2013 Nuclear Staffing Benchmarking Update

An Addendum To The
2011 Nuclear Staffing Benchmarking Analysis

A Report For:

ONTARIO POWER GENERATION

May 10, 2013

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Report Agenda-
Introduction

- Introduction & Executive Summary
- Current Nuclear Staffing Benchmarks
- Comparison of Current & Previous Benchmarks
- Analysis of Change in Benchmarks
- Comparison of Current Benchmarks to OPG
- Appendix A

Goodnight Consulting Was Tasked To Update Key Portions Of The 2011 Benchmarking Report

Our tasking:

- Identify 2013 Pressurized Water Reactor (PWR) benchmarks in a manner similar to the one utilized in the 2011 study
- Compare the 2011 PWR benchmarks to the 2013 benchmarks on a functional basis
- Provide explanations for differences between the 2011 and 2013 PWR benchmarks, where available
- Compare OPG's current staffing plan to the 2013 PWR benchmarks to identify variances

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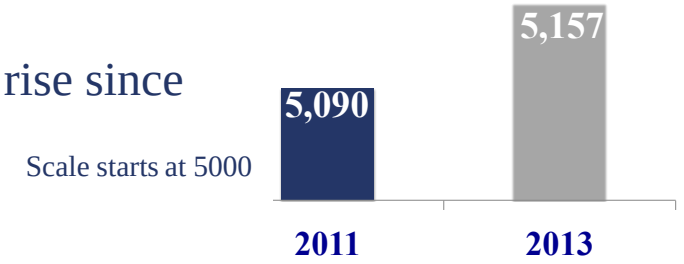
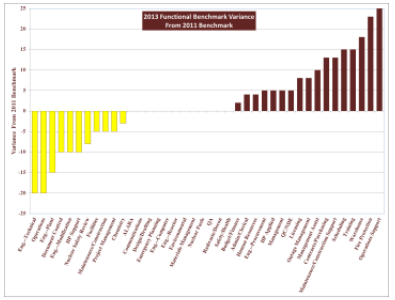
OPG Is Closer To The PWR Benchmarks In 2013 Than It Was In 2011

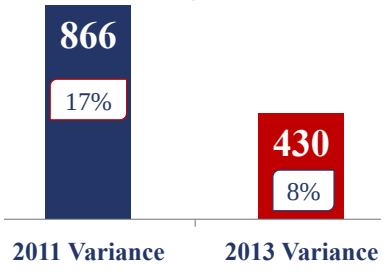
The 2013 PWR benchmark is 5,157, a 1.3% rise since the 2011 benchmark of 5,090



More job functions in the 2013 PWR *benchmarks* increased since 2011 than decreased, supporting an overall rise



In 2011 OPG was 17% (866 FTEs) above the PWR benchmark, in 2013 OPG is 8% (430 FTEs) above the PWR benchmark



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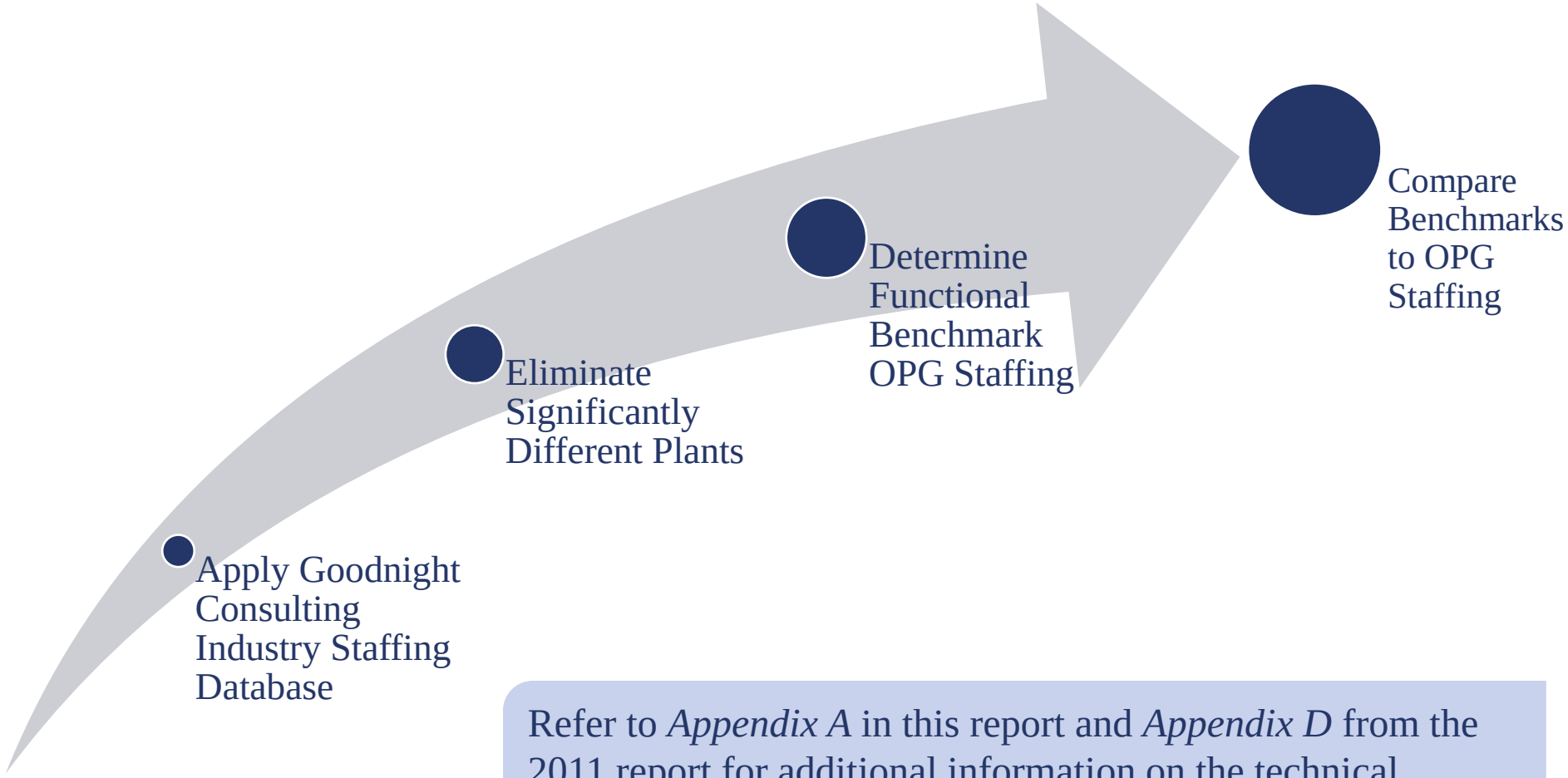
The Benchmarking Methodology Applied For This Report Was The Same As The One Utilized In The 2011 Report



