture. By merely reaching to public/consumers to get feedback /inputs in itself shows the nature of Enersource's seriousness to get inputs and map accordingly the priorities."***
  - ***"Because you ran this survey and I believe you'll live up to your word and to your clients' expectations! Good luck!"***
  - ***"Well planned out and well explained."***
  - ***"Very clear presentation. Very user friendly system. Plan had clear goals and investments were for a variety of different upgrades and efficiencies. Very professional."***

Positive Comments re: IDST™

- *"Firstly I like this survey as it is getting your customers involved and it will be our money that is going to go from our pocket but since your are preparing us in advance of this increase in cost there is no problem. We also know how Enersource works and they are the best."*
- *"You seem to have taken this process very seriously, based on the efforts taken to solicit input. This survey/information project clearly took a lot of effort by many members of your team."*
- *"Going through this module, I can see how thorough and well thought out the plan is. My experience with Enersource has also been one full of care for its customers. I appreciate plain and honest information like the information presented here."*
- *"I'd just like to say that this interactive site is a fantastic idea. Some might wonder why it's necessary or if it represents a spend where none is needed. I look at it as bringing customers closer to the electricity providers and distributers. Well done."*
- *"You are the only provider we've ever had who bothered to share this type of info, for one. It gives the impression that you are confident in your plan."*

Non-Residential Customers

- *[No substantive comments]*

Negative Comments re: IDST™

- **A few Customers made negative comments about the IDST™ when speaking of their *"Low Level"* of confidence in Enersource:**

Residential Customers

- ***"This whole exercise smacks of a very poorly disguised attempt to solicit public support without meaningful information and dialogue."***
- ***"How do you expect me provide a useful comment when I haven't seen any details?"***
- ***"Because this looks strictly like a marketing type engagement survey with three answer fields, HIGH/MEDIUM/LOW. You don't actually supply any details."***

Non-Residential Customers

- ***"The options listed are not encompassing enough. Not enough information is provided. How can I validate your cost claims without hearing an unbiased opinion or being able to review the data or meta data myself? These questions appear to be very self-fulfilling."***

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For more information about Decision Partners, contact:
Gordon Butte and Sarah Thorne, 1-877-588-9106
gbutte@decisionpartners.com; sthorne@decisionpartners.com

UNDERTAKING NO. JT1.17:

TO UPDATE THE TABLES AND SCHEDULES REQUESTED.

Response:

Tables 4, 8, and 9 from the August 17, 2015 filing have been updated to reflect the following (all dollar amounts in $000's):

i. no true-up amount payable to HONI for Cardiff TS;
ii. true-up payment of $40,479 to HONI for Churchill Meadows TS;
iii. inflation rate of 2.1%; and
iv. updated 2016 in-service capital expenditures as provided in JT 1.2 (note: JT 1.2 also reflects items i and ii listed above).

The 2016 Capital Module attached (Attachment H from August 17, 2015 filing) has also been updated to reflect the above changes.

Table 4: Eligible Incremental Capital

Eligible Incremental Capital	Capital Expenditures ($ 000's)
Distribution System Plan 2016 Capex	74,947
CCRA – Churchill Meadows TS	40,479
Total Proposed 2016 ICM Projects	**115,426**
Less: Materiality Threshold	**47,161**
Maximum Eligible Incremental Capital	**68,265**

Table 8: Incremental Capital Adjustment

Incremental Capital Adjustment	Revenue Requirement ($000's)
Eligible Incremental Capital	68,265
Less: Depreciation Expense	912
Incremental Capital to be included in Rate Base	67,353
Return on Rate Base	4,382
Depreciation Expense	912
Incremental Grossed Up PILs	(42)
Incremental Revenue Requirement	**5,252**

Table 9: Rate Riders

Rate Riders	Service Charge Rate Rider	Distribution Volumetric Rate Rider
Residential	0.96	N/A
General Service Less Than 50 KW	1.75	0.0005
General Service 50-499 KW	3.09	0.1859
General Service 500-4999 kW	70.33	0.0956
Large Use	554.51	0.1187
Unmetered Scattered Load	0.36	0.0007
Street Lighting	0.06	0.4644