Refer to *Appendix A* in this report and *Appendix D* from the 2011 report for additional information on the technical adjustments applied in identifying the benchmarks

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Benchmarking Summary: Total 2013 OPG Nuclear Benchmark is 5,157

- A PWR benchmark of 987 was derived from Large 2-Unit US PWR staffing
- Adjustments were applied for:
  - Net differences in CANDU vs. PWR technologies
  - OPG work week differences
  - Workload requirements for Units 2 & 3 at Pickering A
- Scaling factors were applied to identify 4-Unit CANDU benchmarks
  - These benchmarks include contractor FTEs and corporate nuclear support

Refer to *Appendix A* for a detailed overview of the application of the benchmarking methodology

Benchmarking Summary: Total 2013 OPG Nuclear Benchmark is 5,157

	2-Unit PWR	PA**	PB**	DN	Total
Large 2-Unit US PWR benchmarks	987 *(965)**				
Adjust for 2-Unit CANDU	83 *(82)**				
Preliminary 2-Unit CANDU benchmark	1,070 *(1,047)**	1,070 *(1,047)**	1,070 *(1,047)**	1,070 *(1,047)**	
Adjust for 35 Hour Work Week		58 *(58)**	58 *(58)**	58 *(58)**	
Adjust for PA Units 2 & 3		17 *(17)**			
Adjust for Scaling from 2 to 4 Units			878 *(879)**	878 *(879)**	
		1,145 *(1,122)**	2,006 *(1,984)**	2,006 *(1,984)**	5,157 *(5,090)**

***2011 Number*

**We did not analyze the impacts of the amalgamation of Pickering A & Pickering B as it was outside the scope of this study-we estimate it would slightly decrease the need for senior management and admin/clerical personnel by ~10 FTEs

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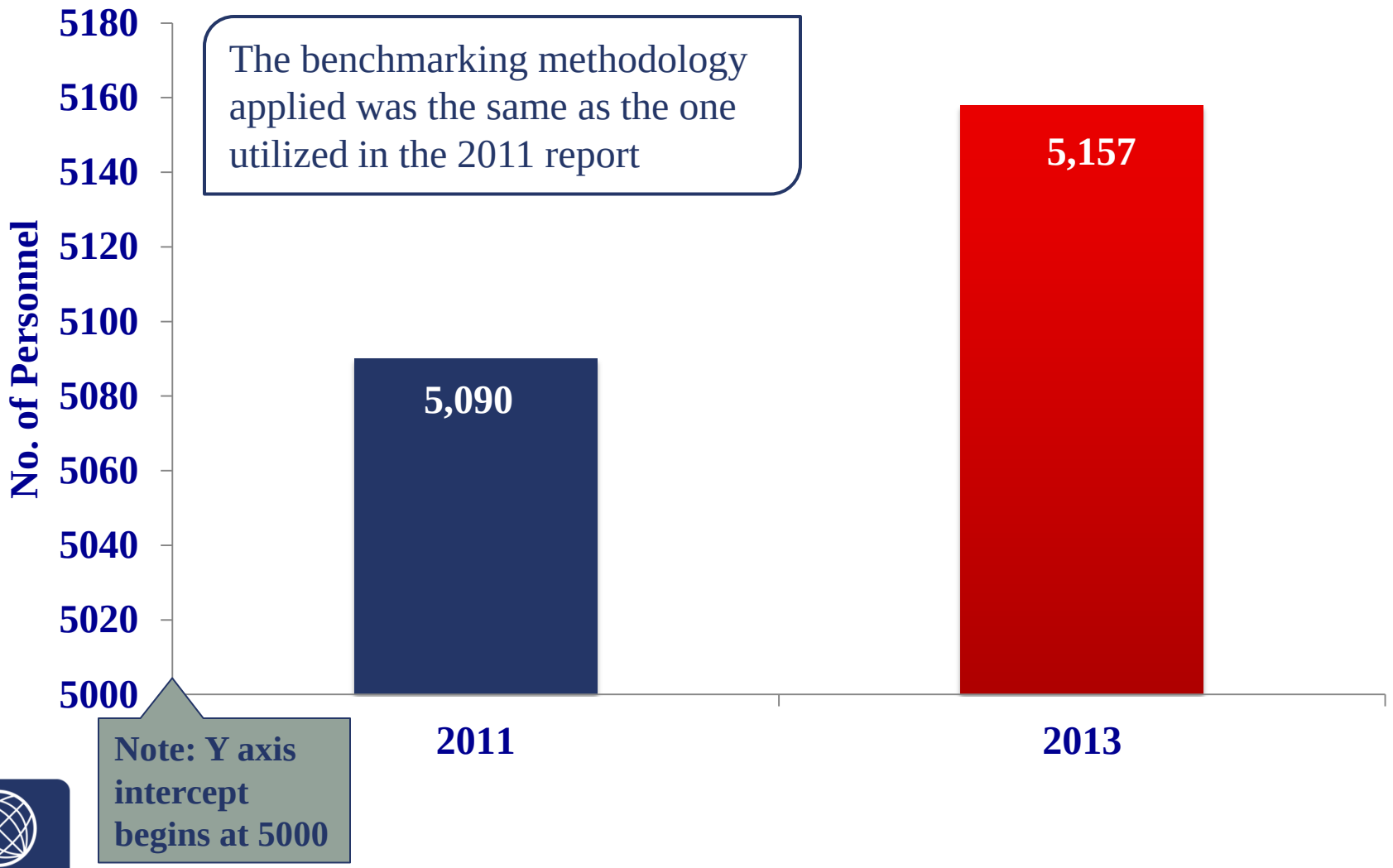
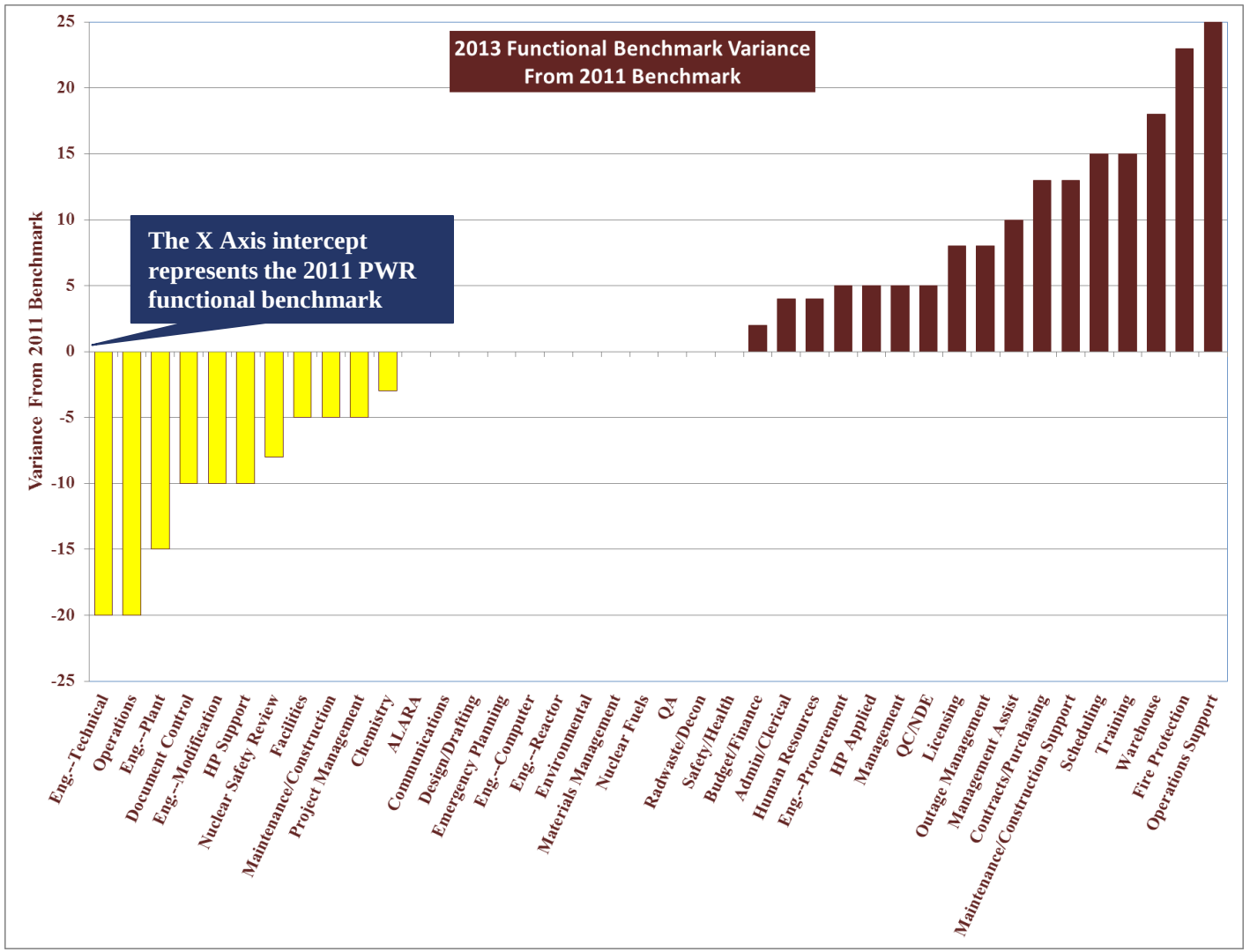
The 2013 OPG *Staffing Benchmark* Has Increased By 67 FTEs (1.3%) Since 2011



Most Job Functions In The 2013 PWR Benchmarks Increased Since 2011, Resulting In An Overall Rise



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The Following Section Provides An Analysis Of The Changes In The PWR Benchmarks Since 2011

This format will be utilized throughout the following section

2011 PWR Staffing Benchmark

2013 PWR Staffing Benchmark

Applicable Staffing Function (in bold)

Goodnight Consulting analysis of change

	2011 PWR B'Mark	2013 PWR B'Mark
Chemistry		
Attrition without full replacement, Chemistry has become less challenging with replacement of steam generators	28	27
Environmental		
No program/functional change	5	5
Operations		
Downside of cyclical staffing associated with ongoing Operations staffing	126	122
Operations Support		
Increase in Operations training candidates to adjust for the down cycle in qualified Operators	30	35
Grand Total	**189**	**189**

Security and Information Management were both excluded, as in the 2011 study

Just as in 2011, US PWR benchmarks provide the baseline for the 2013 OPG benchmarks

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The Total *Operate The Plant* PWR Benchmark Is The Same As It Was In 2011

	2011 PWR B'Mark	2013 PWR B'Mark
Chemistry		
Attrition without full replacement, Chemistry has become less challenging with replacement of steam generators	28	27
Environmental		
No program/functional change	5	5
Operations		
Downside of cyclical staffing associated with ongoing Operations staffing	126	122
Operations Support		
Increase in Operations training candidates to adjust for the down cycle in qualified Operators	30	35
Grand Total	**189**	**189**

The *Work Management* PWR Benchmark Is Higher Than It Was In 2011

	2011 PWR B'Mark	2013 PWR B'Mark
ALARA		
No program/functional change	6	6
HP Applied		
"Hotspots" within the plant increasing due to age and contamination	28	29
HP Support		
Technology improvements in TLDs (Dosimeters)	12	10
Maintenance/Construction		
In spite of overall maintenance requirements increasing, function decreased due to aging workforce	194	193
Maintenance/Construction Support		
More maintenance required due to aging plants	47	50
Outage Management		
Research changes in outage management in trade publications	8	10
Project Management		
Threshold for projects sent to PMs has increased	13	12
Safety/Health		
Industrial safety programs did not change	5	5
Scheduling		
Less efficient due to training requirements for younger staff	17	20
Grand Total	**330**	**335**

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The *Equipment Reliability* PWR Benchmark Is Lower Than It Was In 2011

	2011 PWR B'Mark	2013 PWR B'Mark
Engineering - Computer		
No program/functional change	5	5
Engineering - Plant		
Pipeline of candidates is shrinking and attrition has made finding replacements more difficult	51	48
Engineering - Technical		
Attrition	36	33
QC/NDE		
Increase in inspections due to aging equipment	8	9
Grand Total	**100**	**95**

The *Configuration Management* PWR Benchmark Is Slightly Lower Than It Was In 2011

	2011 PWR B'Mark	2013 PWR B'Mark
Design/Drafting		
Increase in modifications offset by improvements in technology/digitization	7	7
Engineering - Mods		
More selective approvals for design changes	28	26
Engineering - Procurement		
Deemed as a less desirable position by senior staff and has become a "training ground" staffed with less-experienced, and therefore less efficient, personnel	7	8
Engineering - Reactor		
Result of significant digital upgrades across the industry-Plants have switched from analog to digital control systems	8	5
Nuclear Fuels		
Several utilities have taken their fuels procurement process in house	6	9
Grand Total	**56**	**55**

The *Materials & Services* PWR Benchmark Is Higher Than It Was In 2011

	2011 PWR B'Mark	2013 PWR B'Mark
Contracts/Purchasing		
Aging plants and equipment obsolescence require additional contracts	10	12
Materials Management		
No program/functional change	6	6
Warehouse		
More parts and components require more support personnel for coordination	16	20
Grand Total	**32**	**38**

The *Loss Prevention* PWR Benchmark Is Higher Than It Was In 2011

	2011 PWR B'Mark	2013 PWR B'Mark
Emergency Planning		
No program/functional change	7	7
Fire Protection		
Operators no longer qualified to provide fire brigade support requiring more fire brigade	23	28
Licensing		
Increase in requirements post-Fukushima	9	10
Nuclear Safety Review		
No available information	11	10
QA		
No program/functional change	14	14
Radwaste/Decon		
Pay per volume to ship waste out provides an incentive to keep volume low	12	12
Grand Total	**76**	**81**

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The *Support Services & Training* PWR Benchmark Is Higher Than It Was In 2011

	2011 PWR B'Mark	2013 PWR B'Mark
Admin/Clerical		
Ratio function; a few more nuclear utilities admin personnel organized	37	39
Budget/Finance		
Reporting requirements have become more stringent (ie Sarbanes Oxley)	11	13
Communications		
No program/functional change	3	3
Document Control		
Reduction in labor cost; leveraging newer technologies	16	15
Facilities		
Reduction in labor cost; installation of facilities with lower maintenance	25	24
Human Resources		
Utilities are facing a more challenging regulatory environment in addition to more workforce planning and attrition issues	4	7
Management		
Ratio Function; Aging workforce and attrition-driven organizational changes (ie more "Deputy" 1 over 1 leadership positions)	37	40
Management Assist		
More senior technical personnel that plants want to retain	3	4
Training		
Aging plants and obsolete equipment replacements requires more training	46	49
Grand Total	**182**	**194**

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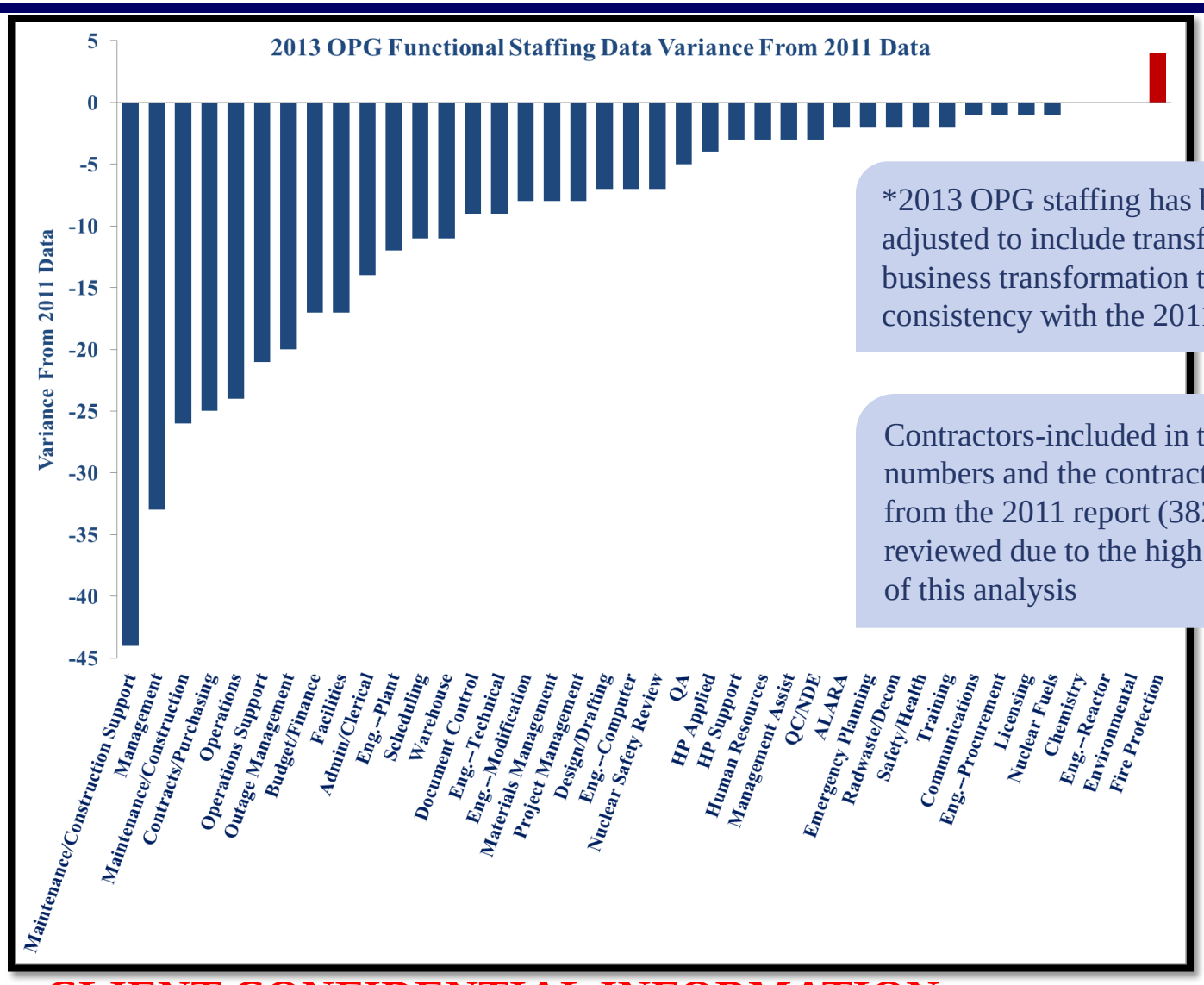
Since 2011, OPG Staffing Has Decreased Or Remained The Same In All But One Job Function*



*2013 OPG staffing has been adjusted to include transfers due to business transformation to ensure consistency with the 2011 study

Contractors-included in these numbers and the contractor count from the 2011 report (382) were not reviewed due to the high-level scope of this analysis

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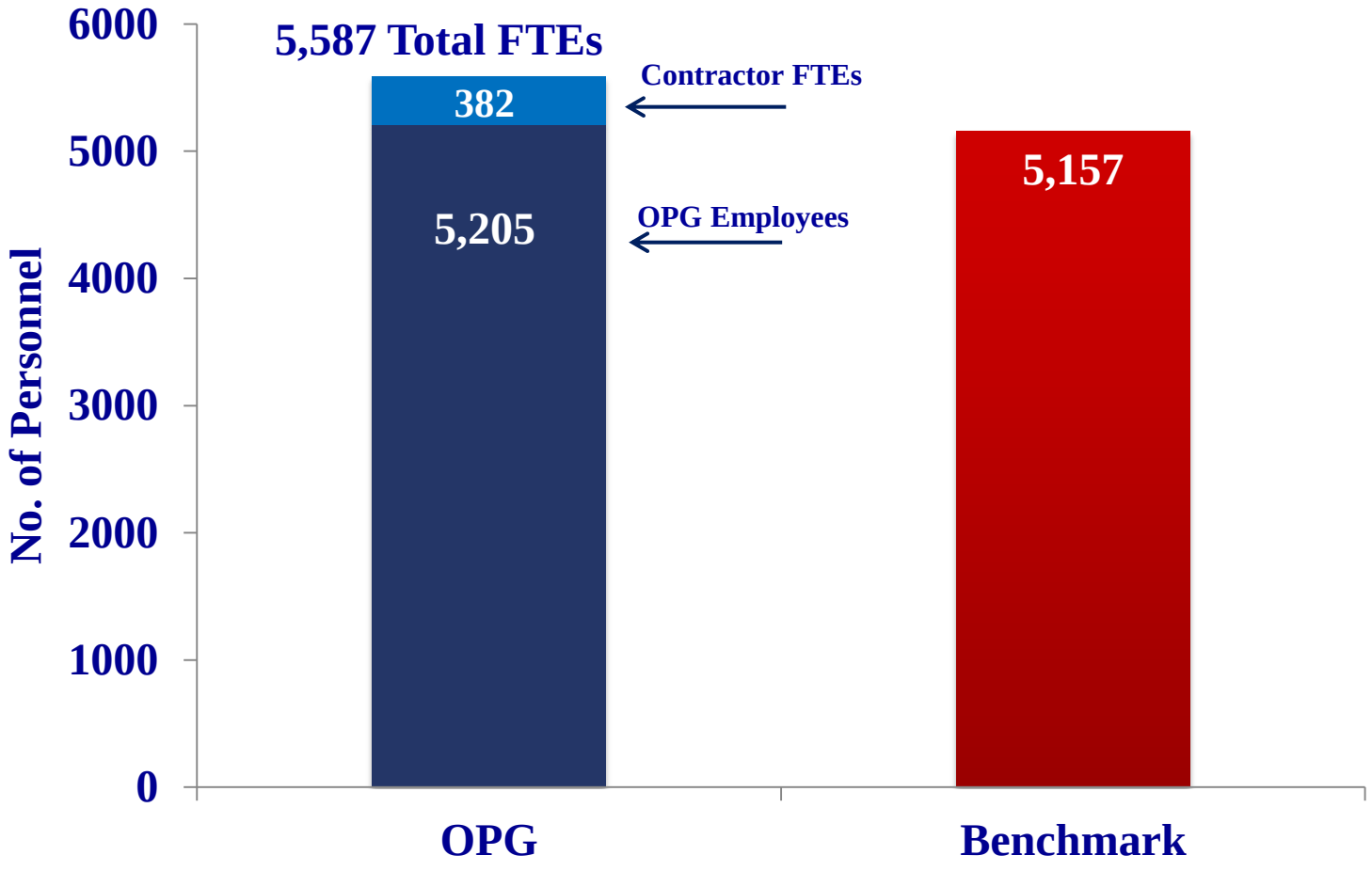
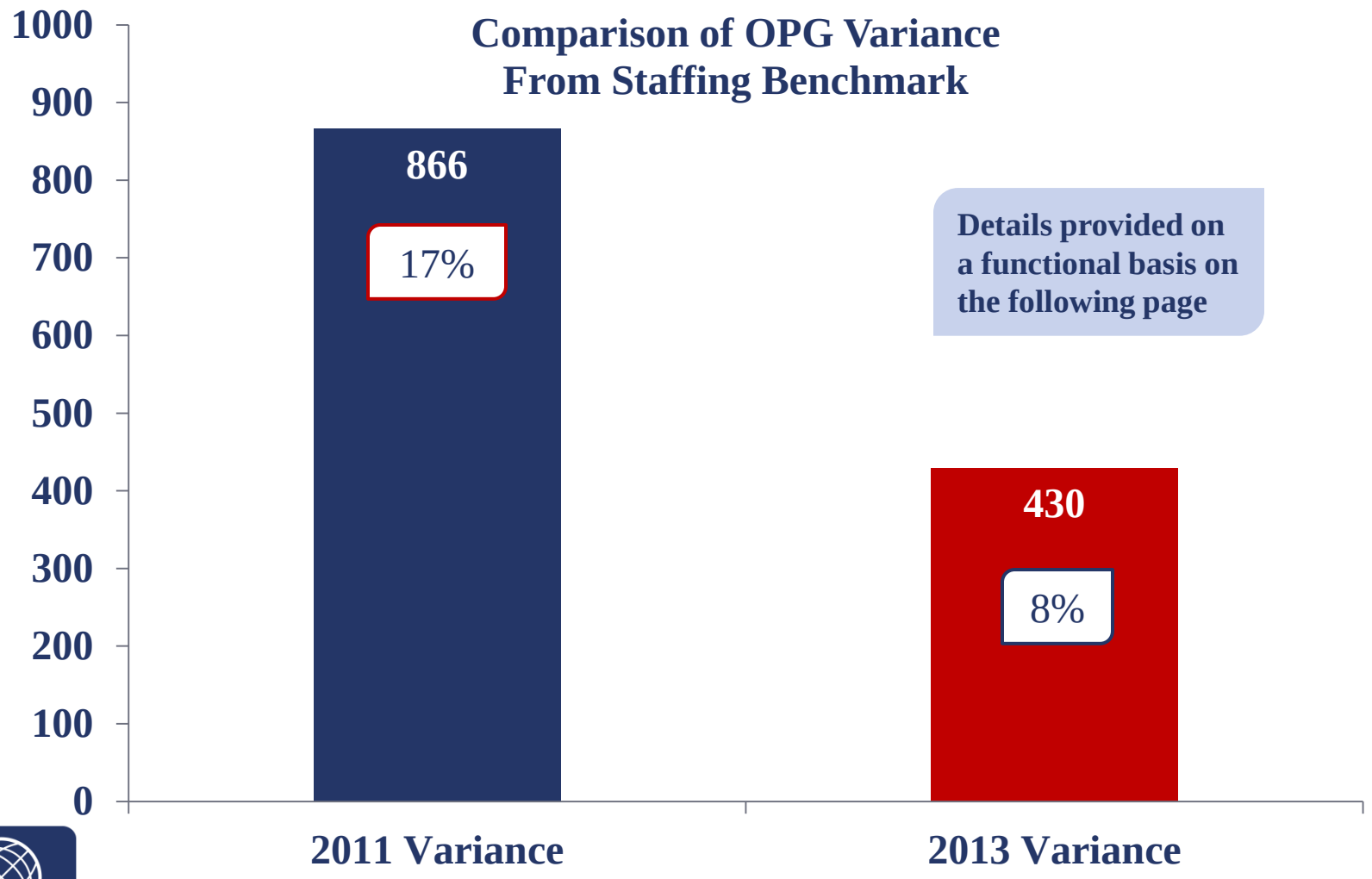
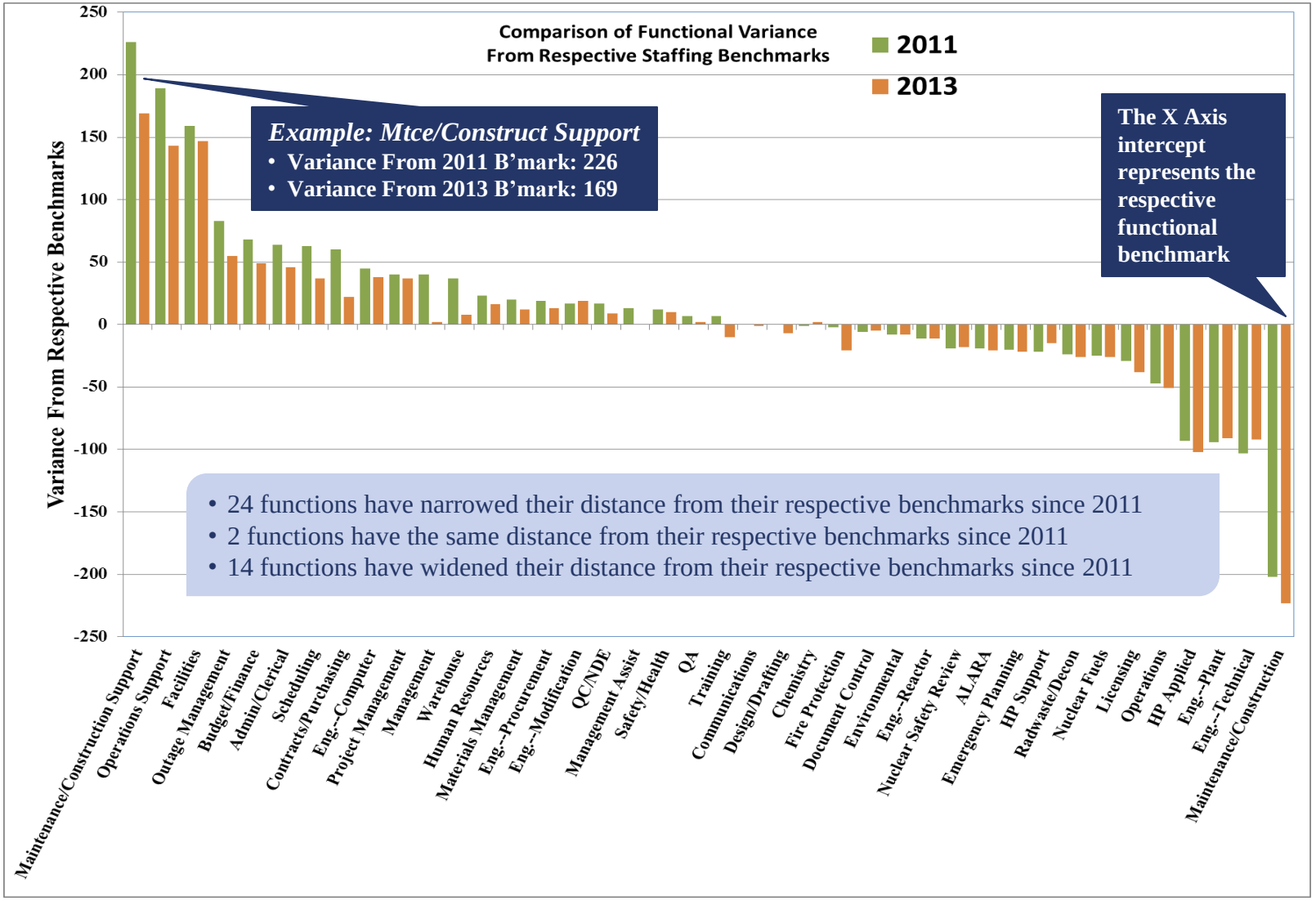
The Variance Between OPG 2013 Staffing & 2013 Benchmark Is 430 FTEs (8%)



The Gap Between OPG & The Benchmark Is 436 FTEs Smaller In 2013 Than It Was In 2011



OPG's Variance From The Applicable Benchmark Has Narrowed In 24 Functions Since 2011



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2013 2-Unit CANDU *Staffing Benchmark* Is 1,070 Personnel (Includes Corporate & Contractors)

Staffing Function	2013 2-Unit U.S. PWR Bmk	Raw Adjustments 2013	Benchmark Ratio %	Ratio Adjustments	Total Adjustments	Total Bmk (2013)
Admin/Clerical	39	Ratio	3.95%	3	3	42
ALARA	6	2			2	8
Budget/Finance	13	Ratio	1.32%	1	1	14
Chemistry	27	0			0	27
Communications	3	0			0	3
Contracts/Purchasing	12	0			0	12
Design/Drafting	7	1			1	8
Document Control	15	2			2	17
Emergency Planning	7	0			0	7
Engineering - Computer	5	0			0	5
Engineering - Mods	26	3			3	29
Engineering - Plant	48	8			8	56
Engineering - Procurement	8	2			2	10
Engineering - Reactor	5	5			5	10
Engineering - Technical	33	5			5	38
Environmental	5	2			2	7
Facilities	24	0			0	24
Fire Protection	28	0			0	28
HP Applied	29	3			3	32
HP Support	10	1			1	11
Human Resources	7	Ratio	0.71%	1	1	8
Licensing	10	1			1	11
Maintenance/Construction	193	22			22	215
Maintenance/Construction Support	50	4			4	54
Management	40	Ratio	4.05%	3	3	43
Management Assist	4	0			0	4
Materials Management	6	0			0	6
Nuclear Fuels	9	-1			-1	8
Nuclear Safety Review	10	0			0	10
Operations	122	0			0	122
Operations Support	35	0			0	35
Outage Management	10	3			3	13
Project Management	12	1			1	13
QA	14	0			0	14
QC/NDE	9	1			1	10
Radwaste/Decon	12	3			3	15
Safety/Health	5	Ratio	0.51%	0	0	5
Scheduling	20	2			2	22
Training	49	3			3	52
Warehouse	20	2			2	22
Total	**987**	**75**		**8**	**83**	**1070**

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Similar Technical Adjustments From 2011 Were Used To Identify The 2013 *Staffing Benchmark*

Staffing Function	Rationale
Admin/Clerical	Ratio of these functional staff is related to the total final staffing level
ALARA	"Hotter shop" tritium, alpha radiation pervasive, more opportunities for ALARA-more equipment, bigger source of radiation and more space.
Budget/Finance	Ratio of these functional staff is related to the total final staffing level
Chemistry	No basis for adjustment
Communications	No basis for adjustment
Contracts/Purchasing	No basis for adjustment
Design/Drafting	Higher number of systems
Document Control	Higher number of systems, more control documents to manage
Emergency Planning	No basis for adjustment
Engineering - Computer	No basis for adjustment
Engineering - Mods	Higher number of systems
Engineering - Plant	Higher number of systems
Engineering - Procurement	Higher number of commercial parts dedications due to a smaller vendor market, lower availability of conforming parts
Engineering - Reactor	Adjusted to 2-unit equivalent of OPG CANDU stated requirements
Engineering - Technical	Higher number of systems, diversity instead of redundancy design philosophy
Environmental	Tritium monitoring, Canadian regulatory requirements
Facilities	No basis for adjustment
Fire Protection	No basis for adjustment
HP Applied	Additional radiation sources, differences in staffing are due to choices in program structures
HP Support	Additional radiation sources, differences in staffing are due to choices in program structures
Human Resources	Ratio of these functional staff is related to the total final staffing level
Licensing	Different regulatory scheme, greater number of safety systems, design philosophy of diversity over redundancy
Maintenance/Construction	Higher number of systems, diversity instead of redundancy design philosophy-track IMS impacts on numbers
Maintenance/Construction Support	Higher number of systems, diversity instead of redundancy design philosophy
Management	Ratio of these functional staff is related to the total final staffing level
Management Assist	No basis for adjustment
Materials Management	No basis for adjustment
Nuclear Fuels	Adjusted to 2-unit equivalent of OPG CANDU stated requirements
Nuclear Safety Review	No basis for adjustment
Operations	Additional systems to monitor= increases, common systems = decreases
Operations Support	Additional systems to monitor= increases, common systems = decreases
Outage Management	Non fueling outages=decreases, more systems to deal with during an outage=increase
Project Management	Higher number of systems, diversity instead of redundancy design philosophy
QA	No basis for adjustment
QC/NDE	Due to additional maintenance work, additional QC/NDE work is required, "Innate" IMS counted here,
Radwaste/Decon	"Hotter shop" tritium, alpha radiation pervasive, more opportunities for deconning-more equipment, bigger source of radiation and more space. Larger volumes of I&LLW generated and packaged.
Safety/Health	Ratio of these functional staff is related to the total final staffing level
Scheduling	Greater number of systems resulting in more scheduling work
Training	Additional trainers required to handle additional maintenance training requirements
Warehouse	Additional parts and components needed for more systems and to overcome more materials kept on hand due to a smaller vendor base

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2013 2-Unit *OPG* CANDU *Staffing Benchmark* Is 1,128 (vs. 1,105); 4-Unit *OPG* CANDU *Staffing Benchmark* Is 2,006 (vs. 1984)

2-unit to 4-unit Scaling Factors, by Functional Area								
Staffing Function	2-Unit CANDU Benchmark	35 hour week	Adjustment for 35 hour week	Scaling Factor From 2 to 4-Units	Initial 4-Unit CANDU Benchmark	Benchmark Ratio %	Ratio Staffing	4-Unit CANDU Benchmark
Admin/Clerical	42	1	48	Ratio		3.76%	69	69
ALARA	8		8	1.8	14			14
Budget/Finance	14	1	16	Ratio		1.12%	20	20
Chemistry	27		27	1.8	49			49
Communications	3		3	1.8	5			5
Contracts/Purchasing	12	1	14	1.8	25			25
Design/Drafting	8	1	9	1.8	16			16
Document Control	17	1	19	1.9	36			36
Emergency Planning	7	1	8	1.5	12			12
Engineering - Computer	5	1	6	2	12			12
Engineering - Mods	29	1	33	1.8	59			59
Engineering - Plant	56	1	64	1.8	115			115
Engineering - Procurement	10	1	11	1.8	20			20
Engineering - Reactor	10	1	11	2	22			22
Engineering - Technical	38	1	43	1.8	77			77
Environmental	7	1	8	1.8	14			14
Facilities	24		24	1.8	43			43
Fire Protection	28		28	1.8	50			50
HP Applied	32		32	1.8	58			58
HP Support	11	1	13	1.8	23			23
Human Resources	8	1	9	Ratio		0.41%	7	7
Licensing	11	1	13	1.8	23			23
Maintenance/Construction	215		215	1.8	387			387
Maintenance/Construction Support	54		54	1.8	97			97
Management	43	1	49	Ratio		3.76%	69	69
Management Assist	4	1	5	1.8	9			9
Materials Management	6	1	7	1.8	13			13
Nuclear Fuels	8	1	9	1.8	16			16
Nuclear Safety Review	10	1	11	1.8	20			20
Operations	122		122	2	244			244
Operations Support	35		35	2	70			70
Outage Management	13		13	1.8	23			23
Project Management	13	1	15	1.8	27			27
QA	14	1	16	1.8	29			29
QC/NDE	10		10	1.8	18			18
Radwaste/Decon	15		15	1.8	27			27
Safety/Health	5	1	6	Ratio		0.51%	9	9
Scheduling	22		22	1.8	40			40
Training	52		52	1.8	94			94
Warehouse	22	1	25	1.8	45			45
Total	**1070**		**1128**		**1832**		**174**	**2006**

- Where applicable, adjustments were made for OPG's 35 Hour Work work week vs. 40 hour weeks at U.S. plants(same approach as 2011); the net increase in 2-Unit benchmarks is 62 FTEs (5.8%)
- CANDU 2-Unit was then scaled up to a 4-Unit model

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Adjustments For Pickering Units 2 & 3 Increase The 2-Unit CANDU Benchmark From 1,070 To 1,145

Adjustments to 2-Unit OPG CANDU for Pickering A						
Staffing Function	2-Unit CANDU Benchmark	35 hour week	Adjustment for 35 hour week	Adjustments for Units 2 & 3	Pickering A Benchmark	Rationale
Admin/Clerical	42	1	48		48	
ALARA	8		8		8	
Budget/Finance	14	1	16		16	
Chemistry	27		27		27	
Communications	3		3		3	
Contracts/Purchasing	12	1	14		14	
Design/Drafting	8	1	9		9	
Document Control	17	1	19		19	
Emergency Planning	7	1	8		8	
Engineering - Computer	5	1	6		6	
Engineering - Mods	29	1	33		33	
Engineering - Plant	56	1	64	4	68	One additional System Engineer per discipine (M, E, I&C, Civil)
Engineering - Procurement	10	1	11		11	
Engineering - Reactor	10	1	11		11	
Engineering - Technical	38	1	43		43	
Environmental	7	1	8		8	
Facilities	24		24		24	
Fire Protection	28		28		28	
HP Applied	32		32	1	33	One additional Rad Pro technican to conduct surveillances
HP Support	11	1	13		13	
Human Resources	8	1	9		9	
Licensing	11	1	13		13	
Maintenance/Construction	215		215	5	220	Estimated Additional staff (FIN-like)
Maintenance/Construction Suppor	54		54	1	55	Ratio of support to additional Maintenance/Construction
Management	43	1	49	1	50	1 Additional Management person to oversee units 2 & 3 Activities
Management Assist	4	1	5		5	
Materials Management	6	1	7		7	
Nuclear Fuels	8	1	9		9	
Nuclear Safety Review	10	1	11		11	
Operations	122		122	5	127	1 Additional Ops person per shift crew for rounds
Operations Support	35		35		35	
Outage Management	13		13		13	
Project Management	13	1	15		15	
QA	14	1	16		16	
QC/NDE	10		10		10	
Radwaste/Decon	15		15		15	
Safety/Health	5	1	6		6	
Scheduling	22		22		22	
Training	52		52		52	
Warehouse	22	1	25		25	
Total	**1070**		**1128**	**17**	**1145**	

- Refer to the 2011 report for a detailed explanation of adjustments applied for Pickering Units 2 & 3

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